

Short List to Leading Option Appraisal Report

Hayling Island Coastal Management Strategy

Havant Borough Council

Project number: 60593354

September 2022

Quality information

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Revision History

Revision	Revision date	Details	Authorized	Name	Position
01	13/01/2022	Draft for Comment	BM	Bernadine Maguire	Associate
02	14/09/2022	Updated draft	BM	Bernadine Maguire	Associate

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1. Introduction

1.1 Background

AECOM has been commissioned by Coastal Partners on behalf of Havant Borough Council (HBC) to develop a Flood and Coastal Erosion Risk Management (FCERM) Strategy for the coastal frontage of Hayling Island (herein referred to as 'the Strategy'). As part of the Strategy an option appraisal has been undertaken to identify the leading options for implementing the Strategy.

This document is the Short List to Leading Option Appraisal report for the Strategy, which outlines the process used to select the leading options from the short list of options for managing coastal flood and erosion risk along the Strategy frontage over the next 100 years. The short list of options were determined in the Long List to Short List report¹, through an appraisal of the long list measures. Following this, strategic options were developed for each Option Development Unit (ODU) which outline the general approach to managing risks.

This report has developed a potential 'package' of measures to implement each strategic option at a local level, for each ODU. Each package of measures comprises of defence structures and management methods, including maintenance and the required phasing of works over the next 100 years to deliver the strategic option. Each of these strategic options has been assessed following the decision-making process outlined in the FCERM Appraisal Guidance (FCERM-AG, 2020). This involves an economic appraisal to determine the FCERM leading option, followed by consideration of wider objectives in a multi-criteria analysis to determine the overall leading option.

1.2 Option Development and Appraisal

This Strategy's development is publicly funded and the schemes recommended by the Strategy will be seeking funding from FCERM Grant in Aid along with partnership funding from other sources. Therefore, the option development has followed the Environment Agency's FCERM appraisal guidelines (FCERM-AG, 2020). Each step undertaken in the option development process is summarised in a separate section of this report:

- Section 2: Strategic Options** – For each ODU, strategic options were identified to outline the overarching approach to managing flood and coastal erosion risks in the unit. Section 2 defines each of the strategic options.
- Section 3: Developing Strategic Options at a Local Level** – To facilitate the delivery of the strategic options, local level 'packages of measures' were established for each ODU comprising different types of coastal defence structures and the required timing of works. This section details the packages of measures identified to deliver each strategic option, by ODU.
- Section 4: Option Appraisal** – This section details the economic, social, technical and environmental appraisal process which was used to select the overall leading options from the shortlisted options.
- Section 5: Leading Options** – This section outlines the overall leading options for each ODU, with further detail to explain their selection. The FCERM leading options are also presented for each ODU, with some consideration given to adaptation as a long term sustainable solution. Each ODU includes a route map, which visually presents the measures for each option over the full Strategy appraisal period.

¹ AECOM (2021) Long List to Short List Option Appraisal Report – Hayling Island FCERM Strategy

2. Strategic Options

Overarching strategic options to manage coastal flood and erosion risk were developed for each ODU. Typically between five and eight strategic options were identified for each ODU, allowing a broad comparison between options to be made and the justification for a leading strategic option to be taken forward.

2.1 Strategic option definitions

Descriptions of the strategic options available in each ODU are provided below. Note that not all of these strategic options were included in each ODU, and in some ODUs combinations of the strategic options were developed:

- **Do Nothing** – allow defences to fail and natural processes to continue;
- **Do Minimum** – reactive maintenance / patch repairs to ensure health and safety compliance;
- **Maintain** – continue to protect against erosion and maintain the current defence crest height but accept that the standard of protection (SoP) against flood risk will fall over time due to sea level rise. Maintenance would involve reactive maintenance and capital refurbishment where necessary. In beachfront locations, maintenance may also involve beach management, for instance through the replacement of groynes, beach nourishment and beach recycling;
- **Sustain** – sustain a consistent SoP against flooding by raising defences / adding additional defence lengths over time to keep pace with sea level rise. This is an adaptive approach and would be delivered in a phased manner, going back on numerous occasions over the next century to raise defences incrementally. Sustain would also help reduce erosion risk if frontline defences are used. As an example, this approach may involve raising and lengthening defences now to the 2042 SoP, going back in 2042 and doing further raising/lengthening to the 2072 SoP, and then finally going back in 2072 for a final round of raising/lengthening to the 2122 SoP;
- **Maintain then Sustain** – initially maintain the existing defences in the present day, then in the future deliver the sustain option to raise the SoP of defences to keep pace with sea level rise. Similar to the sustain option, this would be delivered in a phased manner with the main difference being a delay to the first round of defence raising. The benefit of this approach is that the first round of defence raising / lengthening would be delayed and targeted to when the risk of coastal flooding increases substantially. As an example, this approach may involve maintaining existing defences now until 2042, undertaking lengthening / raising of the defences in 2042 to the 2072 SoP, and then going back again in 2072 to do a final round of raising / lengthening to the 2122 SoP;
- **Improve** – improve the coastal defences to deliver a high SoP against flooding until the end of the appraisal period. This is a precautionary approach and would involve constructing the defences to the full height and length required to the end of the appraisal period, in 2122. For example, this may involve constructing a new defence now (present day) with the required height and length to provide a 2122 SoP;
- **Maintain then Improve** – maintain existing defences for the present day, then implement new defences in the future to provide a high SoP against flooding until the end of the appraisal period, in 2122. For example, this may involve maintaining existing defences now (present day), but then in 2042 constructing new defences with the required height and length to provide a 2122 SoP;
- **Managed Realignment** – including setback defences and habitat creation, for example through realigning coastal defences further inland or by undertaking regulated tidal exchange. This option can be paired with other options, such as sustain and improve;
- **Advance the line** – advance the shoreline seawards to provide an increased SoP against flooding and reduced erosion risk. Option could include flood barriers and land reclamation;
- **Resilience** – improving community resilience through initiatives such as Coastal Change Management Areas (CCMAs), Property Flood Resilience (PFR) and policy changes. PFR has only been considered to

protect properties up to a 5% Annual Exceedance Probability (AEP) event, as it is not effective at providing protection from flooding at higher return period events; and,

- **Adaptation** – relocation of properties at significant risk of flooding and coastal erosion. This option has been included in the strategic options because in some areas it may be unsustainable in the long term to implement new or maintain existing coastal defences; due to technical limitations (i.e. cannot physically raise defences any higher to keep pace with sea level rise), environmental, social or economic constraints. In these situations it may therefore be necessary to undertake adaptation. Further detail on adaptation is provided in Section 6.

Refer to the Long List to Short List Option Appraisal report for further detail on how the strategic options were developed for each ODU (AECOM, 2021).

Note that options for 'Do Minimum' and 'Maintain' have been included in the appraisal even where existing defences are privately owned. For the purpose of the appraisal it was assumed that private landowners will maintain defences in the future, although it is noted that there is no mechanism to enforce private landowner maintenance, and funding for this may not be achievable.

Options for 'Sustain' and 'Maintain then Sustain' were only included where it was possible to raise the existing defences. For these options, and for the 'Improve' and 'Maintain then Improve' options, two different SoP were considered in the economic aspect of the appraisal; 1.33% and 0.5% AEP.. These standards of protection were used as they represent the thresholds in the FCERM-AG decision making process when using the incremental benefit cost ratio to decide on the SoP of a scheme.

3. Developing Strategic Options at a Local Level

For each of the short listed strategic options it was necessary to establish an appropriate 'package of measures'. This was done for each ODU to enable an appropriate scale of local level detail to be developed, such as option costs and environmental impacts, to inform the remainder of the appraisal process.

Each 'package of measures' outlined the types of coastal defence structures and the required timing of works required to deliver the strategic option. The coastal defence type was selected through a short listing exercise, indicative costs and engineering judgement.

Some of the defence combinations include a phasing of the defence works to reflect the variations in land use, any existing defences and variations in assets / infrastructure at risk of flooding and erosion during the next 100 years.

This section provides a summary of the 'package of measures' for each strategic option, by ODU. Unless stated otherwise, each strategic option includes two different options for SoP: 1.33% and 0.5% AEP.

3.1 ODU 1: Hayling Bridge to Northney Farm

ODU 1 spans from Hayling Bridge to Northney Farm and is split into two sections to exclude Northney Marina (ODU 2) (see Figure 5-1). The two sections are the west side – in front of Northney Road from Langstone Road to Langstone Quays Resort – and the east side – from the southern end of Langstone Quays Resort to the end of the ODU at Spinnaker Grange. Table 3-1 presents the key characteristics of ODU 1, and Table 3-2 presents the strategic options to be considered within the option appraisal.

Table 3-1: ODU 1 Key Characteristics

SMP PU and Policy	5aHI01: Hold the Line		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Hampshire County Council / Havant Borough Council / Environment Agency		
Coastal Processes	Estuarine / sheltered		
Main Land Uses / Key Assets	Roadway, agricultural land and Northney coastal landfill		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI.		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	0	1
Flood Risk 1.33% AEP (cumulative in brackets)	16 (16)	30 (46)	92 (138)

Table 3-2: ODU 1 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain	Frontline floodwall on the west side, setback embankment on the east side. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve	Frontline floodwall on the west side, setback embankment on the east side. Built to 2122 SoP	Maintain new defences	Maintain new defences
Improve with Road Raising	Frontline floodwall on the west side, setback embankment on the east side + Raising of Northney Road. Built to 2122 SoP	Maintain new defences	Maintain new defences
Improve with Road Raising and Coastal Remediation	Frontline floodwall on the west side, setback embankment on the east side + Raising of Northney Road + Historic landfill remediation. Built to 2122 SoP	Maintain new defences	Maintain new defences
Managed Realignment (Sustain)	Setback embankment + Habitat creation. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Managed Realignment Hybrid (Sustain)	Frontline embankment on the west side, setback embankment on the east side, verge strengthening in front of historic landfill + Intertidal habitat creation. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Managed Realignment (Improve)	Setback embankment + Intertidal habitat creation. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.2 ODU 2: Northney Marina

ODU 2 encompasses Northney Marina, in between the two sections of ODU 1 (see Figure 5-3). Table 3-3 presents the key characteristics of ODU 2, and Table 3-4 presents the strategic options to be considered within the option appraisal.

Table 3-3: ODU 2 Key Characteristics

SMP PU and Policy	5aHI01: Hold the Line		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private		
Coastal Processes	Estuarine / sheltered		
Main Land Uses / Key Assets	Marina (potential regeneration opportunities)		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI.		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	2	3
Flood Risk 1.33% AEP (cumulative in brackets)	2 (2)	4 (6)	11 (17)

Table 3-4: ODU 2 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain	Frontline floodwall along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve	Frontline floodwall along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event + maintenance of the existing defences	PFR for properties at risk from a 5% AEP flood event + maintenance of the existing defences	PFR for properties at risk from a 5% AEP flood event + maintenance of the existing defences

3.3 ODU 3: Northney Farm to Chichester Road

ODU 3 spans from Northney Farm to Chichester Road (See Figure 5-5). Table 3-5 presents the key characteristics of ODU 3, and Table 3-6 presents the strategic options to be considered within the option appraisal.

Table 3-5: ODU 3 Key Characteristics

SMP PU and Policy	5aH102: Hold the Line* (no public funding available for private defences) *Further detailed studies to consider managed realignment at Northney Farm in the long term		
Residual Life of Defences Without Maintenance	Typically <10 years		
Current Maintainer	Private		
Coastal Processes	Estuarine / sheltered		
Main Land Uses / Key Assets	Agricultural Land		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI.		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	1	10
Flood Risk 1.33% AEP (cumulative in brackets)	11 (11)	27 (38)	80 (118)

Table 3-6: ODU 3 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain	Frontline rock revetment along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve	Frontline rock revetment along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Improve from 2072 - frontline	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Frontline rock revetment along the full length of the unit. Built to 2122 SoP
Maintain then Improve from 2072 - setback	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Setback earth embankment along the full length of the unit. Built to 2122 SoP
Maintain then Managed Realignment (Improve) from 2072	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Setback earth embankment + Intertidal habitat creation along the full length of the unit. Built to 2122 SoP

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Managed Realignment (Sustain)	Setback earth embankment + Intertidal habitat creation along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP+ Maintain new defences
Managed Realignment (Improve)	Setback earth embankment + Intertidal habitat creation along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.4 ODU 4: Chichester Road to Mill Rythe Junior School

ODU 4 spans from Chichester Road to Mill Rythe Junior School (see Figure 5-7). Table 3-7 presents the key characteristics of ODU 4, and Table 3-8 presents the strategic options to be considered within the option appraisal.

Table 3-7: ODU 4 Key Characteristics

SMP PU and Policy	5aH103: Hold the Line (no public funding available for private defences)		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private / Environment Agency		
Coastal Processes	Estuarine / sheltered		
Main Land Uses / Key Assets	Agricultural land, residential properties, caravan park, marina and three historic landfill sites		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI and Gutner Point LNR		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	1	5	9
Flood Risk 1.33% AEP (cumulative in brackets)	15 (15)	51 (66)	121 (187)

Table 3-8: ODU 4 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain (assets only)	Floodwall around assets. Built to 2042 SoP. Includes maintenance of existing defences in front of the historic landfill sites	Raise height of the defences to 2072 SoP + Maintain new and existing defences	Raise height of the defences to 2122 SoP+ Maintain new and existing defences
Improve (assets only)	Floodwall around assets. Built to 2122 SoP. Includes maintenance of existing defences in front of the historic landfill sites	Maintain new and existing defences	Maintain new and existing defences
Improve (full frontage)	Frontline floodwall along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.5 ODU 5: Mill Rythe Junior School to Salterns Lane

ODU 5 spans from Mill Rythe Junior School to Salterns Lane (see Figure 5-9). Table 3-9 presents the key characteristics of ODU 5, and Table 3-10 presents the strategic options to be considered within the option appraisal.

Table 3-9: ODU 5 Key Characteristics

SMP PU and Policy	5aH103: Hold the Line (no public funding available for private defences)		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private / Environment Agency		
Coastal Processes	Estuarine / sheltered		
Main Land Uses / Key Assets	Agricultural land, holiday village and Mengham Land historic landfill site		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI and Tournbury Scheduled Monument		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	2	15
Flood Risk 1.33% AEP (cumulative in brackets)	14 (14)	85 (99)	211 (310)

Table 3-10: ODU 5 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain	Frontline rock revetment along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve	Frontline rock revetment along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Improve from 2072 - Frontline	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Frontline rock revetment along the full length of the unit. Built to 2122 SoP
Maintain then Improve from 2072 - Setback	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Setback earth embankment along the full length of the unit. Built to 2122 SoP
Managed Realignment (Sustain)	Setback earth embankment + Intertidal habitat creation along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Managed Realignment (Improve)	Setback earth embankment + Intertidal habitat creation along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Managed Realignment (Improve) from 2072	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Setback earth embankment + Intertidal habitat creation along the full length of the unit. Built to 2122 SoP
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.6 ODU 6: Salterns Lane to Wilsons Boat Yard

ODU 6 spans from Salterns Lane to Wilsons Boat Yard (see Figure 5-11). Table 3-11 presents the key characteristics of ODU 6, and Table 3-12 presents the strategic options to be considered within the option appraisal.

Table 3-11: ODU 6 Key Characteristics

SMP PU and Policy	5aHI04: Hold the Line		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private		
Coastal Processes	Estuarine / sheltered		
Main Land Uses / Key Assets	Residential properties		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	0	12
Flood Risk 1.33% AEP (cumulative in brackets)	11 (11)	26 (37)	86 (123)

Table 3-12: ODU 6 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain	Frontline floodwall along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve	Frontline floodwall along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Improve from 2072	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Frontline floodwall along the full length of the unit. Built to 2122 SoP
Advance the Line 0.5% AEP	Creek flood barrier built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Advance the Line 0.5% AEP from 2072	Scheduled maintenance on existing assets	Scheduled maintenance on existing assets	Creek flood barrier built to 2122 SoP
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.7 ODU 7: Wilsons Boat Yard to Fishery Creek

ODU 7 spans from Wilsons Boat Yard to Fishery Creek (see Figure 5-13). Table 3-13 presents the key characteristics of ODU 7, and Table 3-14 presents the strategic options to be considered within the option appraisal.

Table 3-13: ODU 7 Key Characteristics

SMP PU and Policy	5aHI04: Hold the Line		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private / Havant Borough Council		
Coastal Processes	Estuarine / sheltered		
Main Land Uses / Key Assets	Residential properties, boat yard, sailing club, holiday park and two historic landfill sites		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	6	11
Flood Risk 1.33% AEP (cumulative in brackets)	46 (46)	145 (191)	294 (485)

Table 3-14: ODU 7 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain (frontline)	Frontline rock revetment along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve (frontline)	Frontline rock revetment along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Sustain (setback)	Setback earth embankment along the full length of the unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve (setback)	Setback earth embankment along the full length of the unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.8 ODU 8: Eastoke

ODU 8 encompasses the southeast corner of the Island, Eastoke (see Figure 5-15). At Eastoke, there are different areas which have different characteristics and different risks. There is a risk of tidal flooding from the harbour to the north of Eastoke and at the open coast the risks are predominantly from wave overtopping and coastal erosion. As such, the strategic options include a range of measures across the ODU. For the beachfront, there are a variety of suitable flood defence types therefore multiple measures have been identified which deliver the same strategic option (crest raising, rock revetment and concrete revetment). Table 3-15 presents the key characteristics of ODU 8 and Table 3-16 presents the strategic options to be considered within the option appraisal.

Table 3-15: ODU 8 Key Characteristics

SMP PU and Policy	5aHI04 and 5aHI05: Hold the Line		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private / Hampshire County Council / Havant Borough Council		
Coastal Processes	Varies – sections of estuarine but also open coast / wave dominated		
Main Land Uses / Key Assets	Residential properties, holiday parks, RNLI station & sailing club (potential regeneration opportunities)		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Chichester Harbour AONB and SSSI and Sandy Point LNR		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	34	513	562
Flood Risk 1.33% AEP (cumulative in brackets)	613 (613)	823 (1436)	1412 (2848)

Table 3-16: ODU 8 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).	Capital Refurbishment and patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).	Capital Refurbishment and patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).
Sustain (crest raising +)	Crest raising / floodwall / setback floodwall / rock groynes + beach management. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Sustain (rock +)	Rock revetment / floodwall / setback floodwall + beach management. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Sustain (concrete +)	Concrete revetment / floodwall / setback floodwall / rock groynes + beach management. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve (crest raising +)	Crest raising / floodwall / setback floodwall / rock groynes + beach management . Built to 2122 SoP	Maintain new defences	Maintain new defences
Improve (rock +)	Rock revetment / floodwall / setback floodwall / rock groynes + beach management . Built to 2122 SoP	Maintain new defences	Maintain new defences
Improve (Concrete +)	Concrete revetment / floodwall / setback floodwall / rock groynes + beach management . Built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Sustain from 2042 (crest raising +)	Scheduled maintenance on existing assets	Crest raising / floodwall / setback floodwall / rock groynes + beach management. Built to 2072 SoP	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Sustain from 2042 (rock +)	Scheduled maintenance on existing assets	Rock revetment / floodwall / setback floodwall / rock groynes + beach management. Built to 2072 SoP	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Sustain from 2042 (Concrete +)	Scheduled maintenance on existing assets	Concrete revetment / floodwall / setback floodwall / rock groynes + beach management. Built to 2072 SoP	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Improve from 2042 (crest raising +)	Scheduled maintenance on existing assets	Crest raising / floodwall / setback floodwall / rock groynes + beach management. Built to 2072 SoP	Maintain new defences
Maintain then Improve from 2042 (rock +)	Scheduled maintenance on existing assets	Rock revetment / floodwall / setback floodwall / rock groynes + beach management. Built to 2072 SoP	Maintain new defences
Maintain then Improve from 2042 (Concrete +)	Scheduled maintenance on existing assets	Concrete revetment / floodwall / setback floodwall / rock groynes + beach management. Built to 2072 SoP	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.9 ODU 9: Eastoke Corner to Inn on the Beach

ODU 9 encompasses the open coast from Eastoke Corner to Inn on the Beach (see Figure 5-17). At ODU 9, the open coast is currently maintained by beach nourishment and beach recycling which regularly takes place at **yearly** intervals. The 'Do Something' strategic options refer to Inn on the Beach, as it plays a key role in the beach management here as a hard beach control point / terminal structure. It promotes sediment accumulation and helps to keep the beach in place on the east side. At this current time it is therefore an important control feature for longshore sediment transport and retaining the beach profile.

In the short term, maintaining the existing defences at the Inn on the Beach or replacing them with other beach control structures will help preserve the existing sediment transport processes in this location. Removing the Inn on the Beach would remove the hard control point from this location and may encourage more sediment movement along the frontage. In the medium and long term, there is greater uncertainty in the beach changes in this location. Sea level rise is likely lead to an evolution in the sediment transport processes and the beach profile is likely to change accordingly.

Table 3-17 presents the key characteristics of ODU 9 and Table 3-18 presents the strategic options to be considered within the option appraisal.

Table 3-17: ODU 9 Key Characteristics

SMP PU and Policy	5AHI05: Hold the Line		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private / Havant Borough Council		
Coastal Processes	Open coast / wave dominated		
Main Land Uses / Key Assets	Beachfront, car parks, roads, recreation areas, high concentration of residential / commercial properties (potential regeneration opportunities)		
Designated Sites	Solent Maritime SAC, Solent and Dorset Coast SPA and Sinah Common SSSI.		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	10	137
Flood Risk 1.33% AEP (cumulative in brackets)	65 (65)	80 (145)	106 (251)

Table 3-18: ODU 9 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).	Capital Refurbishment and patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).	Capital Refurbishment and patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Sustain – Maintain Inn on the Beach	Setback floodwall around assets / Maintenance of defences in front of Inn on the Beach + beach management. Defences built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Sustain – Replace Inn on the Beach	Setback floodwall around assets / Replacement of Inn on the Beach with rock groyne + beach management. Defences built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Sustain – Remove Inn on the Beach	Setback floodwall around assets / Removal of Inn on the Beach / extend size of groyne field to full frontage + beach management. Defences built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2072 SoP+ Maintain new defences
Improve – Remove Inn on the Beach	Setback floodwall around assets / Removal of Inn on the Beach / extend size of groyne field to full frontage + beach management. Defences built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Sustain from 2042	Patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).	Frontline rock revetment along full length of unit, built to 2072 SoP	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Improve from 2042	Patch repair on existing assets. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling).	Frontline rock revetment along full length of unit, built to 2072 SoP	Maintain new defences
Improve beach protection (Timber groynes)	Replacement of timber groynes. Beach nourishment and beach recycling.	Beach nourishment and beach recycling.	Beach nourishment and beach recycling.
Improve beach protection (Rock groynes)	Replace timber groynes with rock groynes (same length of groyne field). Beach nourishment and beach recycling.	Beach nourishment and beach recycling.	Beach nourishment and beach recycling.
Improve beach protection (Rock groynes +)	Replace timber groynes with rock groynes and extend size of groyne field to full length of frontage. Beach nourishment and beach recycling.	Beach nourishment and beach recycling.	Beach nourishment and beach recycling.

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.10 ODU 10: Inn on the Beach to North Shore Road

ODU 10 encompasses the southwest corner of the Island, from Inn on the Beach to North Shore Road (see Figure 5-19). Within ODU 10, defences have been considered separately for the north side (in front of the Kench and Ferry Road) and the south side (open coast). Table 3-19 presents the key characteristics of ODU 10 and Table 3-20 presents the strategic options to be considered within the option appraisal.

Table 3-19: ODU 10 Key Characteristics

SMP PU and Policy	5AH105 and 5AH106: Hold the Line (localised natural evolution at Gunner Point)		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private / Hampshire County Council		
Coastal Processes	Varies – sections of estuarine but also open coast / wave dominated		
Main Land Uses / Key Assets	Golf courses, boat yard, slipways, roadway, agricultural land, holiday park and residential properties		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Solent and Dorset Coast SPA, Sinah Common SSSI, Langstone Harbour SSSI, the Kench Hayling Island LNR and World War II Heavy Anti-aircraft gunsite Scheduled Monument		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	2	30	41
Flood Risk 1.33% AEP (cumulative in brackets)	24 (24)	56 (80)	111 (191)

Table 3-20: ODU 10 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain (north only)	Frontline floodwall (north side only) + Raising of Ferry Road. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve (north only)	Frontline floodwall (north side only) + Raising of Ferry Road. Built to 2122 SoP	Maintain new defences	Maintain new defences
Improve (north and south)	Frontline floodwall (north side and south side) + Raising of Ferry Road. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event Develop an adaptation plan	Implement the adaptation plan

3.11 ODU 11: North Shore Road

ODU 11 encompasses a small stretch of the coastline at North Shore Road (See Figure 5-21). Within ODU 11, defences have been considered separately for the west side (in front of Sinah Lane) and the east side (in front of North Shore Road). There is a risk of flooding and coastal erosion from the present day on the west side, however the risk on the east side is from 2042. Table 3-21 presents the key characteristics of ODU 11 and Table 3-22 presents the strategic options to be considered within the option appraisal.

Table 3-21: ODU 11 Key Characteristics

SMP PU and Policy	5AHI06: Hold the Line		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Private		
Coastal Processes	Estuarine / Sheltered		
Main Land Uses / Key Assets	Residential properties		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC and Chichester and Langstone Harbours SPA, Langstone Harbour SSSI and Hayling Billy LNR		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	1	10
Flood Risk 1.33% AEP (cumulative in brackets)	2 (2)	51 (53)	76 (129)

Table 3-22: ODU 11 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain	Frontline floodwall (west side only). Built to 2042 SoP	Floodwall (east side) built to 2072 SoP + Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve (West side only)	Frontline floodwall (west side only). Built to 2122 SoP	Maintain new defences	Maintain new defences
Improve	Frontline floodwall (east and west side). Built to 2122 SoP	Maintain new defences	Maintain new defences
Maintain then Sustain from 2042	Scheduled maintenance on existing assets	Frontline floodwall (east and west side). Built to 2072 SoP	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Improve from 2042	Scheduled maintenance on existing assets	Frontline floodwall (east and west side). Built to 2122 SoP	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.12 ODU 12: North Shore Road to Newtown

ODU 12 spans from North Shore Road to Newtown (see Figure 5-23). In ODU 12, there are no properties at risk of flooding or coastal erosion however part of the Billy Trail is located in this unit. As such, there are no existing defences and the current SMP policy is No Active Intervention. Table 3-23 presents the key characteristics of ODU 12 and Table 3-24 presents the strategic options to be considered within the option appraisal.

Table 3-23: ODU 12 Key Characteristics

SMP PU and Policy	5AHI07: No Active Intervention (with localised Hold the Line for Newtown)		
Residual Life of Defences Without Maintenance	Undefended		
Current Maintainer	Private / Hampshire County Council		
Coastal Processes	Estuarine / Sheltered		
Main Land Uses / Key Assets	Agricultural Land and Billy Trail footpath		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester, Langstone Harbours SPA, Langstone Harbour SSSI and Hayling Billy LNR		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	0	0
Flood Risk 1.33% AEP (cumulative in brackets)	0 (0)	0 (0)	0 (0)

Table 3-24: ODU 12 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow natural processes to continue	Allow natural processes to continue	Allow natural processes to continue
Erosion Protection (concrete)	Concrete revetment	Maintain new defences	Maintain new defences
Erosion Protection (Gabions)	Gabions	Maintain new defences	Maintain new defences
Erosion Protection (rock)	Rock revetment	Maintain new defences	Maintain new defences

3.13 ODU 13: Newtown

ODU 13 encompasses the coastline at Newtown (see Figure 5-25). Table 3-25 presents the key characteristics of ODU 13 and Table 3-26 presents the strategic options to be considered within the option appraisal.

Table 3-25: ODU 13 Key Characteristics

SMP PU and Policy	5AHI07: No Active Intervention (with localised Hold the Line for Newtown)		
Residual Life of Defences Without Maintenance	Typically 10 – 20 years		
Current Maintainer	Private		
Coastal Processes	Estuarine / Sheltered		
Main Land Uses / Key Assets	Agricultural Land and residential properties		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester, Langstone Harbours SPA, Langstone Harbour SSSI and Hayling Billy LNR.		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	0	4
Flood Risk 1.33% AEP (cumulative in brackets)	0 (0)	45 (45)	75 (120)

Table 3-26: ODU 13 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Maintain then Sustain from 2042	Scheduled maintenance on existing assets	Frontline floodwall along full length of unit. Built to 2072 SoP.	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Improve from 2042	Scheduled maintenance on existing assets	Frontline floodwall along full length of unit. Built to 2122 SoP.	Maintain new defences
Maintain then Managed Realignment (Sustain) from 2042	Scheduled maintenance on existing assets	Setback earth embankment + Managed Realignment / Regulated tidal exchange along full length of unit. Built to 2072 SoP.	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Managed Realignment (Improve) from 2042	Scheduled maintenance on existing assets	Setback earth embankment + Managed Realignment / Regulated tidal exchange along full length of unit. Built to 2072 SoP.	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.14 ODU 14: Newtown to Stoke

ODU 14 spans from Newtown to Stoke (see Figure 5-27). Table 3-27 presents the key characteristics of ODU 14 and Table 3-28 presents the strategic options to be considered within the option appraisal.

Table 3-27: ODU 14 Key Characteristics

SMP PU and Policy	5AH107: No Active Intervention		
Residual Life of Defences Without Maintenance	Typically <10 years		
Current Maintainer	Private / Hampshire County Council		
Coastal Processes	Estuarine / Sheltered		
Main Land Uses / Key Assets	Agricultural land, Billy Trail footpath, roadway and residential properties		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Langstone Harbour SSSI and Hayling Billy LNR		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	0	0
Flood Risk 1.33% AEP (cumulative in brackets)	0 (0)	3 (3)	4 (7)

Table 3-28: ODU 14 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Erosion Protection	Frontline rock revetment along full length of unit	Maintain new defences	Maintain new defences
Maintain then Sustain from 2042	Scheduled maintenance on existing assets	Frontline rock revetment along full length of unit. Built to 2072 SoP	Raise height of the defences to 2122 SoP + Maintain new defences
Maintain then Improve from 2042	Scheduled maintenance on existing assets	Frontline rock revetment along full length of unit. Built to 2122 SoP	Maintain new defences
Managed Realignment (Sustain)	Relocation of the Billy Trail further inland, with a new rock revetment along the full length of the unit to provide protection to the Billy Trail + Intertidal habitat creation in front of the new rock revetment. Built to 2042 SoP	Raise height of the setback defences to 2072 SoP	Raise height of the setback defences to 2072 SoP
Resilience	Patch repair on exiting assets	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.15 ODU 15: Stoke to Langstone Bridge Carpark

ODU 15 spans from Stoke to Langstone Bridge Carpark (see Figure 5-29). Table 3-29 presents the key characteristics of ODU 15 and Table 3-30 presents the strategic options to be considered within the option appraisal.

Table 3-29: ODU 15 Key Characteristics

SMP PU and Policy	5AH108: Hold the Line* (* further detailed studies to consider Managed Realignment at West Northney or Regulated Tidal Exchange at Stoke)		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Hampshire County Council / Havant Borough Council		
Coastal Processes	Estuarine / Sheltered		
Main Land Uses / Key Assets	Agricultural land, Billy Trail footpath, roadway, residential properties and one historic landfill site		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA, Langstone Harbour SSSI, West Hayling LNR and Hayling Billy LNR		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	1	10
Flood Risk 1.33% AEP (cumulative in brackets)	26 (26)	98 (124)	268 (392)

Table 3-30: ODU 15 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain (frontline)	Frontline floodwall along full length of unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve (frontline)	Frontline floodwall along full length of unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Managed Realignment (Sustain)	Setback earth embankment along full length of unit. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Managed Realignment (Improve)	Setback earth embankment along full length of unit. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

3.16 ODU 16: Langstone Bridge Carpark to Langstone Bridge

ODU 16 spans from Langstone Bridge Carpark to Langstone Bridge (see Figure 5-31). Table 3-31 presents the key characteristics of ODU 16 and Table 3-32Table 3-30 presents the strategic options to be considered within the option appraisal.

Table 3-31: ODU 16 Key Characteristics

SMP PU and Policy	5AH108: Hold the Line* (* further detailed studies to consider Managed Realignment at West Northney or Regulated Tidal Exchange at Stoke)		
Residual Life of Defences Without Maintenance	Varies, typically 10-20 years, locally <10 years		
Current Maintainer	Hampshire County Council		
Coastal Processes	Estuarine / Sheltered		
Main Land Uses / Key Assets	Bridge roadway (A3023) and car park		
Designated Sites	Chichester and Langstone Harbours Ramsar, Solent Maritime SAC, Chichester and Langstone Harbours SPA and Langstone Harbour SSSI		
Risk to Residential and Non-Residential Properties	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Erosion Risk (cumulative)	0	0	0
Flood Risk 1.33% AEP (cumulative in brackets)	0 (0)	1 (1)	2 (3)

Table 3-32: ODU 16 Strategic Options Considered

Strategic Option	Epoch		
	2022 - 2042	2042 - 2072	2072 - 2122
Do Nothing	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue	Allow defences to fail and natural processes to continue
Do Minimum	Patch repair on existing assets	Patch repair on existing assets	Patch repair on existing assets
Maintain	Capital Refurbishment and patch repair on existing assets	Capital Refurbishment and patch repair on existing assets.	Capital Refurbishment and patch repair on existing assets
Sustain	Frontline floodwall up to A3023. Built to 2042 SoP	Raise height of the defences to 2072 SoP + Maintain new defences	Raise height of the defences to 2122 SoP + Maintain new defences
Improve	Frontline floodwall up to A3023. Built to 2122 SoP	Maintain new defences	Maintain new defences
Resilience	Patch repair on exiting assets	PFR for properties at risk from a 5% AEP flood event	PFR for properties at risk from a 5% AEP flood event

4. Option Appraisal

4.1 Overview

The next stage of the process was to appraise the short list of strategic options for each ODU to select an overall leading option. This was an iterative process, taking into consideration the technical feasibility and effectiveness, economic appraisal (see economic appraisal report for more details, AECOM 2021) and results from an environmental and social assessment. This option appraisal process was based on the decision making process outlined in FCERM-AG and is summarised in the flow chart in Figure 4-1.

The FCERM-AG recommends that the following steps are followed to select a leading option:

- 1. Establish the whole life costs and benefits of the options:** Remove any options with an average benefit cost ratio (ABCR) <1 from the remainder of the appraisal. Take forward the options with an ABCR >1.
- 2. Organise the options and select the leading economic option:** Organise the options with an ABCR >1 into a list based on reducing probability of flooding or by average benefit cost ratio. Compare the incremental benefit cost ratios between the options to select the option which provides best value for money. This option is classified as the leading economic option and is provisionally selected as the overall leading option. This process for each of the ODUs is outlined in detail in the Economic Appraisal Report (AECOM, 2021).
- 3. Account for contributions:** Consider whether the provisional choice of the overall leading option should change when contributions (financial or otherwise) are taken into account. For example, does a financial contribution that is only available for a certain alternative option mean that the choice of provisional leading option should change? Given that the Strategy is early on in the development of schemes, contributions do not need to be confirmed at this stage and may be aspirational.
- 4. Test for uncertainty:** Using results from a sensitivity analysis, consider whether the choice of the provisional leading option needs to change to account for the uncertainties. If the provisional leading option stays the same in the sensitivity tests, do not change the option choice. However, if the sensitivity tests are showing that the choice of the provisional leading option changes under the test, consider whether the results provide a robust a justifiable case for moving to a different option.
- 5. Consider wider objectives:** Consider whether the provisional leading option should be retained as the leading option once wider objectives and other factors are taken into account. Wider objectives and other factors may include environmental objectives, social objectives or technical constraints. Based on the results of this assessment, the overall leading option is selected by either confirming the provisional choice or selecting an alternative option that better meets the wider objectives and other factors.

In the case of the Strategy, the FCERM-AG approach has been applied with the following provisions:

- During step 2 (organise the options and select the leading economic option) the options have been organised according to their benefit cost ratio, rather than by reducing probability of flooding. The ordering was done in this way because the options are strategic in nature, providing protection to similar levels of risk and reduce or remove coastal erosion risk. The FCERM-AG explains that it is best to order by ABCR for options such as this.
- The leading economic option identified in step 2 has also been termed the '**FCERM leading option**' in the Strategy. Based on steps 3-5 in the process, the FCERM leading option is not always selected as the **overall leading option**. However, to ensure transparency, in the following sections of the report the FCERM leading option is clearly identified.

The flowchart shown in Figure 4-1 illustrates the decision making process used in the Strategy to select the leading options.

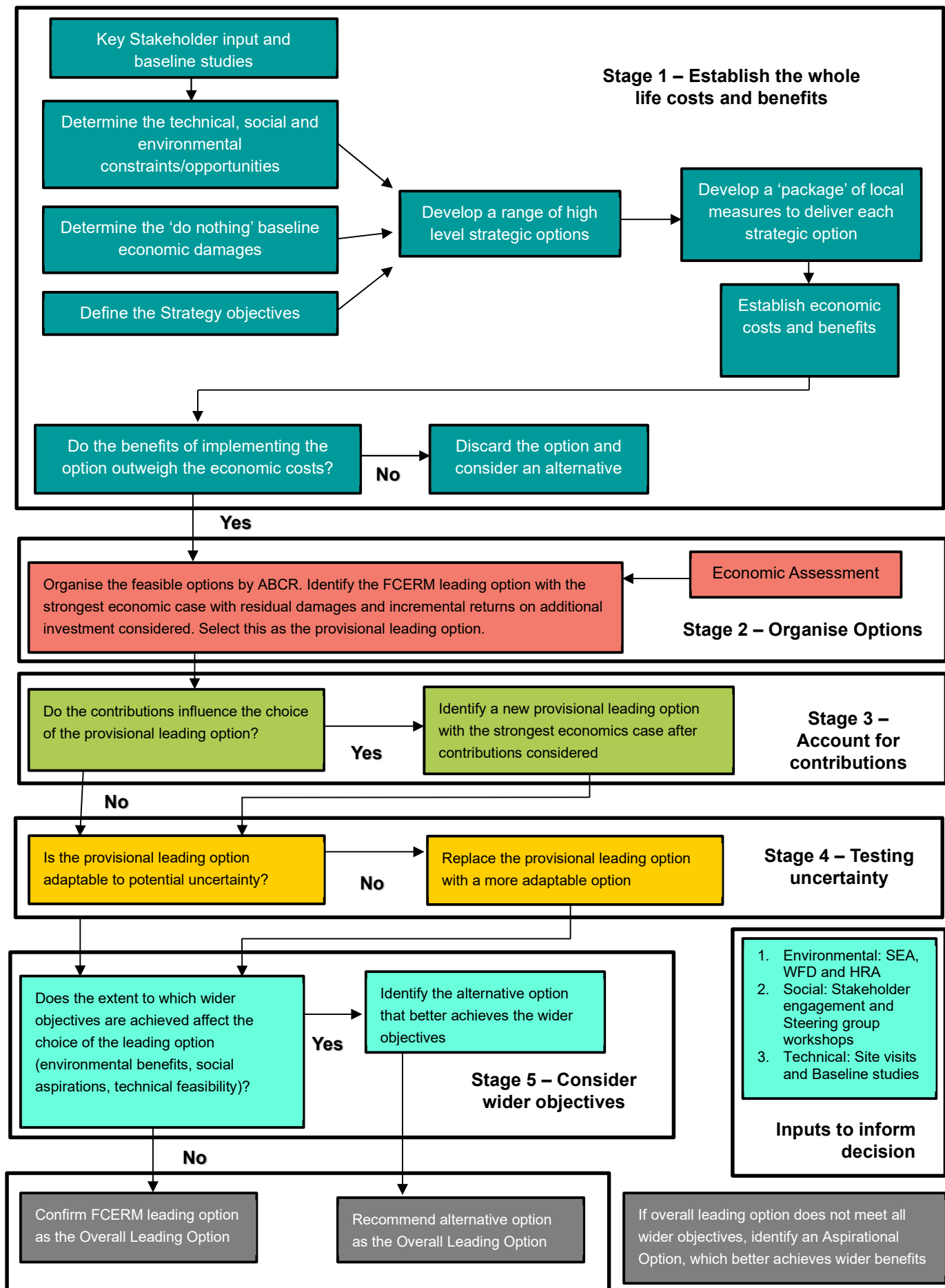


Figure 4-1: Flowchart outlining the key stages and decisions behind the selection of the overall leading options

4.2 Multi-Criteria Analysis

To support the selection of the overall leading option a multi-criteria analysis was undertaken to determine the option that best supports wider objectives (stage 5 of the appraisal process). The multi-criteria analysis was informed by the following assessments:

- **Technical Assessments** – the practical and engineering feasibility of options, informed by site walkovers to identify the potential of each option in different parts of the coastline.
- **Environmental Assessments** – the environmental benefits / impacts of the options, informed by the Strategic Environmental Assessment (SEA), Water Framework Directive Assessment (WFDa) and Habitats Regulation Assessment (HRA).
- **Economic Assessments** – see the Economic Appraisal report. This involved producing an Incremental Benefit-Cost Ratio (IBCR) for each option in each ODU to determine the economic feasibility of each option
- **Stakeholder Assessments** – throughout the strategy development extensive stakeholder engagement was undertaken to capture local issues and opportunities.

The multi-criteria analysis scored each Strategic option against the following four key categories:

- **Technical** – the technical feasibility of implementing an option. Technical considerations include the suitability of the defence types, the timing of works and the space and height requirements. Each of these aspects was considered in the context of the ODU location and existing condition of the coastline (e.g. is there sufficient space in a certain location to construct new defences to implement a particular strategic option?).
- **Economic** – the economic feasibility of implementing an option (e.g. do the likely benefits of the strategic option outweigh the costs required to implement the option?). In order to assess this, the package of measures required to implement the strategic options were costed and the benefits were identified and evaluated, to determine the Average Benefit Cost Ratio and Incremental Benefit Cost Ratio between options. See the Economic Appraisal report for further details.
- **Environmental** – the likely environmental benefits / impacts of implementing an option. The options were appraised in relation to their impact on the environmental objectives of the key categories defined in the SEA. These categories include biodiversity; heritage assets; population & human health; landscape / seascape; soil, water and air; and the interrelationship between the above factors.
- **Social** – the potential of an option to address community wants and needs. This was informed from detailed stakeholder engagement throughout the strategy development process. A number of common themes and aspirations were raised by stakeholders for the strategy to consider. These include robust flood and erosion risk management; protecting, enhancing and creating environmentally important sites; improving and opening up coastal access and disabled coastal access; improving recreational space areas; and linking new defences with redevelopment opportunities. Each of these social aspects was considered when identifying the likely social impact of a particular strategic option.

The following section presents the multi-criteria analysis summary tables for each of the strategic options (Table 4-2 to Table 4-17).

4.3 Multi-Criteria Analysis Tables

For each category (technical, economic, environmental and social) each strategic option was given a score between +2 and -2. A score of +2 indicates strong positive impacts whilst a score of -2 indicates strong negative impacts. A score of 0 is indicative of no change. The total score across all 4 categories was then calculated to inform the selection of the Overall leading option.

For each strategic option the scoring in each category (between -2 and +2) was decided collaboratively by the strategy team and reviewed during project workshops. This helped avoid any individual biases in the scoring system and ensured the process was objective. The scoring was informed by evidence collected throughout the strategy development process, including stakeholder engagement activities, quantitative and qualitative evidence from the relevant technical reports (i.e. economics and environmental reports) and the team's expert engineering judgement and understanding of the strategy frontage. The scoring rules for the appraisal are summarised in Table 4-1 below.

Table 4-1: Appraisal scoring criteria

Category	Score				
	+2	+1	0	-1	-2
Economic	Most economically advantageous	Above average economic case relative to the other options	Average economic case relative to the other options	Below average economic case relative to the other options	Least economically advantageous option
Social	Helps to address community wants and needs around flooding and coastal erosion, likely to achieve stakeholder consent and potential to deliver broad outcomes	Helps to address some community wants and needs around flooding and coastal erosion, likely to achieve stakeholder consent and potential to deliver some broader outcomes	Some community wants and needs delivered, but potential for objections and challenges still remain	A small number of community wants and needs delivered, but overall option may lead to lack of support and challenges	Option fails to deliver the majority of community wants and needs, and is unlikely to be acceptable to a wide range of stakeholders
Technical	Low risk design solution, common approach / similar to existing methods	Standard technical design, with potential to incorporate some low risk elements	Standard technical design	Likely to have complex technical design, with moderate risks associated	Highly complex design, with serious challenges to deliver
Environmental	Most environmentally beneficial / sustainable option	Above average environmental benefits, relative to the other options	Average environmental benefits relative to the other options	Below average environmental benefits relative to the other options	Least environmentally beneficial / sustainable option

4.3.1 ODU 1: Hayling Bridge to Northney Farm

Table 4-2: Multi-criteria appraisal of strategic options for ODU 1 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	-2	0	-2	-6	Negative economic and social impacts due to flooding of Northney Road and to communities. Erosion of the historic landfill could have negative environmental impacts.
Do Minimum	-1	-1	-1	-1	-4	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Erosion of the historic landfill could have negative environmental impacts. Technically difficult to patch repair failing defences.
Sustain 1.33% AEP	0	0	-1	2	1	Average economic case relative to other options with social benefits from reduced flooding to properties and Northney Road. Environment presents technical challenges in constructing a frontline defence due to space and land available.
Sustain 0.5% AEP	0	0	-1	2	1	
Managed Realignment (Sustain) 1.33% AEP	2	2	1	-2	3	Leading FCERM option and most economically advantageous according to FCERM decision rules. Although there are reduced social benefits as the setback defence would not provide protection to Northney Road. Adequate space for construction of defences. Environmental benefits through habitat creation.
Managed Realignment (Sustain) 0.5% AEP	1	2	1	-2	2	Economically beneficial option, although there are reduced social benefits as the setback defence would not provide protection to Northney Road. Adequate space for construction of defences. Environmental benefits through habitat creation.
Managed Realignment Hybrid (Sustain) 1.33% AEP	0	2	0	2	4	Economic and social benefits received from reduction in flood risk. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Managed Realignment Hybrid (Sustain) 0.5% AEP	1	2	0	2	5	Economic and social benefits received from reduction in flood risk, improved benefit cost ratio compared to a 1.33% SoP. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Managed Realignment (Improve) 1.33% AEP	0	0	2	-1	1	Average economic case relative to other options, with less social benefits as the setback defence would not provide protection to Northney Road. Erosion of the historic landfill could have negative environmental impacts. Adequate space for construction of defences.

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Managed Realignment (Improve) 0.5% AEP	0	0	2	-1	1	Average economic case relative to other options, with less social benefits as the setback defence would not provide protection to Northney Road. Erosion of the historic landfill could have negative environmental impacts. Adequate space for construction of defences.
Resilience	0	2	0	0	2	Economically beneficial option, with some social benefits from reduced flooding to properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.2 ODU 2: Northney Marina

Table 4-3: Multi-criteria appraisal of strategic options for ODU 2 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	2	0	0	-2	0	Leading FCERM option and most economically advantageous according to FCERM decision rules as there are few properties at risk. Negative social impacts due to flooding to communities including the boatyard.
Do Minimum	-2	1	-1	-1	-3	Negative economic impacts as the benefit cost ratio is less than 1, and negative social impacts as flood risk will increase to communities including the boatyard. Technically difficult to patch repair failing defences.
Maintain	-2	1	-1	-1	-3	Negative economic impacts as the benefit cost ratio is less than 1, and negative social impacts as flood risk will increase to communities including the boatyard. Technically difficult to patch repair failing defences.
Sustain 1.33% AEP	-2	0	-2	2	-2	Negative economic impacts as the benefit cost ratio is less than 1. Technically difficult as there is limited space at the foreshore to build defences. Positive social impacts, as it provides flood protection.

Sustain 0.5% AEP	-2	0	-2	2	-2	Negative economic impacts as the benefit cost ratio is less than 1. Technically difficult as there is limited space at the foreshore to build defences. Positive social impacts, as it provides flood protection.
Improve 1.33% AEP	-2	-1	-2	2	-3	Negative economic impacts as the benefit cost ratio is less than 1. Technically difficult as there is limited space at the foreshore to build defences. Positive social impacts, as it provides flood protection.
Improve 0.5% AEP	-2	-1	-2	2	-3	Negative economic impacts as the benefit cost ratio is less than 1. Technically difficult as there is limited space at the foreshore to build defences. Positive social impacts, as it provides flood protection.
Resilience	-1	2	0	0	1	Negative economic impacts as the benefit cost ratio is less than 1. Provides some flood protection to properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.3 ODU 3: Northney Farm to Chichester Road

Table 4-4: Multi-criteria appraisal of strategic options for ODU 3 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	0	0	-2	-4	Negative economic and social impacts due to flooding to communities.
Do Minimum	-1	0	-1	-1	-3	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Technically difficult to patch repair failing defences.
Managed Realignment (Sustain) 1.33% AEP	1	2	1	0	4	Economically beneficial option, with social benefits from reduced flooding. Environmental benefits through habitat protection. Adequate space for construction of defences.
Managed Realignment (Sustain) 0.5% AEP	2	2	1	0	5	Leading FCERM option and most economically advantageous according to FCERM decision rules with social benefits from reduced flooding. Environmental benefits through intertidal habitat creation. Adequate space for construction of defences.
Managed Realignment (Improve) 1.33% AEP	0	1	1	0	2	Economically beneficial option, with social benefits from reduced flooding. Environmental benefits through intertidal habitat creation. Adequate space for construction of defences.
Managed Realignment (Improve) 0.5% AEP	0	1	1	0	2	Economically beneficial option, with social benefits from reduced flooding. Environmental benefits through intertidal habitat creation. Adequate space for construction of defences.
Resilience	1	0	0	-1	0	Economically beneficial option, with negative social benefits as this option will only reduce risk to properties and not farmland/buildings. Environmental benefits provided through some natural evolution at the coastline but these are small compared to other options.

4.3.4 ODU 4: Chichester Road to Mill Rythe Junior School

Table 4-5: Multi-criteria appraisal of strategic options for ODU 4 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	2	-1	0	-2	-1	Leading FCERM option and most economically advantageous according to FCERM decision rules, as there are few properties at risk. Negative social impacts due to flooding to communities.
Do Minimum	-2	0	-1	-1	-4	Negative economic impacts as the benefit cost ratio is less than 1, and negative social impacts as flood risk will increase to communities. Technically difficult to patch repair failing defences.
Maintain	-2	0	0	-1	-3	Negative economic impacts as the benefit cost ratio is less than 1, and negative social impacts as flood risk will increase to communities.
Sustain 1.33% AEP	-2	-2	0	2	-2	Negative economic impacts as the benefit cost ratio is less than 1. Provides flood protection to the community.
Sustain 0.5% AEP	-2	-2	0	2	-2	Negative economic impacts as the benefit cost ratio is less than 1. Provides flood protection to the community.
Improve 1.33% AEP (around assets only)	-2	1	-1	1	-1	Negative economic impacts as the benefit cost ratio is less than 1. Provides flood protection to the community, however this may be technically difficult to implement as defences will be constructed around assets only with some access to the coast lost.
Improve 0.5% AEP (around assets only)	-2	1	-1	1	-1	Negative economic impacts as the benefit cost ratio is less than 1. Provides flood protection to the community, however this may be technically difficult to implement as defences will be constructed around assets only with some access to the coast lost.
Improve 1.33% AEP	-2	1	0	2	1	Negative economic impacts as the benefit cost ratio is less than 1. Provides flood protection to the community.
Improve 0.5% AEP	-2	1	0	2	1	Negative economic impacts as the benefit cost ratio is less than 1. Provides flood protection to the community.
Resilience	-1	2	0	1	2	Negative economic impacts as the benefit cost ratio is less than 1. This option would provide some social benefits from reduced flooding to properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.5 ODU 5: Mill Rythe Junior School to Salterns Lane

Table 4-6: Multi-criteria appraisal of strategic options for ODU 5 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	-1	0	-2	-5	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	-2	0	-1	-2	-5	Significant residual flooding and coastal erosion damage to communities. Technically difficult to patch repair failing defences.
Maintain	1	0	0	-2	-1	Some economic benefit from reduced flooding with relatively low cost but some residual damage remains. Involves a standard technical design, with capital refurbishment to replace failing defences. Unlikely to receive community support due to the residual risk of flooding and coastal erosion.
Sustain 1.33% AEP	1	0	-1	-1	-1	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Some technical difficulties around Mill Rythe Coastal Village, and reduced community support for a frontline defence compared to a setback defence.
Sustain 0.5% AEP	1	0	-1	-1	-1	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Some technical difficulties around Mill Rythe Coastal Village, and reduced community support for a frontline defence compared to a setback defence.
Maintain then Improve 1.33% AEP from 2072 – Frontline defence	1	-2	-1	-1	-3	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Some technical difficulties around Mill Rythe Coastal Village, and reduced community support for a frontline defence compared to a setback defence.
Maintain then Improve 0.5% AEP from 2072 – Frontline defence	0	-2	-1	-1	-4	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Some technical difficulties around Mill Rythe Coastal Village, and reduced community support for a frontline defence compared to a setback defence.
Maintain then Improve 1.33% AEP from 2072 – Setback defence	1	1	0	0	2	Some economic benefit from reduced flooding and coastal erosion to communities, with relatively low costs but residual damage remains.
Maintain then Improve 0.5% AEP from 2072 – Setback defence	1	1	0	0	2	Some economic benefit from reduced flooding and coastal erosion to communities with relatively low costs but residual damage remains.

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Managed Realignment (Sustain) 1.33% AEP	1	2	0	2	5	Some economic benefit from reduced flooding and coastal erosion to communities. Environmental and social benefits through habitat creation behind setback defence to be constructed in the present day.
Managed Realignment (Sustain) 0.5% AEP	0	2	0	2	3	Some economic benefit from reduced flooding and coastal erosion to communities with relatively low costs but residual damage remains. Environmental and social benefits through habitat creation behind setback defence to be constructed in the present day.
Managed Realignment (Improve) 1.33% AEP	0	1	0	2	4	Some economic benefit from reduced flooding and coastal erosion to communities with relatively low costs but residual damage remains. Environmental and social benefits through habitat creation behind setback defence to be constructed in the present day.
Managed Realignment (Improve) 0.5% AEP	1	1	0	1	3	Some economic benefit from reduced flooding and coastal erosion to communities. Social benefits through reduced flooding and coastal erosion to communities. Environmental and social benefits through habitat creation behind setback defence to be constructed in the present day.
Maintain then Managed Realignment (Improve) 1.33% AEP from 2072	1	1	0	2	3	Some economic benefit from reduced flooding and coastal erosion to communities with relatively low costs but residual damage remains. Environmental and social benefits through habitat creation created in the longer term.
Maintain then Managed Realignment (Improve) 0.5% AEP from 2072	2	1	0	1	4	Leading FCERM option and most economically advantageous according to FCERM decision rules. Environmental and social benefits through habitat creation created in the longer term.
Resilience	-2	1	0	-1	-2	Negative economic impacts as the it delivers the least economic benefits. Provides some flood protection to properties. Environmental benefits provided through some natural evolution at the coastline but these would be small compared to other options.

4.3.6 ODU 6: Salterns Lane to Wilsons Boat Yard

Table 4-7: Multi-criteria appraisal of strategic options for ODU 6 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	0	0	-2	-4	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	-1	2	-1	-1	-1	Significant residual flooding and coastal erosion damage to communities. Technically difficult to patch repair failing defences.
Maintain	0	1	0	-1	0	Some economic benefit from reduced flooding with relatively low cost but some residual damage remains. Involves a standard technical design, with capital refurbishment to replace failing defences. Unlikely to receive community support due to the residual risk of flooding and coastal erosion.
Maintain then advance the line 0.5% AEP	0	-2	-2	0	-4	Some economic benefit from reduced flooding with relatively low cost but some residual damage remains. Technical challenges with the design and construction of a defence seaward of the existing land with environmental impacts through the loss of intertidal habitats.
Maintain then Improve 1.33% AEP from 2072	1	-1	0	1	1	Economically beneficial option, with some residual flood damage to the community. Defences could act as a barrier to the foreshore.
Maintain then Improve 0.5% AEP from 2072	2	-1	0	1	2	Leading FCERM option and most economically advantageous according to FCERM decision rules. Provides flooding protection, however defences could act as a barrier to the foreshore.
Resilience	1	1	0	-1	1	Economically beneficial option, with some social benefits from reduced flooding to properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.7 ODU 7: Wilsons Boat Yard to Fishery Creek

Table 4-8: Multi-criteria appraisal of strategic options for ODU 7 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	-2	0	-2	-6	Negative economic and social impacts due to flooding to communities. Erosion of the historic landfill could have negative environmental impacts.
Do Minimum	-1	-1	-1	0	-3	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Erosion of the historic landfill could have negative environmental impacts. Technically difficult to patch repair failing defences.
Maintain	1	-1	-1	0	-1	Some economic and social benefits through flood and coastal erosion protection to the community. Erosion of the historic landfill could have negative environmental impacts. Technically difficult to patch repair failing defences.
Sustain 1.33% AEP – Frontline defence	1	2	-1	1	3	Economically beneficial option, with social benefits from reduced flooding and coastal erosion. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Sustain 0.5% AEP – Frontline defence	2	2	-1	1	4	Leading FCERM option and most economically advantageous according to FCERM decision rules. Social benefits through reduced flooding and coastal erosion to communities. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Improve 1.33% AEP – Frontline defence	0	1	-1	1	1	Some economic and social benefits through flood and coastal erosion protection to the community. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Improve 0.5% AEP – Frontline defence	0	1	-1	1	1	Some economic and social benefits through flood and coastal erosion protection to the community. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Sustain 1.33% AEP – Setback defence	0	2	-1	-1	0	Some economic and social benefits through flood and coastal erosion protection to the community, however Mengham Rythe Moorings and Sailing Club would be unprotected. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Sustain 0.5% AEP – Setback defence	0	2	-1	-1	0	Some economic and social benefits through flood and coastal erosion protection to the community, however Mengham Rythe Moorings and Sailing Club would be unprotected. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Improve 1.33% AEP – Setback defence	0	1	-1	-1	-1	Some economic and social benefits through flood and coastal erosion protection to the community, however Mengham Rythe Moorings and Sailing Club would be unprotected. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.
Improve 0.5% AEP – Setback defence	0	1	-1	-1	-1	Some economic and social benefits through flood and coastal erosion protection to the community, however Mengham Rythe Moorings and Sailing Club would be unprotected. Environmental benefits through the protection of the historic landfill from erosion and habitat creation.

4.3.8 ODU 8: Eastoke

Table 4-9: Multi-criteria appraisal of strategic options for ODU 8 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	0	0	-2	-4	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	-2	1	2	-2	-1	Negative economic and social impacts due to flooding and coastal erosion to communities.
Maintain	1	2	1	-2	2	Limited economic and social benefits through flood and coastal erosion protection to the community. Unlikely to be socially acceptable as there will still be significant residual flooding and erosion risk.
Sustain 1.33% AEP - Crest raising / floodwall / setback floodwall	1.5	1	-1	1	2.5	Leading FCERM option and most economically advantageous according to FCERM decision rules. Economic benefits through flood and coastal erosion protection, though some residual damage remains. Social benefits through support for regeneration opportunities and beach access, although access to the marina may be restricted.
Sustain 0.5% AEP - Crest raising / floodwall / setback floodwall	2	1	-1	1	3	Most economically beneficial option. Social benefits through support for regeneration opportunities and beach access, although access to the marina may be restricted.
Sustain 1.33% AEP – Rock revetment / floodwall / setback floodwall	-1.5	1	2	1	2.5	Economic benefits through flood and coastal erosion protection but higher cost than some alternatives. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access. Similar technical design to the rock revetment at Eastoke point.
Sustain 0.5% AEP – Rock revetment / floodwall / setback floodwall	-0.5	1	2	1	3.5	Economic benefits through flood and coastal erosion protection but higher cost than some alternatives, though some residual damage remains. Social benefits through support for regeneration opportunities and beach access. Similar technical design to the rock revetment at Eastoke point.
Sustain 1.33% AEP – Concrete revetment / floodwall / setback floodwall	-1.5	1	-1	-1	-2.5	Economic benefits through flood and coastal erosion protection but highest cost solution considered to deliver this SoP. Some residual damage remains. Some social benefits, though access to the marina may be restricted.
Sustain 0.5% AEP – Concrete revetment / floodwall / setback floodwall	-0.5	1	-1	-1	-1.5	Economic benefits through flood and coastal erosion protection but some residual damage remains. Some social benefits, though access to the marina may be restricted.
Improve 1.33% AEP - Crest raising / floodwall / setback floodwall	0.5	-1	-1	2	0.5	Economic benefits through flood and coastal erosion protection and lower cost solution relative to alternatives considered for this SoP. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access, although access to the marina may be restricted.

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Improve 0.5% AEP - Crest raising / floodwall / setback floodwall	0.5	-1	-1	2	0.5	Economic benefits through flood and coastal erosion protection and lower cost solution relative to alternatives considered for this SoP. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access, although access to the marina may be restricted.
Improve 1.33% AEP – Rock revetment / floodwall / setback floodwall	0	-1	2	0	1	More costly option than crest raising alone. Economic benefits through flood and coastal erosion protection, though some residual damage remains. Similar technical design to the rock revetment at Eastoke point.
Improve 0.5% AEP – Rock revetment / floodwall / setback floodwall	-0.5	-1	2	0	0.5	More costly option than crest raising alone. Economic benefits through flood and coastal erosion protection, though some residual damage remains. Similar technical design to the rock revetment at Eastoke point.
Improve 1.33% AEP – Concrete revetment / floodwall / setback floodwall	1	-1	-1	-1	-2	Economic benefits through flood and coastal erosion protection, though some residual damage remains. Lack of space to construct defences may present some challenges, as the area is densely populated. Some social benefits, though access to the marina may be restricted.
Improve 0.5% AEP – Concrete revetment / floodwall / setback floodwall	1	-1	-1	-1	-2	Economic benefits through flood and coastal erosion protection, though some residual damage remains. Lack of space to construct defences may present some challenges, as the area is densely populated. Some social benefits, though access to the marina may be restricted.
Maintain then Sustain 1.33% AEP from 2042 - Crest raising / floodwall / setback floodwall	-1.5	1	-1	1	-0.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access, although access to the marina may be restricted.
Maintain then Sustain 0.5% AEP from 2042 - Crest raising / floodwall / setback floodwall	-1.5	1	-1	1	-0.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access, although access to the marina may be restricted.
Maintain then Sustain 1.33% AEP from 2042 – Rock revetment / floodwall / setback floodwall	-1.5	1	2	0	1.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Similar technical design to the rock revetment at Eastoke point. Some social benefits, although beach access may be reduced.
Maintain then Sustain 0.5% AEP from 2042 – Rock revetment / floodwall / setback floodwall	-1.5	1	2	0	1.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Similar technical design to the rock revetment at Eastoke point. Some social benefits, although beach access may be reduced.
Maintain then Sustain 1.33% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	-1.5	1	-1	-1	-2.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Lack of space to construct defences may present some

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
						challenges, as the area is densely populated. Some social benefits, though access to the marina may be restricted.
Maintain then Sustain 0.5% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	-0.5	1	-1	-1	-1.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Lack of space to construct defences may present some challenges, as the area is densely populated. Some social benefits, though access to the marina may be restricted.
Maintain then Improve 1.33% AEP from 2042 - Crest raising / floodwall / setback floodwall	1	-2	-1	2	0	Some economic benefits through flood and coastal erosion protection, but lower cost than some alternatives. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access, although access to the marina may be restricted.
Maintain then Improve 0.5% AEP from 2042 - Crest raising / floodwall / setback floodwall	1	-2	-1	2	0	Some economic benefits through flood and coastal erosion protection, but lower cost than some alternatives. Some residual damage remains, although access to the marina may be restricted.
Maintain then Improve 1.33% AEP from 2042 – Rock revetment / floodwall / setback floodwall	-0.5	-2	2	0	-0.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access. Similar technical design to the rock revetment at Eastoke point.
Maintain then Improve 0.5% AEP from 2042 – Rock revetment / floodwall / setback floodwall	-0.5	-2	2	0	-0.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Social benefits through support for regeneration opportunities and beach access. Similar technical design to the rock revetment at Eastoke point.
Maintain then Improve 1.33% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	-0.5	-2	-1	-1	-4.5	Some economic benefits through flood and coastal erosion protection, but higher cost than some alternatives. Some residual damage remains. Some social benefits, though access to the marina may be restricted.
Maintain then Improve 0.5% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	-0.5	-2	-1	-1	-4.5	Some economic benefits through flood and coastal erosion protection, though some residual damage remains. Some social benefits, though access to the marina may be restricted.
Resilience	-1	0	0	-2	-3	Some economic benefits provided through flood protection to properties. Unlikely to be socially acceptable as there will still be significant residual flooding and erosion risk to properties and the communities.

4.3.9 ODU 9: Eastoke Corner to Inn on the Beach

Table 4-10: Multi-criteria appraisal of strategic options for ODU 9 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	-2	0	-2	-6	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	-1	0	-1	-1	-3	Negative economic and social impacts due to flooding and coastal erosion to communities. Technically difficult to patch repair failing defences.
Maintain	-2	0	0	-1	-3	Some economic and social benefits through flood protection to the community, though residual flood damage remains. Unlikely to be socially acceptable as there will still be significant residual flooding and erosion risk.
Sustain 0.5% AEP – Maintain Inn on the Beach	1	2	1	1	6	Some economic benefits through flood and coastal erosion protection. Socially acceptable option, includes protection and maintenance of Inn on the Beach.
Sustain 0.5% AEP – Replace Inn on the Beach	2	1	-1	0	1	Leading FCERM option and most economically advantageous according to FCERM decision rules. Economic benefits through flood and coastal erosion protection. May not be socially acceptable to the community, as Inn on the Beach would be replaced with a rock groyne. May present some technical challenges.
Sustain 1.33% AEP - Replace Inn on the Beach	2	1	-1	-1	1	Economic benefits through flood and coastal erosion protection. May not be socially acceptable to the community, as Inn on the Beach would be replaced with a rock groyne. May present some technical challenges.
Sustain 1.33% AEP - Maintain Inn on the beach	1	2	1	1	5	Some economic benefits through flood and coastal erosion protection. Socially acceptable option, includes protection and maintenance of Inn on the Beach.
Improve 1.33% AEP – Remove Inn on the Beach	1	2	-1	-1	1	Some economic benefits through flood and coastal erosion protection. May not be socially acceptable to the community, as Inn on the Beach would be replaced with a rock groyne. May present some technical challenges.
Improve 0.5% AEP – Remove Inn on Beach	0	2	-1	-1	0	Some economic benefits through flood and coastal erosion protection. May not be socially acceptable to the community, as Inn on the Beach would be replaced with a rock groyne. May present some technical challenges.
Maintain then Sustain 1.33% AEP from 2042	-1	1	0	0	0	Some economic benefits provided through flood protection to properties. Unlikely to be socially acceptable as there will still be considerable residual flooding and erosion risk to properties and the communities.

Maintain then Sustain 0.5% AEP from 2042	-1	1	0	0	0	Some economic benefits provided through flood protection to properties. Unlikely to be socially acceptable as there will still be considerable residual flooding and erosion risk to properties and the communities.
Maintain then Improve 1.33% AEP from 2042	-2	1	0	0	-1	Some economic benefits provided through flood protection to properties. Unlikely to be socially acceptable as there will still be considerable residual flooding and erosion risk to properties and the communities.
Maintain then Improve 0.5% AEP from 2042	-2	1	0	0	-1	Some economic benefits provided through flood protection to properties. Unlikely to be socially acceptable as there will still be considerable residual flooding and erosion risk to properties and the communities.
Improve beach protection (Timber groynes)	0	1	0	0	1	Some economic benefits provided through erosion protection to properties. Unlikely to be socially acceptable as there will still be considerable residual flood risk to properties and the communities.
Improve beach protection (Rock groynes)	0	1	0	0	1	Some economic benefits provided through erosion protection to properties. Unlikely to be socially acceptable as there will still be considerable residual flood risk to properties and the communities.
Improve beach protection (Rock groynes +)	-1	1	-1	0	-1	Some economic benefits provided through erosion protection to properties. Unlikely to be socially acceptable as there will still be considerable residual flood risk to properties and the communities.
Resilience	2	1	0	-1	2	Some economic benefits provided through flood protection to properties. Unlikely to be socially acceptable as there will still be significant residual flooding and erosion risk to properties and the communities. Environmental benefits provided through some natural evolution at the coastline.

4.3.10 ODU 10: Inn on the Beach to North Shore Road

Table 4-11: Multi-criteria appraisal of strategic options for ODU 10 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	-1	0	-2	-5	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	1	1	-1	0	1	Some economic benefit from reduced flooding with relatively low costs but residual damage remains. Erosion of the historic landfill could have negative environmental impacts. Technically difficult to patch repair failing defences.
Maintain	-1	0	-1	-1	-3	Some economic and social benefits through flood protection to the community, though residual flood damage remains. Unlikely to be socially acceptable as there will still be significant residual flooding and erosion risk.

Sustain 1.33% AEP	-2	1	-1	1	-1	Negative economic impacts as the benefit cost ratio is less than 1. Social benefits through protection to Ferry Road and properties to the north of the ODU.
Improve 1.33% AEP	-2	2	-2	1	-1	Negative economic impacts as the benefit cost ratio is less than 1. Social benefits through protection to Ferry Road and properties to the north of the ODU.
Resilience	2	1	0	-2	1	Leading FCERM option and most economically advantageous according to FCERM decision rules. Provides property level protection. Option does not support potential redevelopment at West Beach, or provide protection to Ferry Road / the golf club. Environmental benefits provided through some natural evolution at the coastline.

4.3.11 ODU 11: North Shore Road

Table 4-12: Multi-criteria appraisal of strategic options for ODU 11 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	0	0	-2	-4	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	-2	0	-1	-1	-4	Negative economic and social impacts due to flooding and coastal erosion to communities. Technically difficult to patch repair failing defences.
Maintain	-1	0	0	0	-1	Some economic and social benefits through flood protection to the community. Technically difficult to patch repair failing defences.
Sustain 1.33% AEP	1	2	-1	2	4	Economic and social benefits received from reduction in flood risk. Some challenges in building defences at the foreshore.
Sustain 0.5% AEP	0	2	-1	2	3	Economic and social benefits received from reduction in flood risk. Some challenges in building defences at the foreshore.
Improve 1.33% AEP (West side only)	1	-2	0	1	0	Economic and social benefits received from reduction in flood risk. Some challenges in building defences at the foreshore.
Improve 0.5% AEP (West side only)	2	-2	0	1	1	Leading FCERM option and most economically advantageous according to FCERM decision rules. Social benefits received from reduction in flood risk. Some challenges in building defences at the foreshore.
Maintain then Sustain 1.33% AEP from 2042	1	1	-1	2	3	Economic and social benefits received from reduction in flood risk. Some challenges in building defences at the foreshore.
Maintain then Sustain 0.5% AEP from 2042	0	1	-1	2	2	Economic and social benefits received from reduction in flood risk. Some challenges in building defences at the foreshore.
Resilience	1	1	0	0	2	Some economic and social benefit from reduced flooding to properties. Some technical challenges depending on individual properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.11 ODU 12: North Shore Road to Newtown

Table 4-13: Multi-criteria appraisal of strategic options for ODU 12 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	2	0	0	-1	1	Leading FCERM option and most economically advantageous according to FCERM decision rules, as there are no properties at risk. Social impacts as some coastal access may be lost over time.
Erosion Protection – Concrete revetment	-2	1	0	1	0	Negative economic impacts as the benefit cost ratio is less than 1.
Erosion Protection – Rock revetment	-2	1	0	1	0	Negative economic impacts as the benefit cost ratio is less than 1.
Erosion Protection - Gabions	-2	1	0	1	0	Negative economic impacts as the benefit cost ratio is less than 1.

4.3.12 ODU 13: Newtown

Table 4-14: Multi-criteria appraisal of strategic options for ODU 13 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	0	0	-2	-4	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	1	0	-1	-1	-1	Negative economic and social impacts due to flooding and coastal erosion to communities. Technically difficult to patch repair failing defences.
Maintain	1	0	0	-1	0	Some economic and social benefits through flood protection to the community. Technically difficult to patch repair failing defences.
Maintain then Sustain 1.33% AEP from 2042	1	-1	0	1	1	Economic and social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail.
Maintain then Sustain 0.5% AEP from 2042	2	-1	0	1	2	Leading FCERM option and most economically advantageous according to FCERM decision rules. Social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail.
Maintain then Improve 1.33% AEP from 2042	-1	-2	1	2	0	Some economic and social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail.
Maintain then Improve 0.5% AEP from 2042	0	-2	1	2	1	Some economic and social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail.
Maintain then Managed Realignment (Sustain) 1.33% AEP from 2042	-1	2	-1	-1	-1	Some economic and social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail. Environmental benefits through habitat creation in the regulated tidal exchange, however this may present some technical difficulties.
Maintain then Managed Realignment (Sustain) 0.5% AEP from 2042	0	2	-1	-1	0	Some economic and social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail. Environmental benefits through habitat creation in the regulated tidal exchange, however this may present some technical difficulties.
Maintain then Managed Realignment (Improve) 1.33% AEP from 2042	0	2	-1	-1	0	Some economic and social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail. Environmental benefits through habitat creation in the regulated tidal exchange, however this may present some technical difficulties.
Maintain then Managed Realignment (Improve) 0.5% AEP from 2042	0	2	-1	-1	0	Some economic and social benefits received from reduction in flood and coastal erosion risk. Provides long term protection and access to the Billy trail. Environmental benefits through habitat creation in the regulated tidal exchange, however this may present some technical difficulties.

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Resilience	1	1	0	-1	1	Some economic and social benefit from reduced flooding to properties. Some technical challenges depending on individual properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.13 ODU 14: Newtown to Stoke

Table 4-15: Multi-criteria appraisal of strategic options for ODU 14 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	2	-1	0	-2	-1	Leading FCERM option and most economically advantageous according to FCERM decision rules, as there are very few properties at risk. Unlikely to be supported by the community as access to the Billy trail may be lost over time.
Do Minimum	-2	-1	-1	-1	-5	No economic benefits as the benefit cost ratio is less than 1. Unlikely to be supported by the community as access to the Billy trail may be lost over time. Technically difficult to patch repair failing defences.
Maintain	-2	-1	0	-1	-4	No economic benefits as the benefit cost ratio is less than 1. Unlikely to be supported by the community as access to the Billy trail may be lost over time.
Erosion protection – rock revetment	-2	0	0	1	-1	No economic benefits as the benefit cost ratio is less than 1. Social benefits provided through erosion protection to the Billy trail.
Maintain then Sustain 1.33% AEP from 2072	-2	-1	1	1	-1	No economic benefits as the benefit cost ratio is less than 1. Social benefits provided through erosion protection to the Billy trail.
Maintain then Sustain 0.5% AEP from 2072	-2	-1	1	1	-1	No economic benefits as the benefit cost ratio is less than 1. Social benefits provided through erosion protection to the Billy trail.
Maintain then Improve 1.33% AEP from 2072	-2	-1	1	1	-1	No economic benefits as the benefit cost ratio is less than 1. Social benefits provided through erosion protection to the Billy trail.
Maintain then Improve 0.5% AEP from 2072	-2	-1	1	1	-1	No economic benefits as the benefit cost ratio is less than 1. Social benefits provided through erosion protection to the Billy trail.
Managed Realignment (Sustain) 1.33% AEP	-2	1	-1	1	-1	No economic benefits as the benefit cost ratio is less than 1. Social benefits provided through erosion protection to the Billy trail.
Managed Realignment (Sustain) 0.5% AEP	-2	1	-1	1	-1	No economic benefits as the benefit cost ratio is less than 1. Social benefits provided through erosion protection to the Billy trail.
Resilience	-1	1	0	-1	-1	No economic benefits as the benefit cost ratio is less than 1. Some social benefit from reduced flooding and coastal erosion to properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.14 ODU 15: Stoke to Langstone Bridge Carpark

Table 4-16: Multi-criteria appraisal of strategic options for ODU 15 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	0	0	-2	-4	Negative economic and social impacts due to flooding and coastal erosion to communities, including loss of the Billy trail.
Do Minimum	-2	0	-1	0	-3	Negative economic impacts due to flooding and coastal erosion to communities. Technically difficult to patch repair failing defences.
Maintain	1	0	0	1	2	Some economic and social benefits through flood protection to the community.
Sustain 1.33% AEP – Frontline defence	0	0	0	2	2	Some economic and social benefits received from reduction in flood and coastal erosion risk to properties and the Billy trail. Environmental benefits through the protection of the historic landfill. Technical challenges in constructing a defence at the foreshore.
Sustain 0.5% AEP – Frontline defence	0	0	0	2	2	Some economic and social benefits received from reduction in flood and coastal erosion risk to properties and the Billy trail. Environmental benefits through the protection of the historic landfill. Technical challenges in constructing a defence at the foreshore.
Improve 0.5% AEP – Frontline defence	0	0	0	2	2	Some economic and social benefits received from reduction in flood and coastal erosion risk to properties and the Billy trail. Environmental benefits through the protection of the historic landfill. Technical challenges in constructing a defence at the foreshore.
Sustain 1.33% AEP – Setback defence	1	1	1	2	5	Economic and social benefits received from reduction in flood and coastal erosion risk to properties and the Billy trail. Environmental benefits through the protection of the historic landfill.
Sustain 0.5% AEP – Setback defence	2	1	1	2	6	Leading FCERM option and most economically advantageous according to FCERM decision rules. Social benefits through flood and coastal erosion protection to properties and the Billy trail. Environmental benefits through the protection of the historic landfill.
Improve 1.33% AEP – Setback defence	0	1	1	2	4	Economic and social benefits received from reduction in flood and coastal erosion risk to properties and the Billy trail. Environmental benefits through the protection of the historic landfill.
Improve 0.5% AEP – Setback defence	0	1	1	2	4	Economic and social benefits received from reduction in flood and coastal erosion risk to properties and the Billy trail. Environmental benefits through the protection of the historic landfill.

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Resilience	-1	2	0	-1	0	Negative economic impacts as the it delivers the least economic benefits. Provides some flood protection to properties. Environmental benefits provided through some natural evolution at the coastline.

4.3.15 ODU 16: Langstone Bridge Carpark to Langstone Bridge

Table 4-17: Multi-criteria appraisal of strategic options for ODU 16 (Overall leading option highlighted red, FCERM leading option highlighted yellow)

Strategic Option	Economic	Environmental	Technical	Social	Total Score	Notes
Do Nothing	-2	0	0	-2	-4	Negative economic and social impacts due to flooding and coastal erosion to communities.
Do Minimum	-2	1	-1	0	-2	Negative economic impacts due to flooding and coastal erosion to communities. Technically difficult to patch repair failing defences.
Maintain	-2	0	0	0	-2	Some economic and social benefits through flood protection to the community.
Sustain 1.33% AEP – Frontline defence	2	-1	-1	1	1	Leading FCERM option and most economically advantageous according to FCERM decision rules. Social benefits through protection of properties, the A3023 and Northney Road. Limited space at the foreshore to build defences, which may also cause disruption to road users.
Sustain 0.5% AEP – Frontline defence	1	-1	0	2	2	Economic and social benefits received from reduction in flood and coastal erosion risk to properties, the A3023 and Northney Road. Limited space at the foreshore to build defences, which may also cause disruption to road users. This option is more technically and socially feasible than the 1.33% AEP, as it will provide a better standard of protection to the A3023 which is critical infrastructure for access and egress from Hayling Island. It also better links to the Langstone Scheme, which will be constructed to a 0.5% SoP.
Improve 1.33% AEP - Frontline	0	-1	-1	1	-1	Some economic benefits. Technically difficult as there is limited space at the foreshore to build defences. Positive social impacts, as it provides flood protection.

Resilience	-1	1	0	0	0	Negative economic impacts as the it delivers the least economic benefits. Provides some flood protection to properties. Environmental benefits provided through some natural evolution at the coastline.
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5. Leading Options

The option appraisal process identified an overall leading option for each ODU based on the multi-criteria analysis. The following sections provide further details of the overall leading options, as well as the FCERM leading options. For each ODU, a route map is presented to highlight which measures would be implemented as part of each option over the Strategy period.

5.1 ODU 1: Hayling Bridge to Northney Farm

ODU 1 spans from Hayling Bridge to Northney Farm, split into two sections to exclude Northney Marina (ODU 2).

The overall leading option for ODU 1 is: **Managed Realignment Hybrid (Sustain) 0.5% AEP** – sustain minimum 0.5% AEP (1:200 year) SoP through the construction of a frontline floodwall on the west (including in front of the access road to Langstone Quays Resort) at ODU1a, a setback embankment on the east at ODU1b and frontline protection of the historic landfill at ODU1c. Create intertidal habitat in front of the setback defences on the east side along ODU1b. Figure 5-1 displays the existing boundaries for ODU 1, including the subunits..

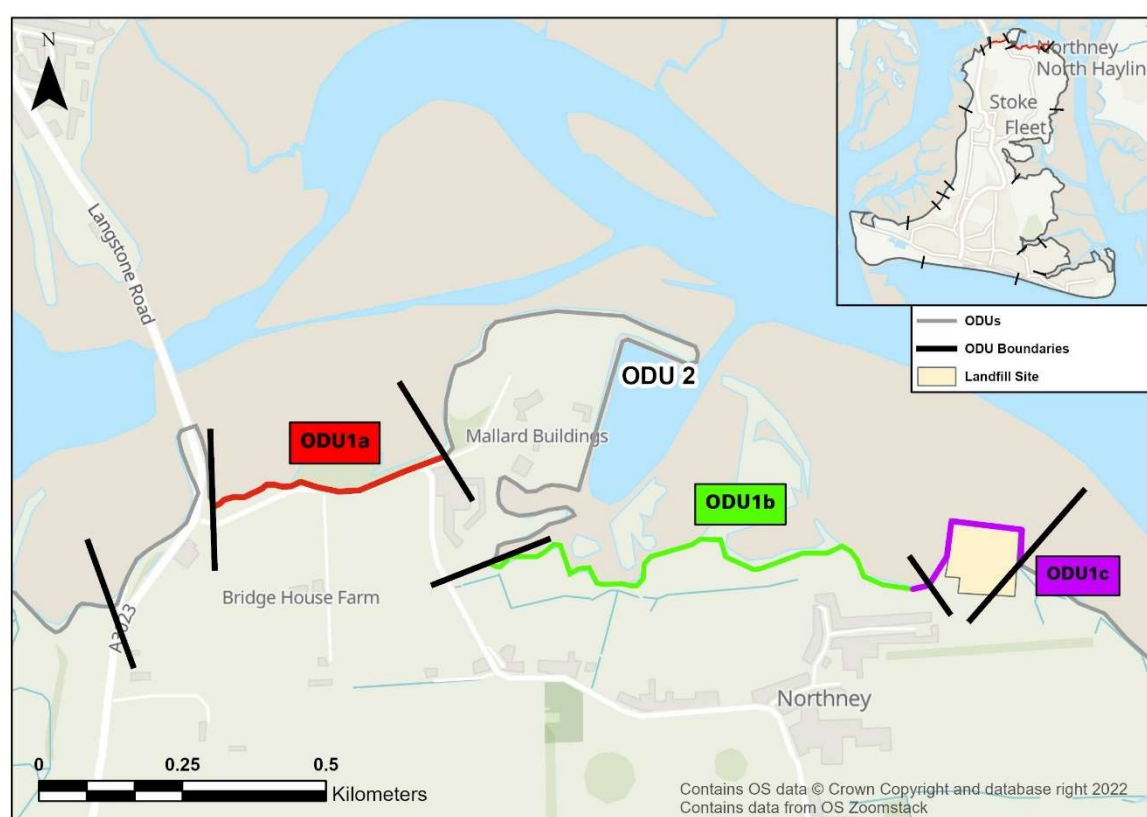


Figure 5-1: ODU 1 - Hayling Bridge to Northney Farm

This option would involve constructing new defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years. The implementation of the defences would be phased; the initial height of the defences would be built to a 0.5% SoP for 2042, and raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. The new intertidal habitat would be created in epoch 1. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy.

In the west side, the frontline floodwall would provide protection to Northney Road from flooding. Northney Road is a major road connecting to Langstone Road, and there would be social impacts if flood risk to the road continued to increase in the future due to sea level rise, as the road is necessary for accessing the eastern part of the Island and also provides the main access to Northney Marina. This option has the potential to cause some deterioration of the saltmarsh fronting it, however options to minimise the impact could be explored through the design of the floodwall as part of the scheme appraisal process. The presence of a frontline defence would provide improved access along Northney Road, preventing people from walking through the saltmarsh or on the road itself. As part

of this option, there would also be new defences in front of the access road to Langstone Quays Resort. These defences would ensure that there would be sufficient flood protection to the hotel in the absence of defences in ODU 2.

In the east side, this option would protect the historic landfill at North Common from flooding and coastal erosion. For both environmental and social reasons, it is important to prevent the historic landfill from eroding in the future and reduce the risk of potentially contaminated land exposure. Whilst there are other strategic options with stronger economic cases, they would not prevent the erosion of potentially contaminated land and are therefore not considered environmentally and socially sustainable. The economic impacts of landfill eroding onto the foreshore is challenging to estimate under the current FCERM-AG process. Damages have been estimated using typical remediation costs but these do not consider any potential additional impacts associated with the environmental or site specific costs related to the type of material / depth / volume of the site. The weaker economic case of this option may therefore not reflect the full reality of its benefits and further more detailed studies would be required to more accurately capture the economic damages avoided by preventing the historic landfill erosion. The creation of new intertidal habitat in the east side would also help to deliver on the objectives of the Solent and South Downs Regional Habitat Compensation Plan (RHCP)². Through this habitat creation, other habitat losses elsewhere in the region from coastal squeeze could be offset, and other environmental benefits (such as carbon sequestration and improved biodiversity) could be achieved. An environmental management plan would need to be created as part of this option during the scheme development, including exploring the potential for the beneficial use of dredged sediment (BuDS).

In summary, the overall leading option would deliver sustainable flood and erosion risk management, as well as facilitating wider environmental and social benefits. All of the strategic options considered for ODU 1 are presented in Table 5-1 below, comparing the benefits and costs of each option, as well as the residual damages (damages prior to scheme implementation and damages expected during above design standard flood events).

Table 5-1: Whole life present value costs and benefits of the strategic options developed for ODU 1

Strategic Option	Whole Life Cost (PV £k)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	4,915	0.00
Do Minimum	321	0	4,915	0.00
Sustain 1.33% AEP	5,516	4,334	581	0.79
Sustain 0.5% AEP	6,063	4,895	20	0.81
Managed Realignment (Sustain) 1.33% AEP	1,192	5,116	790	2.68
Managed Realignment (Sustain) 0.5% AEP	2,341	5,501	405	2.31
Managed Realignment Hybrid (Sustain) 1.33% AEP	5,217	6,188	0	1.19
Managed Realignment Hybrid (Sustain) 0.5% AEP	5,353	6,749	0	1.26
Managed Realignment (Improve) 1.33% AEP	3,393	5,220	686	1.54
Managed Realignment (Improve) 0.5% AEP	3,678	5,403	503	1.47
Resilience	1,807	2,400	3,506	1.33

As per the table above, the FCERM leading option is Sustain with Managed Realignment 1.33% AEP, as it has the highest benefit cost ratio when compared to the other options. This option would involve the construction of a setback embankment within ODU1a and ODU1b with habitat creation in the present day. In the future, the defences would be maintained and raised to keep pace with rising sea level. This option is similar to the overall leading

² Southern Coastal Group and SCOPAC (2021) Regional Habitat Compensation Programme – Solent and South Downs. Available from: <https://southerncoastalgroup-scopac.org.uk/rhcp/> [Accessed 20 December 2021]

option, however it does not include protection of the historic landfill site within ODU1c and the setback embankment in ODU1A could lead to increased flood risk to Northney Road.

Figure 5-2 (overleaf) presents the route map for ODU 1, with the overall leading option and FCERM leading option.

Depending on potential funding constraints for implementing the leading options, if these options are not viable then adaptation could be considered as a way forward. Adaptation may become more important in the future as without any FCERM interventions the risk of coastal flooding and erosion is expected to increase over time due to sea level rise; an additional 48 residential and 29 non-residential properties are expected to be at risk from a 0.5% AEP event in 2122 compared to the present day. Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaptation could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation.

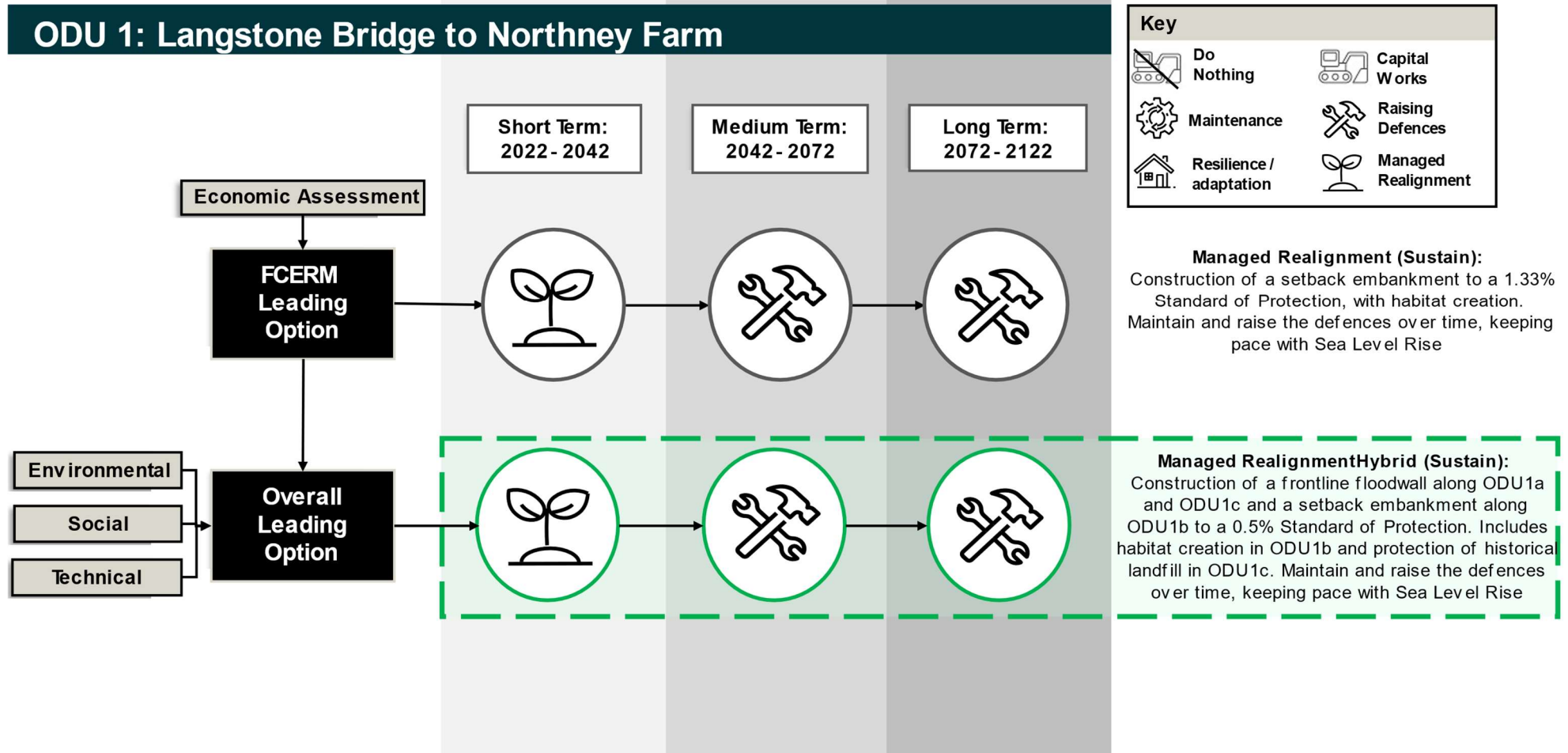


Figure 5-2: ODU 1 Option Route Map

5.2 ODU 2: Northney Marina

ODU 2 encompasses Northney Marina, in between the two sections of ODU 1 as shown in Figure 5-3. The overall leading option for ODU 2 is: **Resilience** – PFR for properties at risk of flooding from a 5% AEP (1:20 year) flood event. This would include maintenance of the existing frontline defences at Northney Marina. The FCERM leading option here is Do Nothing, as all of the options (including Resilience) have a benefit cost ratio less than 1.

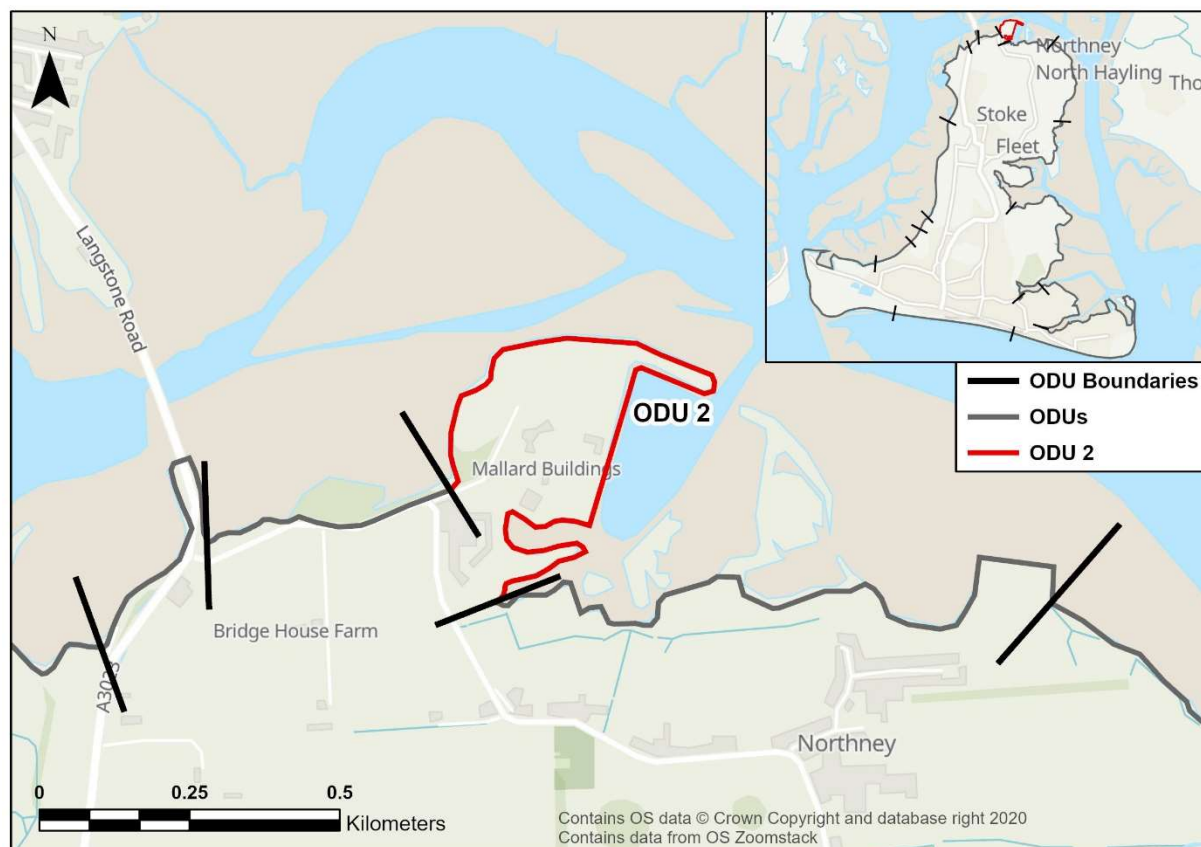


Figure 5-3: ODU 2 - Northney Marina

The overall leading option would involve implementing PFR measures in epoch 1 (2022 – 2042) for all properties within the ODU which are at risk of flooding from a 5% AEP flood event. Further PFR measures would need to be installed for properties as they become at risk in epochs 2 and 3. In the present day, there is only one property at risk; in epoch 3, there will be 3 properties at risk. These properties are non-residential, therefore they may require more bespoke PFR measures than residential properties. PFR has only been considered to protect properties up to a 5% AEP event, as it is not effective at providing protection from flooding at higher return period events.

As part of this option, there would also need to be patch and repair of the existing frontline defences throughout the Strategy appraisal period. Formal defences are not present across the entire unit and therefore patch and repair would only cover areas that are currently defended. Further details of the exact PFR measures and the maintenance schedule would need to be investigated as part of the scheme appraisal process following the Strategy.

This option is unlikely to support any wider social or environmental benefits, particularly when compared to the other strategic options, however it has the greatest economic benefits. There is a very limited case for new defences here, as a long length of defence would be required to protect comparatively few properties. This has resulted in the FCERM leading option being Do Nothing. Despite this, the intention of the overall leading option is to provide some protection where possible to properties, and the continued maintenance of the defences would protect other assets within the marina. This is in line with the Chichester Harbour Conservancy (CHC) guidance for works licenses, as maintenance would only be permitted where assets or infrastructure are at risk. In areas where there are no assets or infrastructure at risk, a Do Nothing approach would be followed.

There are links between flood risk in ODU 1 and 2. For example, in ODU 2 there is a reliance on new defences in ODU 1 to preserve access. Access to ODU 2 is mainly provided by Northney Road in ODU 1 and if the flood risk

to this road is not reduced in the future, then access to ODU 2 during periods of flooding would be challenging, particularly as depths of flooding increase over time due to projected sea level rise. On the other hand, the leading option in ODU 2 does not include construction of any new defences which provides a potential flow path through to ODU 1 during some return period events. This has been considered in the option alignments for ODU 1 and the defences in ODU 1 would prevent this potential flowpath from impacting any properties and benefits within ODU1.

The strategic options considered for ODU 2 are presented in Table 5-2 below, comparing the benefits and costs of each option, as well as the residual damages (damages prior to scheme implementation and damages expected during above design standard flood events).

Figure 5-4 presents the route map for ODU 2, with the overall leading option and FCERM leading option. Adaptation may be required in the future if funding for the leading options cannot be found and/or regeneration of the area does not occur.

Table 5-2: Whole life present value costs and benefits of the strategic options developed for ODU 2

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	115	0.00
Do Minimum	303	0	115	0.00
Maintain	394	64	51	0.16
Sustain 1.33% AEP	942	108	7	0.11
Sustain 0.5% AEP	994	115	0	0.12
Improve 1.33% AEP	1,914	108	7	0.06
Improve 0.5% AEP	2,042	115	0	0.06
Resilience	318	65	50	0.21

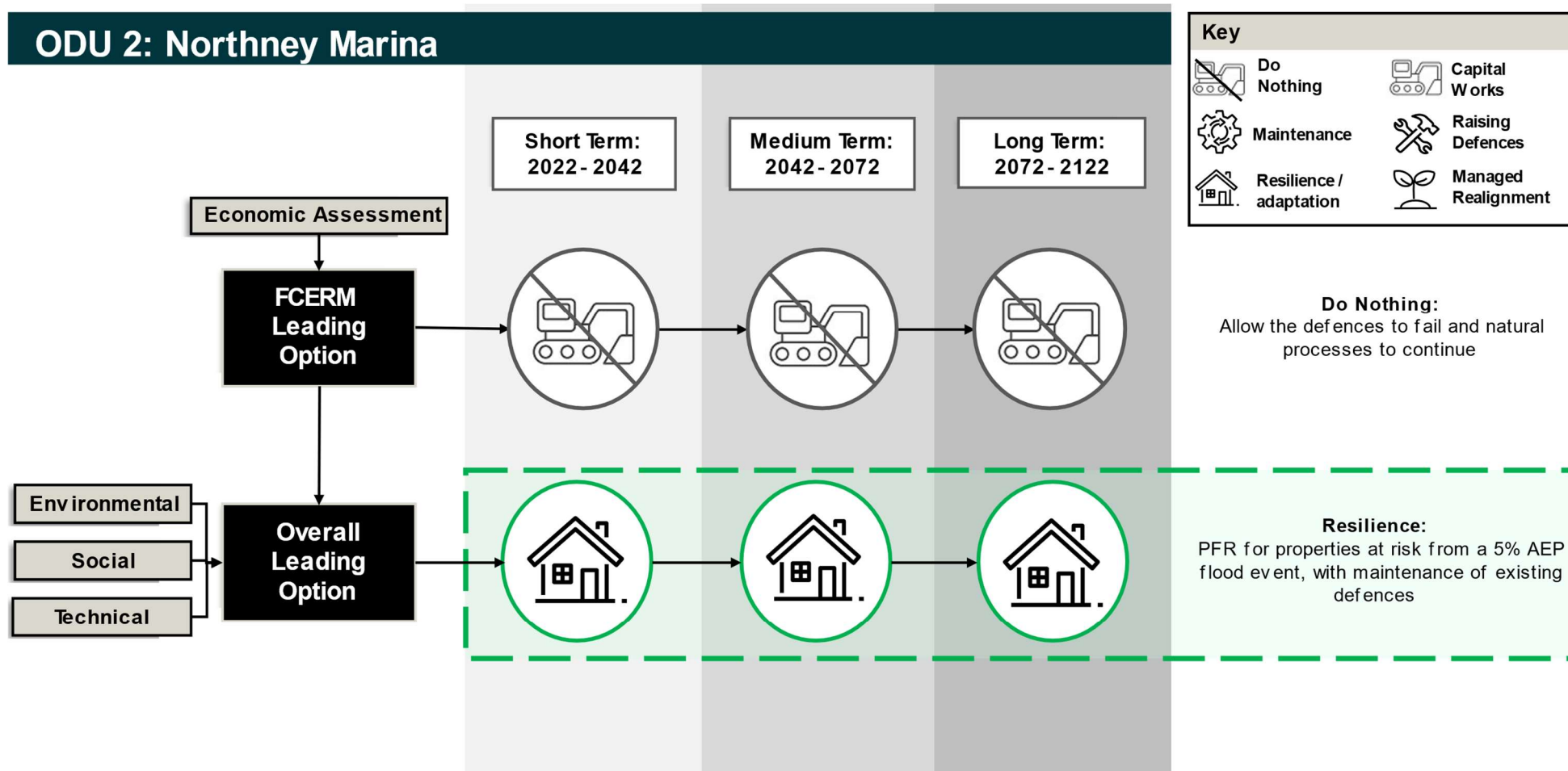


Figure 5-4: ODU 2 Option Route Map

5.3 ODU 3: Northney Farm to Chichester Road

The overall leading option for ODU 3 is: **Managed Realignment (Sustain) 0.5% AEP** – sustain minimum 0.5% AEP (1:200 year) SoP through the construction of a setback earth embankment, with intertidal habitat created in front of the defence. Figure 5-5 displays the existing boundaries for ODU 3, and an approximate location for the setback defence and potential habitat creation.

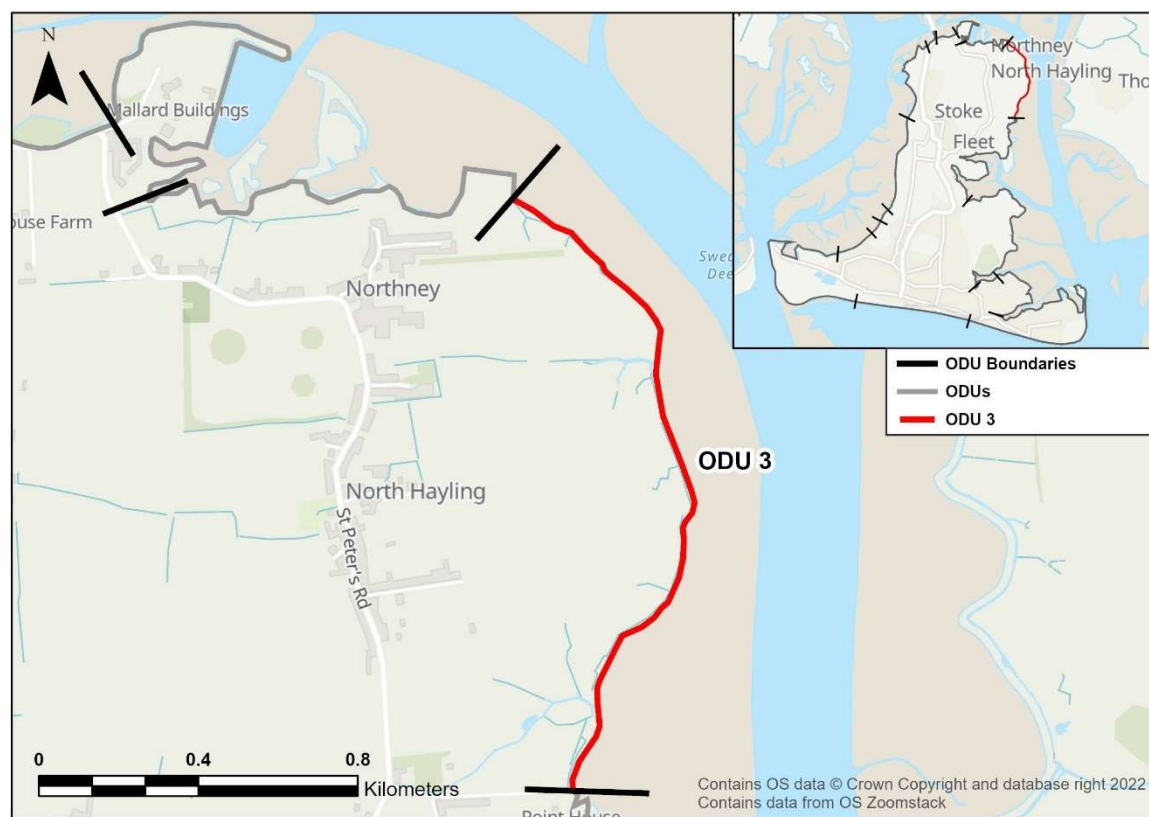


Figure 5-5: ODU 3 - Northney Farm to Chichester Road

This option would involve constructing new defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is less than 10 years. The implementation of the defences would be phased; the initial height of the defences would be built to a 0.5% SoP for 2042, and raised over time to keep pace with sea level rise. Between raising of the defences, the defences would need to be maintained with scheduled maintenance. The new intertidal habitat would be created in epoch 1. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy. This option is expected to generally support the community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure. However, the land owner of the proposed realignment area may not fully support the option. The option has the strongest economic case compared to the other options (Table 5-3).

The creation of intertidal habitat in front of the defences is supported by the Shoreline Management Plan (SMP) policy for this area, which is Hold the Line / Managed Realignment. This area has previously been highlighted as a key site for habitat creation through the Solent and South Downs Regional Habitat Creation Project (RHCP)³. Through this habitat creation, other habitat losses elsewhere in the region from coastal squeeze could be offset, and other environmental benefits (such as carbon sequestration and improved biodiversity) could be achieved. In this area, it is likely that a mosaic of habitats would be established; this will be explored in more detail through additional studies. An environmental management plan would be created as part of this and would include communications with the landowners to confirm the area available for habitat creation.

The FCERM leading option is the same as the overall leading option, as it has the highest benefit cost ratio and the strongest economic case. Figure 5-6 presents the route map for ODU 3, with the overall leading option / FCERM leading option.

Depending on potential funding constraints for implementing the leading options, if these options are not viable then adaptation could be considered as a way forward. Adaptation may become more important in the future as

without any FCERM interventions the risk of coastal flooding and erosion is expected to increase over time due to sea level rise; an additional 38 residential and 41 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaption could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation.

Table 5-3: Whole life present value costs and benefits of the strategic options developed for ODU 3

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	2,991	0.00
Do Minimum	338	0	2,991	0.00
Managed Realignment (Sustain) 1.33% AEP	2,252	6,032	0	2.68
Managed Realignment (Sustain) 0.5% AEP	2,287	6,140	0	2.68
Managed Realignment (Improve) 1.33% AEP	5,246	6,065	0	1.16
Managed Realignment (Improve) 0.5% AEP	5,597	6,183	0	1.10
Resilience	509	776	2,215	1.52

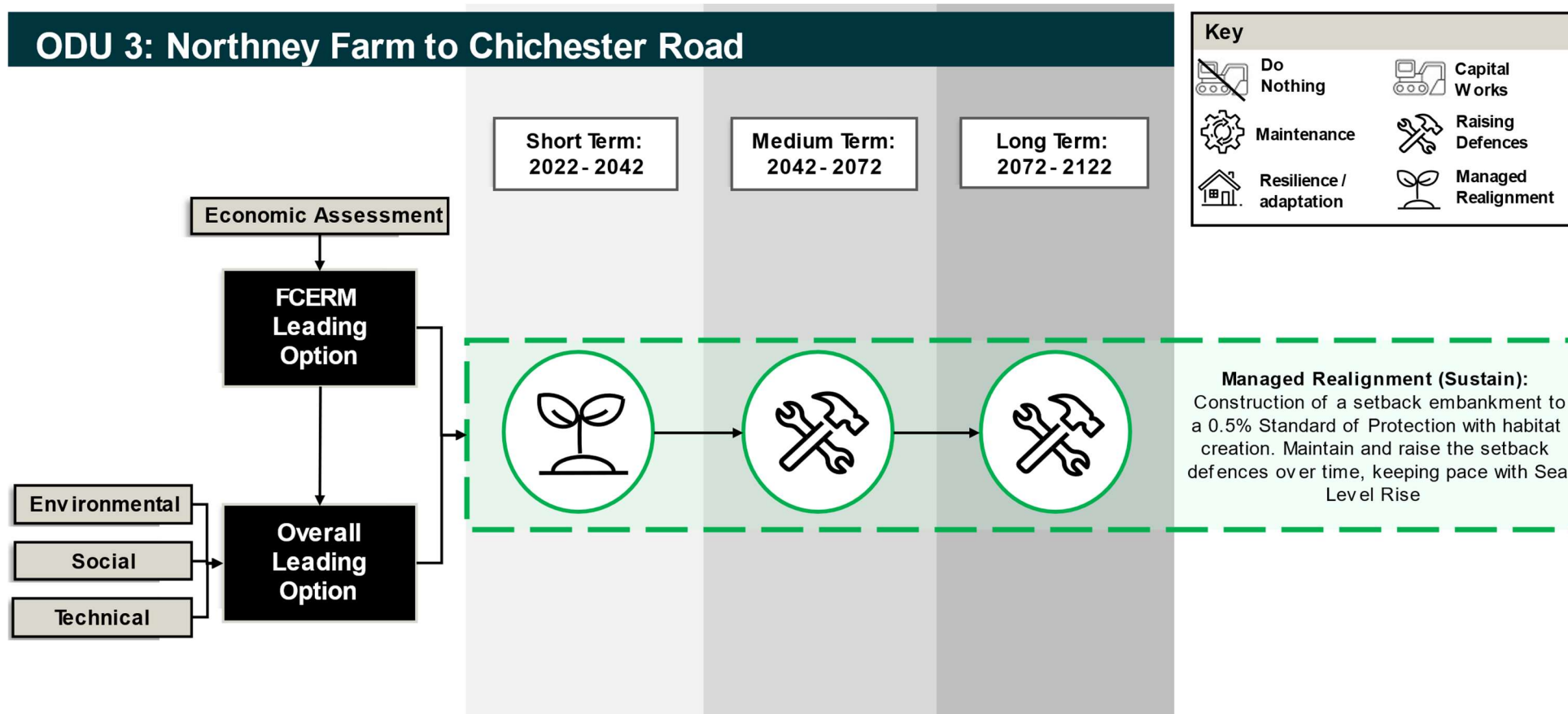


Figure 5-6: ODU 3 Option Route Map

5.4 ODU 4: Chichester Road to Mill Rythe Junior School

The overall leading option for ODU 4 is: **Resilience** – PFR for properties at risk of flooding from a 5% AEP (1:20 year) flood event. This would include maintenance of the existing frontline defences. Figure 5-7 presents the existing boundaries for ODU 4. The FCERM leading option here is Do Nothing, as all of the options (including Resilience) have a benefit cost ratio less than 1.

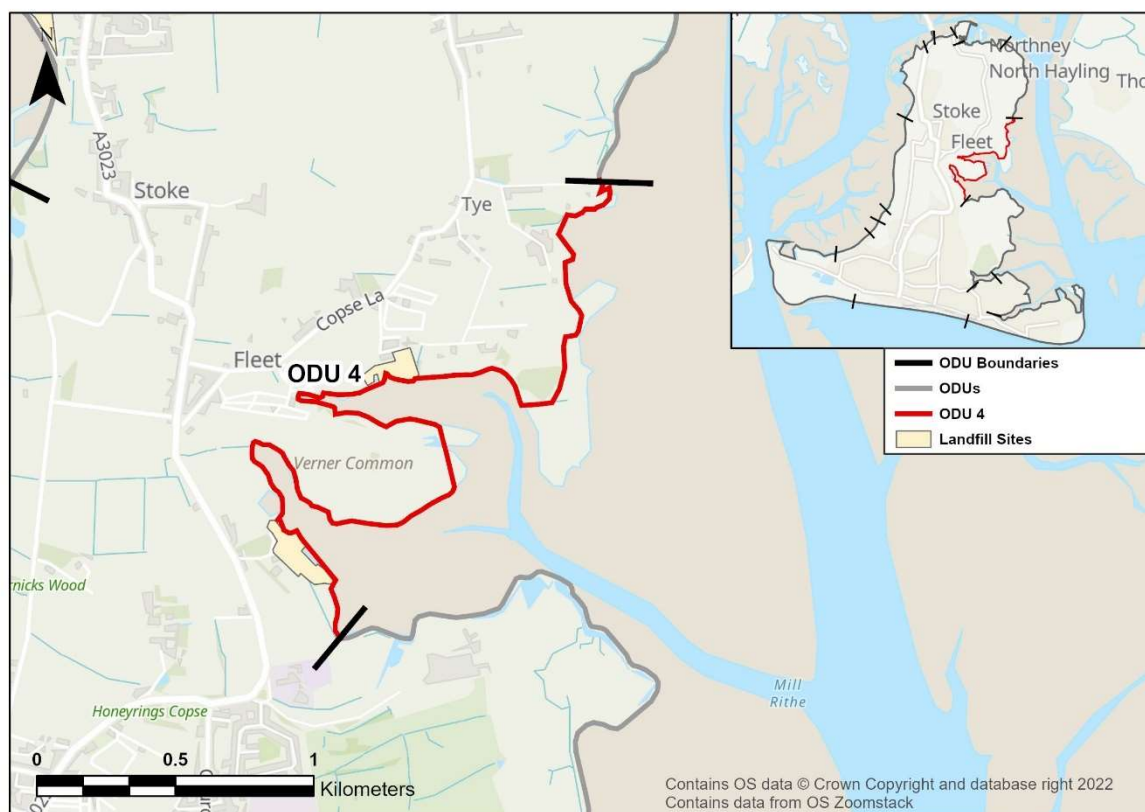


Figure 5-7: ODU 4 - Chichester Road to Mill Rythe Junior School

This option would involve implementing PFR measures in epoch 1 (2022 – 2042) for all properties within the ODU which are at risk of flooding from a 5% AEP flood event. Further PFR measures would be installed for properties as they become at risk in epochs 2 and 3. In the present day, there are 3 residential properties at risk; in epoch 3, there will be 24 properties at risk. PFR has only been considered to protect properties up to a 5% AEP event, as it is not effective at providing protection from flooding at higher return period events. As part of this option, there would also be patch and repair of the existing frontline defences throughout the Strategy appraisal period. Further details of the exact PFR measures and the maintenance schedule would be investigated as part of the scheme appraisal process following the Strategy.

This option would provide some flood protection to the properties within ODU 4 through PFR, as well as some coastal erosion protection through maintenance of frontline defences where there are properties at risk. This defence maintenance would also help to protect the historic landfill from flooding and coastal erosion, without the construction of any new defences. For both environmental and social reasons, it is important to prevent the historic landfill from eroding in the future and reduce the risk of contaminated land exposure.

There is a very limited case for new defences here, as a long length of defence would be required to protect comparatively few properties. This has resulted in the FCERM leading option being Do Nothing. Despite this, the intention of the overall leading option is to provide some protection where possible to properties, and to prevent erosion of the historic landfill. This is in line with the Chichester Harbour Conservancy (CHC) guidance for works licenses, as maintenance would only be permitted where assets or infrastructure are at risk. In areas where there are no assets at risk, a Do Nothing approach would be followed. This would lead to a gradual rollback of the shoreline, which will help to naturally create intertidal habitats. An environmental management plan would be required as part of this option to manage this transition.

The strategic options considered for ODU 4 are presented in Table 5-4 below, comparing the benefits and costs of each option, as well as the residual damages (damages prior to scheme implementation and damages expected during above design standard flood events).

Figure 5-8 presents the route map for ODU 4, with the overall leading option and FCERM leading option.

Depending on the funding availability for the leading option, adaptation could be considered in the future as an alternative. If the leading option cannot be funded, adaptation is likely to become increasingly important as without any FCERM interventions the risks of coastal flooding and erosion increase over time due to sea level rise; there will be an additional 26 residential and 83 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. Adaptation may need to be considered when PFR becomes ineffective due to the increasing risk of flooding. Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaptation could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation.

Table 5-4: Whole life present value costs and benefits of the strategic options developed for ODU 4

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	5,913	0.00
Do Minimum	904	41	5,872	0.05
Maintain	3,204	757	5,115	0.24
Sustain 1.33% AEP	7,752	4,517	1,396	0.58
Sustain 0.5% AEP	8,292	4,753	1,160	0.57
Improve 1.33% AEP (around assets only)	13,703	3,691	2,240	0.27
Improve 0.5% AEP (around assets only)	14,557	3,891	2,022	0.27
Improve 1.33% AEP	25,900	5,453	460	0.21
Improve 0.5% AEP	26,934	5,710	203	0.21
Resilience	1,181	937	4,976	0.79

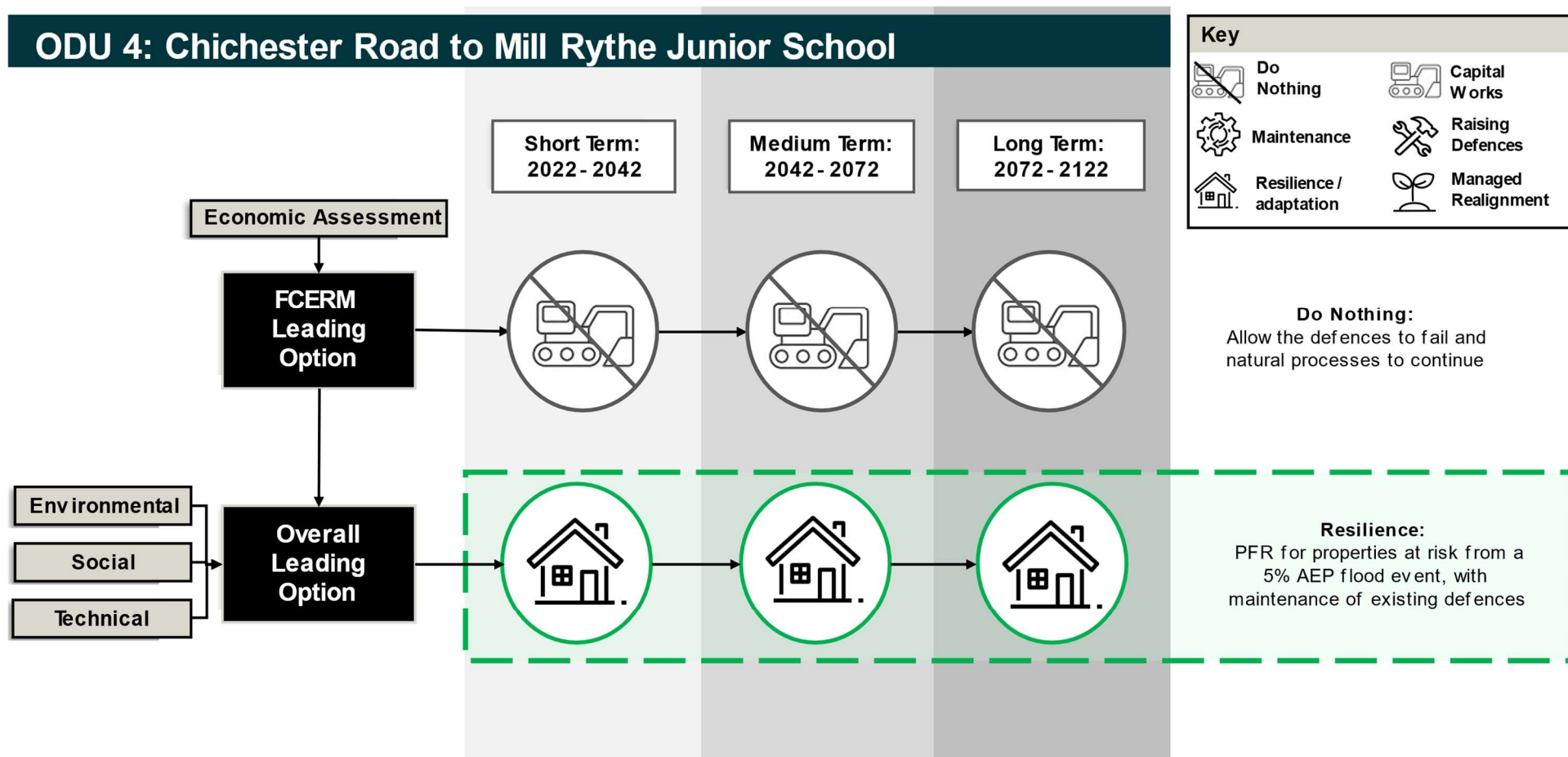


Figure 5-8: ODU 4 Option Route Map

5.5 ODU 5: Mill Rythe Junior School to Salterns Lane

The overall leading option for ODU 5 is: **Managed Realignment (Sustain) 1.33% AEP** – sustain minimum 1.33% AEP (1:200 year) SoP through the construction of a setback embankment, with habitat creation in front of the defences along ODU5b and maintain and raise defences along ODU5a and ODU5c. Figure 5-9 displays the existing boundaries for ODU 5, including the subunits.

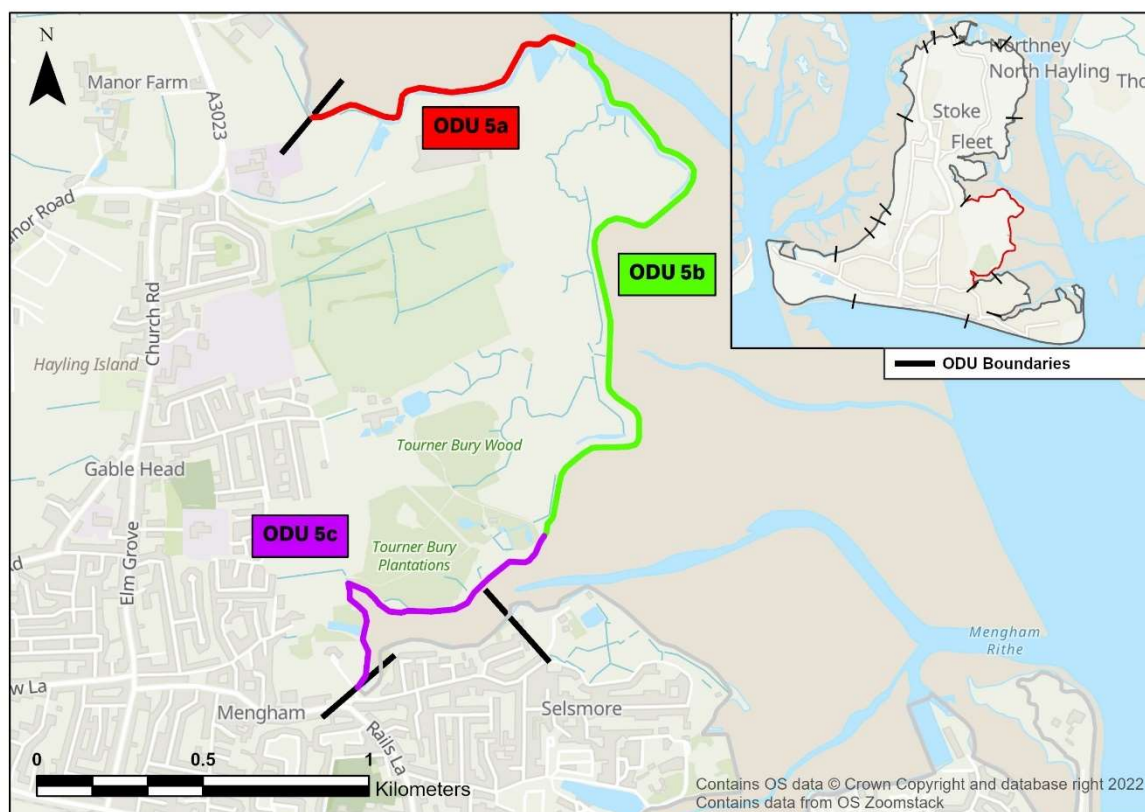


Figure 5-9: ODU 5 - Mill Rythe Junior School to Salterns Lane

This option would involve constructing new defences in epoch 1 (2022 – 2042) along ODU5b, as the residual life of the existing defences is between 10 and 20 years. The implementation of the defences would be phased; the initial height of the defences would be built to a 1.33% SoP for 2042 and raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. The new intertidal habitat would be created along ODU5b in epoch 1. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy. This option would also involve maintaining and raising the existing defences to a 1.33% SoP along ODU5a and ODU5c.

This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure, including Mill Rythe Coastal Village and Tournerbury Woods Estate. There is also a strong economic case, as there is only a small amount of residual damage associated with the option in comparison to others (Table 5-5).

. This area (specifically ODU5b) has previously been considered as a potential site for habitat creation through the Solent and South Downs RHCP³. Through this potential habitat creation, other habitat losses elsewhere in the region from coastal squeeze could be offset, and other environmental benefits (such as carbon sequestration and improved biodiversity) could be achieved. This would provide a range of environmental benefits from the present day, hence this option is the most environmentally sustainable. In this area, it is likely that a mosaic of habitats would be established; this will be explored in more detail through additional studies. An environmental management plan would need to be created as part of this.

The FCERM leading option is Maintain then Managed Realignment (Improve) 0.5% AEP from 2072, as it has the highest benefit cost ratio when compared to the other options. This option would involve maximising the life of the existing defences (including some capital refurbishment where there are failing defences), then constructing a setback embankment in 2072 with intertidal habitat creation in front of the defences. This option may receive less stakeholder support with fewer environmental benefits, as the habitat creation would not take place for 50 years. This would make it more difficult to achieve RHCP objectives compared to the leading option, particularly considering the prevalence of climate change in the present day.

Table 5-5: Whole life present value costs and benefits of the strategic options developed for ODU 5

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	7,373	0.00
Do Minimum	778	13	7,360	0.02
Maintain	1,309	2,566	4,807	1.96
Sustain 1.33% AEP	3,994	6,214	1,159	1.56
Sustain 0.5% AEP	4,769	7,373	0	1.55
Maintain then Improve 1.33% AEP from 2072 – Frontline defence	3,044	4,358	3,015	1.43
Maintain then Improve 0.5% AEP from 2072 – Frontline defence	3,238	6,768	605	2.09
Maintain then Improve 1.33% AEP from 2072 – Setback defence	2,564	4,358	3,015	1.70
Maintain then Improve 0.5% AEP from 2072 – Setback defence	2,506	6,768	605	2.70
Managed Realignment (Sustain) 1.33% AEP	4,671	7,116	257	1.52
Managed Realignment (Sustain) 0.5% AEP	5,506	7,724	0	1.40
Managed Realignment (Improve) 1.33% AEP	6,038	7,120	253	1.18
Managed Realignment (Improve) 0.5% AEP	6,038	7,724	0	1.28
Maintain then Managed Realignment (Improve) 1.33% AEP from 2072	2,527	5,278	2,095	2.09
Maintain then Managed Realignment (Improve) 0.5% AEP from 2072	2,527	7,683	0	3.04
Resilience	1,196	1,447	5,926	1.21

Figure 5-10 (overleaf) presents the route map for ODU 5, with the overall leading option and FCERM leading option.

Depending on the funding constraints for implementing the leading options, if these options are not viable then adaptation could be considered as a way forward. This may become increasingly important in the future as the risk from coastal flooding and erosion increases without any FCERM interventions; there will be an additional 103 residential and 112 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaption could include for example, creating community flood support

groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation.

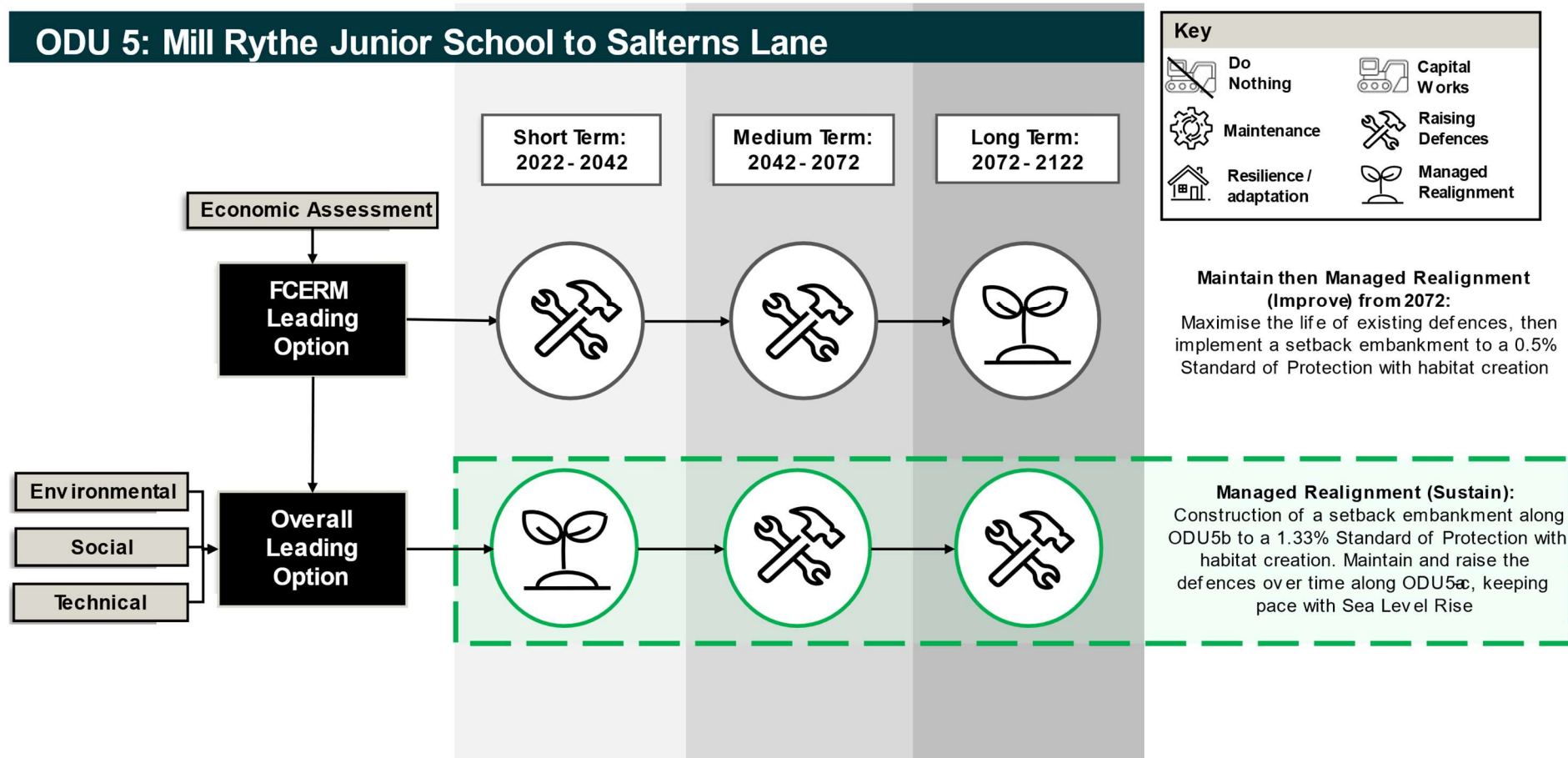


Figure 5-10: ODU 5 Option Route Map

5.6 ODU 6: Salterns Lane to Wilsons Boat Yard

The overall leading option for ODU 6 is: **Maintain then Improve 0.5% AEP from 2072** – maximise the life of existing defences, then construct a frontline floodwall in 2072 to a minimum 0.5% AEP (1 in 200 year) SoP. This would include PFR for properties at risk of flooding from a 5% AEP (1:20 year) flood event up to 2072. Figure 5-11 presents the existing boundaries for ODU 6.

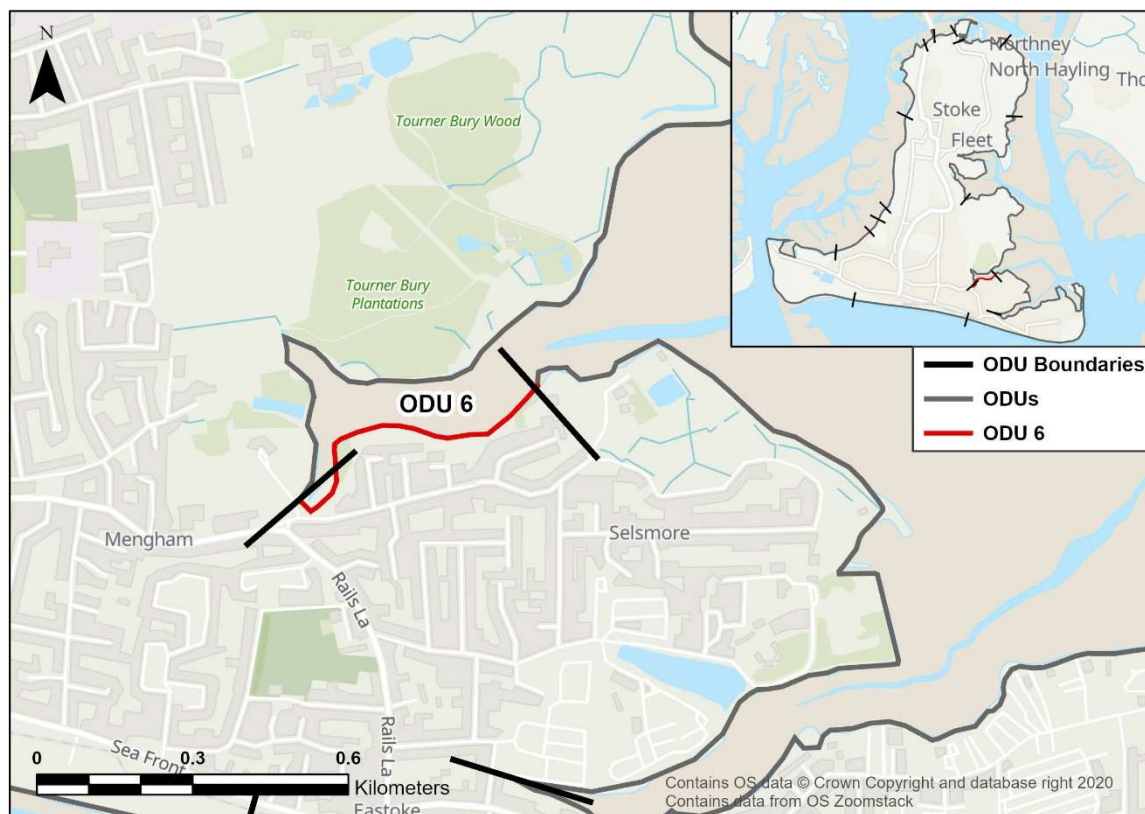


Figure 5-11: ODU 6 – Salterns Lane to Wilsons Boat Yard

This would involve maintenance of the existing defences in epoch 1 and epoch 2 (2022 – 2072), as the residual life of the existing defences is more than 20 years and there is a low risk of flooding and coastal erosion until epoch 3 in 2072. During this period, PFR would be implemented to minimise flooding to properties. In 2072, new defences would be built to a 0.5% SoP for 2122. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy.

This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure. There is a potential for new defences to act as a barrier to the foreshore, however this would be worked into the design to prevent restrictions on coastal access. This option also has the strongest economic case, with only a small amount of residual damage associated with the option in comparison to others (Table 5-6).

The FCERM leading option is the same as the overall leading option, as it has the highest benefit cost ratio. Figure 5-12 presents the route map for ODU 6, with the overall leading option / FCERM leading option.

Depending on the funding constraints for implementing the leading options, if these options are not viable then adaptation could be considered as a way forward. This may become increasingly important in the future as the risk from coastal flooding and erosion increases without any FCERM interventions; there will be an additional 60 residential and 34 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 12 properties expected to be at risk of coastal erosion by 2122. Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaption could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation.

Table 5-6: Whole life present value costs and benefits of the strategic options developed for ODU 6

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	2,493	0.00
Do Minimum	118	0	2,493	0.00
Maintain	830	2,061	829	1.00
Maintain then advance the line 0.5% AEP	2,539	2,299	194	0.91
Maintain then Improve 1.33% AEP from 2072	977	1,222	1,271	1.25
Maintain then Improve 0.5% AEP from 2072	986	5,166	2,299	2.33
Resilience	975	2,536	1,620	1.66

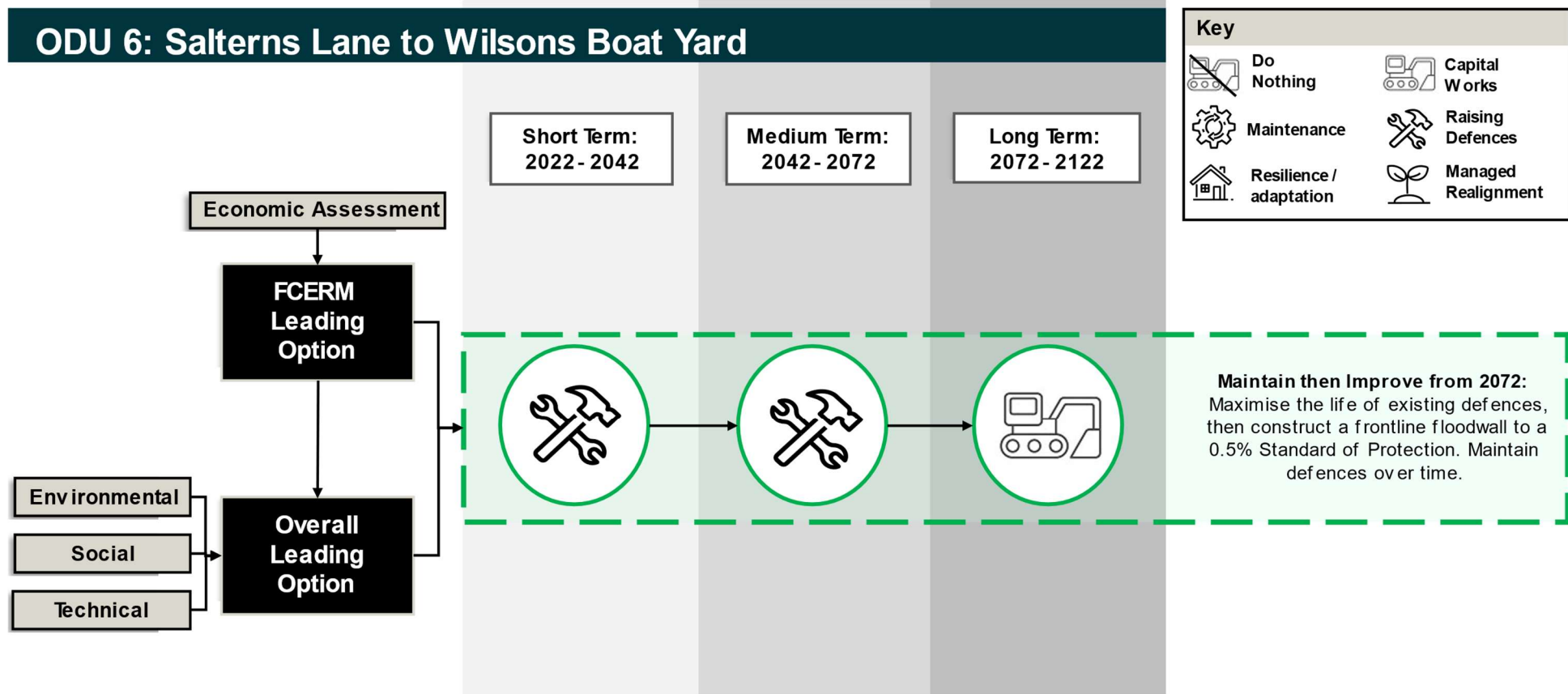


Figure 5-12: ODU 6 Option Route Map

5.7 ODU 7: Wilsons Boat Yard to Fishery Creek

The overall leading option for ODU 7 is: **Sustain 0.5% AEP** – sustain minimum 0.5% AEP (1:200 year) SoP through the construction of a frontline rock revetment. Figure 5-13 displays the existing boundaries for ODU 7. Although new defences in ODU 6 will not be constructed until 2072, there are no flow paths from ODU 6 into ODU 7, therefore it would not be outflanked.

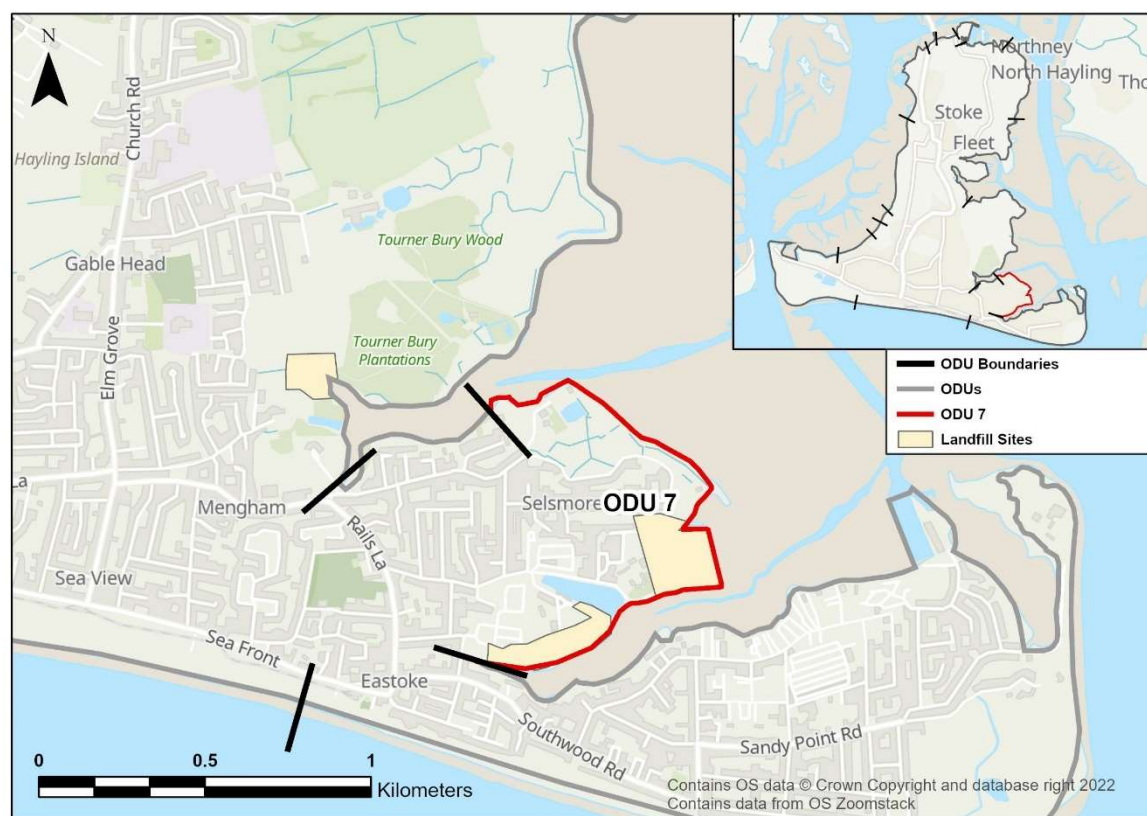


Figure 5-13: ODU 7 – Wilsons Boat Yard to Fishery Creek

This option would involve constructing new defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years. The implementation of the defences would be phased; the initial height of the defences would be built to a 0.5% SoP for 2042, and raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy.

This option supports community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure, and it is similar to previous works undertaken by the Environment Agency. There is a potential for new defences to act as a barrier to Mengham Rytte Moorings, however this would be worked into the design to prevent restricting access. The option would also prevent erosion of the historic landfill at Selsmore and Fishery Creek. For both environmental and social reasons, it is important to prevent the historic landfill from eroding in the future and reduce the risk of potentially contaminated land exposure. This option also has the strongest economic case compared to the other options, with minimal residual damages (Table 5-7).

The FCERM leading option, following the appraisal guidance decision process of Incremental Cost Benefit Ratio (ICBR), is the same as the overall leading option. Figure 5-6 presents the route map for ODU 7, with the overall leading option / FCERM leading option.

Depending on the funding constraints for implementing the leading options, if these options are not viable then adaptation could be considered as a way forward. This may become increasingly important in the future as the risk from coastal flooding and erosion increases without any FCERM interventions; there will be an additional 187 residential and 111 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 17 properties expected to be at risk of coastal erosion by 2122. Adaptation may follow the avoid,

accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaption could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation.

Table 5-7: Whole life present value costs and benefits of the strategic options developed for ODU 7

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	12,878	0.00
Do Minimum	391	2	12,876	0.01
Maintain	913	2,122	10,756	2.32
Sustain 1.33% AEP – Frontline defence	3,607	11,224	1,654	3.11
Sustain 0.5% AEP – Frontline defence	4,001	12,878	0	3.22
Improve 1.33% AEP – Frontline defence	9,024	11,508	1,370	1.28
Improve 0.5% AEP – Frontline defence	9,945	12,878	0	1.29
Sustain 1.33% AEP – Setback defence	3,666	11,224	1,654	3.06
Sustain 0.5% AEP – Setback defence	3,914	12,878	0	3.29
Improve 1.33% AEP – Setback defence	5,728	11,508	1,370	2.15
Improve 0.5% AEP – Setback defence	6,113	12,878	0	2.24

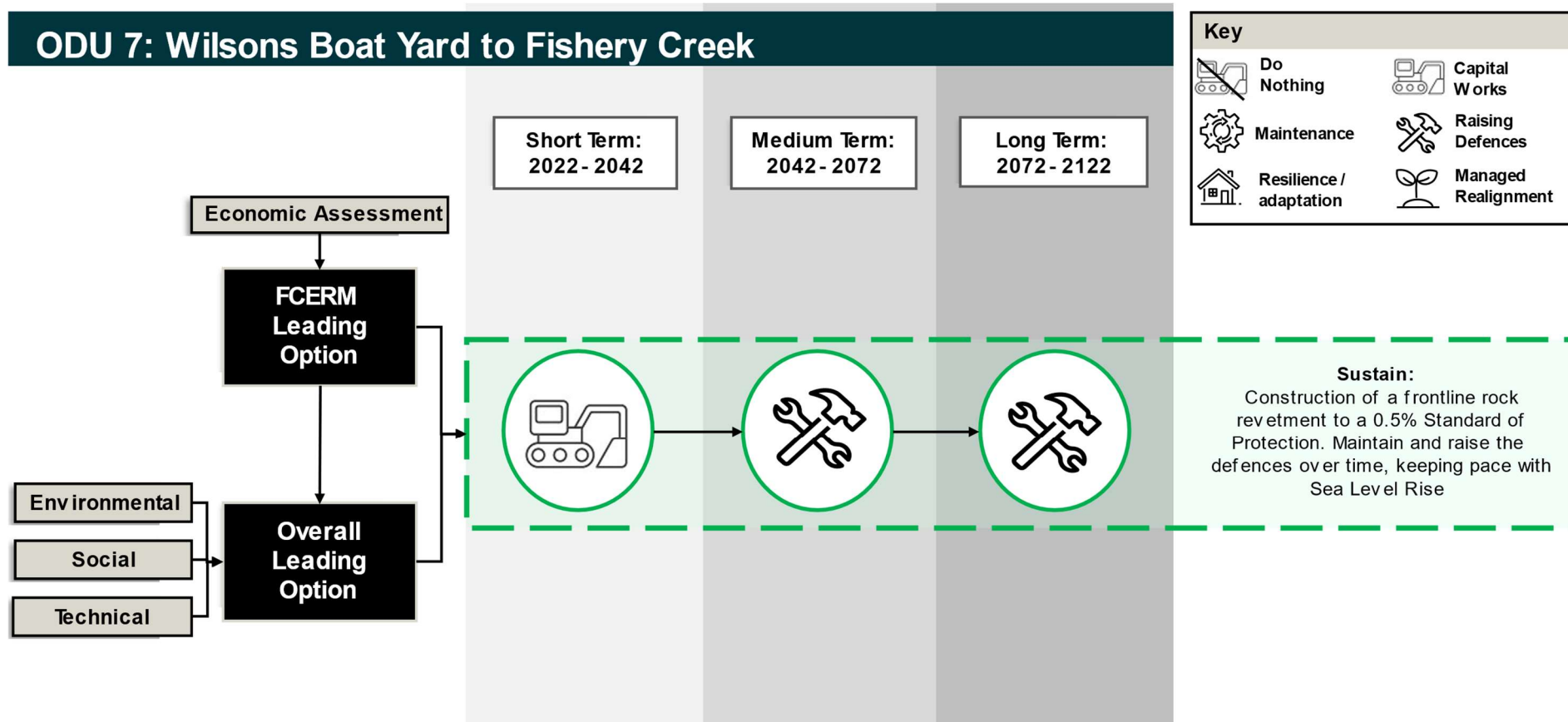


Figure 5-14: ODU 7 Option Route Map

5.8 ODU 8: Eastoke

The overall leading option for ODU 8 is: **Sustain 0.5% AEP** – sustain minimum 0.5% AEP (1:200 year) SoP through the construction of new defences. Figure 5-15 displays the existing boundaries for ODU 8.

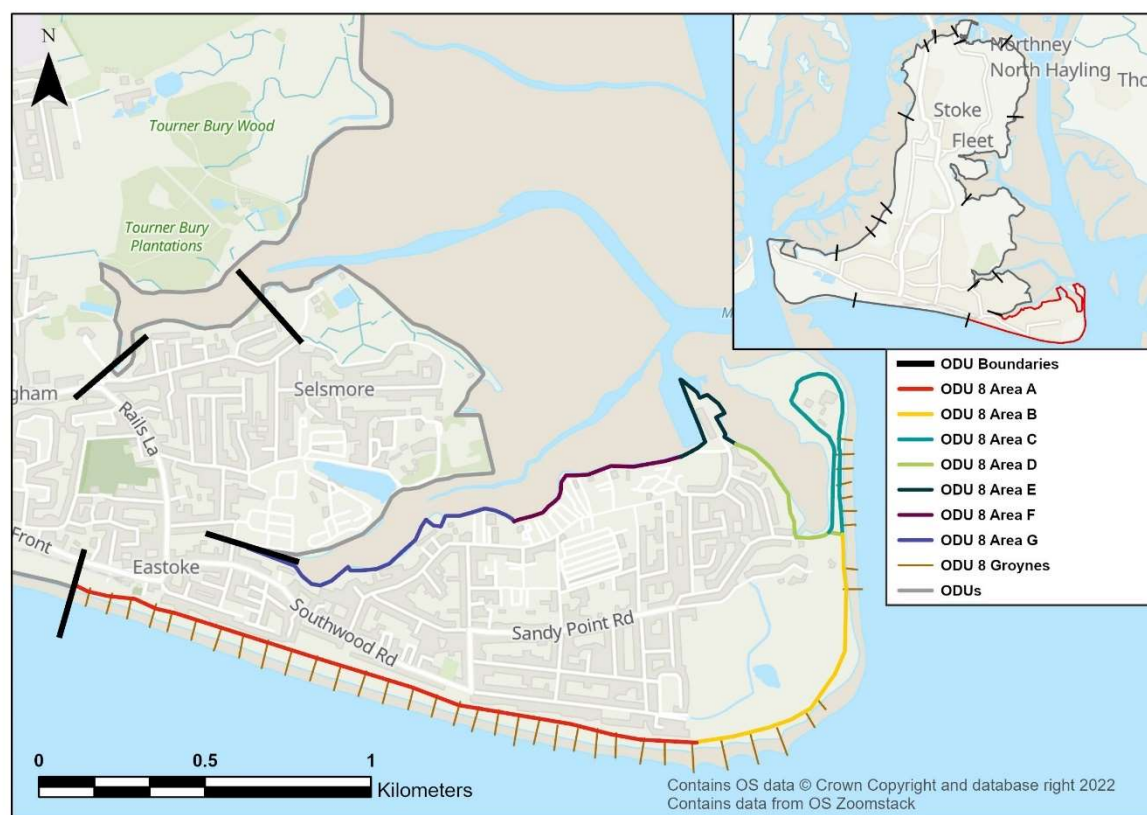


Figure 5-15: ODU 8 - Eastoke

This option would involve constructing new defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years. The ODU would be split into different areas to implement defences which are most suitable to the coastline. This would include a combination of rock revetments, crest raising, floodwalls and setback floodwalls as defined in Table 5-8. The implementation of the defences would be phased; the initial height of the defences would be built to a 0.5% SoP for 2042, and raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy.

Table 5-8: Potential defence types to be implemented as part of the overall leading option for ODU 8

Area	Defence Type	Approximate length (metres)
A: Open Coast, from the eastern end of the Hayling Seaside Railway to the eastern end of Southwood Road	Rock revetment with beach management	1,900
B: Open Coast, from the eastern end of Southwood Road to Wittering Road	Floodwall	900
C: Open Coast / Estuarine, around Sandy Point, including Hayling Island Sailing Club	Floodwall	1,100
D: Estuarine, from Wittering Road to Sparkes Marina	Crest raising	500
E: Setback from the coastline behind Sparkes Marina	Setback floodwall	200
F: Estuarine, from Sparkes Marina to Eastoke Avenue at Birdham Road	Crest raising	600
G: Estuarine, from Eastoke Avenue at Birdham Road to Southwood Road	Floodwall	1,000

At area A, a rock revetment would be constructed in front of the promenade. This option presents a low risk technical design and it is similar to the existing rock revetment scheme at Eastoke point. All existing groynes would then be replaced by new rock groynes. Beach nourishment and recycling would continue to keep the beach in place and protect the toe of the hard defence at the back of the beach.

At present the beach crest is used as the primary defence, however with this approach the rock revetment would become the primary defence. Flood defence for the area would therefore not be reliant on a high beach crest to provide the desired standard of protection. However, some beach management would still be required to ensure that the beach would protect the toe of the rock revetment and prevent undermining. If through effective beach management a high crest level could be sustained, the beach would provide additional FCERM benefits by reducing wave energy interacting with the rock revetment and potentially reduce maintenance requirements. A large beach would also provide amenity and recreation benefits to the area although this would be reduced compared to the existing situation due to the rock revetment at the top of the beach.

This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure. This would include protection of Southwood Road from erosion, which is a key access road into Eastoke, protecting access to approximately 810 properties. It would also maintain beach access, and provide support for future regeneration and redevelopment plans under development with HBC.

This option has a strong economic case compared to the other options, with minimal residual damages (Table 5-9). The FCERM leading option is Sustain 0.5% AEP, with crest raising instead of rock revetment at the front of the promenade. Although this has the best economic case following the appraisal guidance decision process of ICBR, it would be more technically complex.. Figure 5-16 presents the route map for ODU 8, with the overall leading option and FCERM leading option.

Depending on the funding availability for implementing the leading options, if these options are not viable then adaptation could be considered as a way forward. This may become increasingly important in the future as the risk from coastal flooding and erosion increases without any FCERM interventions; there are an additional 1100 residential and 261 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 1109 properties expected to be at risk of coastal erosion by 2122 (either directly, or indirectly through loss of access along Southwood Road). Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust the reality of future coastal flooding and erosion risk. Adaptation could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning. Relocation of properties at Eastoke may be more challenging than in other areas on the Island due to the larger number of properties at risk.

Table 5-9: Whole life present value costs and benefits of the strategic options developed for ODU 8

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	250,085	0.00
Do Minimum	20,135	5,450	244,635	0.27
Maintain	23,156	199,665	50,420	8.15
Sustain 1.33% AEP - Crest raising / floodwall / setback floodwall	53,981	243,208	6,877	4.51
Sustain 0.5% AEP - Crest raising / floodwall / setback floodwall	54,840	250,085	0	4.56
Sustain 1.33% AEP – Rock revetment / floodwall / setback floodwall	74,597	243,208	6,877	3.26
Sustain 0.5% AEP – Rock revetment /	76,843	250,085	0	3.25

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
floodwall / setback floodwall				
Sustain 1.33% AEP – Concrete revetment / floodwall / setback floodwall	79,546	243,208	6,877	3.06
Sustain 0.5% AEP – Concrete revetment / floodwall / setback floodwall	50,040	250,085	0	5.00
Improve 1.33% AEP - Crest raising / floodwall / setback floodwall	60,313	243,466	6,619	4.04
Improve 0.5% AEP - Crest raising / floodwall / setback floodwall	61,410	250,085	0	4.07
Improve 1.33% AEP – Rock revetment / floodwall / setback floodwall	94,527	243,466	6,619	2.58
Improve 0.5% AEP – Rock revetment / floodwall / setback floodwall	98,659	250,085	0	2.53
Improve 1.33% AEP – Concrete revetment / floodwall / setback floodwall	97,280	243,466	6,619	2.50
Improve 0.5% AEP – Concrete revetment / floodwall / setback floodwall	99,582	250,085	0	2.51
Maintain then Sustain 1.33% AEP from 2042 - Crest raising / floodwall / setback floodwall	18,917	213,460	36,625	11.28
Maintain then Sustain 0.5% AEP from 2042 - Crest raising / floodwall / setback floodwall	19,394	215,911	34,174	11.13
Maintain then Sustain 1.33% AEP from 2042 – Rock revetment / floodwall / setback floodwall	62,986	213,460	36,625	3.39
Maintain then Sustain 0.5% AEP from 2042 – Rock revetment / floodwall / setback floodwall	64,218	215,911	34,174	3.36

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Maintain then Sustain 1.33% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	65,158	213,460	36,625	3.28
Maintain then Sustain 0.5% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	66,170	215,911	34,174	3.26
Maintain then Improve 1.33% AEP from 2042 - Crest raising / floodwall / setback floodwall	52,963	213,590	36,495	4.03
Maintain then Improve 0.5% AEP from 2042 - Crest raising / floodwall / setback floodwall	53,516	215,911	34,174	4.03
Maintain then Improve 1.33% AEP from 2042 – Rock revetment / floodwall / setback floodwall	70,191	213,590	36,495	3.04
Maintain then Improve 0.5% AEP from 2042 – Rock revetment / floodwall / setback floodwall	72,271	215,911	34,174	2.99
Maintain then Improve 1.33% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	71,577	213,590	36,495	2.98
Maintain then Improve 0.5% AEP from 2042 – Concrete revetment / floodwall / setback floodwall	72,736	215,911	34,174	2.97
Resilience	26,047	33,019	217,066	1.27

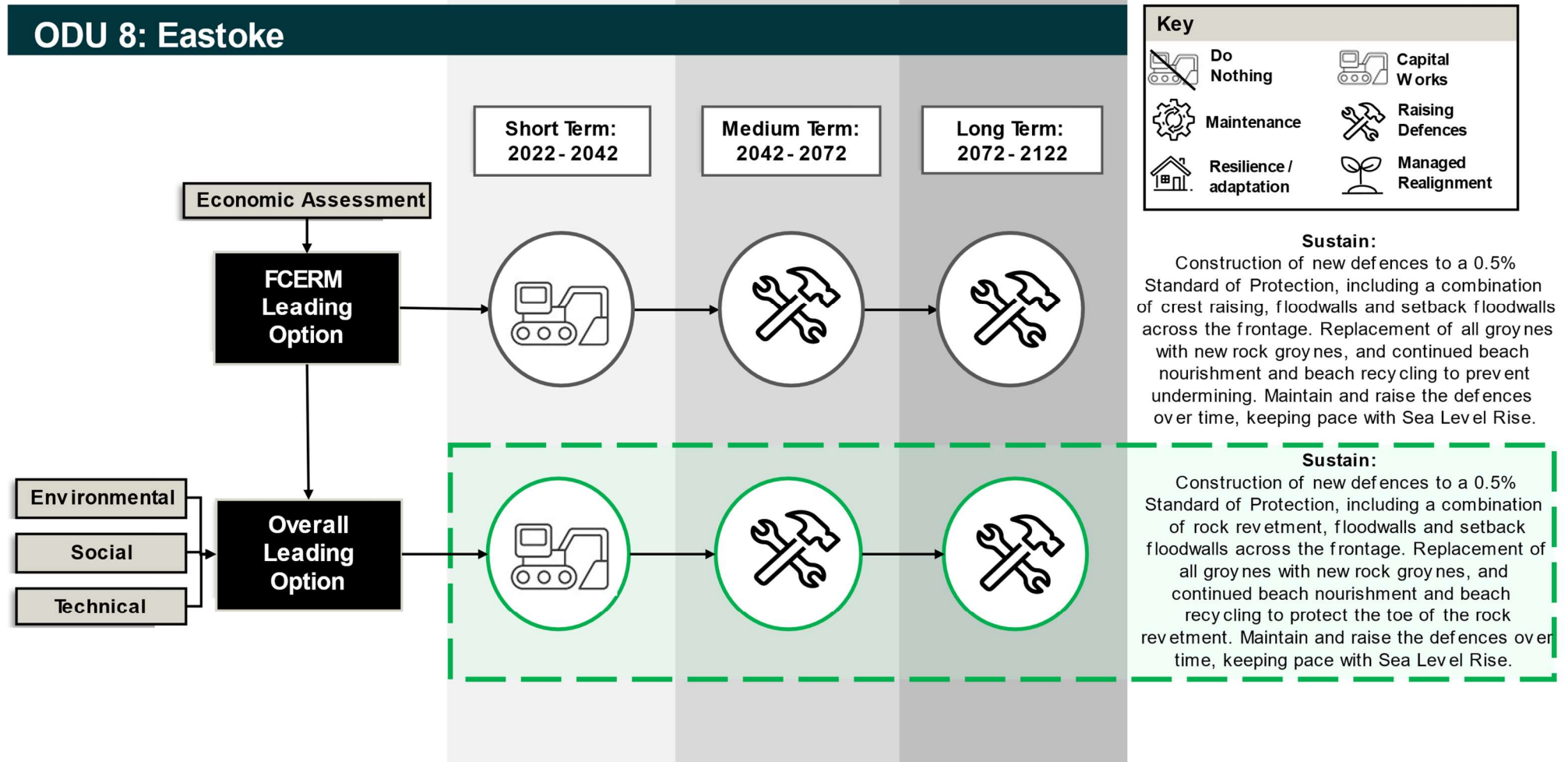


Figure 5-16: ODU 8 Option Route Map

5.9 ODU 9: Eastoke Corner to Inn on the Beach

The overall leading option for ODU 9 is: **Sustain 0.5% AEP** – sustain minimum 0.5% AEP (1:200 year) SoP through the construction of a new setback floodwall and capital refurbishment of the defences in front of Inn on the Beach. Figure 5-17 displays the existing boundaries for ODU 9.

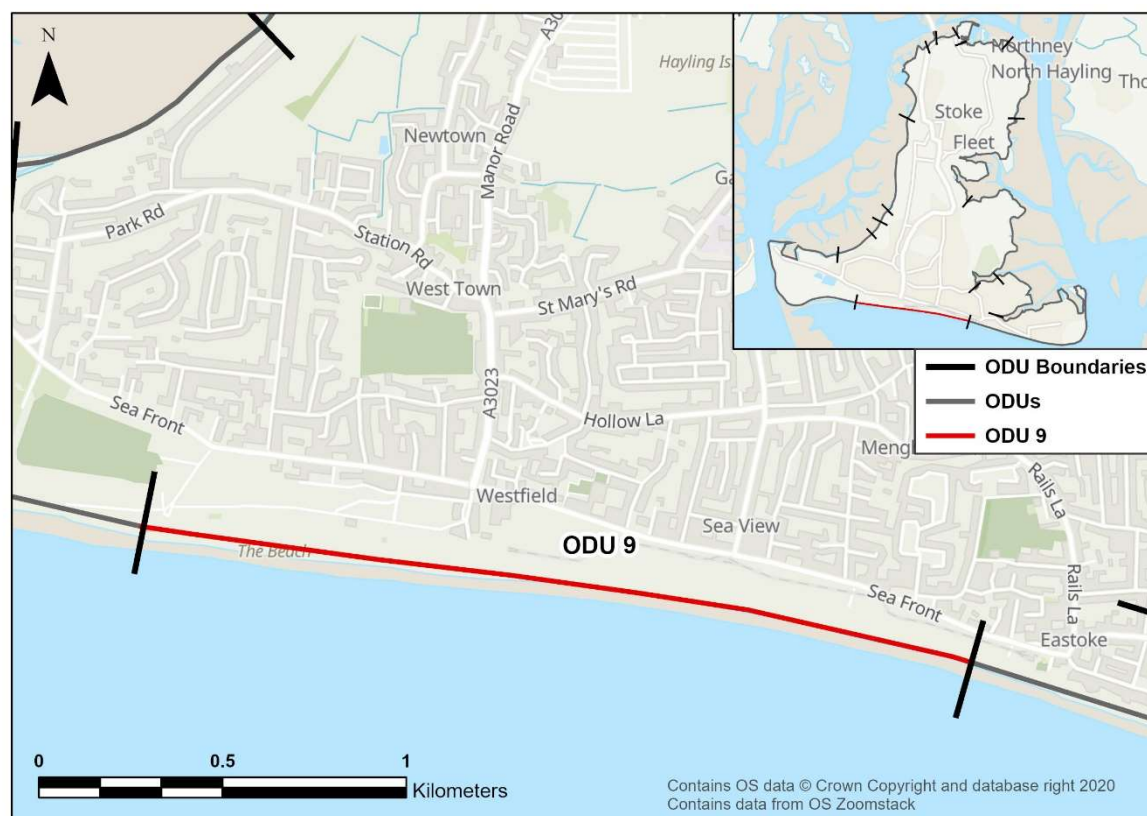


Figure 5-17: ODU 9 - Eastoke Corner to Inn on the Beach

This option would involve constructing new defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years. An asset-focused setback floodwall would be implemented in two lengths (from the eastern end of the Hayling Seaside Railway to Hayling Island Coast Guard station and in front of Funland Amusement Parks) in epoch 1, with additional lengths added in epoch 2 and epoch 3 across the rest of the ODU as the flood and coastal erosion risk increases. The initial height of the defences would be built to a 0.5% SoP for 2042, and raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of a scheme appraisal process following the Strategy.

Inn on the Beach currently acts as a terminal structure which allows sediment to accumulate; it holds the beach in place on the east side, and is therefore an important control feature for longshore sediment transport and retaining the beach profile. As such, it is necessary to either maintain the existing defences at Inn on the Beach or replace them with other structures in order to continue to enable sediment to accumulate. This option would involve capital refurbishment of the defences in front of Inn on the Beach with continued beach nourishment and recycling to regulate the accumulation. All groynes in the east of the area would be replaced with new rock groynes, maintaining the existing size of the groyne field. This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and the seafront infrastructure. It would also maintain beach access and would provide support for future regeneration and redevelopment plans under development with HBC.

This option has a stronger economic case compared to the other options, with minimal residual damages (Table 5-10). However, due to comparatively high costs the benefit cost ratio is just above 1 and therefore further work / funding is likely to be required to develop a viable business case for this option.

The FCERM leading option is Sustain 0.5% AEP, with the replacement of Inn on the Beach with a new rock groyne instead of maintaining the defences in front. Although this has the best economic case, it is likely to provide more technical challenges as well as receiving less support from the local community and stakeholders.

Figure 5-18 presents the route map for ODU 9, with the overall leading option and FCERM leading option. Depending on the evidence base and funding constraints, adaptation could be considered in the future as there will be an additional 16 residential and 38 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 147 properties expected to be at risk of coastal erosion by 2122.

Table 5-10: Whole life present value costs and benefits of the strategic options developed for ODU 9

Strategic Option	Whole Life Cost (PV £k)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	10,543	0.00
Do Minimum	6,393	2,344	8,199	0.37
Maintain	7,625	4,531	6,012	0.59
Sustain 0.5% AEP – Maintain Inn on the Beach	10,324	10,543	0	1.02
Sustain 0.5% AEP – Replace Inn on the Beach	10,211	10,543	0	1.03
Sustain 1.33%AEP - Replace Inn on the Beach	9,448	8,469	2,074	0.9
Sustain 1.33%AEP - Maintain Inn on the beach	9,541	8,469	2,074	0.89
Improve 1.33% AEP – Remove Inn on the Beach	13,820	8,702	1,841	0.63
Improve 0.5% AEP – Remove Inn on Beach	14,328	10,543	0	0.74
Maintain then Sustain 1.33% AEP from 2042	10,327	5,571	4,972	0.54
Maintain then Sustain 0.5% AEP from 2042	10,876	6,001	4,542	0.55
Maintain then Improve 1.33% AEP from 2042	15,978	5,586	4,957	0.35
Maintain then Improve 0.5% AEP from 2042	16,778	6,001	4,542	0.36
Improve beach protection (Timber groynes)	6,950	4,531	6,012	0.65
Improve beach protection (Rock groynes)	6,693	4,531	6,012	0.68
Improve beach protection (Rock groynes +)	9,336	4,531	6,012	0.49
Resilience	6,582	7,761	2,782	1.18

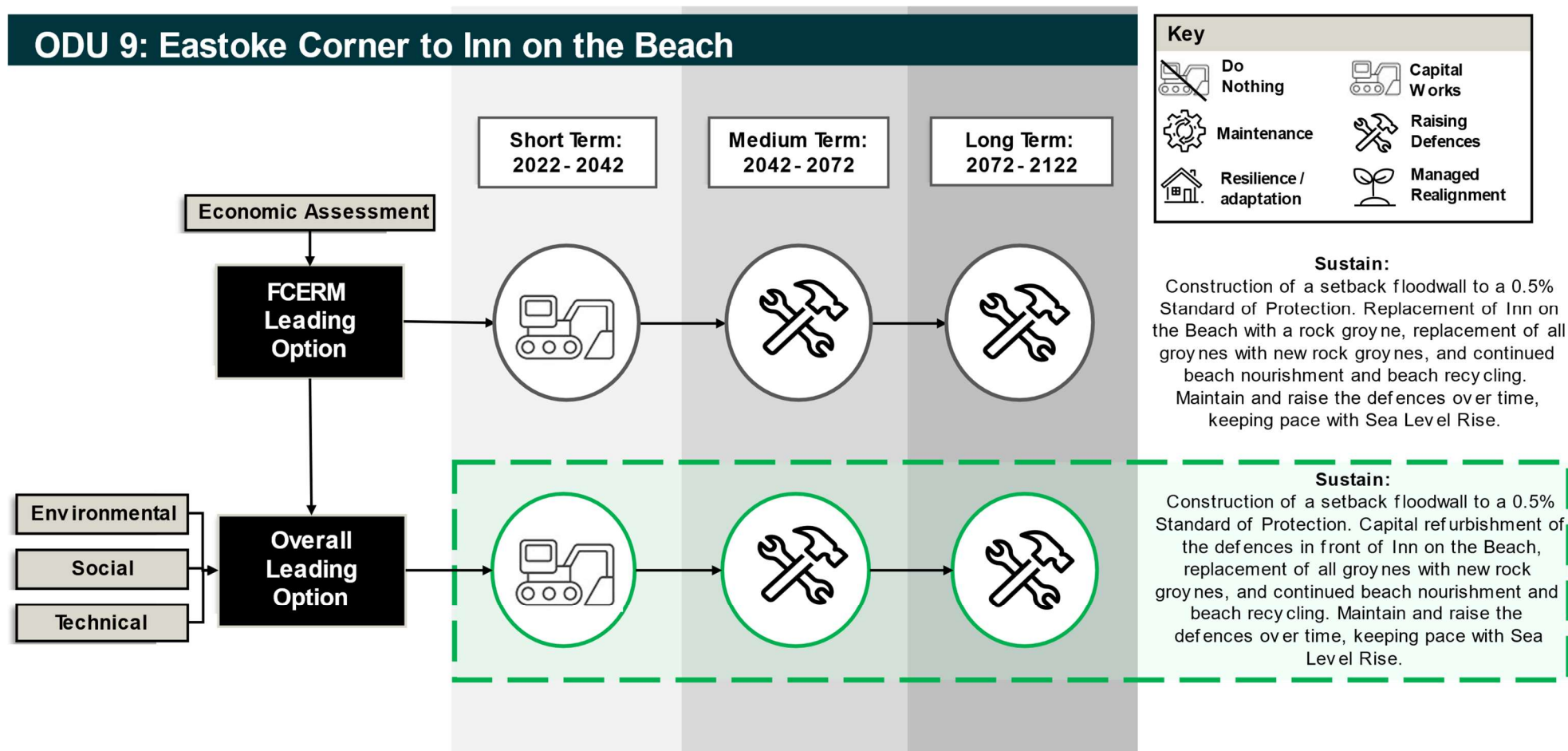


Figure 5-18: ODU 9 Option Route Map

5.10 ODU 10: Inn on the Beach to North Shore Road

The overall leading option for ODU 10 is: **Resilience** – PFR for properties at risk of flooding from a 5% AEP (1:20 year) flood event. This includes maintenance of the existing frontline defences along ODU 10a. Figure 5-19 displays the existing boundaries for ODU 10.



Figure 5-19: ODU 10 - Inn on the Beach to North Shore Road

This option would involve implementing PFR measures in epoch 1 (2022 – 2042) for all properties within the ODU which are at risk of flooding from a 5% AEP flood event. Further PFR measures would be installed for properties as they become at risk in epochs 2 and 3. As part of this option, there would also be patch and repair of the existing frontline defences along ODU10a. Further details of the exact PFR measures and the maintenance schedule would need to be investigated as part of any scheme progressed following the Strategy.

This option would provide protection to the properties within ODU 10. It has the strongest economic case when compared to the other options (Table 5-11). It is likely to receive support from the Kench community in the north, as they are already aware of the increased need for resilience and adaptation to flood and coastal erosion risk. However, this option would not provide improved protection to Ferry Road. It is likely that road damages to Ferry Road during flood events would reduce access to some properties in the area, businesses and to the Ferry.

The erosion zones developed by Coastal Partners indicate that there is dynamic movement of the beach in this area, which would need to be monitored as part of the overall leading option. Importantly the erosion zones assume that all beach management in ODUs 8-10 ceases (i.e. representing the baseline scenario). Under this baseline, the erosion zones indicate that there is likely to be beach accretion at Gunner Point up to 2072, where the beach would then revert to erosion. Anecdotally, at West Beach, there was initially a rebound effect where the beach eroded following the removal of the groynes and breastwork in 2019, and the removal of the revetment in 2020. Given that the leading options in ODU 8 and 9 include ongoing beach management, the erosion zones developed by Coastal Partners may not be representative of the future beach evolution in ODU 10 if these leading options are implemented (as the zones do not include beach management in ODUs 8 and 9). The monitoring of the beach in ODU 10 is therefore key to understanding how the beach is responding to sea level rise and continued beach management to the east.

It is likely that the retention of the Inn on the Beach at the boundary between ODU 9 and ODU 10 would affect the sediment feed into West Beach and could lead to localised erosion in the short term to the west of Inn on the Beach. By monitoring the beach levels at Inn on the Beach and the erosion at West Beach as part of the overall leading option, any erosion trends would be identified. Localised erosion controls (e.g. rock armour) could then be implemented as required, depending on the outcome of the monitoring. This would retain coastal access and reduce the impact of erosion on the golf club, supporting recreation and the future redevelopment plans which are currently under consideration by HBC.

The FCERM leading option is the same as the overall leading option, as it has the highest benefit cost ratio. Similarly, to the overall leading option detailed above, this FCERM leading option would also include monitoring of Inn on the Beach and the erosion at West Beach with the potential to implement localised erosion controls if necessary.

Figure 5-20 presents the route map for ODU 10, with the overall leading option / FCERM leading option. There will be an additional 45 residential and 42 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 43 properties expected to be at risk of coastal erosion by 2122. Adaptation may need to be considered when PFR becomes ineffective due to the increasing risk of flooding. Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaptation could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation. It may be viable to explore the relocation of properties here in the future, as the costs of constructing new defences exceed the benefits.

Table 5-11: Whole life present value costs and benefits of the strategic options developed for ODU 10

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	9,969	0.00
Do Minimum	966	44	9,925	0.05
Maintain	1,407	3,326	6,643	2.12
Sustain 1.33% AEP	27,441	9,472	497	0.35
Improve 1.33% AEP	18,055	9,472	497	0.52
Resilience	1,280	3,634	6,335	2.84

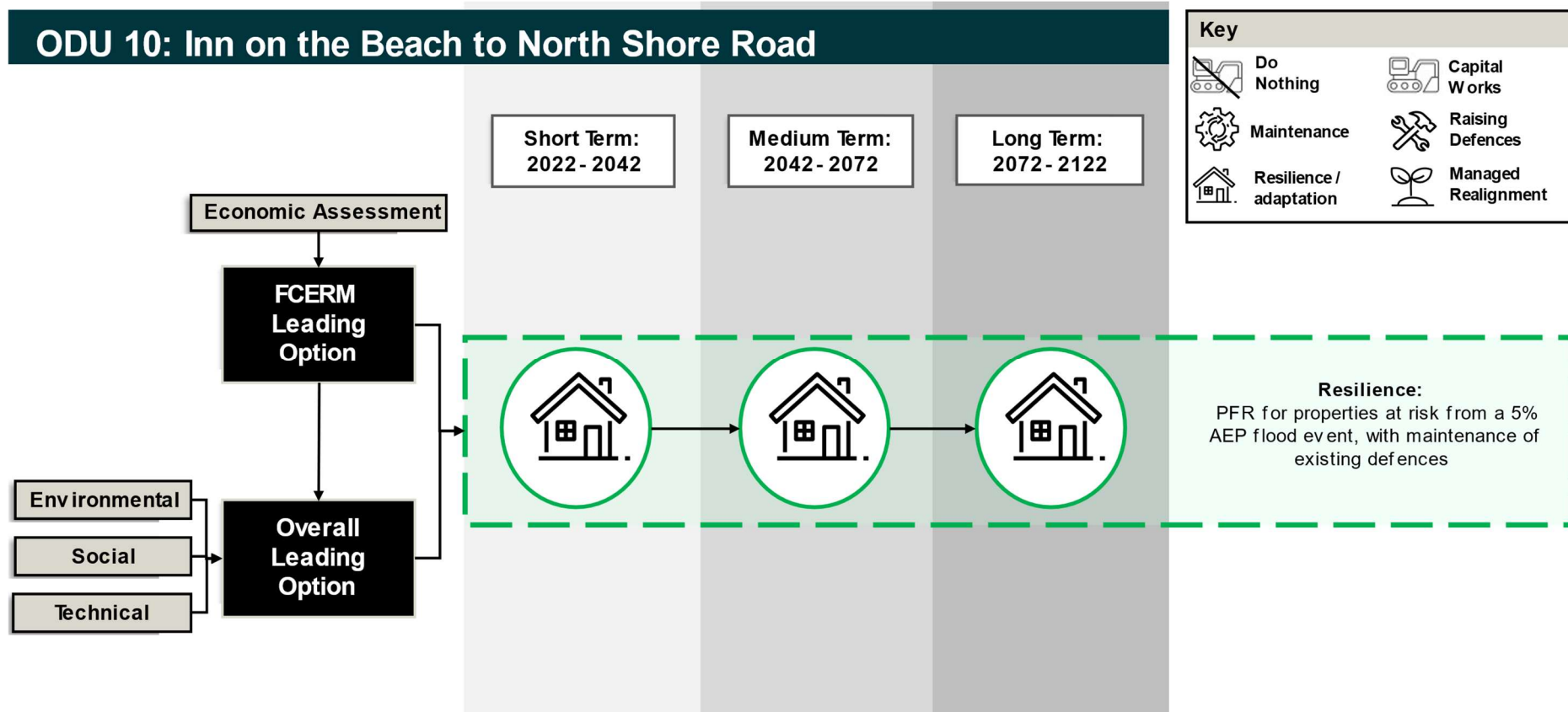


Figure 5-20: ODU 10 Option Route Map

5.11 ODU 11: North Shore Road

The overall leading option for ODU 11 is: **Sustain 1.33% AEP** – sustain minimum 1.33% AEP (1:75 year) SoP through the construction of a frontline floodwall. Figure 5-21 displays the existing boundaries for ODU 11.

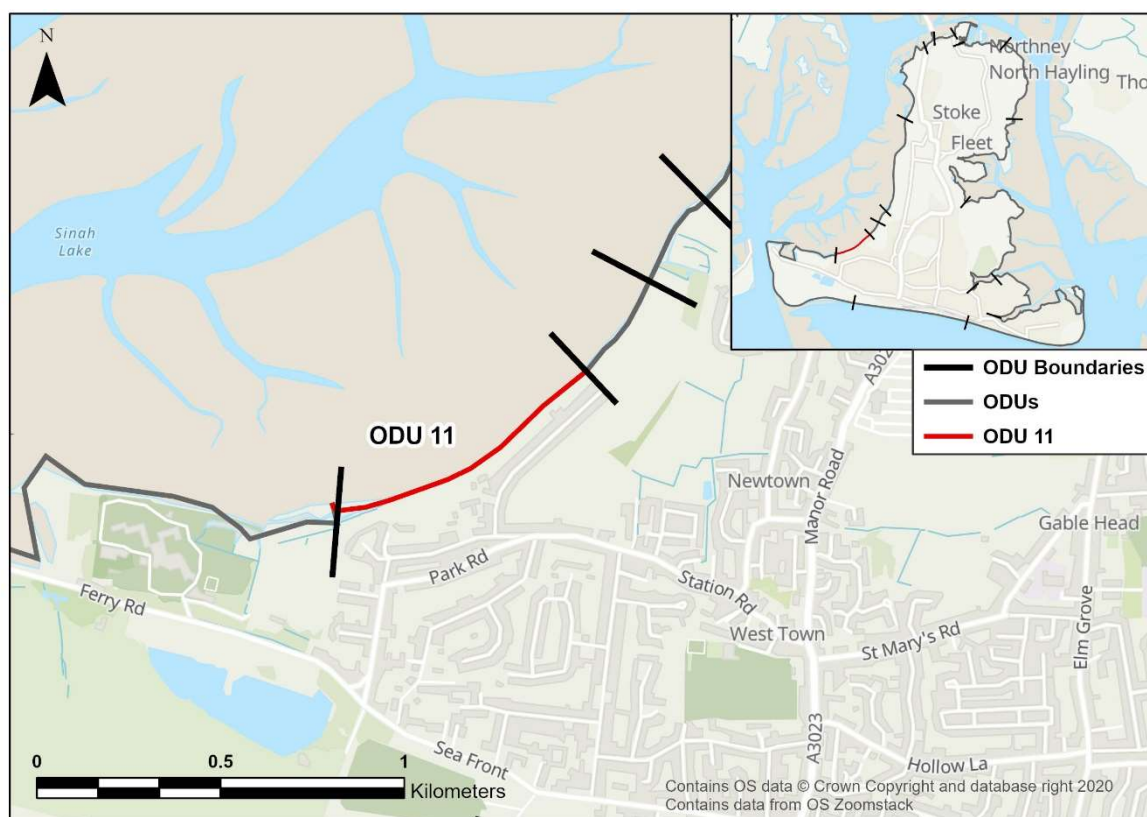


Figure 5-21: ODU 11 – North Shore Road

This option would involve constructing new defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years. The implementation of the defences would be phased; the initial height of the defences would be built to a 1.33% SoP for 2042 on the west section of the ODU. In epoch 2 (2042 – 2072), an additional length would need to be added on the east section of the ODU as flood risk increases and the initial defences would also need to be raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy.

This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure. This option also has a reasonable economic case, with only a small amount of residual damage associated with the option in comparison to others (Table 5-12). There may be some technical challenges in building the defences as the property boundaries are located close to the foreshore, however this would be worked into the design.

The FCERM leading option is Improve 0.5% AEP (west side only), which would include the construction of defences on the west (Sinah Lane) to a 2122 0.5% SoP in the present day with maintenance over the appraisal period. This option would not include the construction of any defences to the east (North Shore Road). Although this option has the best economic case, there may be some residual flood risk to the gardens on the east side which would receive less support from the local community.

Figure 5-22 presents the route map for ODU 11, with the overall leading option and FCERM leading option. Depending on the evidence base and funding constraints, adaptation could be considered in the future as there will be an additional 61 residential and 23 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 11 properties expected to be at risk of coastal erosion by 2122.

Table 5-12: Whole life present value costs and benefits of the strategic options developed for ODU 11

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	3,278	0.00
Do Minimum	155	0	3,278	0.09
Maintain	1,104	2,739	2,194	1.99
Sustain 1.33% AEP	2,508	2,942	336	1.17
Sustain 0.5% AEP	3,020	3,278	0	1.09
Improve 1.33% AEP	1,225	2,943	335	2.40
Improve 0.5% AEP	1,303	3,278	0	2.52
Maintain then Sustain 1.33% AEP from 2042	2,994	3,126	152	1.04
Maintain then Sustain 0.5% AEP from 2042	3,085	3,219	59	1.04
Resilience	1,166	2,350	2,339	2.01

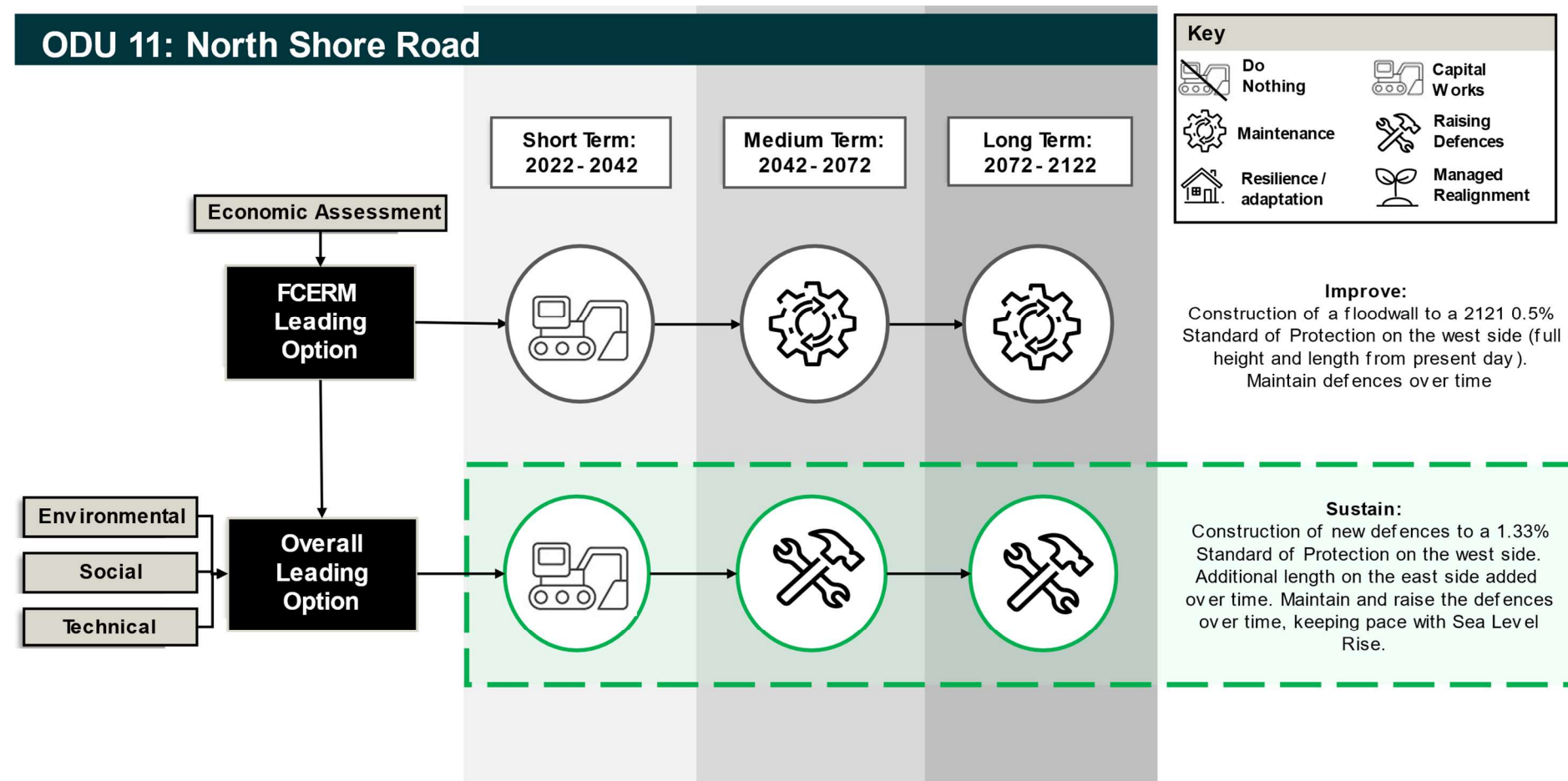


Figure 5-22: ODU 11 Option Route Map

5.12 ODU 12: North Shore Road to Newtown

The overall leading option for ODU 12 is: **Do Nothing** – Allow natural processes to continue. Figure 5-23 displays the existing boundaries for ODU 12.

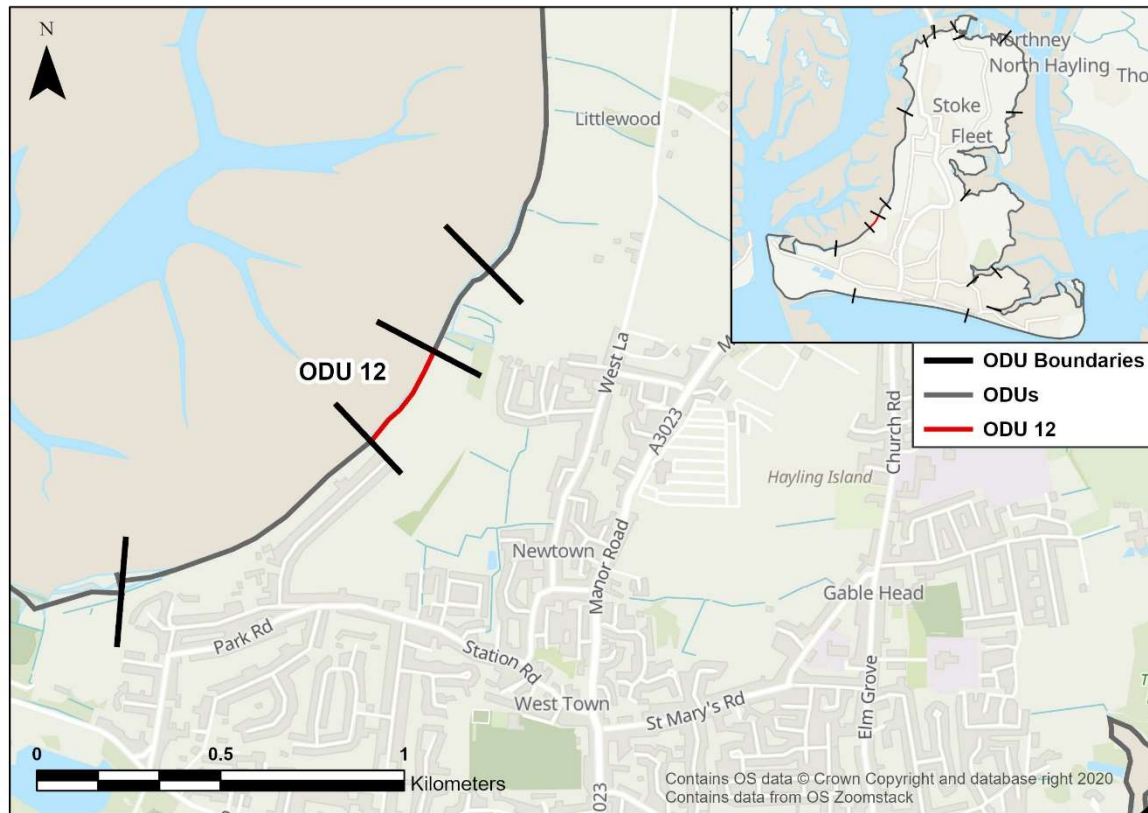


Figure 5-23: ODU 12 – North Shore Road to Newtown

This option would involve allowing the coastline to evolve naturally over the appraisal period. It is currently an undefended area of the coastline, with no risk of flooding or coastal erosion to properties or other infrastructure. As such, the option to Do Nothing has the strongest economic case and there is no economic justification to undertake any other options (Table 5-13). There is a Brent Geese refuge area located here, which could be impacted without any protection. Furthermore, there could be negative social impacts due to loss of coastal access.

Figure 5-24 presents the route map for ODU 12, with the overall leading option / FCERM leading option. The FCERM leading option is the same as the overall leading option, as there is no economic justification to undertake any works.

As there are no properties located here, adaptation has not been included as an option for the future.

Table 5-13: Whole life present value costs and benefits of the strategic options developed for ODU 12

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	62	0.00
Erosion Protection – Concrete revetment	2,339	61	1	0.03
Erosion Protection – Rock revetment	421	61	1	0.15
Erosion Protection - Gabions	284	61	1	0.22

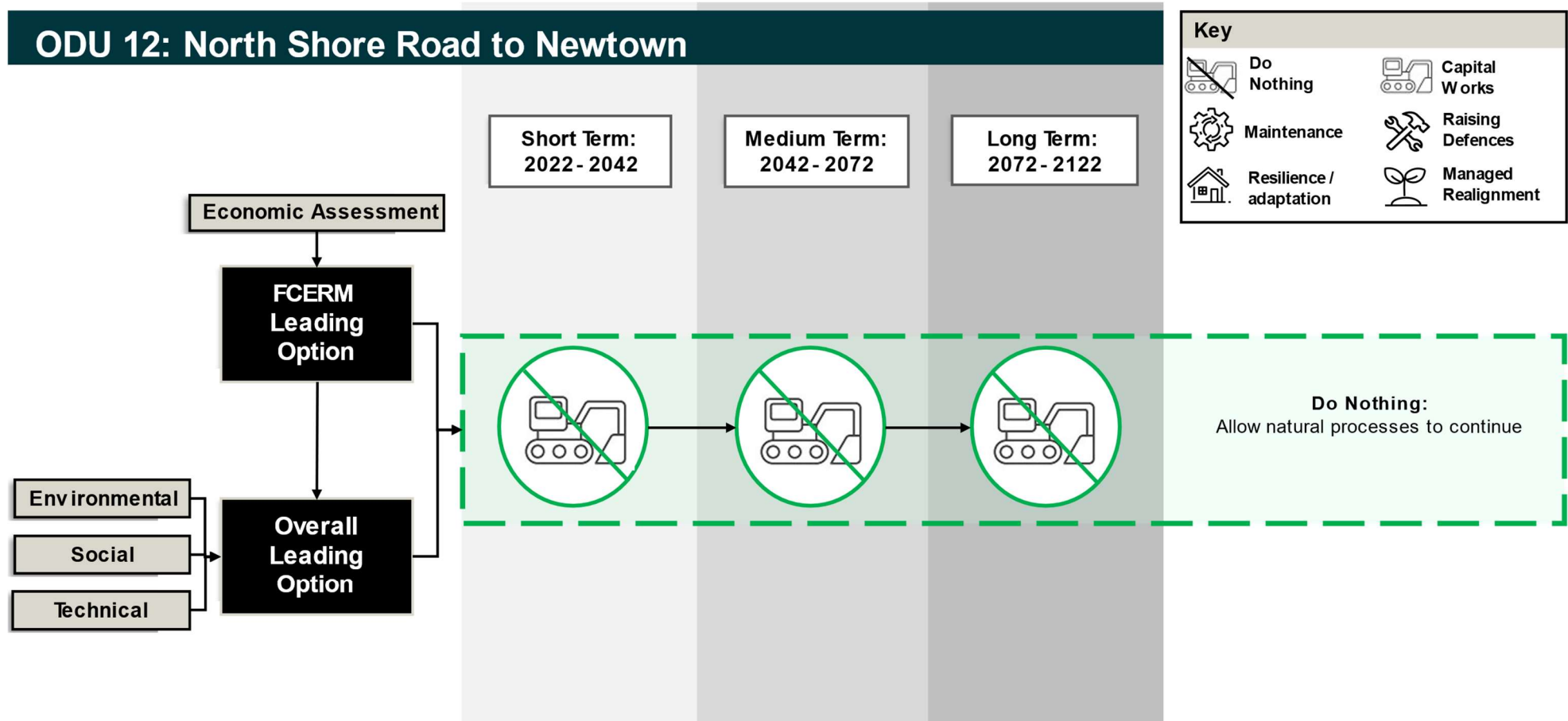


Figure 5-24: ODU 12 Option Route Map

5.13 ODU 13: Newtown

The overall leading option for ODU 13 is: **Maintain then Sustain 0.5% AEP from 2042** – maximise the life of existing defences, then construct a frontline floodwall in 2042 to a minimum 0.5% AEP (1 in 200 year) SoP. This includes maintenance of the existing defences in the present day. Figure 5-25 presents the existing boundaries for ODU 13.

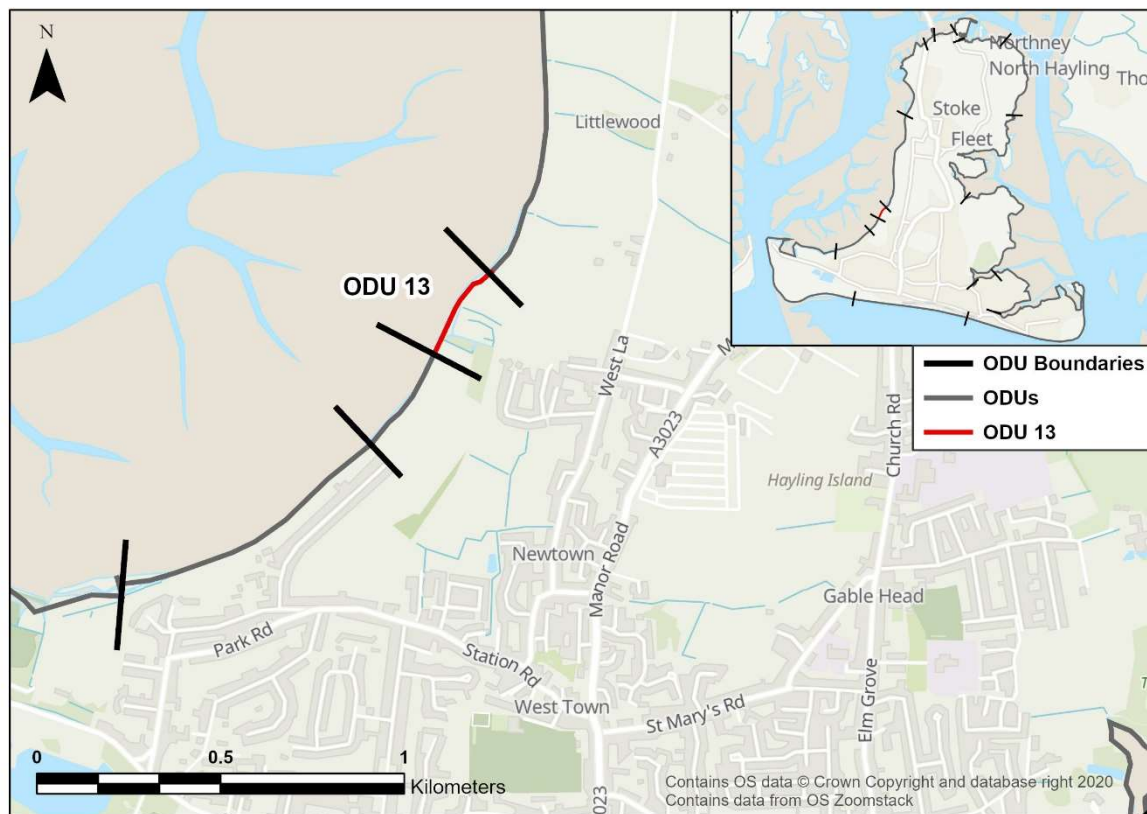


Figure 5-25: ODU 13 - Newtown

This option would involve maintenance of the existing defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years and there is a low risk of flooding and coastal erosion until epoch 2 in 2042. During this period, the existing defences would be maintained through scheduled maintenance. The implementation of the defences would be phased from 2042; the initial height of the defences would be built to a 0.5% SoP for 2072, and then raised over time to keep pace with sea level rise. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of a scheme appraisal process following the Strategy.

This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure, including the Billy trail. This option also has the strongest economic case compared to the other options, with minimal residual damages (Table 5-14). The FCERM leading option is the same as the overall leading option, as it has the highest benefit cost ratio.

Figure 5-26 presents the route map for ODU 13, with the overall leading option / FCERM leading option. Depending on the evidence base and funding constraints, adaptation could be considered in the future as there will be an additional 72 residential and 8 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 4 properties expected to be at risk of coastal erosion by 2122.

Table 5-14: Whole life present value costs and benefits of the strategic options developed for ODU 13

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	3,298	0.00
Do Minimum	53	0	3,298	0.00
Maintain	88	578	2,720	6.60
Maintain then Sustain 1.33% AEP from 2042	311	3,136	160	10.09
Maintain then Sustain 0.5% AEP from 2042	342	3,298	0	9.65
Maintain then Improve 1.33% AEP from 2042	450	3,134	164	6.96
Maintain then Improve 0.5% AEP from 2042	492	3,298	0	6.70
Maintain then Managed Realignment (Sustain) 1.33% AEP from 2042	678	3,138	160	6.70
Maintain then Managed Realignment (Sustain) 0.5% AEP from 2042	701	3,298	0	6.72
Maintain then Managed Realignment (Improve) 1.33% AEP from 2042	805	3,138	160	5.29
Maintain then Managed Realignment (Improve) 0.5% AEP from 2042	841	3,298	0	5.24
Resilience	218	1,033	2,257	4.73

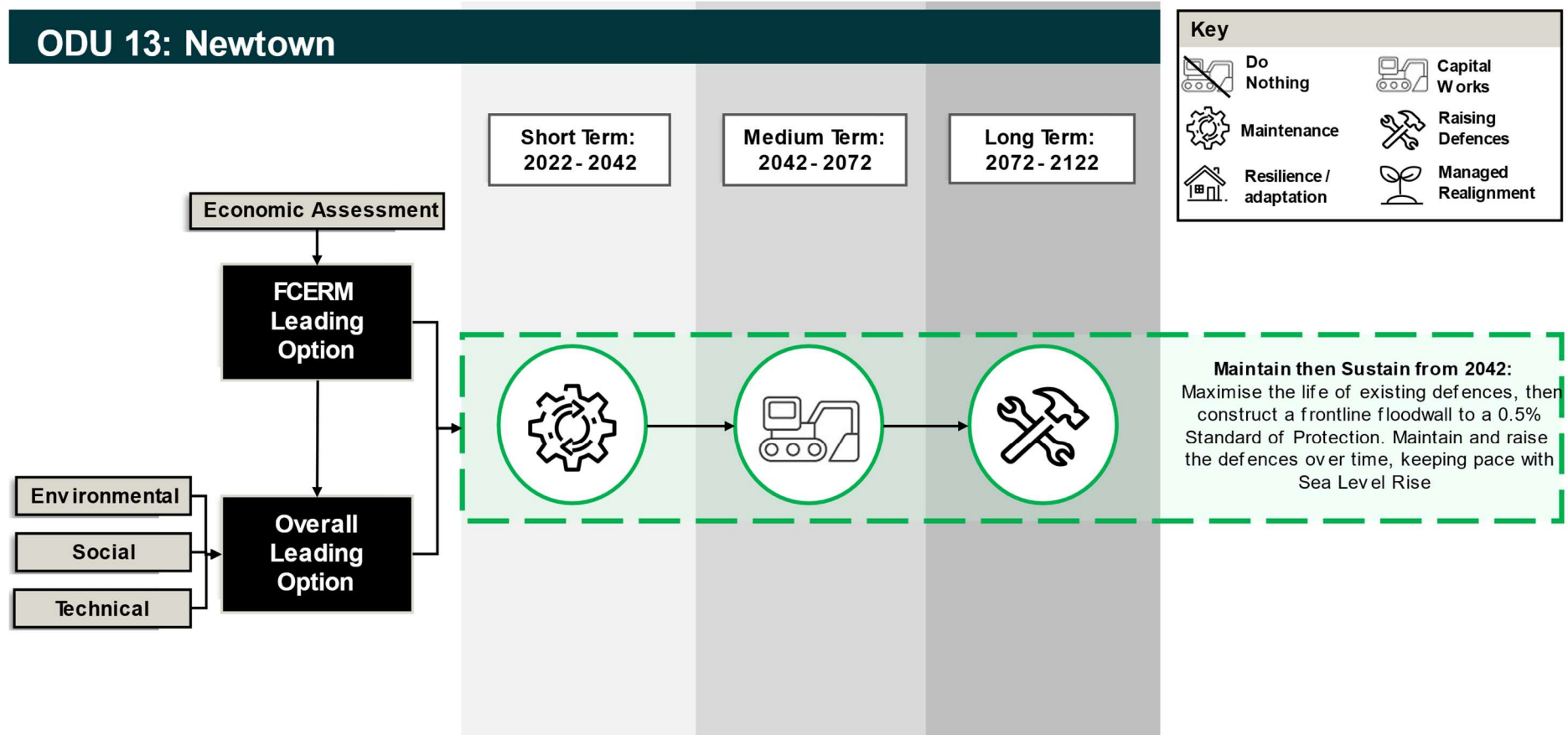


Figure 5-26: ODU 13 Option Route Map

5.14 ODU 14: Newtown to Stoke

The overall leading option for ODU 14 is: **Do Nothing** – Allow the defences to fail and natural processes to continue. Figure 5-27 displays the existing boundaries for ODU 14.

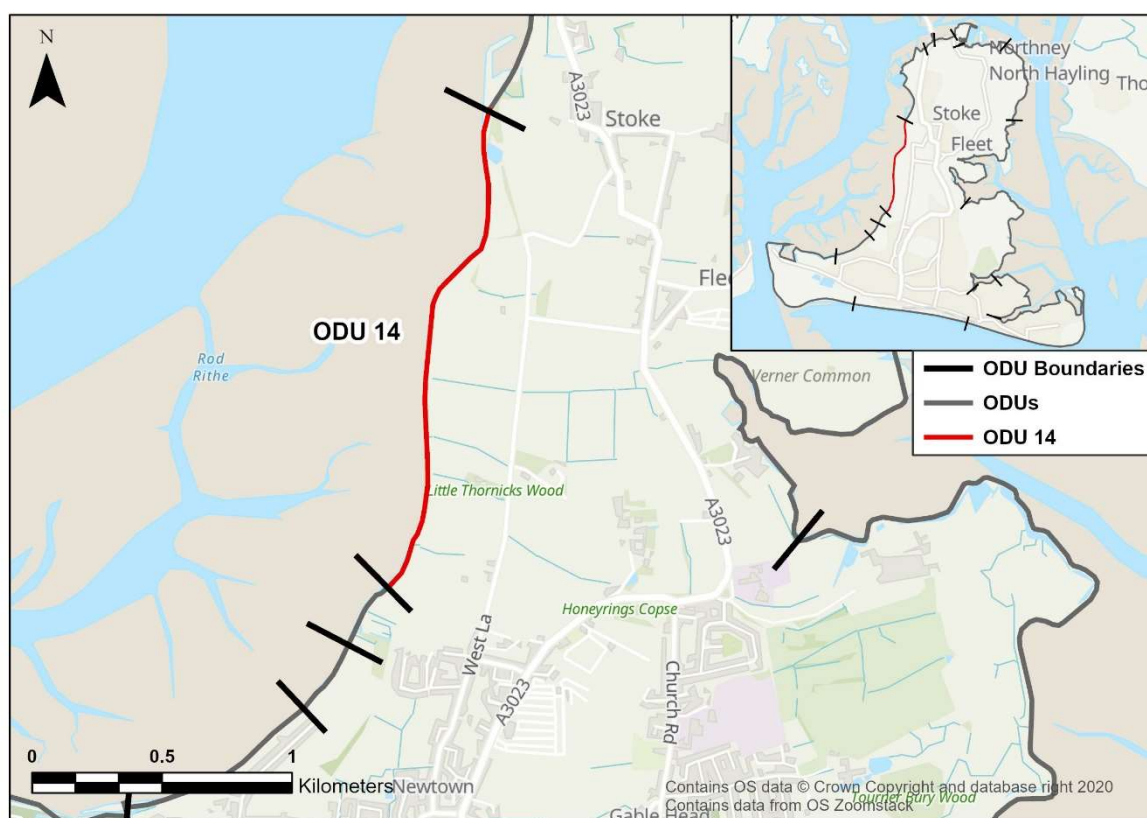


Figure 5-27: ODU 14 – Newtown to Stoke

This option would involve allowing the coastline to evolve naturally over the appraisal period, with the existing defences likely to fail within 10 years. There is some risk of flooding to properties here, as well as a risk of coastal erosion to the Billy Trail. As such this option is unlikely to be supported by the wider community. However, there is no economic justification to undertake any other options (Table 5-15), as a long length of defence would be required to protect comparatively few properties and would create coastal squeeze impacts resulting in the loss of intertidal habitats in the future. There are no properties at risk in the present day, with only 4 predicted to become at risk from a 0.5% AEP event in 2122. These properties may consider localised resilience measures in the future. Figure 5-28 presents the route map for ODU 14, with the overall leading option / FCERM leading option and the aspirational option. The FCERM leading option is the same as the overall leading option, as there is no economic justification to undertake any works.

Adaptation may be required as an option for the future, as there are 3 residential and 1 non-residential properties predicted to be at risk from a 0.5% AEP event in 2122. Adaptation may follow the avoid, accommodate, retreat approach and explore methods to adjust to the reality of future coastal flooding and erosion risk. Adaption could include for example, creating community flood support groups, signing up to flood warning systems, identifying no build areas, risk informed land use planning or property relocation.

Table 5-15: Whole life present value costs and benefits of the strategic options developed for ODU 14

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	198	0
Do Minimum	371	0	198	0.00

Maintain	725	0	198	0.00
Erosion protection – rock revetment	1,245	0	198	0.00
Maintain then Sustain 1.33% AEP from 2072	1,389	125	73	0.09
Maintain then Sustain 0.5% AEP from 2072	1,788	136	62	0.08
Maintain then Improve 1.33% AEP from 2072	1,484	125	73	0.08
Maintain then Improve 0.5% AEP from 2072	1,888	136	62	0.07
Managed Realignment (Sustain) 1.33% AEP	3,682	429	0	0.12
Managed Realignment (Sustain) 0.5% AEP	3,782	440	0	0.12
Resilience	11	0	198	0.00

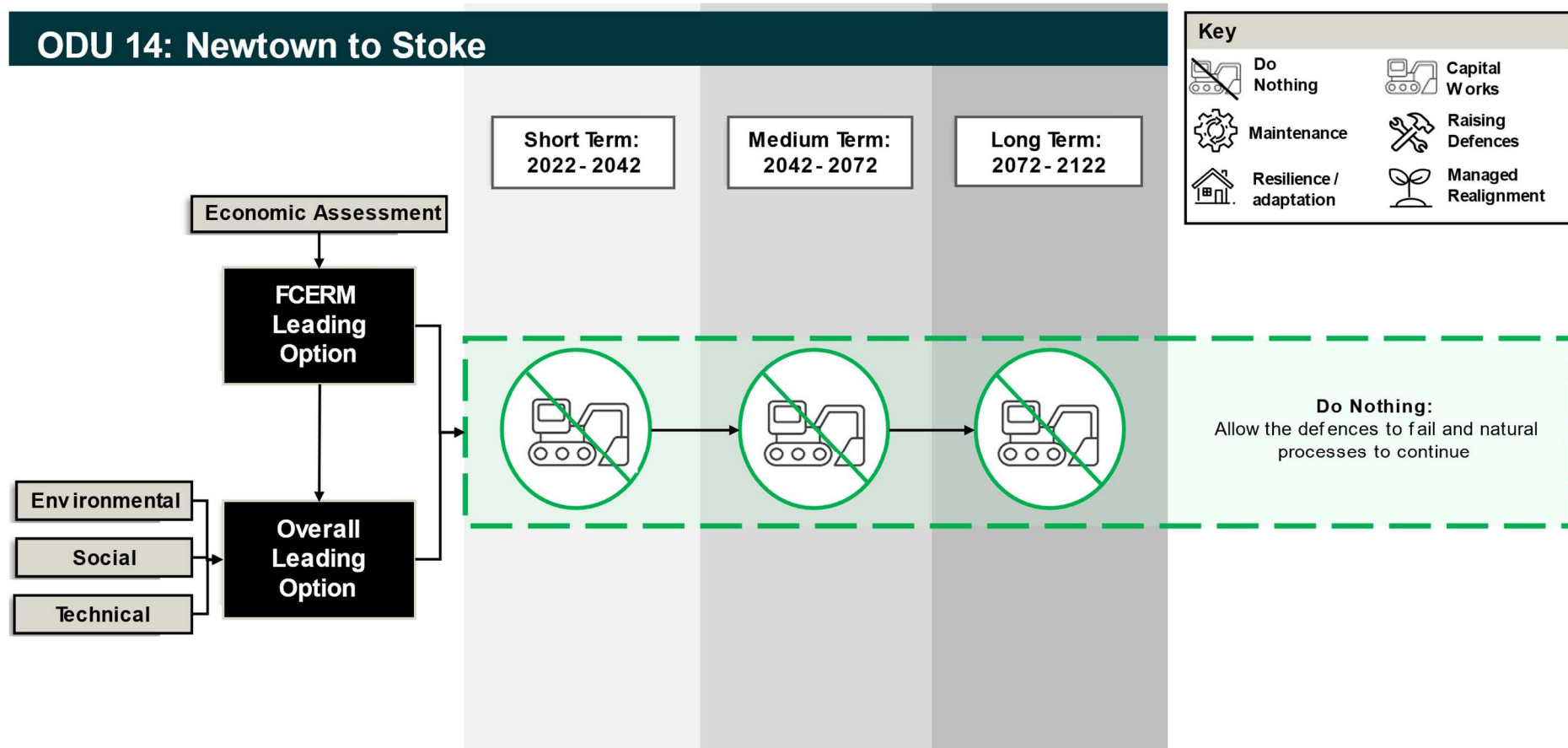


Figure 5-28: ODU 14 Option Route Map

5.15 ODU 15: Stoke to Langstone Bridge Carpark

The overall leading option for ODU 15 is: **Sustain 0.5% AEP** – sustain minimum 0.5% AEP (1:200 year) SoP through the construction of a setback embankment. This would include maintenance of the existing frontline defences. Figure 5-29 displays the existing boundaries for ODU 15, and an approximate location for the setback defences.

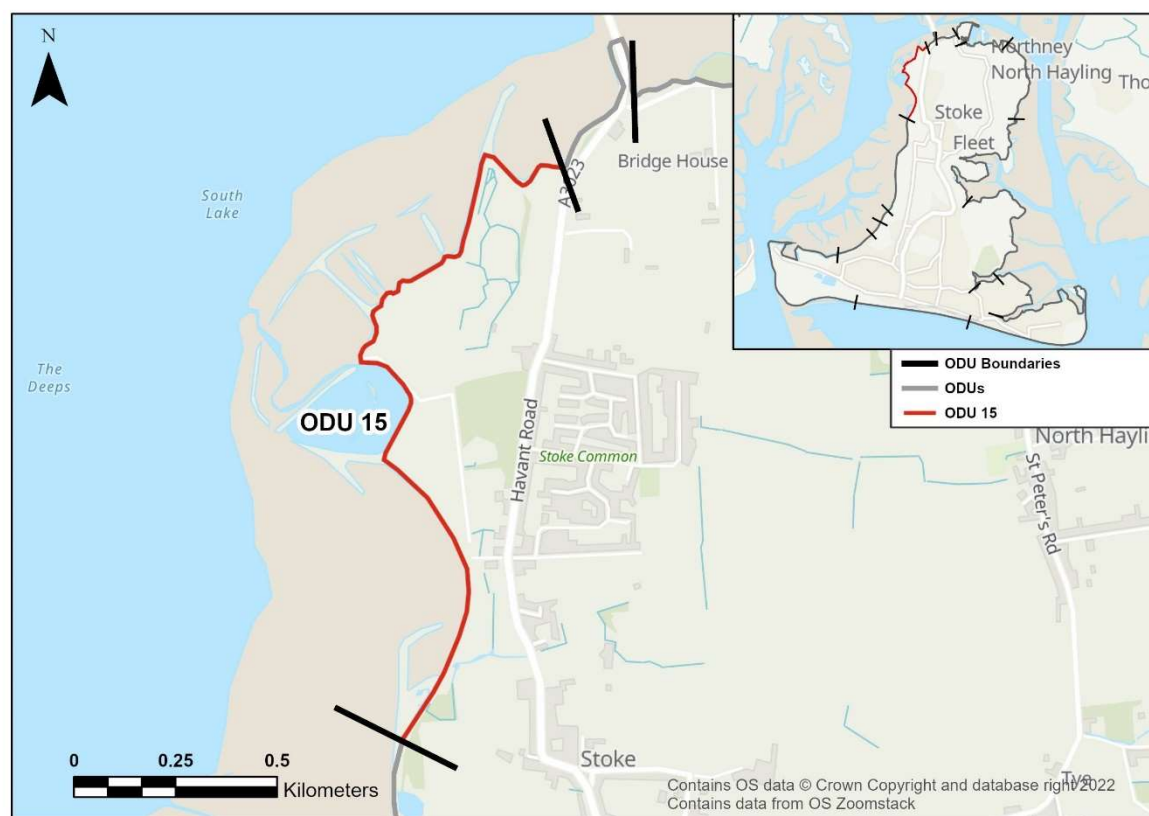


Figure 5-29: ODU 15 – Stoke to Langstone Bridge Carpark

This option would involve constructing new setback defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years. In the present day, there are 30 properties at risk of flooding from a 0.5% AEP event. The implementation of the defences would be phased; the initial height of the defences would be built to a 0.5% SoP for 2042, and then raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. Further details including the defence alignments, exact heights and lengths would need to be investigated as part of the scheme appraisal process following the Strategy.

As part of this option, the existing frontline defences would be maintained to prevent erosion of the historic landfill. For both environmental and social reasons, it is important to prevent the historic landfill from eroding in the future and reduce the risk of potentially contaminated land exposure. This option also has the strongest economic case compared to the other options, with minimal residual damages (Table 5-16). This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure, including the Billy Trail. During the scheme appraisal process following the Strategy, the location of the setback defence would be assessed.

The FCERM leading option is the same as the overall leading option, as it has the highest benefit cost ratio. Figure 5-30 presents the route map for ODU 15, with the overall leading option / FCERM leading option. Depending on the evidence base and funding constraints, adaptation could be considered in the future as there will be an additional 189 residential and 69 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day. There are also 11 properties expected to be at risk of coastal erosion by 2122.

Table 5-16: Whole life present value costs and benefits of the strategic options developed for ODU 15

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	11,600	0.00
Do Minimum	391	0	11,600	0.00
Maintain	1,303	3,481	8,119	1.47
Sustain 1.33% AEP – Frontline defence	7,630	10,312	1,288	1.35
Sustain 0.5% AEP – Frontline defence	8,017	11,600	0	1.45
Improve 0.5% AEP – Frontline defence	11,243	11,600	0	1.03
Sustain 1.33% AEP – Setback defence	6,025	10,312	1,288	1.71
Sustain 0.5% AEP – Setback defence	6,270	11,600	0	1.85
Improve 1.33% AEP – Setback defence	7,717	10,372	1,228	1.34
Improve 0.5% AEP – Setback defence	8,087	11,600	0	1.43
Resilience	846	2,777	8,823	0.96

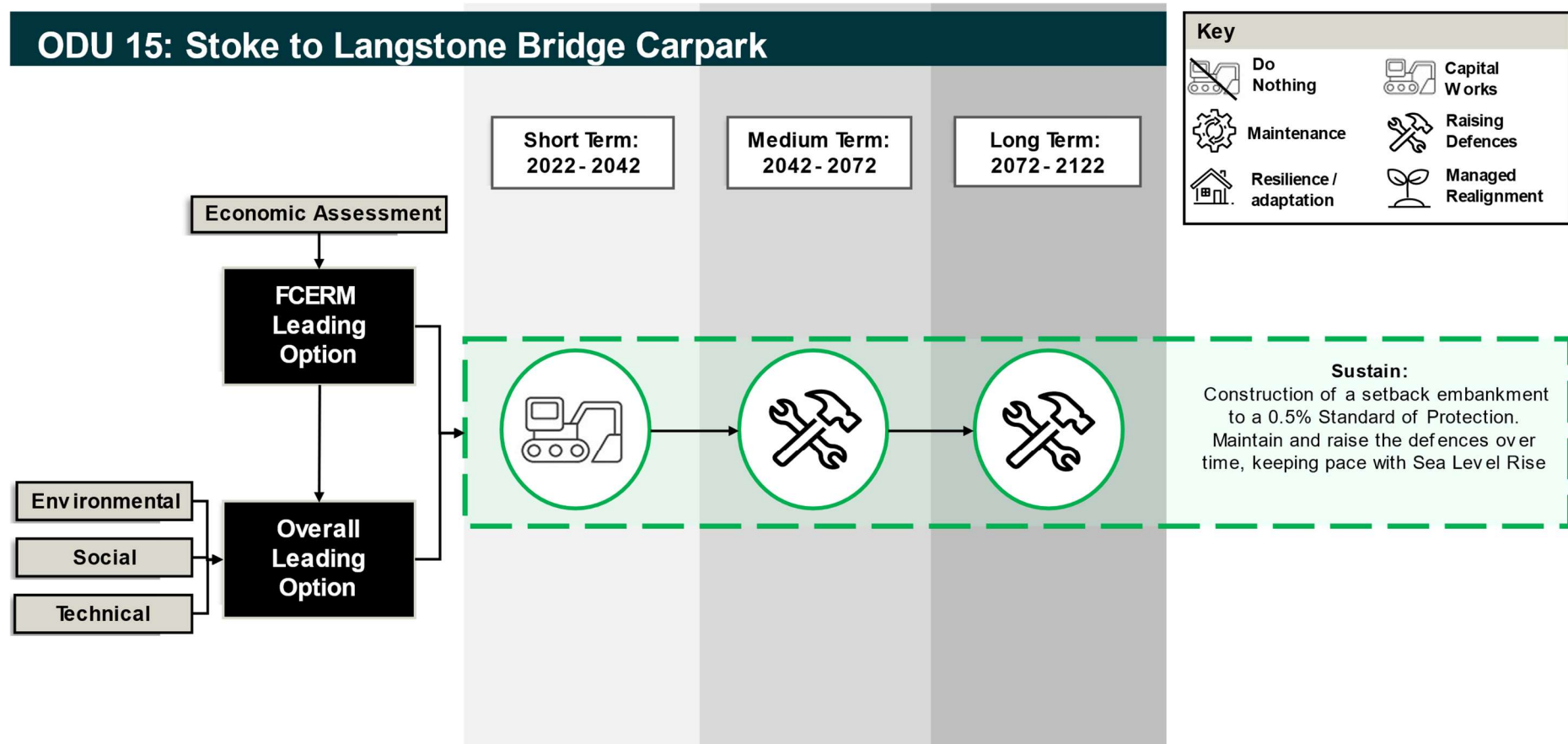


Figure 5-30: ODU 15 Option Route Map

5.16 ODU 16: Langstone Bridge Carpark to Langstone Bridge

The overall leading option for ODU 16 is: **Sustain 0.5% AEP** – sustain minimum 0.5% AEP (1:200 year) SoP through the construction of a frontline floodwall embankment. Figure 5-31 displays the existing boundaries for ODU 16.

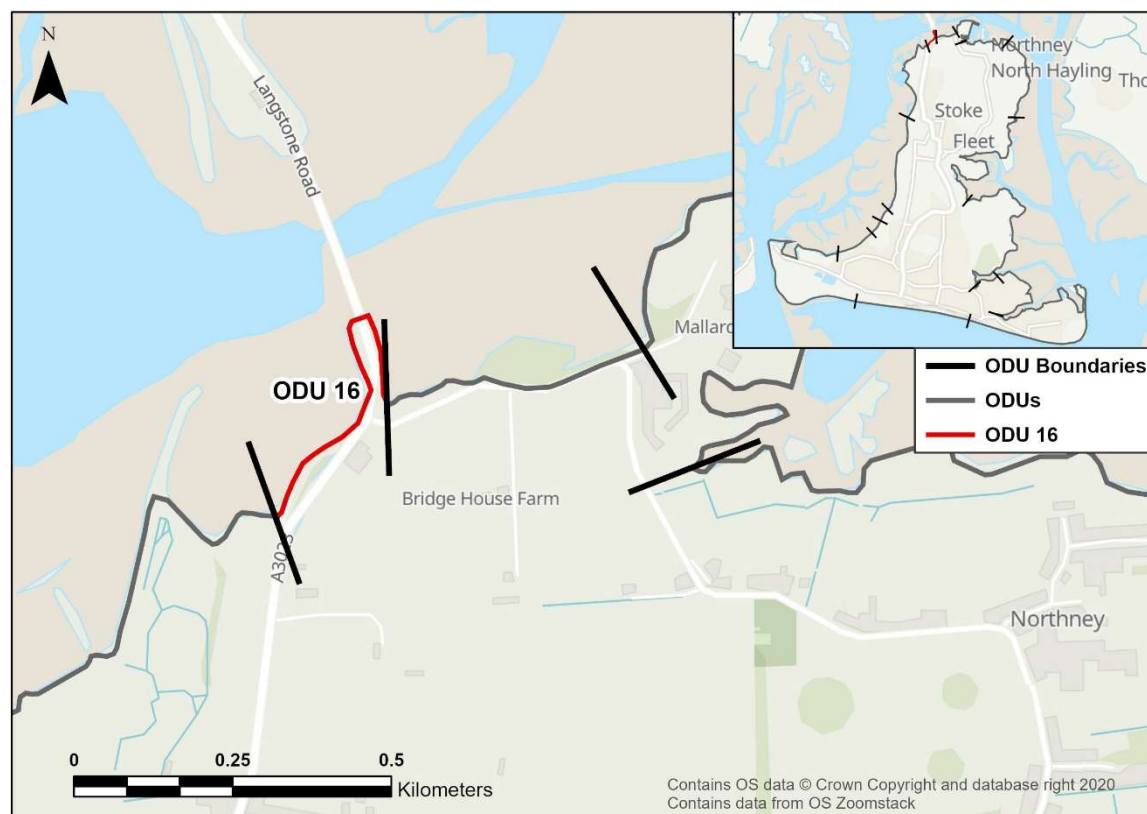


Figure 5-31: ODU 16 – Langstone Bridge Carpark to Langstone Bridge

This option would involve constructing new frontline defences in epoch 1 (2022 – 2042), as the residual life of the existing defences is between 10 and 20 years. The implementation of the defences would be phased; the initial height of the defences would be built to a 0.5% SoP for 2042, and raised over time to keep pace with sea level rise. Between raising of the defences, they would be maintained with scheduled maintenance. Further details including the exact heights and lengths would be investigated as part of a scheme appraisal process following the Strategy.

This option has the strongest economic case compared to the other options, with a small number of residual damages (Table 5-17). This option would support community wants and needs through the provision of sufficient flood and erosion protection to all properties and infrastructure, including the A3023 which is a major road connecting Hayling Island to Langstone, and it would not be socially or politically acceptable to allow this road to continue to be at significant risk of flooding as it is necessary for access and egress from the island. This option would link to the scheme in Langstone, which will be constructed to a 0.5% SoP against tidal still water level flood risk.

The FCERM leading option is Sustain 1.33% AEP, as it has the highest benefit cost ratio. This option would receive less stakeholder support, as a higher SoP would be more beneficial to protect the A3023 and link to the scheme at Langstone. Figure 5-32 presents the route map for ODU 16, with the overall leading option and FCERM leading option. Depending on the evidence base and funding constraints, adaptation could be considered in the future as there will be an additional 3 non-residential properties at risk from a 0.5% AEP event in 2122 compared to the present day.

Table 5-17: Whole life present value costs and benefits of the strategic options developed for ODU 16

Strategic Option	Whole Life Cost (PV £K)	Whole Life Benefits (PV £k)	Residual Damage 0.5% AEP event (PV £k)	Benefit Cost Ratio
Do Nothing	0	0	702	0.00
Do Minimum	102	0	702	0.00
Maintain	141	12	690	0.08
Sustain 1.33% AEP – Frontline defence	410	683	19	1.66
Sustain 0.5% AEP – Frontline defence	445	702	0	1.58
Improve 1.33% AEP - frontline	687	694	8	1.01
Resilience	104	61	641	0.58

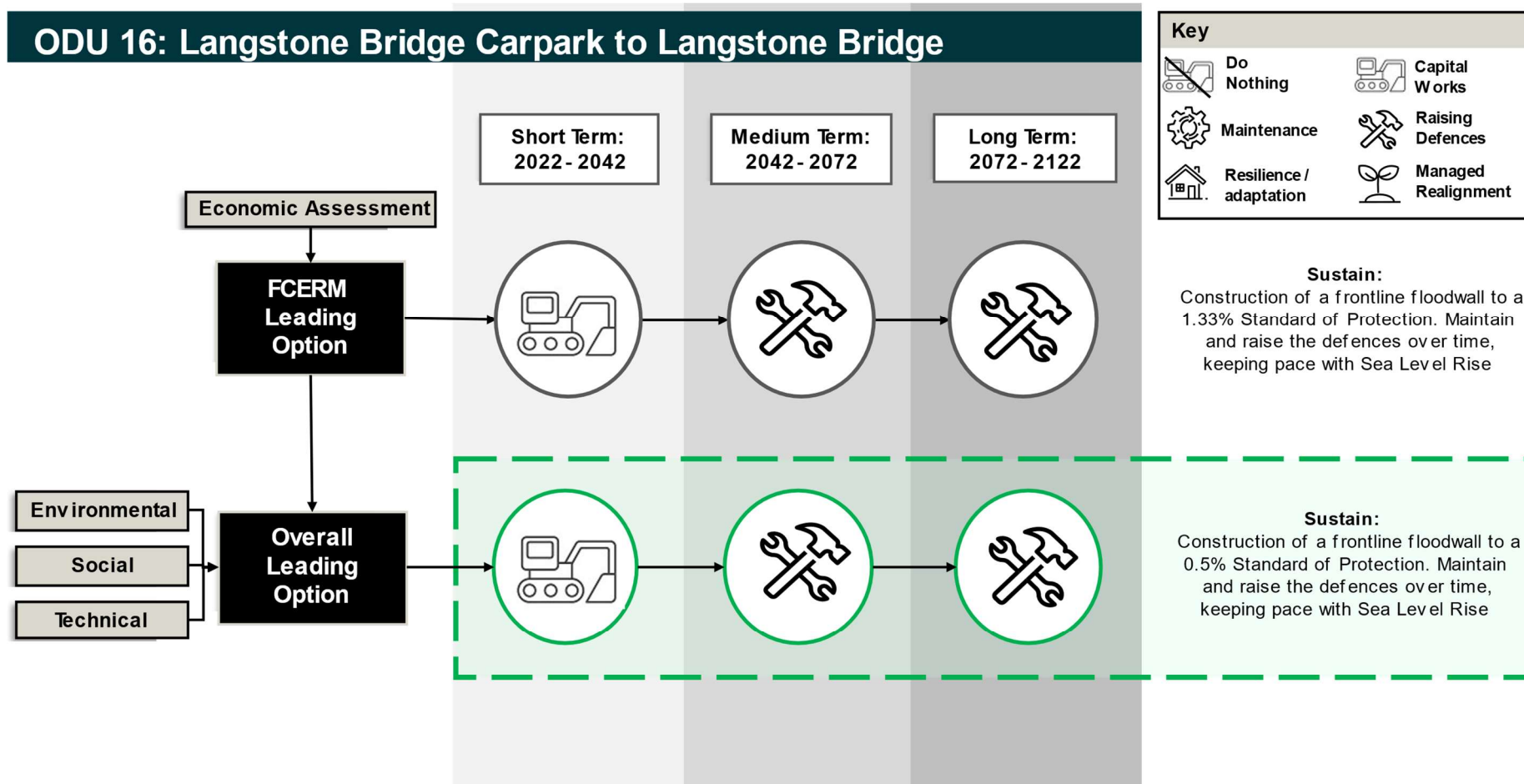


Figure 5-32: ODU 16 Option Route Map

6. Strategic Approach

The Strategy Leading Options provide a comprehensive plan for managing the flood and coastal erosion risk to the coastline around Hayling Island. The Leading Options have primarily been identified by undertaking an appraisal on an ODU by ODU basis. However, there has also been consideration for how options in adjacent ODUs combine to produce an integrated and coherent approach across a wider area.

Table 6-1 presents further details of the locations around the Island where there are clear links between ODUs in terms of coastal processes, flood and erosion risk. In these locations it was particularly important to align the Leading Options in adjacent ODUs into a coherent strategic approach. Moving forward into Strategy delivery, any scheme appraisals should consider these linkages and ensure the schemes are delivered as part of the overall strategic approach. This has the added benefit of potentially providing more cost effective solutions for individual schemes as they can be designed to complement each other and/or be constructed simultaneously.

Table 6-1: Strategically linked ODUs

ODUs	Coastal Processes and Risks	Scheme Delivery Considerations
ODU 8, 9 and 10: Eastoke to North Shore Road	<p>Beach material from Eastoke moves in both an easterly direction (approximately one third of material) towards Black Point, and in a westerly direction (approximately two thirds of material) towards the open coast in ODU 9. In ODU 9, the Inn on the Beach acts as a terminal structure minimising further movement of beach material to the west. In the past some localised downdrift erosion has occurred immediately to the west of the Inn on the Beach, though Gunner Point continues to accrete.</p> <p>With present management an extensive beach management programme of beach recycling / nourishment is undertaken. Without this, and if natural processes were allowed to continue without intervention, it is likely that there would be significant beach erosion at Eastoke, over time leading to the failure of defences at the back of the beach and erosion of Southwood Road. Erosion would also be expected to occur in ODUs 9 and 10.</p> <p>There is a risk of flooding across all three ODUs, with the most significant flood risk predicted for Eastoke given the high concentration of properties / assets in this location.</p>	<p>The dynamic movement of material across these ODUs requires bi-annual beach nourishment and annual recycling to retain the beach. This should continue as part of the leading options for ODU 8 and 9 to protect the toe and prevent undermining of defence structures.</p> <p>There is a risk that the shoreline at ODU 10 may not respond as predicted, particularly as the retention of Inn on the Beach at the boundary between ODU 9 and ODU 10 will affect the sediment feed into West Beach, and could lead to localised erosion in the short term to the west of Inn on the Beach. Monitoring of the sediment transport should take place here, to identify trends so mitigation can be planned to limit the impacts of erosion. If localised erosion controls are required, these should be implemented with the scheme at ODU 9, as part of the capital refurbishment of the defences at Inn on the Beach.</p> <p>The flood risk across these areas is most prevalent at Eastoke, which presents the best economic case for the construction of new defences according to FCERM decision rules. The scheme for ODU 8 should be developed jointly with that of ODU 9 to prevent flow routes between them. This would also ensure a cohesive design, which is important for providing adequate beach access and supports plans for the seafront regeneration.</p>

ODUs	Coastal Processes and Risks	Scheme Delivery Considerations
<p>ODU 13, 14 and 15: Newtown to Langstone Bridge Carpark</p>	<p>Across these ODUs, there is a risk of flooding and erosion to some properties. The Billy Trail is also at risk of erosion in ODUs 14 and 15.</p>	<p>As part of the leading options for ODU 13 and 15, construction of new defences is the Strategy in epoch 1. For ODU 15, this will also include partial relocation of the Billy Trail to prevent erosion. However, in ODU 14 the leading option is Do Nothing which would lead to erosion of the Billy Trail.</p> <p>When delivering schemes on the west side of the Island, how the schemes interact with the location and future viability of the Billy Trail is an important consideration. Although this is not an FCERM issue, it is a key objective / aspiration of wider stakeholders in the option development process.</p> <p>For example, there may be little merit in relocating the Billy Trail in ODU 15 if it is to erode in ODU 14 with the Do Nothing scenario. The likelihood of undertaking the aspiration option in ODU 14 is therefore important in the delivery of the Leading options in ODU 13 and 15 and the individual scheme requirements.</p> <p>To ensure a cohesive approach is followed it is recommended that schemes for all three units are delivered in parallel (assuming the aspiration option for ODU 14 is undertaken).</p>

7. Adaptation

Section 5 outlined the overall leading option that was selected for each ODU through the multi-criteria analysis, as well as the FCERM leading options. These options provide the recommended pathways for managing flooding and coastal erosion on Hayling Island over the next 100 years. However, the implementation of these options is dependent on funding availability. Without the necessary funding, it may not be possible to construct / maintain the defences measures recommended by the options. If this is to occur, coastal adaptation may be considered as an alternative coastal management approach rather than reverting to a Do Nothing or Do Minimum scenario.

Adaptation focusses on adjusting to, and managing, the impacts of flooding and coastal erosion, as opposed to the other strategic options highlighted within this report which aim to mitigate the impacts through physical flood protection measures. Ways in which communities can adjust to coastal flood and erosion risk as part of an adaptation approach include:

- Creating community flood support groups
- Signing up to flood warning systems and evacuating prior to flood events
- Risk informed land-use planning
- Relocation

In the long term, the flood and erosion risks are expected to increase significantly due to sea level rise; the economic assessment identified 335 properties at risk from a 0.5% AEP tidal flood event in the present day – increasing to 3,152 properties at risk from the same event in 2122 (without defences in place). Similarly, 37 properties are currently directly at risk from erosion with a further 795 at risk in 2122. With this significant increase in numbers of properties at risk, relocation may be the most sustainable long term approach if funding for flood defences cannot be found. Relocation may be considered necessary when entire communities are at significant risk of flooding and coastal erosion and it is no longer economically or technically feasible to maintain or construct new defences, however, it should be acknowledged that this would be a significant challenge as suitable location(s) for relocating properties would be required as well as the logistics of planning, co-ordinating and implementing such an intervention. The potential costs of relocation have been estimated Island-wide within the Economic Assessment; however this option has not been considered on an ODU by ODU basis within the benefit cost ratio assessment or the multi-criteria analysis as it is unlikely to be acceptable to the community in the present day.

The current FCERM AG guidance also does not adequately allow adaptation to be considered given the difficulty in valuing the economic benefits or costs avoided when comparing the option of building defences to the cost of relocation. There is also limited funding for adaptation from grant in aid which makes it harder to select adaptation over the options of physical protection measures which do attract funding.

However as national policy on the topic of adaptation, and how it might be funded, is developed over the coming years, adaptation is likely to become a credible 'Do-Something' approach and may be considered the most sustainable option for protecting life if climate change impacts and sea level rise continue as predicted. As such throughout the delivery of the Strategy and subsequent recommendations adaptation should be reconsidered at scheme development stage for all ODU's in line with emerging or updated guidance.

8. Summary

This report outlines the process by which the overall leading and FCERM options for the Strategy frontage have been developed from the shortlisted options through a multi-criteria appraisal. The appraisal process considered the technical, economic, environmental and social aspects of each option. Table 8-1 below presents a summary of the costs and benefits for each of the overall leading options for each ODU.

Table 8-1: The Overall Leading Options for each ODU

ODU	Overall Leading Option	PV Costs (£k)				PV Benefits (£k)	ABCR
		Capital	Non-capital	Other	Total PV Costs		
1	Sustain 0.5% AEP with Managed Realignment Hybrid - Frontline floodwall on the west and setback embankment on the east and frontline embankment in front of historic landfill, with habitat creation. Increasing length and height over time to keep pace with sea level rise	4,367	986	0	5,353	6,749	1.26
2	Resilience – PFR for properties at risk of flooding from a 5% AEP flood event.	15	303	0	318	67	0.21
3	Sustain 0.5% AEP with Managed Realignment – Setback earth embankment with habitat creation. Increasing length and height over time to keep pace with sea level rise	1,866	421	0	2,287	6,140	2.68
4	Resilience – PFR for properties at risk of flooding from a 5% AEP flood event	277	904	0	1,181	937	0.79
5	Sustain 1.33% AEP with Managed Realignment – Setback earth embankment with habitat creation. Increasing length and height over time to keep pace with sea level rise	3,819	852	0	4,671	7,116	1.52
6	Improve from 2070 (Maintain then Improve) 0.5% Frontline – Maximise the life of existing defences, then implement frontline floodwall	723	263	0	986	2,299	2.33
7	Sustain 0.5% AEP – Frontline rock revetment. Increasing length and height over time to keep pace with sea level rise	3,274	727	0	4,001	12,878	3.22

ODU	Overall Leading Option	PV Costs (£k)				PV Benefits (£k)	ABCR
		Capital	Non-capital	Other	Total PV Costs		
8	Sustain 0.5% - Combination of rock revetment, floodwalls and setback floodwalls across the frontage. Increasing length and height over time to keep pace with sea level rise. Includes beach management (replacement of all groynes with new rock groynes, beach nourishment and beach recycling)	29,451	6,467	40,925	76,843	250,085	3.25
9	Sustain 0.5% AEP Maintain Inn on the Beach – Setback floodwall, increasing length and height over time to keep pace with sea level rise. Capital refurbishment of the defences in front of Inn on the Beach. Beach management including replacement of the timber groynes with rock groynes (same size of groyne field), beach nourishment and beach recycling	3,110	521	6,693	10,324	10,543	1.02
10	Resilience – PFR for properties at risk of flooding from a 5% AEP flood event	315	966	0	1,280	3,634	2.84
11	Sustain 1.33% AEP – Floodwall around the west side, followed by a floodwall around the east side in 2040. Increasing length and height over time to keep pace with sea level rise	2,037	471	0	2,508	2,942	1.17
12	Do Nothing – No Active Intervention. Baseline scenario	0	0	0	0	0	0.00
13	Sustain from 2040 (Maintain then Sustain) 0.5% AEP – Maximise the life of existing defences, then implement a frontline floodwall. Increasing length and height over time to keep pace with sea level rise	252	90	0	342	3,298	9.65
14	Do Nothing – No Active Intervention. Baseline scenario	0	0	0	0	0	0.00
15	Sustain 0.5% AEP – Setback earth embankment. Increasing length and height over time to keep pace with sea level rise	2,249	951	3,071	6,270	11,600	1.85
16	Sustain 1.33% AEP – Frontline floodwall. Increasing length and height over time to keep pace with sea level rise	336	74	-	410	683	1.66
Total		52,091	13,996	50,689	116,773	308,531	2.64

