

Version	Details	Date	Prepared	Checked
1	Draft for client review	02/04/2024	BT	JS
2	Update following review	22/04/2024	BT	JS

General notes

- The sea level rise trigger thresholds are relative to the present day sea level (2024)
- The defence condition trigger threshold of 'poor' is for an the overall asset. However, there may be local variations in the condition of defence assets that could mean that localised repairs are needed before the trigger threshold is reached.
- Defence maintenance should be guided by detailed condition assessments undertaken regularly and this action plan should not be relied upon to inform maintenance requirements / timing
- The adaptive pathway figures are to be updated for all units so the epoch dates match those within this spreadsheet
- The cost profiles have been obtained directly from the 'Christchurch FCERM Strategy funding profiles_v5_240130' and the same limitations / assumptions apply (i.e. strategic level costing, subject to change)
- ODU 8 is not included as it has been agreed with the Environment Agency that future River Avon projects will appraise this area

Decision tree notes

- The decision tree diagrams are for illustrative purposes only and may not include all key decisions that need to be made when delivering the Strategy
- The decision tree diagrams have been produced to provide more detail for epoch 1. However, if key decisions within an ODU are due in epoch 2 or 3, the decision tree also provides this information

ODU 1 - Hengistbury Head East

Key features / risks

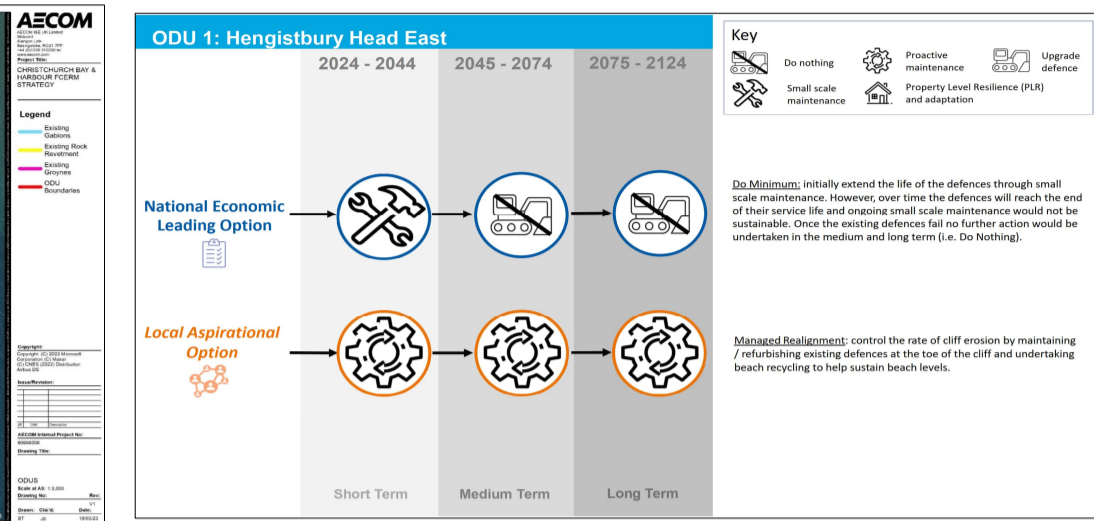
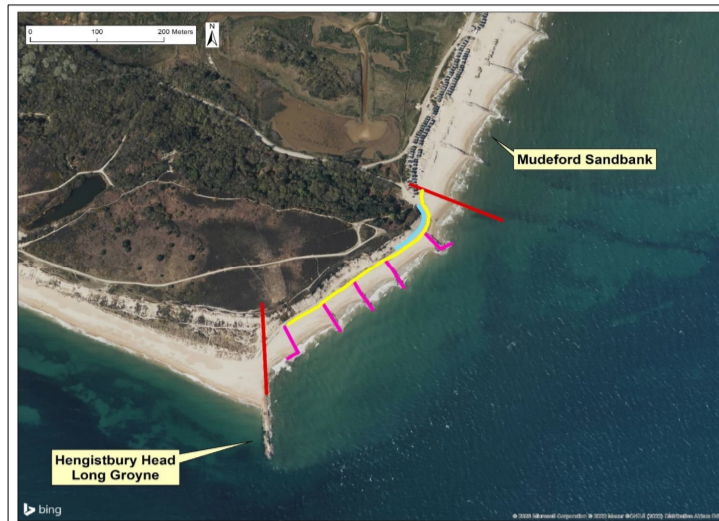
- No flooding / erosion risk to properties
- Erosion risk to headland and scheduled monument / environmental designations (SSSI, SAC, SPA, LNR)
- Existing rock defences at base of cliff including rock revetment and rock groyne
- Unmanaged erosion of headland 'anchor point' could threaten Mudeford Sandbank and wider morphology

Strategy Leading Options

- National and Local Option identified
- National Option is Do Minimum whereas Local Option is Managed Realignment
- Local Option (Managed Realignment) provides more confidence in future coastline position and would involve refurbishing existing rock defences over time. Some limited erosion expected to occur due to cliff slope processes
- National Option (Do Minimum) would not involve replacing existing defences when they fail and erosion would be expected

Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Epoch 1			Epoch 2		Epoch 3
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044	Years 2045-2074	Years 2075-2124
National	No planned works other than small scale patch & repair and ensuring H&S compliance. Review SHP policy to align with the option if this is the option delivered.					
Local	Develop funding strategy. Undertake defence condition assessments. Begin planning defence refurbishments (as condition is already poor for some assets). Secure funding and consenting for refurbishments. Undertake beach management as required.		Refurbish existing rock defences. Undertake beach management as required.		Undertake beach management as required.	Further refurbishments of existing defences.

*note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
 *timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£K - cash)																	
	Epoch 1 (years)			Epoch 2 (years)				Epoch 3 (years)			Total							
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084	2085-2089	2090-2094	2095-2104	2105-2114	2115-2124	
National	23	46	91	183	37	0	0	0	0	0	0	0	0	0	0	0	0	654
Local	40	54	2,098	54	40	54	40	2,112	40	54	94	2,152	94	2,152	94	2,152	94	9,172

*note that defence refurbishments timing may need to be adjusted if refurbishments are required sooner (to be informed by detailed defence condition assessment)

FCERM GiA funding availability

- FCERM GiA funding unlikely to be available for defence works due to BCR < 1 on national basis

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Defence condition	Timing of defence refurbishments in Local Option	<ul style="list-style-type: none"> If implementing the Local Option: <ul style="list-style-type: none"> The existing rock defences were assessed to have a 'Poor' or 'Fair' condition in the Strategy defence condition assessment, with an estimated residual life (without maintenance) of <10 for the 'poor' defences and 10-15 years for the 'fair' defences. Ongoing small scale / patch repair maintenance would be expected to extend the life of these asset but they are still expected to require a refurbishment during epoch 1. More detailed defence condition assessments are required to inform the exact timing of defence refurbishments. The timing of the refurbishments should be based on these detailed condition inspections and may need to be brought forward or delayed accordingly. It is recommended that when the condition reaches a 'poor' rating then a refurbishment is undertaken as soon as possible once funding is secured. Given the Strategy defence condition assessment identified that some of the defences are already in a poor condition, it is recommended that planning for the refurbishments begins in the first years of the Strategy implementation. 	Condition rating of Poor
Funding	Decision on Local vs National Option and timing of embankment improvements	<ul style="list-style-type: none"> The Local Option will have a funding shortfall for the defence refurbishment works. The Funding Strategy will need to outline how the defence refurbishments will be funded. If funding is not likely, then these refurbishment works could be delayed until the funding is secured or the National Option delivered instead. 	Funding availability Revert to National Option if funding for refurbishments is not secured

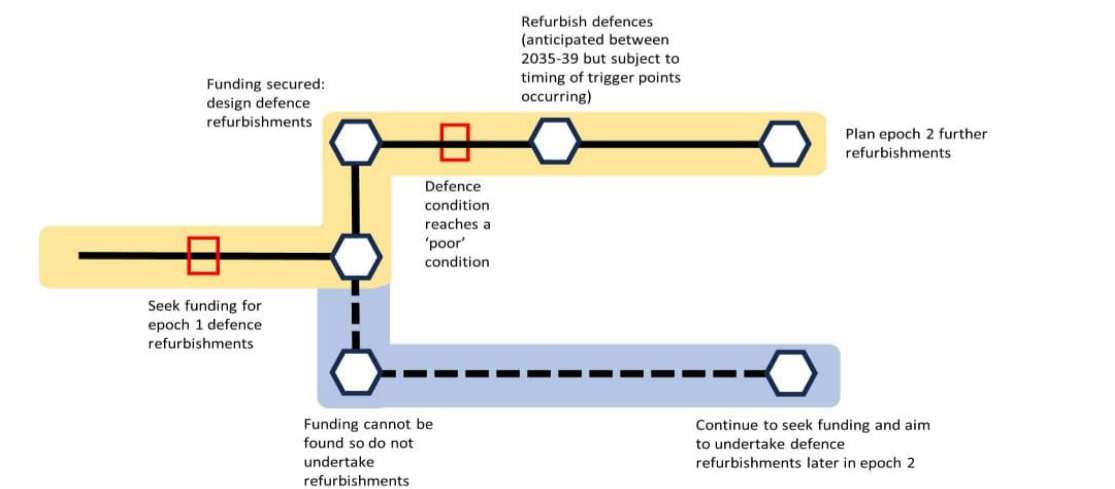
Decision Tree



ODU 1: Hengistbury Head East Decision tree

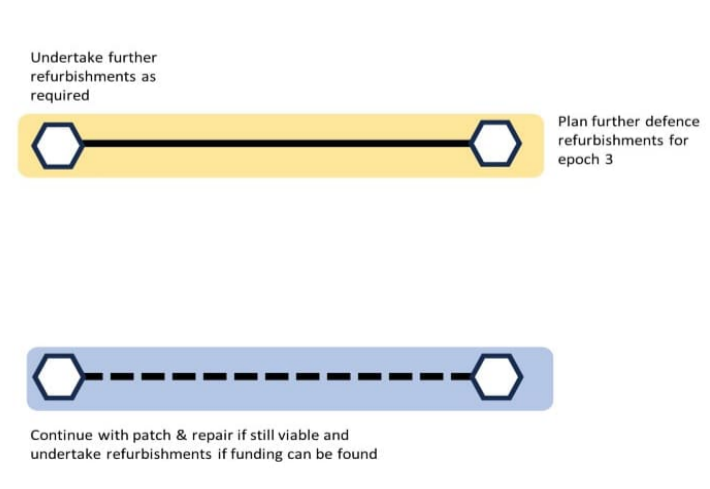
Epoch 1 (2024-2044)

Present day (2024) Time & Sea level rise 2044 or 0.13m SLR



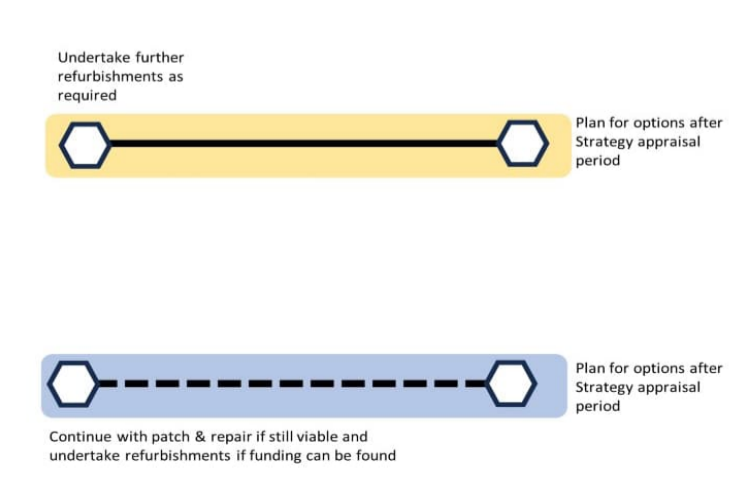
Epoch 2 (2045-2074)

Time & Sea level rise 2074 or 0.42m SLR



Epoch 3 (2075-2124)

Time & Sea level rise 2124 or 1.06m SLR



ODU 2 - Mudeford Sandbank

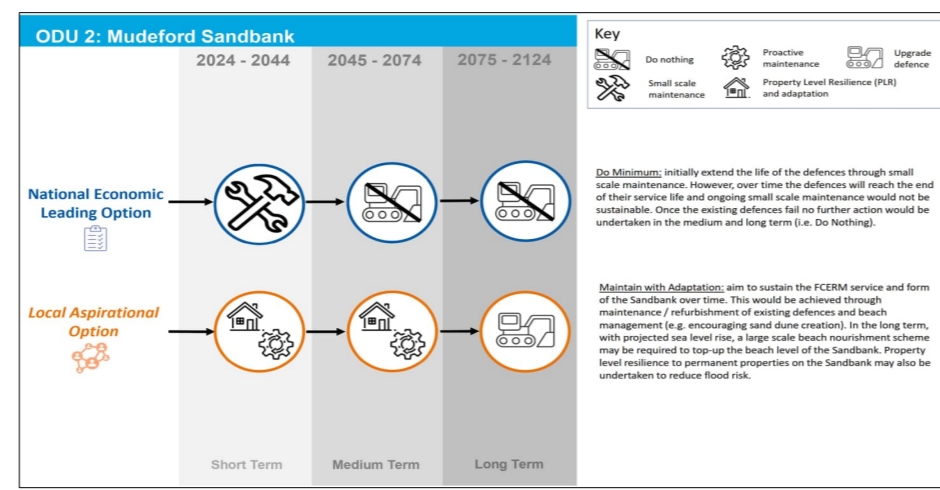
Key features / risks

- Six properties at risk from flooding (2124 0.5% AEP) so therefore there is only limited economic benefits on a national basis
- Large number of beach huts and recreational / amenity resource on the Sandbank providing local benefit to the area
- With no further interventions the Sandbank is expected to rollback over time. Risk of breaching
- Buried services beneath the Sandbank which could be damaged if the Sandbank rolls back significantly
- Uncertain impact on coastal morphology should Sandbank roll back in an unconstrained manner



Strategy Leading Options

- National and Local Option identified
- National Option is Do Minimum whereas Local Option is Maintain with Adaptation
- Local Option (Maintain with Adaptation) aims to sustain the FCERM service of the Sandbank by holding its form over time and aiming to keep it broadly in its current position. Achieved through beach nourishment, defence refurbishments and property level resilience.
- National Option (Do Minimum) would not involve replacing existing defences when they fail and rollback of the Sandbank would be expected



Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal
- PLR requirements to be determined on property by property basis as required



Works required to deliver leading options*

Option	Epoch 1				Epoch 2	Epoch 3
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044	Years 2045-2074	Years 2075-2124
National	No planned works other than small scale patch repair and ensuring HMA compliance. Review DMP policy to align with this option if this is the option delivered.					
Local	Develop funding strategy. Undertake defence condition assessments. Undertake beach management as required. Review DMP policy to align with this option if this is the option delivered.	Begin planning defence refurbishments. Secure funding and consenting for refurbishments. Undertake beach management as required.	Refurbish existing defences on the Sandbank. Undertake beach management as required.	Undertake beach management as required.	Further refurbishments of existing defences.	Beach Nourishment scheme. Further refurbishments of existing defences.

*note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
 *timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash													Total		
	Epoch 1 (years)				Epoch 2 (years)				Epoch 3 (years)				Total			
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2084	2085-2094			2095-2104	2105-2114
National	46	91	183	183	365	365	73	0	0	0	0	0	0	0	0	1,304
Local	23	37	3,688	37	37	37	3,688	37	37	3,057	3,725	1,566	3,725	74	19,805	

*note that defence refurbishments timing may need to be adjusted if refurbishments are required sooner (to be informed by detailed defence condition assessment)

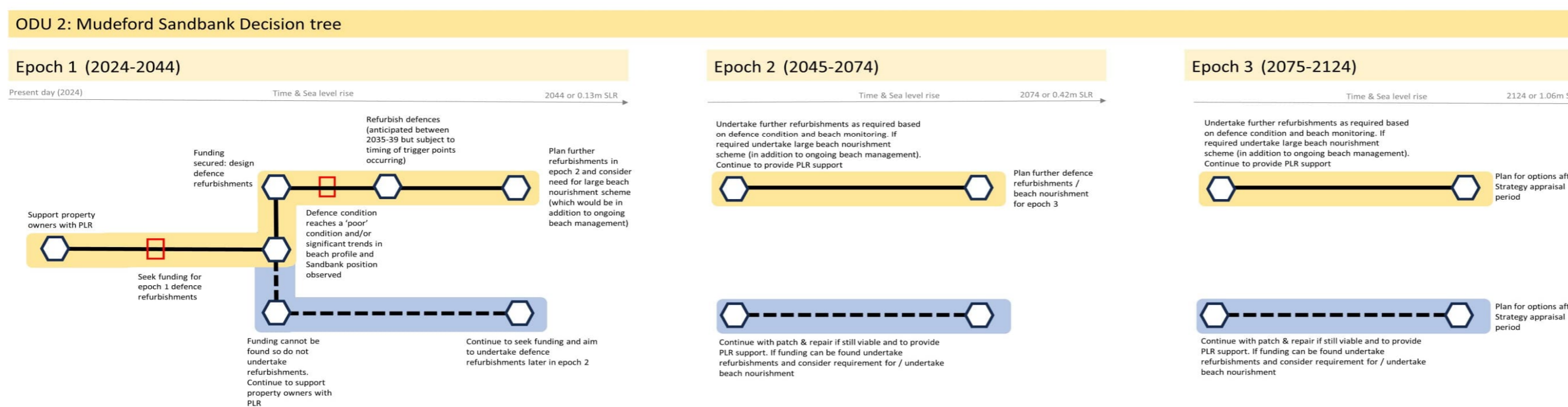
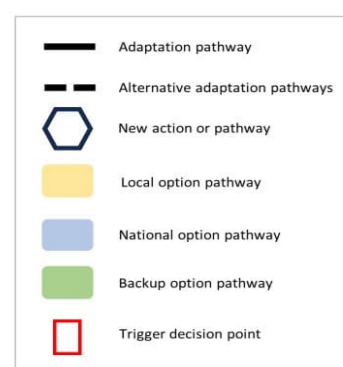
FCERM GIA funding availability

- FCERM GIA funding unlikely to be available for defence works due to BCR < 1 on national basis

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Defence condition	Timing of defence refurbishments in Local Option	- If implementing the Local Option: - The existing risk defences were assessed to have a "Good" or "Fair" condition in the Strategy defence condition assessment, with an estimated residual life (without maintenance) of >10 years - Ongoing small scale / patch repair maintenance would be expected to extend the life of these asset but they are still expected to require a refurbishment during epoch 1 - The requirement for a refurbishment will need to be determined based on detailed condition inspections and may need to be brought forward or delayed accordingly based on the results of the inspections - It is recommended that when the condition reaches a "Poor" rating then a refurbishment is undertaken	Condition rating of Poor
Sandbank beach monitoring	Timing of defence refurbishments in Local Option	- If implementing the Local Option: - The existing defences (rock groynes) currently help control beach levels and the position of the Sandbank - There is a risk that the existing defences could become less effective over time in response to storms / sea level rise - It is recommended that the Sandbank beach profiles continues to be monitored on a regular basis (i.e. every 6 months) to identify any trends in the beach profile / Sandbank movement. - If the beach profile trends indicate that the beach profile is changing beyond the typical range or there is evidence of the Sandbank position moving significantly then this could be a trigger for refurbishing / modifying the existing defences - A long term record of monitoring is required to enable long term significant trends to be identified relative to typical seasonal variations	- A consistent trend in beach profile change / Sandbank position (not typical seasonal change)
Funding	Decision on Local vs National Option and timing of defence refurbishments	- The Local Option will have a funding shortfall for the defence refurbishment works and beach nourishment (in epoch 3) - The Funding Strategy will need to outline how the defence refurbishments will be funded. If funding is not likely, then these refurbishment works could be delayed until the funding is secured or the National Option could be delivered instead	- Funding availability - Revert to National Option if funding for refurbishments is not secured

Decision Tree



ODU 3 - Christchurch Harbour South

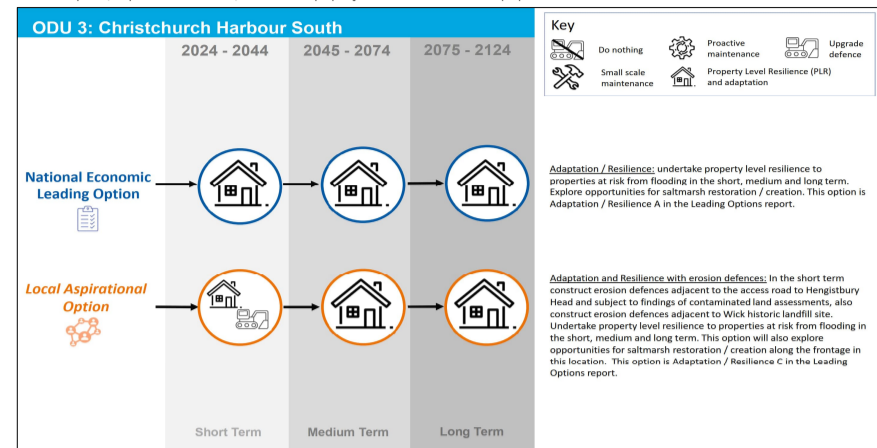
Key features / risks

- Eight properties at risk from flooding (2124 0.5% AEP event) so therefore there is limited economic benefits on a national basis
- Two historic landfill sites (Wick and east of Double Dykes) adjacent to the shoreline and potentially at risk from erosion
- Contamination status of historic landfill sites is unknown at this stage
- Only access road onto Hengistbury Head also adjacent to shoreline and potentially at risk from erosion



Strategic Leading Options

- National and Local Option Identified
- National Option is Adaptation / Resilience (A) whereas Local Option is Adaptation / Resilience (C) with erosion defences
- Local Option (Adaptation / Resilience C with defences) aims to provide property level resilience measures to properties at risk of flooding
- and new defences to Wick historic landfill as well as refurbish defences to the access road to Hengistbury Head (also defencing Double Dykes historic landfill site)
- National Option (Adaptation / Resilience A) would include property level resilience measures to properties at risk but would not include defences to landfill / access road



Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal
- PLR requirements to be determined on property by property basis as required



Works required to deliver leading options*

Option	Years 2025 - 2029	Years 2030 - 2034	Epoch 1 Years 2035 - 2039	Years 2040 - 2044	Epoch 2 Years 2045-2049	Epoch 3 Years 2050-2124
National	Identify properties that would benefit from property level resilience measures Engage with property owners and support property level resilience funding applications / implementation as required Review SAMP policy to align with this option if this is the option delivered					
Local	Develop leading strategy Undertake historic landfill investigations to determine contamination status of the landfill sites Identify properties that would benefit from property level resilience measures Engage with property owners and support property level resilience funding applications / implementation as required Review SAMP policy to align with this option if this is the option delivered	Business case development, outline design and secure funding for erosion defences at Wick historic landfill and Hengistbury Head Access Road (if required pending contaminated land assessment) Approval of business case Outline design, consenting and procurement for erosion defences Construction of erosion defences			Maintenance / refurbishment of erosion defences as required Continued support for PLR measures to property owners	Maintenance / refurbishment of erosion defences as required Continued support for PLR measures to property owners

*note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
*timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (\$k - cash)																
	Epoch 1 (years)			Epoch 2 (years)						Epoch 3 (years)			Total				
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084		2085-2089	2090-2104	2105-2114	2115-2124
National	11	11	51	11	11	11	11	11	11	23	23	23	23	23	63	23	383
Local	11	11	51	23	23	23	23	51	23	23	46	46	46	46	579	46	2,573

*note that defence upgrades / refurbishments timing may need to be adjusted if works are required sooner (to be informed by detailed defence condition assessment and historic landfill investigations)

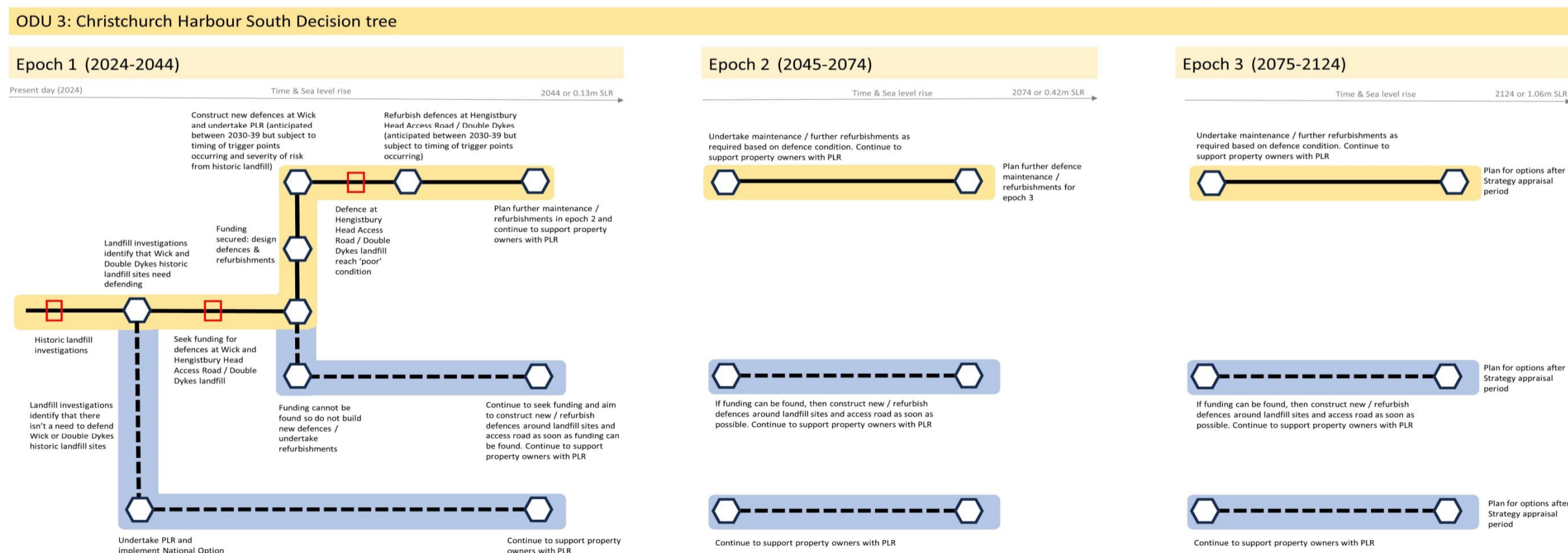
FCERM GIA funding availability

- FCERM GIA funding likely to be limited for defence works due to very few properties being at risk and lack of funding typically available for historic landfill defences

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Historic landfill status	Decision on Local vs National Option	It is recommended that site investigations into the contaminated land status of the historic landfill sites are undertaken This will inform whether the new defences are required around the historic landfill sites and help steer the decision on whether the Local Option or National Option is delivered If the land is found to be contaminated then the Local Option should be delivered as a preference / if funding allows The investigations will also help better inform environmental assessments, such as WFD assessment, at scheme level appraisal	Contaminated land status
Defence condition	Timing of defence refurbishments / upgrades at Hengistbury Head Access Road in local option	If implementing the Local Option: There is currently a gabion basket wall adjacent to the Hengistbury Head Access road at the location where it is closest to the shoreline The gabion basket wall is not included in the Strategy defence condition assessment and therefore the condition status is not known It is recommended that routine defence condition assessments are undertaken on this structure to determine its initial condition status and change over time Ongoing small scale / patch repair maintenance would be expected to extend the life of this asset but it is likely that a refurbishment would be needed during epoch 1 It is recommended that when the condition reaches a "Poor" rating then a refurbishment is undertaken	Condition rating of Poor
Funding	Decision on Local vs National Option and timing of defence refurbishments	The Local Option will have a funding shortfall for the defences around Wick historic landfill and any refurbishments to the defence at the Hengistbury Head Access Road The Funding Strategy will need to outline how the defences will be funded. If funding is not likely, then these defences would be delayed until the funding is secured or the National Option could be delivered instead	Funding availability Revert to National Option if funding for refurbishments is not secured

Decision Tree



ODU 4 - Wick

Key features / risks

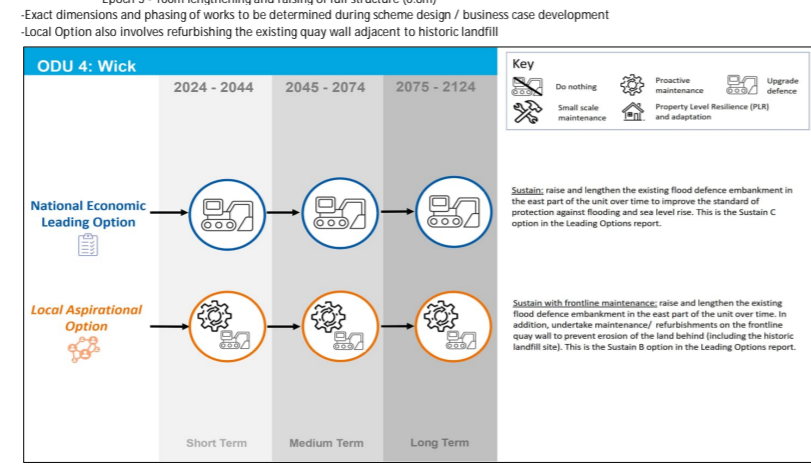
- Flood risk to residential area in west part of unit expected to increase over time with sea level rise
- Two properties at risk from flooding from present day 0.5% AEP event, 121 properties at risk in 2124 0.5% AEP event
- Existing earth embankment defence originally constructed to 2070 20yr SdP (EA comm)
- Latest modelling indicates embankment would be sufficient to the south, increasing in severity over time
- Historic landfill site north of Wick Lane. Contamination status of land unknown
- Quay wall adjacent to historic landfill site will fail at end of service life, leading to erosion of historic landfill
- Adjacent to environmental designations, including LNR & SSSI

Strategy/Leading Options

- National and Local Option identified
- Both options involve raising and lengthening the setback embankment in the east part of the unit over time
- Raising and lengthening would be done incrementally
- Approx. changes to embankment required:
 - Epoch 1 - subject to alignment, between 100m to 400m lengthening to the south (low height <0.5m)
 - Epoch 2 - 170m lengthening and raising of full structure (<0.5m)
 - Epoch 3 - 100m lengthening and raising of full structure (0.6m)
- Exact dimensions and phasing of works to be determined during scheme design / business case development
- Local Option also involves refurbishing the existing quay wall adjacent to historic landfill

Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Years 2025 - 2029		Years 2030 - 2034		Epoch 1		Years 2035 - 2039		Years 2040 - 2044		Epoch 2		Epoch 3			
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084	2085-2089	2090-2094	2105-2114	2115-2124
National	34	606	34	34	34	34	34	34	34	34	34	1,929	68	68	68	68
Local	34	606	34	1,162	870	34	34	34	1,162	34	1,162	1,196	68	68	1,196	11,627

*note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
 *timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash																
	Epoch 1 (years)				Epoch 2 (years)				Epoch 3 (years)				Total				
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084	2085-2089	2090-2094	2105-2114	2115-2124	Total
National	34	606	34	34	34	34	34	34	34	34	1,929	68	68	68	68	3,984	
Local	34	606	34	1,162	870	34	34	34	1,162	34	1,162	1,196	68	68	1,196	11,627	

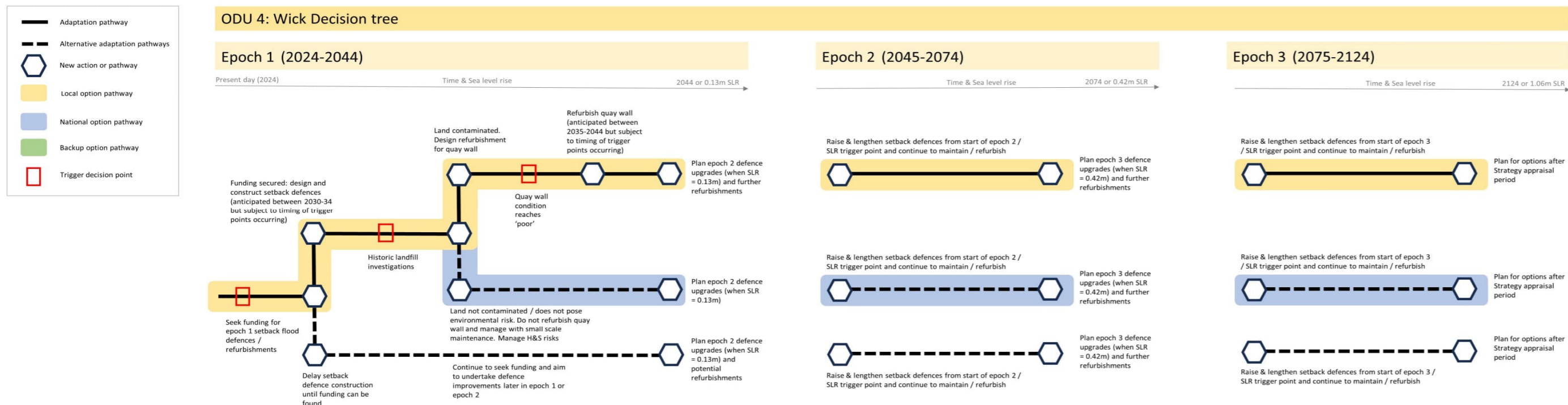
FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for largest scheme as part of the national / local option (epoch 3 defence upgrades)
- Indicative amount of FCERM GIA available for epoch 3 upgrades estimated to be in region of £735-809k
- GIA also likely to be available for defence upgrades in epoch 1 and 2, but fewer benefits so amount of GIA likely to be considerably less
- See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Sea level rise	Embankment improvements for Local and National Options	<ul style="list-style-type: none"> The Strategy National and Local Options follow a managed adaptive approach whereby the setback embankment is raised / lengthened incrementally over time in response to rising sea levels For each embankment improvement, the target SdP is for a SdP at the end of the epoch. For example, the epoch 2 improvement undertaken at the start of the epoch will aim to achieve a target SdP for 2074. Note that more work to define the SdP will need to be reviewed during business case development In the National and Local options, estimates have been made as to when the embankment will need improving based on projections for sea level rise (UKCP18, RCP 8.5, 70%ile) Should sea level rise occur faster / slower than projected, this will change the timing of when embankment improvements are required The projected sea level rise between present day and the start of epoch 2 is 0.13m The projected sea level rise between present day and the start of epoch 3 is 0.42m The embankment improvement in epoch 1 is not related to sea level rise but due to outflanking risk identified in the River Avon model for present day model simulations. Therefore the timing of this intervention will remain unchanged (i.e. midway through epoch 1). The planning / business case development for the second and third rounds of defence improvements (in epochs 2 and 3 respectively) should be undertaken when the structure design life is close to falling below the design SdP of the previous round of defence upgrades. Based on existing UKCP18 sea level rise projections, and assuming the defences are designed to a target SdP at the start of each epoch, the planning / business case development should begin when sea level rise reaches 0.13m (epoch 2) and 0.42m (epoch 3). 	<ul style="list-style-type: none"> Commencement of second round of embankment planning / upgrades when SLR is 0.13m Commencement of third round of embankment planning / upgrades when SLR is 0.42m
Historic landfill status	Decision on Local vs National Option	<ul style="list-style-type: none"> It is recommended that site investigations into the contaminated land status of the historic landfill site are undertaken This will help inform how important it is to refurbish the quay wall adjacent to the historic landfill site and help steer the decision on whether the Local Option or National Option are delivered The Local Option includes a provision for refurbishing the frontline quay wall over time to ensure that it continues to provide erosion protection to the historic landfill behind If the land is found to be contaminated then the Local Option should be delivered as a preference / if funding allows The investigations will also help better inform environmental assessments, such as WFD assessment, at scheme level appraisal 	Contaminated land status
Defence condition	Timing of quay wall refurbishments in Local Option	<ul style="list-style-type: none"> If implementing the Local Option The frontline quay wall was assessed to have an 'Fair' condition in the Strategy defence condition assessment, with an estimated residual life (without maintenance) of 10-15 years Ongoing small scale / patch repair maintenance would be expected to extend the life of this asset but it is still expected to require a refurbishment during epoch 1 (assumed to be around year 15 in the appraisal) The requirement for a refurbishment will need to be determined based on detailed condition inspections and may need to be brought forward or delayed accordingly based on the results of the inspections It is recommended that when the condition reaches a 'Poor' rating then a refurbishment is undertaken 	Condition rating of Poor
Funding	Decision on Local vs National Option and timing of embankment improvements	<ul style="list-style-type: none"> The National and Local Options will have a funding shortfall for the embankment improvement works in each epoch (i.e. FCERM GIA will not cover the full cost) The funding shortfall is likely to be most significant for the earlier interventions (i.e. epochs 1 and 2) because the benefits are not expected to have increased significantly yet, relative to epoch 3 The Funding Strategy will need to outline how the epoch 1 embankment improvements will be funded. If funding is not likely, then these embankment improvement works could be delayed until the funding is secured This will increase the residual risk to properties at risk from outflanking prior to the works being completed, but it is not until epoch 3 when significant numbers of properties are expected to be at risk here (with current SLR projections) and therefore risks could be managed on an individual property by property basis. With existing FCERM GIA Funding rules, for the Local Option, it is unlikely that FCERM GIA will cover a significant proportion (if any) of the refurbishment costs as the primary benefit will be to defend historic landfill from erosion (and not properties) The Funding Strategy will need to outline how the quay wall refurbishment works will be funded. If funding is not likely then the National Option could be delivered as a fallback in the interim. This could lead to the failure of the quay wall and therefore health and safety compliance measures would be needed in this location. 	Funding availability Revert to National Option if funding for quay wall refurbishment is not secured

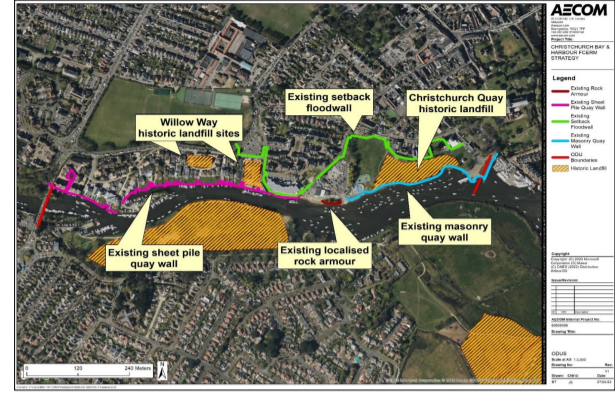
Decision Tree



ODU 5 - Willow Drive and the Quomps

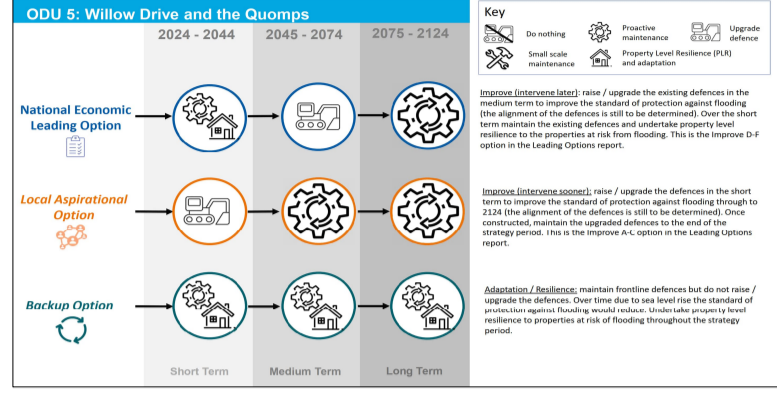
Key features / risks

- Flood risk to residential area
- 27 properties at flood risk from present day 0.5% AEP event primarily in the west part of the unit. 562 properties at risk in 2124 0.5% AEP event across entire unit
- Existing setback flood defence scheme in east part of unit. West part of unit has a quay wall but this is not raised so at risk from flooding
- Outstanding risk of existing flood defence scheme in the future
- Multiple historic landfill sites including beneath the Quomps recreation ground in the east part of the unit
- Quay wall adjacent to Quomps historic landfill site will fail at end of service life, leading to erosion of historic landfill
- Adjacent to environmental designations



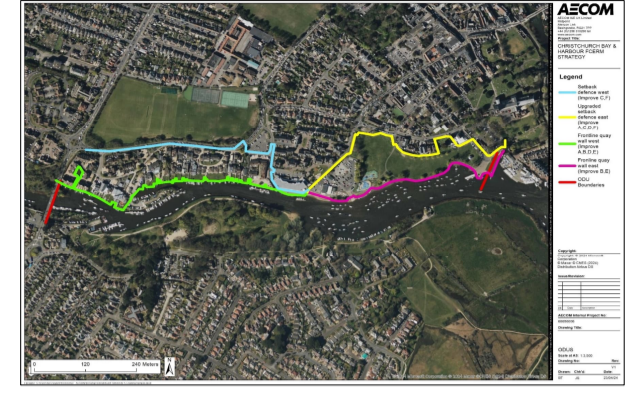
Strategy Leading Options

National, Local and Backup Options Identified
 Both of the National and Local options involve raising and lengthening the defence to improve the SLP. National Option is Improve Df and Local Option is Improve A-C.
 Further work is required after the Strategy to confirm the alignment of the new defences, and this will impact the economic case / timing of interventions.
 Provisionally the Local Option involves intervening sooner whereas the National Option involves waiting until the medium term (epoch 2) to raise defences.
 Both the National and Local Options have significant funding shortfalls and therefore a Backup Option has been identified (Adaptation / Resilience).
 The Backup option involves PLR to manage flood risk and repair refurbishments of defences. It does not have a large one-off scheme cost like the National / Local Options.



Map of Leading Options

Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Years 2025 - 2029	Years 2030 - 2034	Epoch 1	Years 2035 - 2039	Epoch 2	Epoch 3
National	Service leading strategy. Plan for key refurbishments, acquire consent and start leading refurbishment. Operational refurbishment of quay wall. Identify properties that would benefit from property level resilience measures. Engage with property owners and support property level resilience funding applications/implementation as required. Consider historic landfill investigations as appropriate stage.			Address case development for capital scheme to improve defences. Identify properties that would benefit from property level resilience measures to be addressed in a further 10 years (including or excluding the west part of the unit) in accordance with funding in the scheme.	Capital scheme to improve defences. Identify properties that would benefit from property level resilience measures to be addressed in a further 10 years (including or excluding the west part of the unit) in accordance with funding in the scheme.	Property level resilience measures and refurbishment of quay wall.
Local	Identify additional commercial engagement to deliver an overall alignment for the defences. This needs to identify the commercial use of the west part of the unit that will support a defence / PLR in the location of the west part of the unit. Obtain commercial consent for upgrading existing flood defences and property level resilience measures. Obtain consent for business support to economic engagement / business case / design for the scheme, incorporating stakeholder feedback. If upgrades to the defences / PLR are supported in the west part of the unit, proceed with a scheme in epoch 1. This will include: Business case development, scheme design and secure funding for refurbishment improvements. Approval of business case. Identify key properties that would benefit from property level resilience measures. Engage with property owners and support property level resilience funding applications/implementation as required. Consider historic landfill investigations as appropriate stage.			Identify an alignment of scheme, potential engagement to refurbish existing building / quay walls.	Identify an alignment of scheme, potential engagement to refurbish existing building / quay walls.	Property level resilience measures and refurbishment of quay wall.
Backup	Service leading strategy. Plan for key refurbishments, acquire consent and start leading refurbishment. Operational refurbishment of quay wall. Identify properties that would benefit from property level resilience measures. Engage with property owners and support property level resilience funding applications/implementation as required. Consider historic landfill investigations as appropriate stage.			Plan further quay wall refurbishments / repairs, acquire consent and funding for operational refurbishment of quay wall / repairs. Identify properties that would benefit from property level resilience measures. Engage with property owners and support property level resilience funding applications/implementation as required.	Property level resilience measures and refurbishment of quay wall. Support to property owners.	Property level resilience measures and refurbishment of quay wall. Support to property owners.

*Note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required. Timings of works subject to trigger points such as funding and condition of existing defences.

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash													
	Epoch 1 (years)			Epoch 2 (years)			Epoch 3 (years)			Total				
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2120-2124	2125-2134	
National	3,354	23	23	19,499	23	23	2,590	23	46	2,613	2,804	46	2,613	33,670
Local (Improve B shown)	19,916	23	23	23	23	23	4,401	23	46	46	46	46	46	28,275
Backup	2,820	23	23	23	23	23	3,581	46	46	4,274	1,664	46	6,224	36,275

*Note - costing for defence refurbishments / upgrades conservatively assumed in first 5 years, but actual delivery time may be later subject to time taken to acquire funding / undertake design / investigate landfill etc.

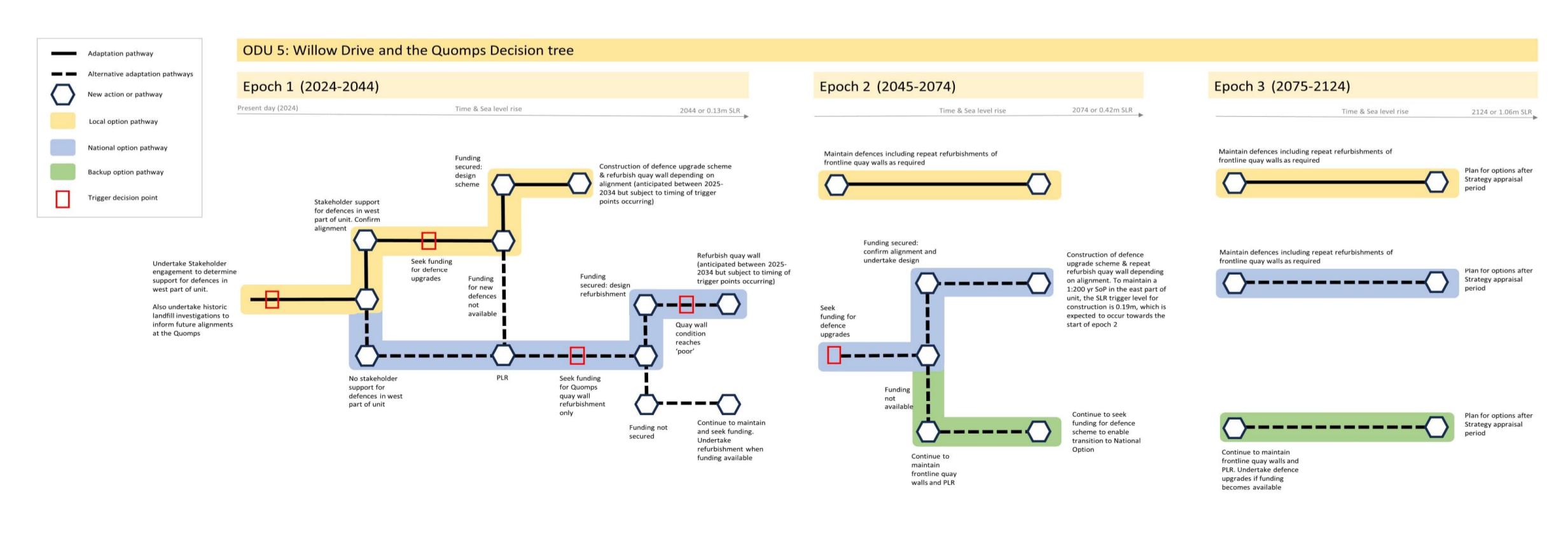
FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for initial defence upgrade scheme as part of the national / local option
- Indicative amount of FCERM GIA available for defence upgrade scheme estimated to be in region of £2.5 million to £4.3 million
- See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

Category	Information	Details of key decisions when implementing options	Triggers
Stakeholder engagement	Choice of Local or National Option, and defence alignment	Currently there is a setback flood defence in the east part of the unit that reduces the risk of flooding to a large number of residential properties in the east part of the unit (this was constructed in the 1990s). However, there is no raised flood defence in the west part of the unit and therefore this area is at increased risk of flooding. It is understood that during the scheme construction in the east part of the unit, the residents in the west part of the unit are opted out and don't support extending the flood defences to the west. Hence this area remained unattended. It is important that stakeholder / community engagement is undertaken before making a decision on future schemes in this location because to understand the support for a scheme to reduce the risk of flooding in the west part of the unit and potential alignment for a scheme need to be identified. For the Strategy, the economic case for the leading options is based on delivering a combined scheme / PLR across both the west and east parts of the unit. However, the feedback from the stakeholder engagement will determine if the leading options are delivered in this way. This will have an impact on the economic case and potential timing of schemes that can be delivered. If defences / property level resilience measures to reduce flood risk in the west part of the unit are not supported (as outlined by the leading options), then this significantly reduces the economic case for the leading options in ODU 5 in the short term. This is because most of the economic benefits of the leading options in ODU 5 support 1 are associated with the properties in the west part of the unit and removing these benefits reduces the overall economic case for a scheme. If this is the case then the National Option should be followed as that flood defence improvements are delayed and delivered in future epochs. By waiting to deliver the scheme, the flood risk will get worse over time in the east part of the unit due to sea level rise and deteriorating condition of the defences. This will increase the amount of benefits that can be associated with the defence upgrades in the east part of the unit and improve the economic case for the scheme. It is likely that the defence improvements would be delayed until epoch 2 but the exact timing will need to be determined from sea level rise triggers and defence condition triggers for the existing setback defences. However, if new flood defences and/or property level resilience in the west part of the unit is supported, then this improves the economic case for delivering a scheme across the full unit and can help justify improving the defences in the east in epoch 1 (i.e. the Local Option), subject to funding.	Stakeholder support / opposition to defences in the west part of the unit and overall alignment decisions
Sea level rise	Timing of scheme for National Option	The Strategy Local Option involves upgrading defences early in epoch 1 and therefore a sea level rise trigger level for implementing this defence as part of this option is not relevant. However, the National Option involves upgrading the defences at a later point in time (epoch 2). The exact timing of this should be informed by status of sea level rise and the onset of flood risk in the future. According to the Environment Agency AMR5 dataset, the existing defences in the east part of the unit have a crest level of approximately 2.3m OD which is in excess of a present day 1 in 1000 year AEP water level in the harbour (not considering any defence / setback or water level gradients up the River Quomps). However, with sea level rise, the SLP of the defence will fall over time and the risk of overflow / outflanking will increase. In the east part of the unit (currently defended), should the objective be to sustain a 1 in 200 year SLP and if a 0.3m freeboard is assumed, the defence will need to be raised once the 200 year extreme water level in the harbour reaches within 0.1m of the existing crest elevation. This equivalent water level is approximately 2.2m OD which is approximately 0.1m sea level rise from the 200 year present day water level. Based on UKCP18 projections, this amount of SLR is expected to occur during epoch 2. However, the actual rate of sea level rise will need to be monitored and once the 0.1m trigger level has been reached then planning for the defence raising should begin.	Begin National Option scheme planning / Business case development when SLR is 19cm
Historic landfill sites	Defence alignment	It is recommended that site investigations into the contaminated land status of the historic landfill sites in ODU 5 are undertaken. This will help inform the choice of defence alignment and design for the flood defence scheme. The information will also inform the design of any frontline quay wall refurbishments. If issues such as leaching need to be considered. The investigations will also help better inform environmental assessments, such as WFA assessment, at scheme level appraisal.	Contaminated land status
Defence condition	Timing of scheme / quay wall refurbishment	The condition of the defences in ODU 5 varies but is typically 'fair' or 'poor'. For defence refurbishments it is recommended that refurbishments are undertaken once defences reach a 'poor' condition. However, the requirement for refurbishment works should consider the outcomes of broader work (such as stakeholder engagement) which will inform the choice of scheme alignment. It may not be appropriate to refurbish defences that are likely to be replaced as part of a scheme alignment a few years later. If defences reach a 'poor' condition and are on the proposed alignment of the envisaged scheme, then this is also a trigger for undertaking the scheme as soon as possible. It is recommended that detailed defence condition surveys are undertaken on a regular basis to inform the defence condition and changes over time.	Condition rating of floor
Funding	Decision on Local or National vs Backup Option	The National Local and Backup Options will have a funding shortfall (i.e. FCERM GIA will not cover the full cost). The Funding Strategy will need to outline how the scheme / refurbishments will be funded. If funding is not likely, then the scheme could be delayed until the funding is secured. Delaying the scheme will increase the residual risk to proper risk prior to the works being completed, but this risk could be managed on an individual property by property by using PLR. The availability of funding should be a key point of discussion with stakeholders and will also inform scheme alignment decisions.	Funding availability - Revert to National Option if funding not initially available - Revert to Backup option if funding not available in medium term

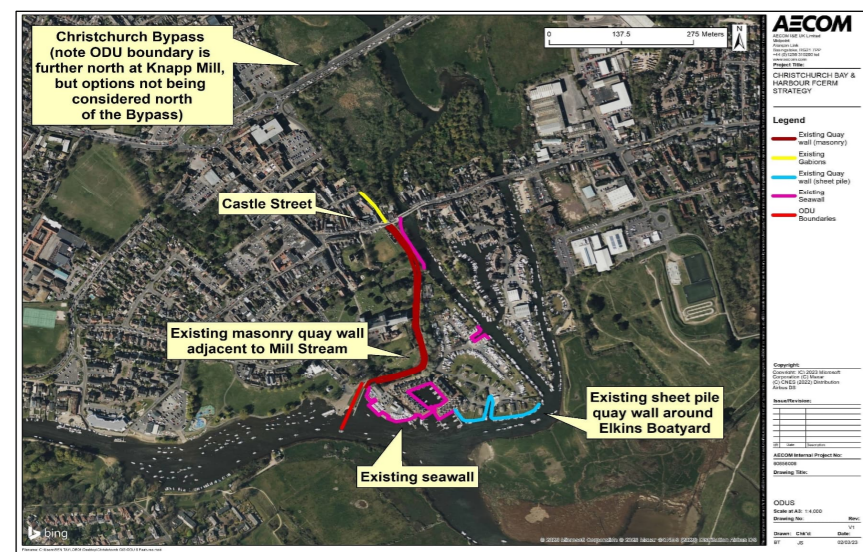
Decision Tree



ODU 6 - River Avon West Bank

Key features / risks

- 126 properties at risk from flooding in the future (2124 0.5% AEP event).
- Flooding also in proximity to key historic environment designations such as scheduled monument
- Economic case for new defences is weak due to length of defences required
- Two main areas of flood risk: Elkins Boatyard / Priory Quay and adjacent to Castle Street. Risk comes from River Avon and Millstream

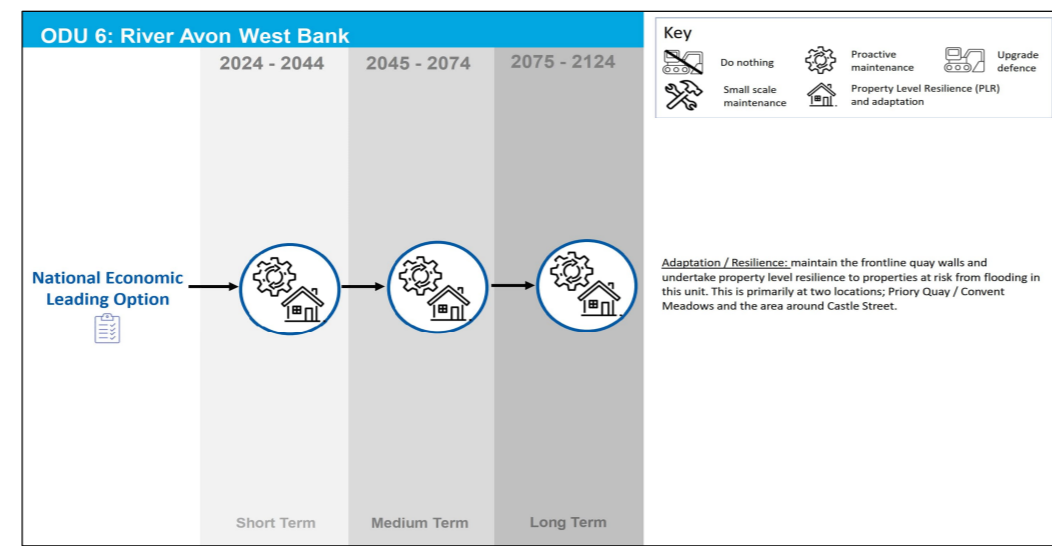


Strategy Leading Options

- National Option is Adaptation / Resilience which involves PLR and maintenance of defences
- No Local Option identified here

Map of Leading Options

- Alignments / areas for PLR are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Epoch 1			Epoch 2	Epoch 3
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039		
National	Identify properties that would benefit from property level resilience measures Engage with property owners and support property level resilience funding applications / implementation as required Develop funding strategy for defence refurbishments			Ongoing PLR measures Plan quay wall refurbishments, acquire consenting and funding for refurbishment Undertake refurbishment of quay wall	Ongoing PLR, maintenance and defence refurbishments Ongoing PLR, maintenance and defence refurbishments

*note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
*timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash														
	Epoch 1 (years)			Epoch 2 (years)					Epoch 3 (years)			Total			
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2084		2085-2094	2095-2104	2105-2114
National	641	11	11	1,582	701	11	11	11	1,582	953	23	2,900	23	23	8,508

*note that defence refurbishments timing may need to be adjusted if refurbishments are required sooner (to be informed by detailed defence condition assessment)

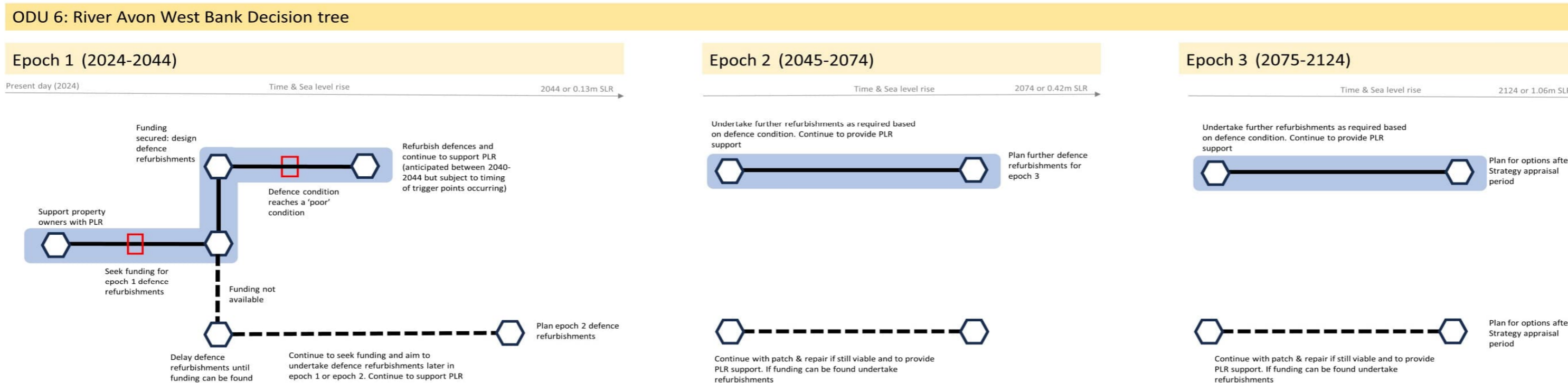
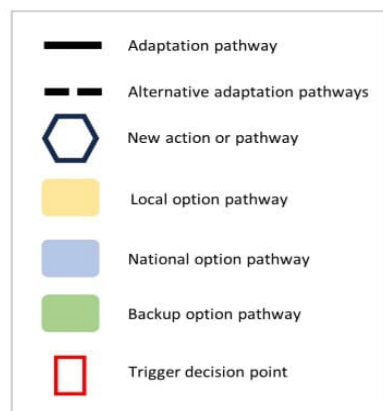
FCERM GiA funding availability

- FCERM GiA funding unlikely to be available for PLR as part of the leading option. Other sources of funding could be available

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Defence condition	Timing of defence refurbishments	- There are currently quay walls and sheet pile walls in this unit that will need refurbishing over time - Generally in fair / good condition based on Strategy defence condition assessment - In the Strategy costing estimates have been made with regards to the timing of defence refurbishments based on estimated residual life - It is recommended that routine defence condition assessments are undertaken on the structures to determine initial condition status and change over time - Ongoing small scale / patch repair maintenance would be expected to extend the life of these assets but it is likely that a refurbishment would be needed during epoch 1 - It is recommended that when the condition reaches a 'Poor' rating then a refurbishment is undertaken	- Condition rating of Poor
Funding	Timing of defence refurbishments	- The National Option may have a funding shortfall for the defence refurbishment works (unlikely FCERM-GiA will cover this work) - The Funding Strategy will need to outline how the defence refurbishments will be funded. If funding is not likely, then these refurbishment works could be delayed until the funding is secured	- Funding availability - Delay refurbishments if funding is not secured

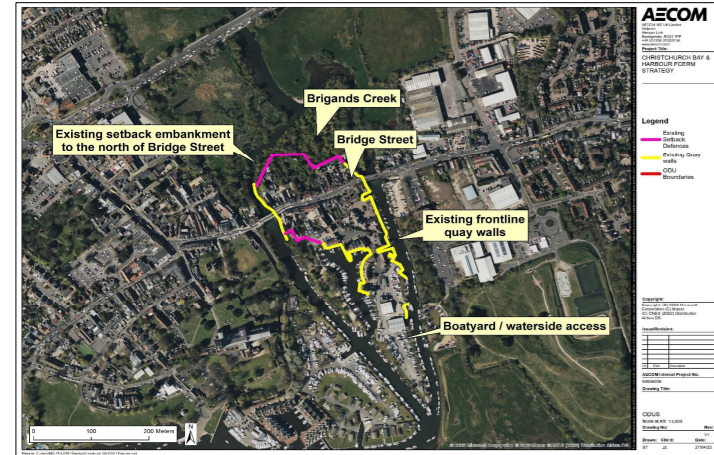
Decision Tree



ODU 7 - Rossiters Quay

Key features / risks

- Island within the River Avon. Residential / non-residential properties either side of Bridge Street
- Area has a high SoP for the present day but over time due to SLR the SoP will fall.
- By 2124 there are 57 properties expected to be at risk from 0.5% AEP event
- A lack of space to construct new defences in parts of this unit and waterside alignments therefore likely to be required
- During design key issues to consider include access to the water and the natural creek (Brigands Creek) that pass through the defences

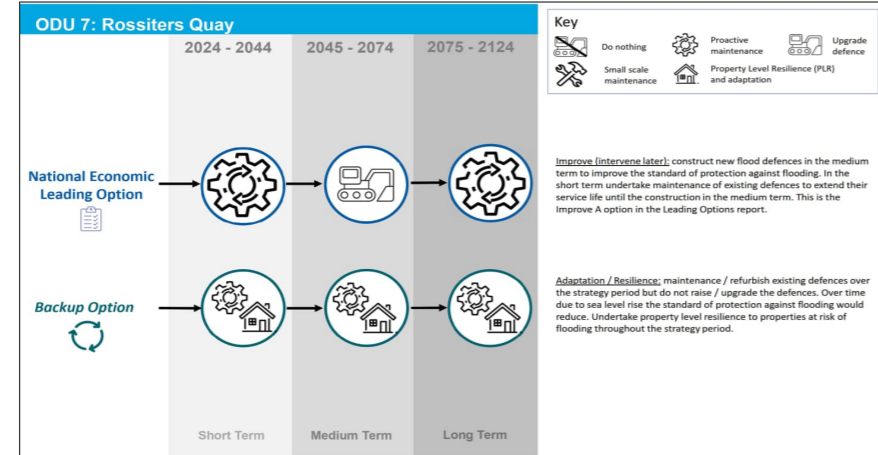


Strategy/Leading Options

- National Option and Backup Option identified
- National Option is Improve (A) that involves raising existing defences / new defences from epoch 2
- Backup option is Adaptation / Resilience which involves undertaking PLR and maintaining existing defences through refurbishments

Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Epoch 1		Epoch 2		Epoch 3	
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044	Years 2045 - 2074	Years 2075 - 2124
National	Develop leading strategy for defence improvements / scheme included to epoch 2			Business case development, outline design and secure funding for defence improvements in epoch 2 Approval of business case Detailed design, consenting and procurement for defence improvements	Finalise design for defence improvements	
Backup	Identify properties that would benefit from property level resilience measures Engage with property owners and support property level resilience funding applications / implementation as required Change funding strategy for defence refurbishments			Engage PLR measures Finalise refurbishment, outline consenting and funding for refurbishment Undertake refurbishment of quay wall	Engage maintenance and defence refurbishment and support to property owners for PLR	Engage maintenance and defence refurbishment and support to property owners for PLR

*note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
*timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash														Total	
	Epoch 1 (years)				Epoch 2 (years)				Epoch 3 (years)				Total			
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084		2085-2089	2090-2114	2115-2124
National	11	11	11	11	8,014	23	23	23	23	23	46	46	46	46	46	8,403
Backup	41	11	11	1,821	746	11	11	1,821	821	23	1,833	878	23	1,833	9,895	9,895

*note that defence refurbishments timing may need to be adjusted if refurbishments are required sooner (to be informed by detailed defence condition assessment)

FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for initial defence upgrade scheme as part of the national option
- Indicative amount of FCERM GIA available for defence upgrade scheme estimated to be in region of £638k
- See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

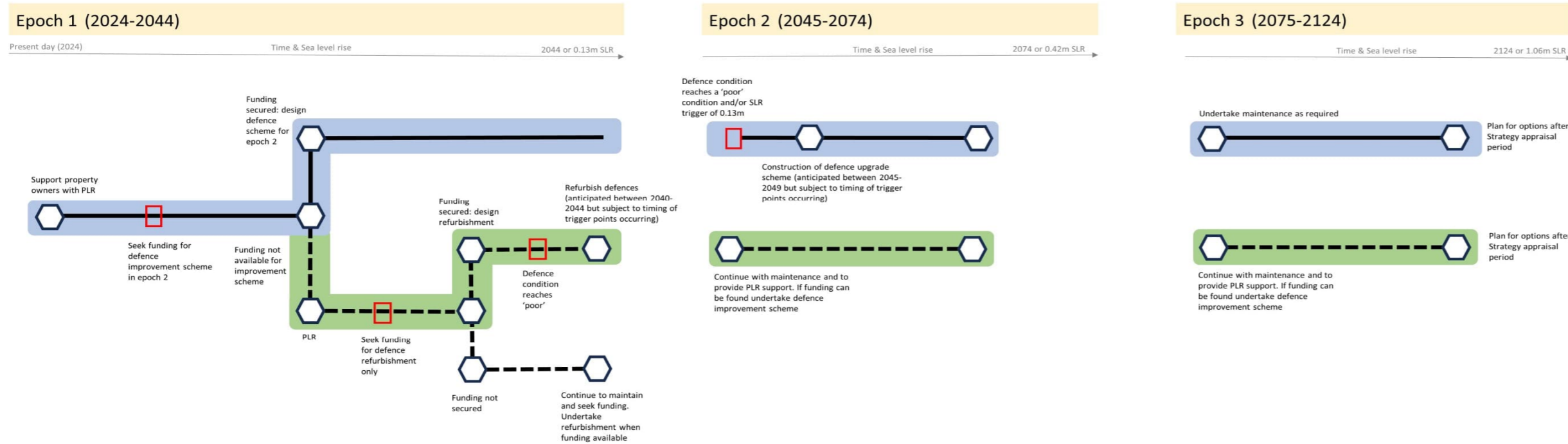
Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Defence condition	Timing of scheme for National Option / refurbishments for Backup Option	- There are currently quay walls / raised defences in this unit that provide flood defence - Generally in fair / good condition based on Strategy defence condition assessment - It is recommended that routine defence condition assessments are undertaken on the structures to determine initial condition status and change over time - Ongoing small scale / patch repair maintenance would be expected to extend the life of these assets. - However, when the condition of the defences / quay walls deteriorates then either construction of the defence improvement scheme will be required (national option) or a refurbishment required (backup) - It is recommended that when the condition reaches a "Poor" rating then the scheme / refurbishment is undertaken	- Condition rating of Poor
Sea level rise	Timing of scheme for National Option	- The National Option involves upgrading the defences in the future (most likely in epoch 2). The exact timing of this should be informed by rates of sea level rise and the onset of flood risk in the future (as well as the defence condition) - According to the Environment Agency AIMS dataset, the raised defences in the unit typically have a crest level of approximately 2.4-2.5m OD (although this does vary and there are some sections with a lower crest level, particularly on the west side). - 2.4m OD is in excess of a present day 1 in 1000 year AEP water level in the harbour (not considering any defence freeboard or water level gradients up the River Avon). However, with sea level rise, the SoP of the defence will fall over time and the risk of overflow / outflanking will increase. - Should the objective be to sustain a 1 in 200 year SoP and if a 0.3m freeboard is assumed, the defences will need to be raised once the 200 year extreme water level in the harbour reaches within 0.3m of the existing crest elevation. This equates to a water level of approximately 2.1-2.2m OD which is approximately 0.09-0.19m sea level rise from the 200 year present day water level. - Existing UKCP18 SLR projections indicate 0.13m of sea level rise is expected to occur by the start of epoch 2 and this represents an approximate mid-point for the 0.09m-0.19m range. Therefore it is suggested that a 0.13m trigger for sea level rise is used for undertaking planning / construction for the defence raising. - It should be noted that the crest level in parts of this unit is lower than 2.4-2.5m and therefore some sections may need raising sooner if the desire is to sustain a 1 in 200yr SoP before a scheme is constructed. However, there is not sufficient detail available to assess the need for this in the Strategy and detailed analysis of flow paths / deflecto defences would be required to draw any conclusions.	- Begin National Option scheme planning / business case development when SLR is 0.13m
Funding	Timing of scheme for National Option / choice switching to Backup Option	- The National Option may have a funding shortfall for the scheme / defence improvement works (unlikely FCERM GIA will cover all of this work) - The Funding Strategy will need to outline how the scheme will be funded. If funding is not likely, then the scheme could be delayed or the option choice switched to the Backup Option. - Funding will still be required for the defence refurbishments as part of the Backup Option but this amount is expected to be less	- Funding availability - Delay refurbishments if funding is not secured

Decision Tree



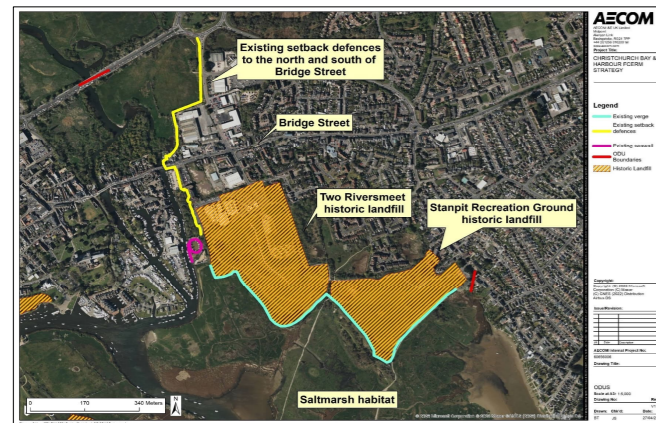
ODU 7: Rossiters Quay Decision tree



ODU 9 - Stanpit

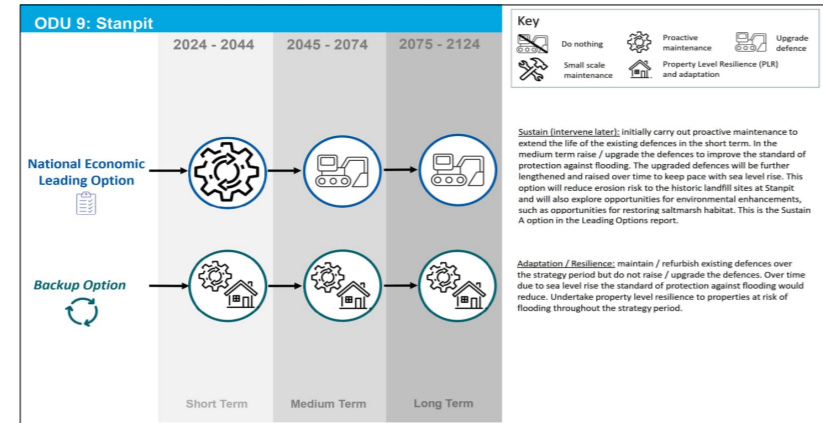
Key features / risks

- East bank of the River Avon and the North side of Christchurch Ground that are adjacent to the harbour
- Large areas of historic landfill sites at Two Rivermead and Stanpit Recreation Ground that are adjacent to the harbour
- Potentially contaminated land status of landfill sites is unknown
- Also there are expected to be a large number of properties at risk from flooding in the future
- By 2124 expected that 867 properties would be at risk from 0.5m AEP event



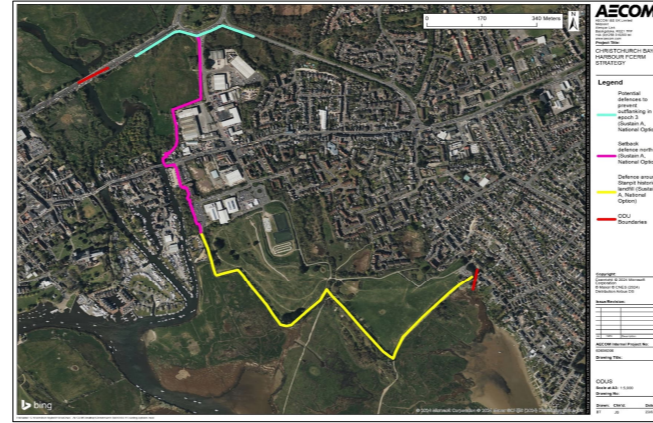
Strategy Leading Options

- National Option and Backup Option identified
- National Option is Sustain (A) that involves raising defences over time to keep pace with SLR (0.05 y SoP) from epoch 2.
- Sustain A also involves defences around the historic landfill and will seek opportunities for saltmarsh refurbishment
- Backup option is Adaptation / Resilience which involves undertaking PLR and maintaining existing defences (including around the historic landfill sites) through refurbishments



Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Years 2025 - 2029	Years 2030 - 2034	Epoch 1	Years 2035 - 2039	Years 2040 - 2044	Epoch 2	Epoch 3
National	Operate historic landfill investigations to determine contamination status of the landfill sites Begin funding strategy for defence improvements / scheme considered for epoch 2 Review S&P policy to align with this option if this is the option selected				Determine scheme alignment options to determine protection (landfill investigations) Business case development, scheme design and cost funding for defence improvements Appraisal of business case Detailed design, consenting and procurement for defence improvements	Construction for defence improvements	Start raising of defences in required / ongoing maintenance
Backup	Operate historic landfill investigations to determine contamination status of the landfill sites Identify properties that would benefit from property level resilience measures Begin property owners and support property level resilience investigations / representation as required Standing funding strategy for defence refurbishments Review S&P policy to align with this option if this is the option selected				Design PLR measures Understand need for defence maintenance around historic landfill sites (subject to outcome of historic landfill investigations). Refurbishment of other defences along the bank of the Avon would still be required if historic landfill defences not raised Plan defence refurbishments, scheme consenting and funding for refurbishment Undertake refurbishment of defences	Design maintenance and defence refurbishment and support to property owners for PLR	Ongoing maintenance and defence refurbishments and support to property owners for PLR

*Note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
 *Timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Epoch 1 (years)						Epoch 2 (years)						Epoch 3 (years)			Total	
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084	2085-2089	2090-2104	2105-2114		2115-2124
National	0	34	0	0	16,910	0	0	0	0	0	0	0	0	0	0	0	25,942
Backup	24	34	34	1,811	8,945	34	34	34	1,811	34	4,520	1,845	8,730	68	68	1,350	29,279

*Note that defence refurbishments timing may need to be adjusted if refurbishments are required sooner (to be informed by detailed defence condition assessments)

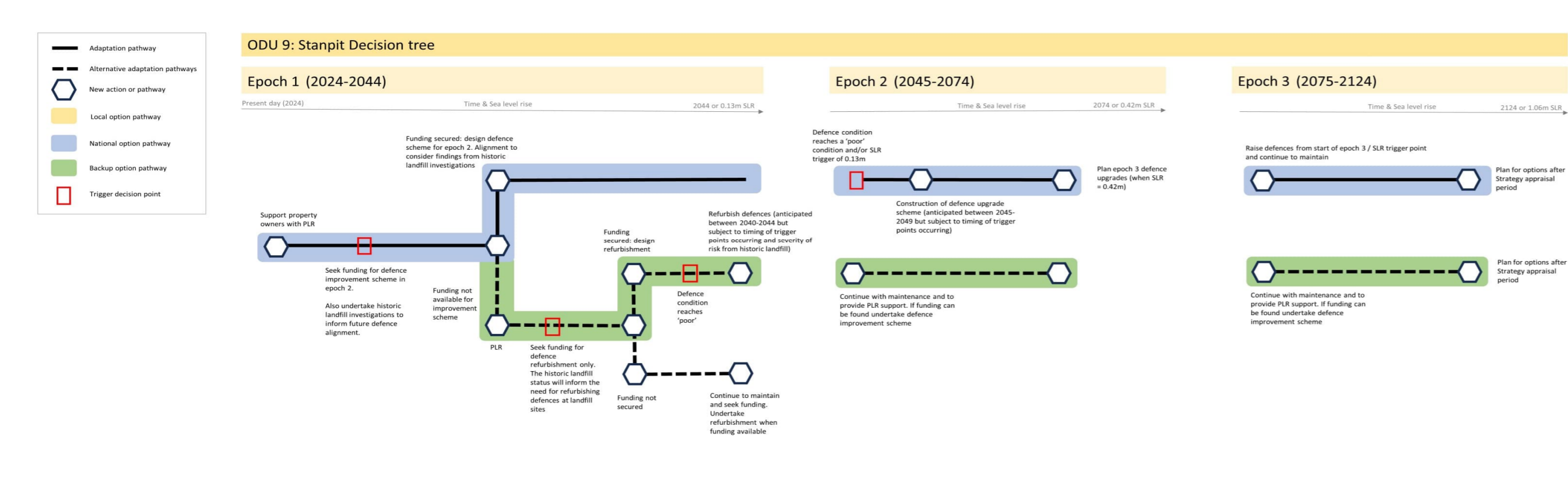
FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for initial defence upgrade scheme as part of the national option
- Indicative amount of FCERM GIA available for defence upgrade scheme estimated to be in region of £2.7 million
- See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Historic landfill status	Decision on defence alignment for National Option	It is recommended that site investigations into the contaminated land status of the historic landfill sites are undertaken This will inform whether the new defences are required around the historic landfill sites and help steer the decision on the defence alignment for the National Option If the land is found to be contaminated then defences around the landfill sites should be delivered as a preference / if funding allows The investigations will also help better inform environmental assessments, such as WFD assessment, at scheme level appraisal	Contaminated land status
Defence condition	Timing of scheme for National Option / refurbishments for Backup Option	There are currently raised defences in this unit that provide flood defence The condition for the majority of the defence length is unknown (data not available for the Strategy defence condition assessment). The AMIS dataset suggests a 'Fair' condition although this needs to be confirmed It is recommended that routine defence condition assessments are undertaken on the structure to determine initial condition status and change over time Ongoing small scale / patch repair maintenance would be expected to extend the life of these assets However, when the condition of the defences deteriorates then either construction of the defence improvement scheme will be required (national option) or a refurbishment required (Backup) It is recommended that when the condition reaches a 'Poor' rating then the scheme / refurbishment is undertaken	Condition rating of Poor
Sea level rise	Timing of scheme for National Option	The National Option involves upgrading the defences in the future (most likely in epoch 2). The exact timing of this should be informed by rates of sea level rise and the onset of flood risk in the future (as well as the defence condition) According to the Environment Agency AMIS dataset, the raised defences in the unit typically have a crest level of approximately 2.4.2 5m OD 2.4m OD in excess of a present day 1 in 1000 year AEP water level in the harbour (not considering any defence freboard or water level gradients up the River Avon). However, with sea level rise, the SoP of the defence will fall over time and the risk of overflow / outflanking will increase Should the objective be to sustain a 1 in 200 year SoP and if a 0.3m freboard is assumed, the defences will need to be raised once the 200 year extreme water level in the harbour reaches within 0.3m of the existing crest elevation. This equates to a water level of approximately 2.1.2 2m OD which is approximately 0.9m sea level rise from the 200 year present day water level Existing URCP18 SLR projections indicate 0.13m of sea level rise is expected to occur by the start of epoch 2 and this represents an approximate mid-point for the 0.09m-0.19m range. Therefore it is suggested that a 0.13m trigger for sea level rise is used for undertaking planning / construction for the defence raising It should be noted that the crest level in parts of the unit is lower than 2.4.2 5m and therefore some sections may need raising sooner if the desire is to sustain a 1 in 200yr SoP before a scheme is constructed. However, there is not sufficient detail available to assess the need for this in the Strategy and detailed analysis of flow paths / defacto defences would be required to draw any conclusions The planning / business case development for the second round of defence improvements (in epoch 3) should be undertaken when the structure design life is close to falling below the design SoP of the previous round of defence upgrades undertaken in epoch 2 Based on existing URCP18 sea level rise projections, and assuming the defences are designed to a target SoP at the start of epoch 3, the planning / business case development for the second round of upgrades should begin when sea level rise reaches 0.42m	Begin National Option scheme planning / business case development when SLR is 0.13m
Funding	Timing of scheme for National Option / choice switches to Backup Option	The National Option may have a funding shortfall for the scheme / defence improvement works (partly FCERM GIA will cover all of this work) The Funding Strategy will need to outline how the scheme will be funded if funding is not likely, then the scheme could be delayed or the option choice switched to the Backup Option Funding will still be required for the defence refurbishments as part of the Backup Option but it does not include one-off capital scheme costs that are as large as the National Option and therefore could be more deliverable.	Funding availability Delay refurbishments if funding is not secured

Decision Tree



ODU 10 - Mundeford

Key features / risks

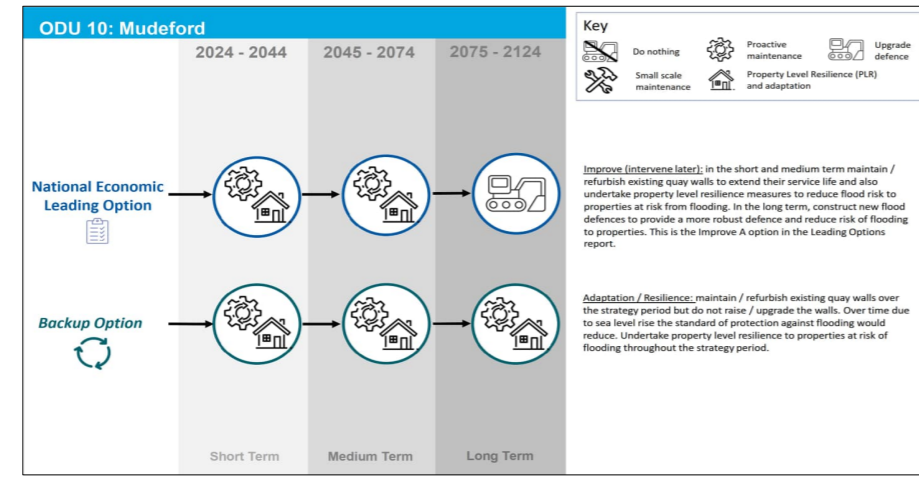
- North side of Christchurch Harbour. Main land use is residential properties / gardens which back onto the shoreline
- River Mude and Bare Brook located at the eastern end of the unit
- Privately owned / maintained quay wall along length of unit
- 25 properties at risk for a present day 0.5% AEP event, increasing to 370 properties by 2124
- Future flood risk is relatively linear along the frontage

Strategy Leading Options

- National Option and Backup Option identified
- National Option is Improve (A) that involves raising defences in epoch 3 when the flood risk begins to increase significantly
- In epochs 1 and 2 Improve A also involves PLR measures and quay wall refurbishments as required
- Backup option is Adaptation / Resilience which involves undertaking PLR and maintaining existing defences through refurbishments

Map of Leading Options

- Alignments / PLR areas are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Epoch 1			Epoch 2	Epoch 3
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039		
National	Identify properties that would benefit from property level resilience measures. Engage with property owners and support property level resilience funding applications / implementation as required. Develop funding strategy for defence refurbishments in epochs 1 and 2. Also consider potential funding for scheme in epoch 3 through this will be highly uncertain.			Ongoing PLR measures. Plan quay wall refurbishments, acquire consenting and funding for refurbishment. Undertake refurbishment of quay wall.	Ongoing PLR measures. Refurbishments.
Backup	Identify properties that would benefit from property level resilience measures. Engage with property owners and support property level resilience funding applications / implementation as required. Develop funding strategy for defence refurbishments.			Ongoing PLR measures. Plan quay wall refurbishments, acquire consenting and funding for refurbishment. Undertake refurbishment of quay wall.	Ongoing maintenance and defence refurbishments and support to property owners for PLR.

*Note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
 *timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash															
	Epoch 1 (years)				Epoch 2 (years)				Epoch 3 (years)				Total			
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084		2085-2089	2095-2104	2105-2114
National	763	23	23	3,056	1,333	23	23	23	23	25,533	46	46	46	46	46	31,030
Backup	763	23	23	3,056	1,333	23	23	23	23	1,250	3,079	4,136	46	3,079	20,540	

*Note that defence refurbishments timing may need to be adjusted if refurbishments are required sooner (to be informed by detailed defence condition assessment)

FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for defence upgrade scheme as part of the national option in epoch 3
- Indicative amount of FCERM GIA available for defence upgrade scheme estimated to be in region of £2 million
- See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

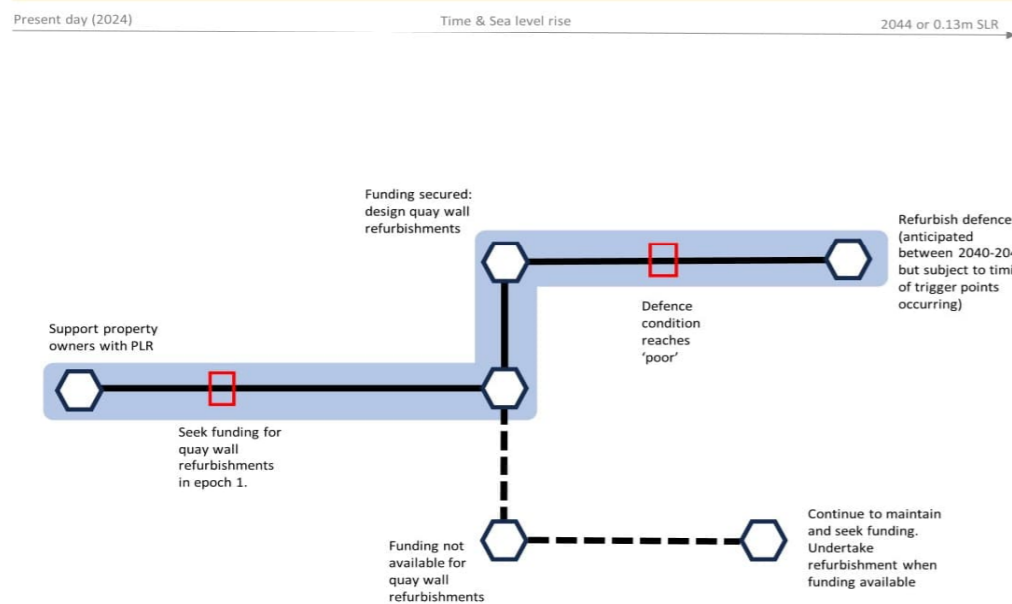
Category	Influence on	Details of key decisions when implementing options	Triggers
Defence condition	Timing of refurbishments for National and Backup Option. Timing of scheme in epoch 3 for National Option	- There is currently a quay wall along this frontage that provides stability to the land behind and prevents erosion - The condition for the quay wall is unknown (data not available for the Strategy defence condition assessment). - It is recommended that routine defence condition assessments are undertaken on the structures to determine initial condition status and change over time - Ongoing small scale / patch repair maintenance would be expected to extend the life of these assets - However, when the condition of the defences deteriorates then refurbishments will be required with the National and Backup options. - It is recommended that when the condition reaches a 'Poor' rating then the refurbishments are undertaken - In epoch 3 the National Option recommends a new defence scheme. The condition of the quay wall during this time period will also help determine the timing of the scheme in epoch 3	- Condition rating of Poor
Sea level rise	Timing of scheme for National Option	- The National Option involves upgrading the defences in epoch 3 when the flood risk is expected to increase significantly and there is a stronger economic case to improve the defences. - The exact timing of the defence scheme with the National Option should be informed by the observed rates of sea level rise and the onset of flood risk in the future (as well as the defence condition). - The UKCP18 sea level rise projections estimate 0.42m of sea level rise by the start of epoch 3 (2074) relative to today. It is therefore recommended that planning / business case development for the scheme begins when observed sea level rise is around 0.42m	- Begin National Option scheme planning / business case development when SLR is 0.42m
Funding	Timing of refurbishments for National Option / Backup Option. Timing of defence improvement scheme with the National Option	- The National and Backup Options may have a funding shortfall for the quay wall refurbishment works (unlikely FCERM-GIA will cover all of this work) - The Funding Strategy will need to outline how these refurbishments will be funded. If funding is not likely, then the refurbishments could be delayed until funding is secured. However, this will increase the residual risk and localised impacts, such as erosion, could occur in locations where defences fail. - In the long term, there is also expected to be a funding shortfall for the defence scheme as part of the National Option. If funding cannot be secured then the scheme could be delayed until funding can be found. Alternatively the Strategy could implement the Backup option in the long term but there would be increased uncertainty with this due to increased residual risk and deeper flooding and the effectiveness of PLR would reduce.	- Funding availability - Delay refurbishments if funding is not secured

Decision Tree

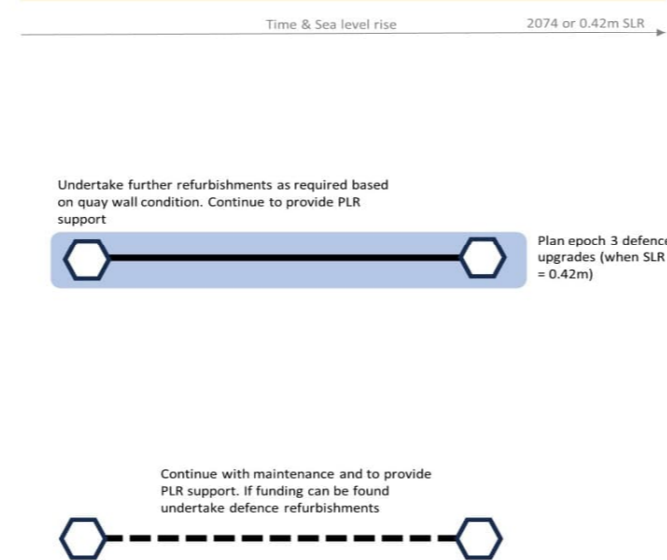


ODU 10: Mundeford Decision tree

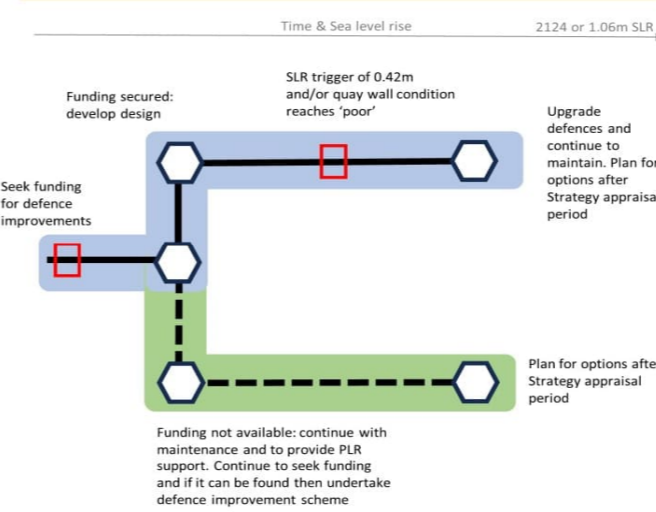
Epoch 1 (2024-2044)



Epoch 2 (2045-2074)



Epoch 3 (2075-2124)



ODU 11 - Mundeford Quay

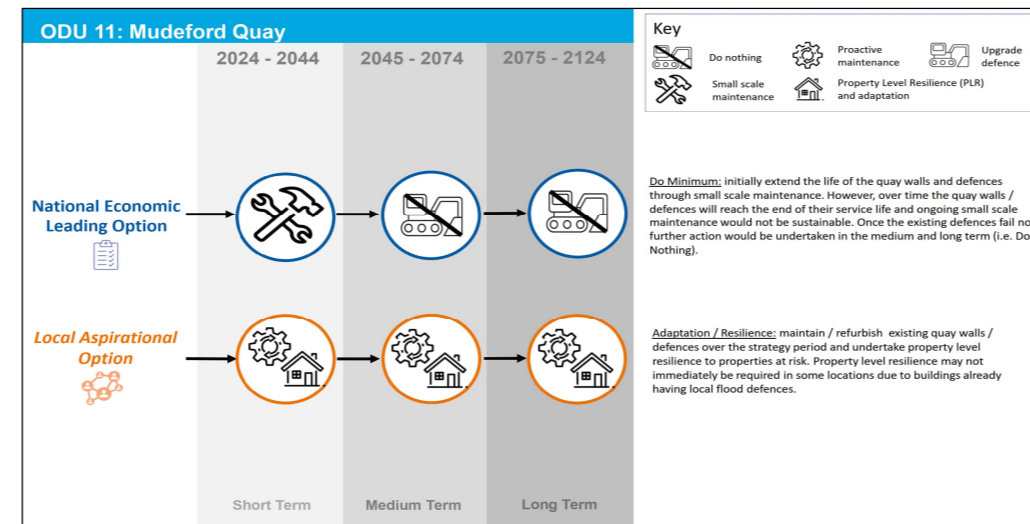
Key features / risks

- Small number of properties at risk from flooding / erosion so therefore there is limited economic benefits on a national basis for defence improvements / maintenance
- Mundeford Quay at risk from flooding currently and depth of flooding expected to increase significantly over next 100 years
- Three properties at risk for a present day 0.5% AEP event, increasing to 12 by 2124
- The quay is a strategically important features for overall morphology of the area, for example, in acting as a training wall for 'the Run' channel
- Uncertain impact on coastal morphology should quay walls around the quay be left to fail in the future
- Key infrastructure passes beneath 'the Run' from the quay



Strategy Leading Options

- National and Local Option identified
- National Option is Do Minimum whereas Local Option is Adaptation / Resilience
- Local Option (Adaptation / Resilience) would involve maintaining the quay walls with refurbishments and manage flood risk on the quay using PLR
- National Option (Do Minimum) would not involve replacing existing defences when they fail and long term morphology is uncertain



Map of Leading Options

- Defence maintenance assumed along existing alignments, however this may vary subject to further appraisal
- PLR requirements to be determined on property by property basis as required



Works required to deliver leading options*

Option	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044	Years 2045 - 2074	Years 2075 - 2124
National	No planned works other than small scale patch & repair and ensuring H&S compliance. Review S&P policy to align with the option if this is the option delivered.					
Local	Develop funding strategy for quay wall refurbishments. Undertake defence condition assessments. Undertake historic landfill investigations to determine contamination status of landfill sites. Identify properties that would benefit from property level resilience measures. Engage with property owners and support property level resilience funding applications / implementation as required.	Begin planning defence refurbishments. Secure funding and consenting for refurbishments. Continue to provide PLR support.	Refurbish existing quay walls. Continue to provide PLR support.	Continue to provide PLR support.	Further refurbishments of existing defences and PLR.	Further refurbishments of existing defences and PLR.

*note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
 *timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash														Total
	Epoch 1 (years)				Epoch 2 (years)				Epoch 3 (years)						
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2084	2085-2094	2095-2104	2105-2114	2115-2124
National	23	46	91	91	183	183	37	0	0	0	0	0	0	0	0
Local	101	11	7,517	11	121	11	11	7,517	11	11	143	7,529	143	7,529	23
															30,689

*note that defence refurbishments timing may need to be adjusted if refurbishments are required sooner (to be informed by detailed defence condition assessment)

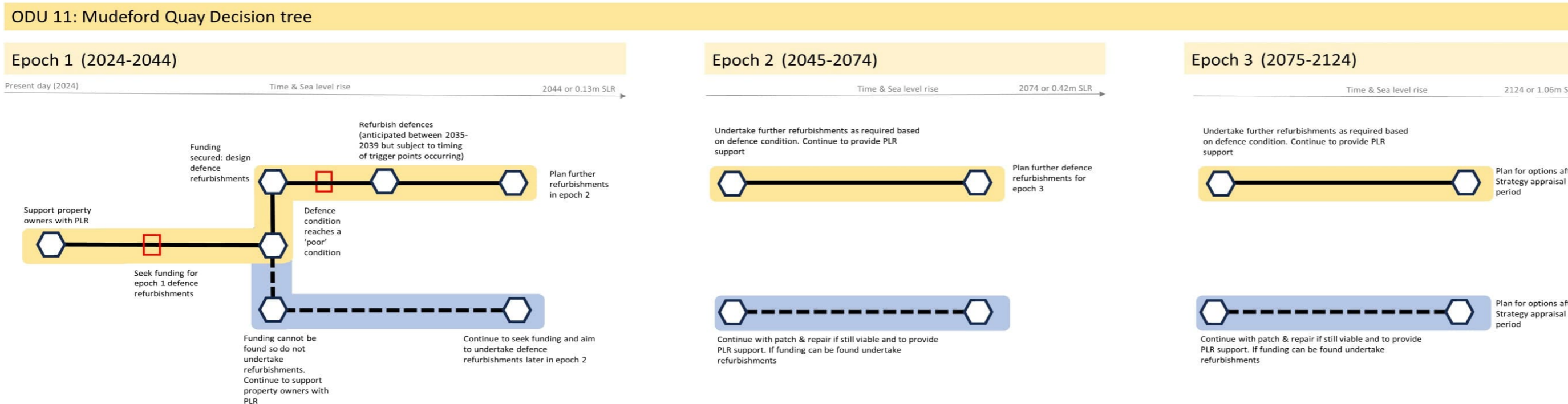
FCERM GiA funding availability

- FCERM GiA funding unlikely to be available for defence works due to BCR < 1 on national basis. Funding may be available for PLR from separate funding routes

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Defence condition	Timing of defence refurbishments in Local Option	- If implementing the Local Option: - The existing quay wall around Mundeford Quay was assessed to have a 'Fair' condition in the Strategy defence condition assessment, with an estimated residual life (without maintenance) of 10-15 years - Ongoing small scale / patch repair maintenance would be expected to extend the life of these asset but they are still expected to require a refurbishment during epoch 1 - The timing of a refurbishment will need to be determined based on further detailed condition inspections and may need to be brought forward or delayed accordingly based on the results of the inspections - It is recommended that when the condition reaches a 'Poor' rating then a refurbishment is undertaken	- Condition rating of Poor
Funding	Decision on Local vs National Option and timing of defence refurbishments	- The Local Option will have a funding shortfall for the defence refurbishment works - The Funding Strategy will need to outline how the defence refurbishments will be funded. If funding is not likely, then these refurbishment works could be delayed until the funding is secured or the National Option could be delivered instead. - The residual risk of defence failure will increase if refurbishments are delayed or not undertaken and the consequences of this could be erosion / uncertain morphological change.	- Funding availability - Delay refurbishments or revert to National Option if funding for refurbishments is not secured

Decision Tree



ODU 12 - Avon Beach and Friars Cliff

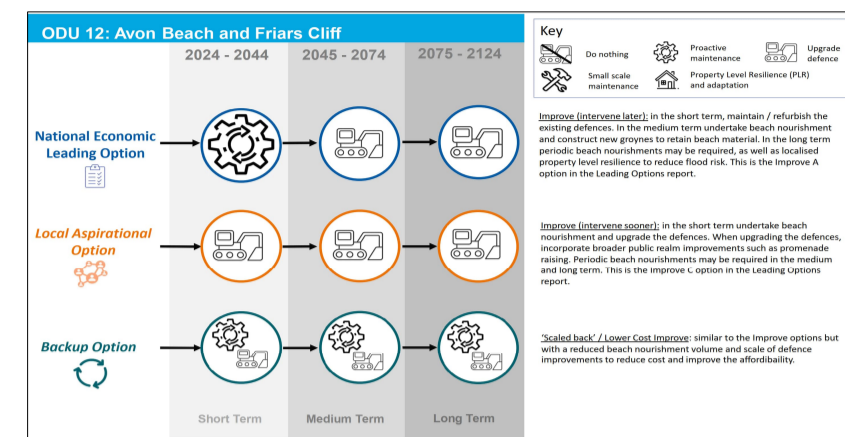
Key features / risks

- Open coast frontage between Marlford Quay and Steamer Point
- Variety of coastal defences including rock groynes, timber groynes, rock revetment and seawall
- Key area for coastal recession / tourism
- Main risk is from coastal erosion, with some minor localised flood risk. Initially erosion risk is low, increasing over time
- Nine properties expected to be at risk from erosion during epoch 1. However, this increases to 172 properties over the next 100 years (cumulative)



Strategy Leading Options

- National (Improve A), Local (Improve C) and Backup Options (scaled back Improve A) identified
- Each of the leading options involve upgrading the defences to provide erosion defence over the Strategy period
- Further work is required after the Strategy to confirm the alignment of the new defences, and this will impact the economic case / timing of interventions
- The National Option (Improve A) involves maintaining / refurbishing defences in epoch 1. Then in epoch 2 upgrade defences / beach nourishment
- The Local Option (Improve C) is the same as the National Option but it involves upgrading defences in epoch 2 and also undertaking public realm enhancements
- The Backup option is the same as the National Option (Improve A) but is 'scaled back' and involves smaller defence upgrades / less beach nourishment material



Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Epoch 1				Epoch 2		Epoch 3	
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044	Years 2045-2074	Years 2075-2124	Years 2075-2124	Years 2075-2124
National	Develop funding strategy Undertake beach management as required	Plan epoch 1 defence refurbishments, acquire consenting and funding for refurbishments and undertake design Undertake beach management as required	Undertake refurbishment of defences Undertake beach management as required	Business case development for capital scheme to improve defences and beach nourishment Acquire consent and funding for the scheme and undertake design Undertake beach management as required	Business case development for capital scheme to improve defences and beach nourishment Acquire consent and funding for the scheme and undertake design Undertake beach management as required	Capital scheme to improve defences and beach nourishment	Ongoing maintenance and beach management	Ongoing maintenance and beach management
Local	Develop funding strategy Undertake beach management as required	Business case development for capital scheme to improve defences and beach nourishment, and public realm enhancements Acquire consent and funding for this scheme and undertake design Undertake beach management as required	Undertake capital scheme to upgrade defences and beach nourishment If funding allows include works to improve public realm	Undertake beach management as required	Capital scheme to improve defences and beach nourishment	Ongoing maintenance and beach management	Ongoing maintenance and beach management	Ongoing maintenance and beach management
Backup	Develop funding strategy Undertake beach management as required	Plan epoch 1 defence refurbishments, acquire consenting and funding for refurbishments and undertake design Undertake beach management as required	Undertake refurbishment of defences Undertake beach management as required	Business case development for capital scheme to improve defences and beach nourishment This would be a 'scaled back' version of the defence upgrades and a smaller beach nourishment scheme compared to the National Option Acquire consent and funding for the scheme and undertake design Undertake beach management as required	Capital scheme to improve defences and beach nourishment	Ongoing maintenance and beach management	Ongoing maintenance and beach management	Ongoing maintenance and beach management

*Note: not shown in table above, but monitoring and small scale / patch regular maintenance on existing defences and assets should be undertaken annually / as required
*Timing of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash															
	Epoch 1 (years)				Epoch 2 (years)				Epoch 3 (years)				Total			
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2084	2085-2094	2095-2104	2105-2114	2115-2124	
National	49	49	3,499	49	49	49	49	49	49	2,097	213	97	2,143	97	2,143	20,373
Local	49	49	18,216	49	49	49	49	49	49	2,097	256	140	2,188	140	2,188	25,617

FCERM GiA funding availability

- Indicative FCERM GiA funding availability calculated for defence upgrade scheme as part of the national option epoch 2
- Indicative amount of FCERM GiA available for defence upgrade scheme estimated to be in region of £1.4 million
- See economics report for assumptions when calculating indicative GiA availability (such as baseline year)

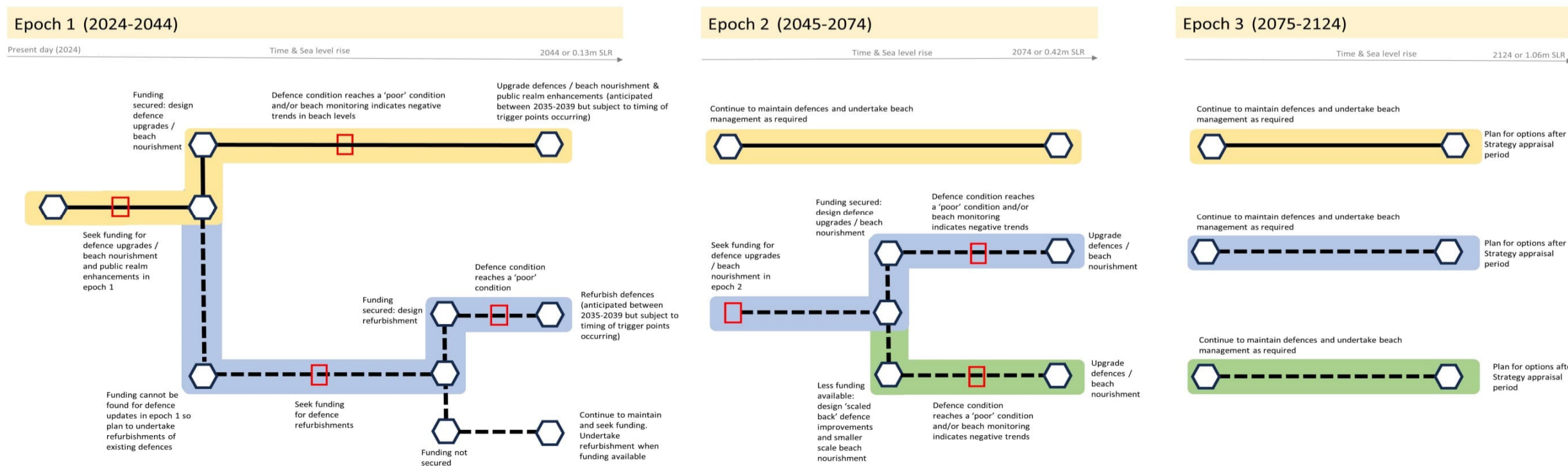
Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Beach monitoring	Timing of defence upgrades / beach nourishment in Leading Options	- The beach is a key component of the defence system in this location and the existing defences (groynes) currently help control beach levels - There is a risk that the beach profile could change over time in response to storms / sea level rise which could reduce the effectiveness of the defence system - It is recommended that the beach profiles in ODU 12 continue to be monitored on a regular basis (i.e. every 6 months) to identify any trends in the beach profile movement. - If the beach profile trends indicate that the beach profile is lowering beyond the typical range then this could be a trigger for upgrading / modifying the existing defences to help retain more beach material and undertaking a beach nourishment scheme. - A long term record of monitoring is required to enable long term significant trends to be identified relative to typical seasonal variations	- A consistent trend in beach profile change (not typical seasonal changes)
Defence condition	Timing of defence refurbishments and defence upgrades in Leading Options	- The condition of the defences in ODU 12 varies but are typically 'fair'. There are some defences in a 'poor' or 'good' condition. - The condition of the defences can also inform the timing of refurbishments and defence upgrades - For defence refurbishments it is recommended that refurbishments are undertaken once defences reach a 'poor' condition - Similarly, if a defence upgrade scheme is scheduled within several years and the defences reach a 'poor' condition then this could also be a trigger for undertaking the scheme sooner. - It is recommended that detailed defence condition surveys are undertaken on a regular basis to inform the defence condition and changes over time.	- Condition rating of Poor
Funding	Decision on Local vs National vs Backup Option	- The National, Local and Backup Options will have a funding shortfall (i.e. FCERM GiA will not cover the full cost) - The Funding Strategy will need to outline how the scheme / refurbishments will be funded. - If funding for undertaking the defence improvements and beach nourishment for the Local Option in epoch 1 is not available, then the Strategy could revert to the National Option and refurbish existing defences instead during epoch 1 (with the aspiration to then undertake the defence improvements in epoch 2) - If funding for the defence improvements and beach nourishment for the National Option in epoch 2 is not available, then the Strategy could revert to the Backup option and reduce the scale of defence improvements / beach nourishment to reduce the overall cost. - If funding is not likely for the refurbishments, then the refurbishments / scheme could be delayed until the funding is secured. However, delaying the refurbishments / scheme will increase the residual risk of erosion and damage to properties prior to the works being completed.	- Funding availability - Revert to National Option if funding not available for scheme in epoch 1 - Revert to Backup option if not enough funding is available in medium term

Decision Tree



ODU 12: Avon Beach and Friars Cliff Decision tree



ODU 13 - Highcliffe

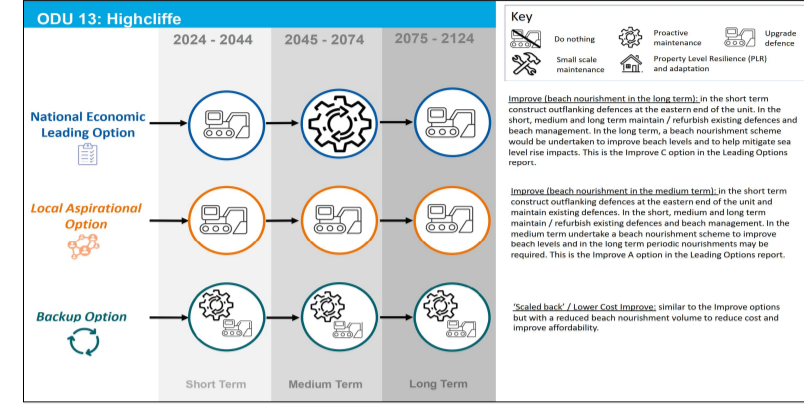
Key features / risks

- Open coast frontage between Steamer Point and Chewton Bunnery
- Variety of coastal defences including rock groynes, rock revetment and cliff stabilisation / drainage
- Key areas for coastal recreation / tourism
- Main risk is from coastal erosion. Initially erosion risk is low, increasing over time
- 191 properties expected to be at risk from erosion over the next 100 years (cumulative)
- Risk of outflanking at the eastern end of the unit at undeveloped Naish Cliff



Strategy Leading Options

- National (Improve C), Local (Improve A) and Backup Options (scaled back Improve C) identified
- Each of the leading options involve upgrading the defences to provide erosion defence over the Strategy period and this will also support ongoing maintenance of the cliff drainage and stabilisation system at Highcliffe
- Further work is required after the Strategy to confirm the alignment of the new defences, and this will impact the economic case / timing of interventions
- The National Option (Improve C) involves constructing an outflanking defence in epoch 1 and then maintaining / refurbishing existing defences in epoch 1 and 2. Then in epoch 3 upgrade defences / beach nourishment.
- The Local Option (Improve A) is the same as the National Option but it involves undertaking the beach nourishment from epoch 2 (rather than epoch 3)
- The Backup option is the same as the National Option (Improve C) but is 'scaled back' and involves smaller defence upgrades / less beach nourishment material



Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Epoch 1			Epoch 2			Epoch 3		
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044	Years 2045 - 2074	Years 2075 - 2124	Years 2045 - 2074	Years 2075 - 2124	Years 2075 - 2124
National	Develop funding strategy Understand beach management as required	Plan epoch 1 outflanking defence, acquire consenting and funding, and undertake design Understand beach management as required	Construct outflanking defence Understand beach management as required	Plan and business case development for defence refurbishments in epoch 2 if required Understand beach management as required	Understand defence refurbishments as required and ongoing beach management	Beach nourishment scheme and further defence maintenance / upgrades as required and ongoing beach management	Understand defence refurbishments as required and ongoing beach management	Beach nourishment scheme and further defence maintenance / upgrades as required and ongoing beach management	Further defence maintenance and upgrade delivery if required Ongoing beach management
Local	Develop funding strategy Understand beach management as required	Plan epoch 1 outflanking defence, acquire consenting and funding, and undertake design Understand beach management as required	Construct outflanking defence Understand beach management as required	Begin planning for beach nourishment in epoch 2 if required Understand beach management as required	Beach nourishment scheme and further defence maintenance / upgrades as required and ongoing beach management	Further defence maintenance and upgrade delivery if required Ongoing beach management	Understand defence refurbishments as required and ongoing beach management	Beach nourishment scheme and further defence maintenance / upgrades as required and ongoing beach management	Further defence maintenance and upgrade delivery if required Ongoing beach management
Backup	Develop funding strategy Understand beach management as required	Plan epoch 1 outflanking defence, acquire consenting and funding, and undertake design Understand beach management as required	Construct outflanking defence Understand beach management as required	Plan and business case development for defence refurbishments in epoch 2 if required Understand beach management as required	Understand defence refurbishments as required and ongoing beach management	Scaled back beach nourishment scheme and further defence maintenance / upgrades as required and ongoing beach management	Understand defence refurbishments as required and ongoing beach management	Beach nourishment scheme and further defence maintenance / upgrades as required and ongoing beach management	Further defence maintenance and upgrade delivery if required Ongoing beach management

*Note: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
*Timing of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash															
	Epoch 1 (years)			Epoch 2 (years)			Epoch 3 (years)			Total						
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2084	2085-2094	2095-2104	2105-2114	2115-2124	Total
National	60	60	740	740	60	5,919	60	60	60	60	6,142	120	1,676	120	120	16,873
Local	60	60	740	60	60	60	60	60	60	60	6,142	120	1,676	120	120	18,430

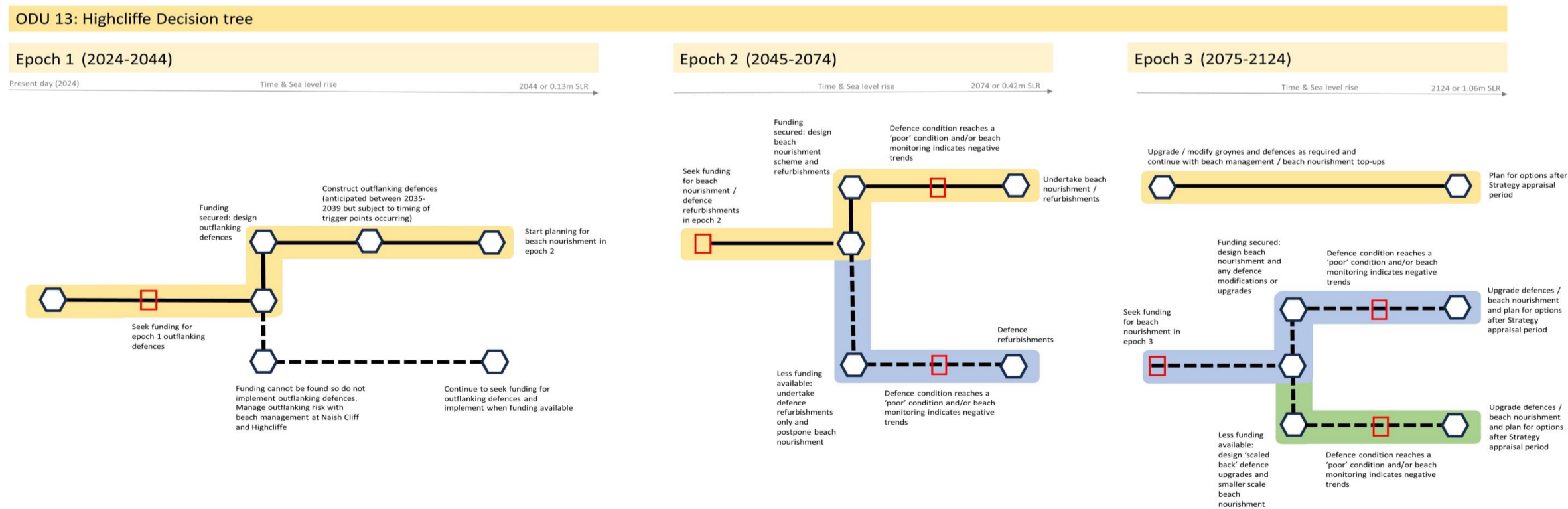
FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for scheme as part of the local option in epoch 2, and the national option in epoch 3
- Indicative amount of FCERM GIA available for defence scheme estimated to be in region of £1.5 million (local option scheme) to £2.2 million (national option scheme)
- See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
Beach monitoring	Timing of defence upgrades / beach nourishment in Leading Options	The beach is a key component of the defence system in this location and the existing defences (groynes) currently help control beach levels There is a risk that the beach profile could change over time in response to storms / sea level rise which could reduce the effectiveness of the defence system It is recommended that the beach profiles in ODU 13 continue to be monitored on a regular basis (i.e. every 6 months) to identify any trends in the beach profile movement. If the beach profile trends indicate that the beach profile is lowering beyond the typical range then this could be a trigger for upgrading / modifying the existing defences to help retain more beach material and undertaking a beach nourishment scheme. A long term record of monitoring is required to enable long term significant trends to be identified relative to typical seasonal variations	A consistent trend in beach profile change (not typical seasonal changes)
Defence condition	Timing of defence refurbishments and defence upgrades in Leading Options	The condition of the defences in ODU 13 varies but are typically 'good'. The condition of the defences can also inform the timing of refurbishments and defence upgrades For defence refurbishments it is recommended that refurbishments are undertaken once defences reach a 'poor' condition. Similarly, if a defence upgrade scheme is scheduled within several years and the defences reach a 'poor' condition then this could also be a trigger for undertaking the scheme sooner. It is recommended that detailed defence condition surveys are undertaken on a regular basis to inform the defence condition and changes over time.	Condition rating of Poor
Funding	Decision on Local vs National vs Backup Option	The National, Local and Backup Options will have a funding shortfall (i.e. FCERM GIA will not cover the full cost) The Funding Strategy will need to outline how the scheme / refurbishments will be funded If funding for undertaking the beach nourishment for the Local Option in epoch 2 is not available, then the Strategy could revert to the National Option and undertake the beach nourishment in epoch 3. If funding for the defence improvements and beach nourishment for the National Option in epoch 3 is not available, then the Strategy could revert to the Backup option and reduce the scale of defence improvements / beach nourishment to reduce the overall cost. If funding is not available for the outflanking defences in epoch 1 (recommended in each of the leading options) then the defences could be delayed and beach management could be utilised instead at Naish Cliff to help control rates of erosion at the eastern end of ODU 13 (i.e. moving material from Highcliffe to Naish Cliff)	Funding availability Revert to National Option if funding not available for scheme in epoch 1 Revert to Backup option if not enough funding is available in medium term

Decision Tree



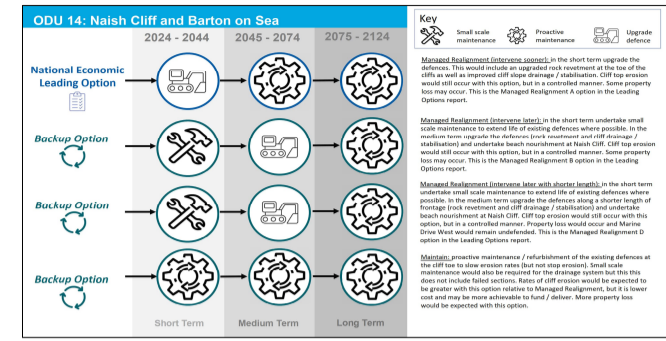
ODU 14 - Naish Cliff and Barton on Sea

Key features / risks

Operational heritage between Devonian Burrey and the western end of Barton on Sea. Characterised by eroding shingle cliffs. Variety of coastal defences including rock revetment and cliff stabilisation / drainage. Backup Option (Managed Regrowth E) is the current preferred option. Backup Option (Managed Regrowth E) is the current preferred option. Backup Option (Managed Regrowth E) is the current preferred option.

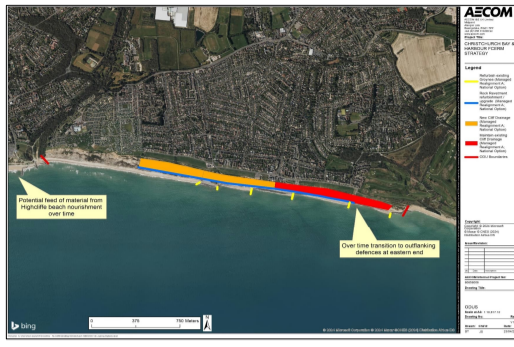
Status/paths/Options

National Managed Regrowth (A), and multiple Backup Options (Managed Regrowth E, Managed Regrowth D, Managed Regrowth C, Managed Regrowth B, Managed Regrowth A). The National Option (Managed Regrowth E) involves new / upgraded defences between Marine Drive West and Marine Drive East (main urban area of BOD) underpin in epoch 1. Erosion would not be stopped entirely due to geology of cliff. Backup Option (Managed Regrowth E) is the current preferred option. Backup Option (Managed Regrowth E) is the current preferred option. Backup Option (Managed Regrowth E) is the current preferred option.



Map of Location/Options

Agreement on location and will vary subject to further appraisal. Only National Option shown in figure (Backup options not shown).



Works required to deliver leading options*

Option	Years 2024 - 2029	Years 2030 - 2039	Years 2040 - 2049	Years 2050 - 2059	Years 2060 - 2069	Years 2070 - 2079	Years 2080 - 2089	Years 2090 - 2099	Years 2100 - 2109	Years 2110 - 2119	Years 2120 - 2124	
National Managed Regrowth (A)	Design funding strategy and engage with potential funders for epoch 1 scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise business case and design of scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.
Backup Managed Regrowth (B)	Design funding strategy and engage with potential funders for epoch 2 scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise business case and design of scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	
Backup Managed Regrowth (C)	Design funding strategy and engage with potential funders for epoch 3 scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise business case and design of scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	
Backup (Mainnet)	Design funding strategy and engage with potential funders for epoch 4 scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise business case and design of scheme. Complete detailed design for Marine Drive West and Marine Drive East. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	Finalise construction of scheme and deliver to standard of completion. Agree funding and construction programme for scheme. Agree construction scheme.	

*Note: not shown if stable above, but monitoring and small scale 'patch' repair maintenance on existing defences and assets would be undertaken annually, as required. *Range of works subject to trigger points such as funding and condition of existing defences.

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	2024-2029	2030-2039	2040-2044	2045-2049	2050-2059	2060-2069	2070-2074	2075-2079	2080-2084	2085-2089	2090-2094	2095-2099	2100-2104	2105-2109	2110-2114	2115-2119	2120
National Managed Regrowth (A)	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255
Backup Managed Regrowth (B)	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255
Backup Managed Regrowth (C)	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255
Backup (Mainnet)	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255	255

*Note that specific for defence upgrade as part of backup option is undertaken as soon as possible. Therefore the costs outlined in year 2120 - 2124 could occur sooner.

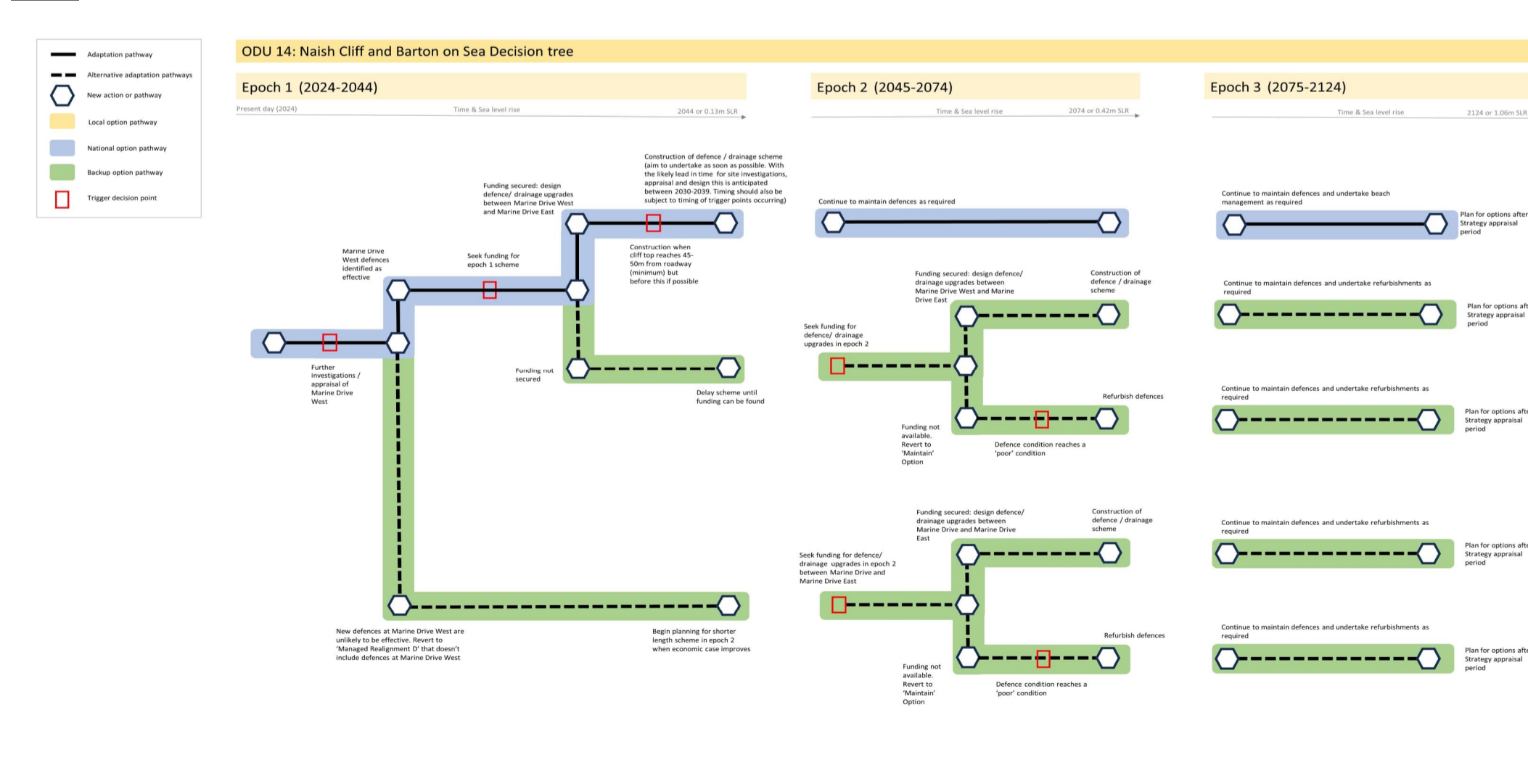
FCEM GIA funding availability

Indicates FCEM GIA funding availability calculated for defence upgrade scheme as part of the national option in epoch 1. Indicates amount of FCEM GIA available for defence scheme in epoch 1 in region of £12 million. FCEM GIA would not be eligible to cover off stabilisation / drainage part of the scheme cost. FCEM GIA could be used on cliff face defences. See economic report for assumptions when calculating indicative GIA availability (each business year).

Trigger Points

Category	Influence on	Point of key decision when implementing option	Trigger
Marine Drive West feasibility	Defence alignment for scheme (includes Marine Drive West) and therefore choice of Strategic option	Revised the 2024-2029 ODU at Marine Drive West in the water ramp area of the alignment back ODU. The effectiveness of new sea defences / cliff drainage in this location is therefore uncertain. Prior to, or during the development of a business case / scheme design for the Barton on Sea Strategic, it is recommended that further appraisal of constructing new defences at Marine Drive West is undertaken. If the appraisal indicates that defences would be effective and provide sufficient cost benefit then it is recommended that they are included in the scheme alignment. This would deliver the National Option that currently assumes that defences would be included here. If the appraisal indicates that defences would not be effective / not provide sufficient cost benefit then it is recommended that they are excluded from the scheme alignment. This would mean that the Strategic reverts to the Managed Regrowth Option that is currently a backup option.	Funding to cover further appraisal of Marine Drive West (during or prior to business case development)
Observed cliff erosion and geology at ODU	Timing of defence / drainage scheme as part of the National Option	As outlined in the Barton on Sea option review, as much as possible it is required at the top of the cliff between the cliff line and the roadway in order to implement the emerging drainage solution being developed by MFC. As a minimum detail design is required and should be with review to see that this does not result in the requirement of the emerging drainage solution: challenging. Erosion of the cliff typically occurs in increments and is not a linear process. It is typically sections of cliff erode in response to storm / rainfall events rather than a gradual loss every year. The planning and design for the defence and drainage scheme should therefore begin before the cliff reaches the roadway to account for any erosion events that could occur during the planning and design process. It is recommended that planning / scheme development begins when the cliff is between 50-60m from the roadway and construction starts when the cliff is between 40-50m from the roadway (at the latest). Some parts of the cliff are already at this trigger threshold and therefore the National Option recommendations planning / starting on the scheme delivery as soon as possible.	Begin scheme planning / development and delivery of ODU 14 (50-60m from roadway) and construction begins when cliff is 40-50m from roadway (at the latest)
Defence condition	Timing of defence refurbishments / upgrades as part of the leading options	The condition of the defences in ODU 14 varies but are typically 'good' and 'fair' although some groups are in a 'poor' condition. The condition of the defences can also be the trigger for refurbishments and defence upgrades. For defence refurbishments it is recommended that refurbishments are undertaken once defences reach a 'poor' condition. Similarly, if defence upgrade scheme is scheduled within several years and the defence reach a 'poor' condition then the build should be a trigger for undertaking the scheme sooner. It is recommended that detailed defence condition surveys are undertaken on a regular basis to inform the defence condition and changes over time.	Condition rating of Poor
Funding	Decision on National or Backup Options	The National and Backup Options will have a funding shortfall at J in FCEM GIA will not cover the full cost. The Funding Strategy will need to outline how the scheme / refurbishments will be funded. If funding for undertaking National Option in epoch 1 is not available, then the Strategic could revert to the Backup Option (Managed Regrowth E) and undertake the scheme in epoch 2. If funding for the Backup option scheme in epoch 2 (Managed Regrowth E) is not available, then the Strategic could revert to the other Backup option (Backup A) and undertake defence refurbishments rather than defence / drainage upgrades in the event of funding not being available for refurbishments then small scale maintenance could be continued but the realistic expectation is that erosion would be expected to occur in line with the 100 year return period.	Funding availability. Revert to Backup Option if funding not available for National Option

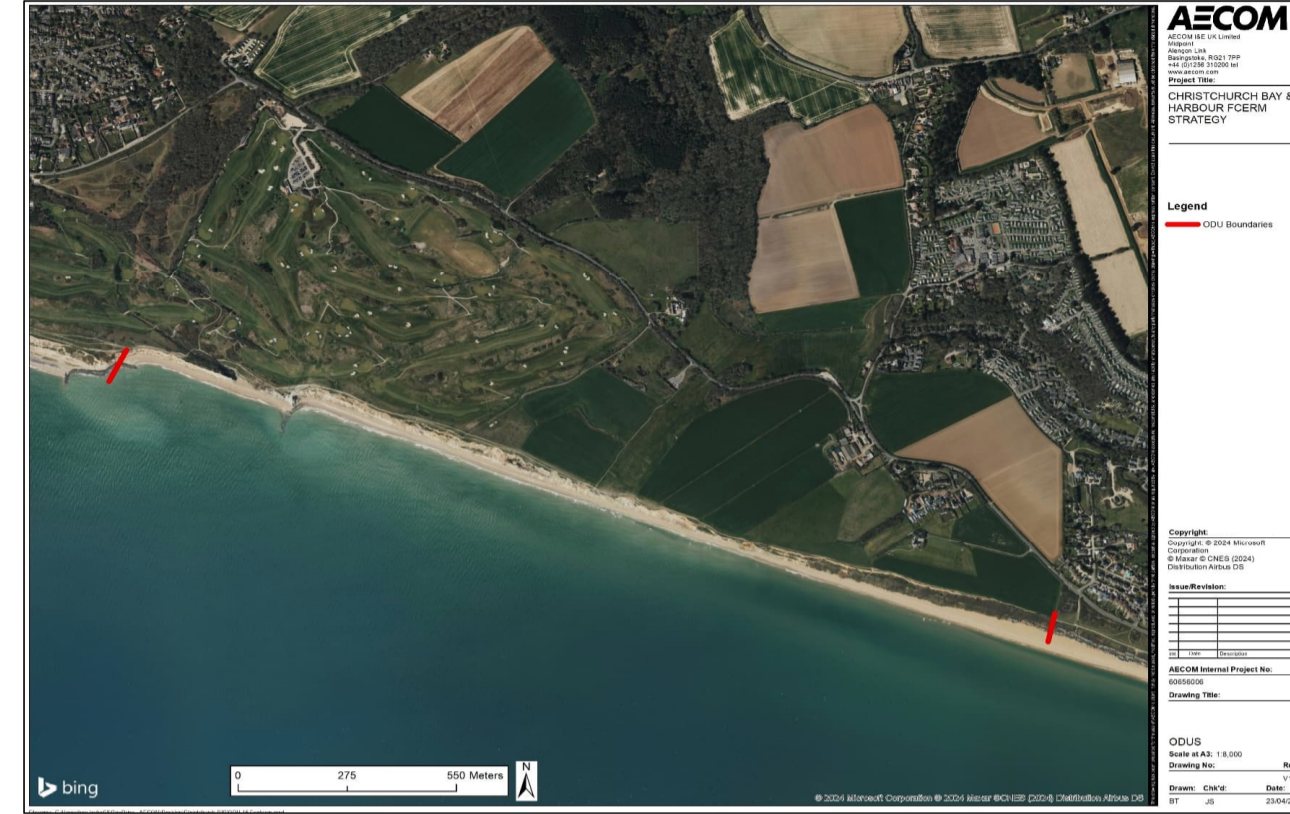
Decision Tree



ODU 15 - Barton on Sea to Hordle Cliff

Key features / risks

- Undefended open coast frontage between Barton on Sea and Hordle Cliff
- No properties or other assets at risk until epoch 3 (only 1 property at risk in epoch 3)

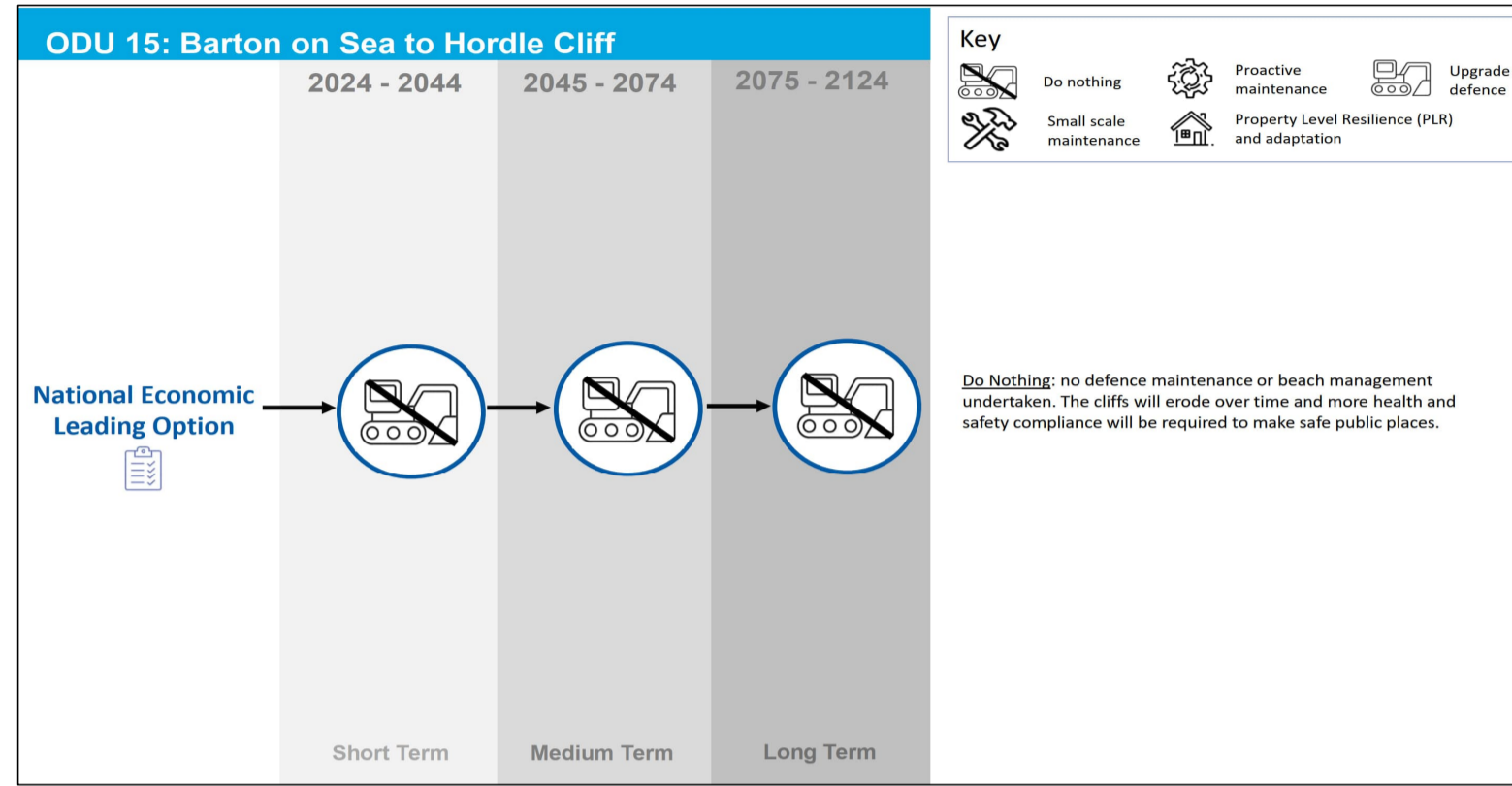


Strategy Leading Options

- National option is Do Nothing
- Allow natural processes to occur, supporting the features of the environmental designations found in this area

Map of Leading Options

- No map of Leading Options provided as Do Nothing does not include any interventions



Works required to deliver leading options*

Option	Epoch 1					Epoch 2	Epoch 3
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044	Years 2045-2074	Years 2075-2124	
National	No defence maintenance or beach management undertaken. Undertake health and safety activities following cliff erosion events to make safe public spaces						

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash															
	Epoch 1 (years)				Epoch 2 (years)					Epoch 3 (years)					Total	
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2084	2085-2094	2095-2104	2105-2114		2115-2124
National	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

FCERM GiA funding availability

- Not applicable with Do Nothing option

Trigger Points

Category	Influence on	Details of key decisions when implementing options	Triggers
NA	NA	NA	

Decision Tree

- Not applicable with Do Nothing option

ODU 16 - Cliff Road

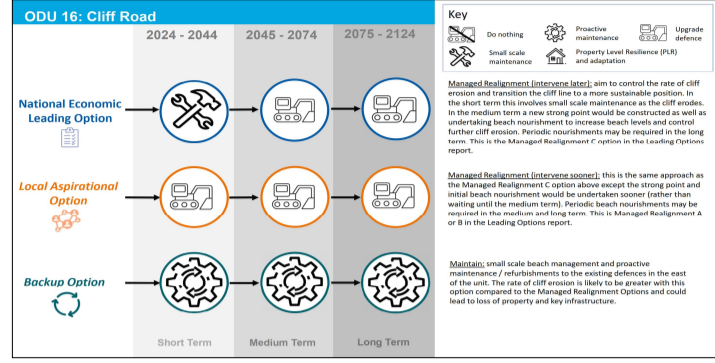
Key features / risks

- Open coast frontage between the beach huts and the western end of the defences at Cliff Cliff, used extensively for recreation / amenity
- Most of the cliff is underlain by the beach floor of the cliffs provides the main protection to the cliff toe
- However, at the eastern end of the cliff there is a wall and groynes that provide local protection
- Main risk is from coastal erosion. Beach huts at end of cliff are at risk of erosion to the cliff and main road
- Also risk to public amenity features, toilets, car parking and beach access
- Over the next 100 years 223 properties at risk of erosion, but majority of the properties at risk are expected during epoch 3
- Cliff designated as SSSI due to geological importance
- Dominant sediment transport direction is from west to east



Strategy Leading Options

- National (Managed Realignment C), Local (Managed Realignment A/B) and Backup Options (Mantain) identified
- The National Option (Managed Realignment C) involves constructing a local strong point and undertaking beach nourishment in epoch 2. The aim will be to limit erosion of the cliff toe and cliff line to reach more sustainable position. However, with the defence interventions this will be done in a controlled manner to avoid property loss / loss of road in the future
- The Local Option (Managed Realignment A/B) is the same as the National Option but it involves undertaking the beach nourishment and construction of local strong point sooner (in other epoch 1 or the start of epoch 2)
- The Backup option involves maintenance of existing defences and beach recycling. However, in the long term the erosion risk is likely to be greater than the National / Local options and property loss could occur
- Further work is required after the Strategy to confirm the alignment of the new defences, and this will impact the economic case / timing of interventions



Map of Leading Options

- Alignments are indicative and will vary subject to further appraisal



Works required to deliver leading options*

Option	Years 2020 - 2029	Years 2030 - 2034	Epoch 1	Years 2035 - 2039	Years 2040 - 2044	Epoch 2	Epoch 3	
National	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required
Local Managed Realignment (A shown for reference)	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required
Backup	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required	Develop funding strategy / undertake defence refurbishment as required / The cliff will continue to erode to support beach hut owners as required

*Notes: not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required

*Range of work subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash												Total			
	Epoch 1 (years)			Epoch 2 (years)			Epoch 3 (years)			Total						
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2079	2080-2084	2085-2089	2090-2094	2105-2114	2115-2124
National	98	98	193	193	348	264	264	10,237	127	137	214	1,940	274	1,940	271	19,514
Local	98	1,660	137	137	137	137	137	137	137	1,940	274	1,940	274	1,940	271	12,250
Backup	98	491	98	98	348	264	741	264	348	264	615	615	615	1,000	615	6,860

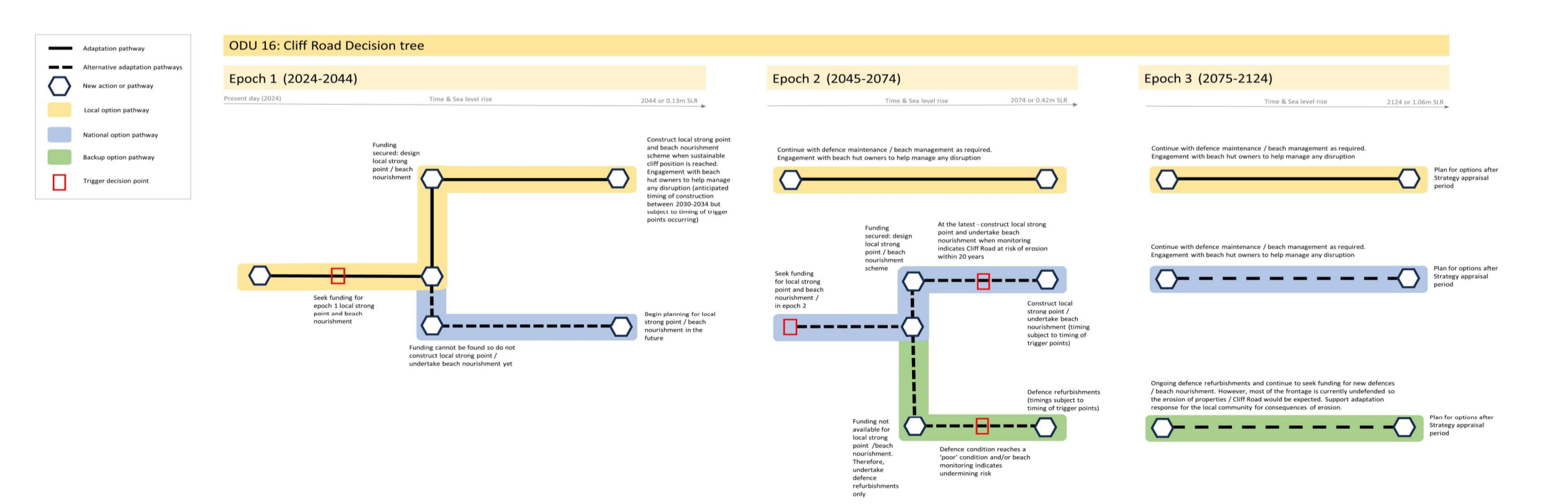
FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for scheme as part of the local option in epoch 1 and the national option in epoch 2
- Indicative amount of FCERM GIA available for defence scheme estimated to be in region of £1.3 million (local option scheme) to £1.9 million (national option scheme)
- *See economic report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

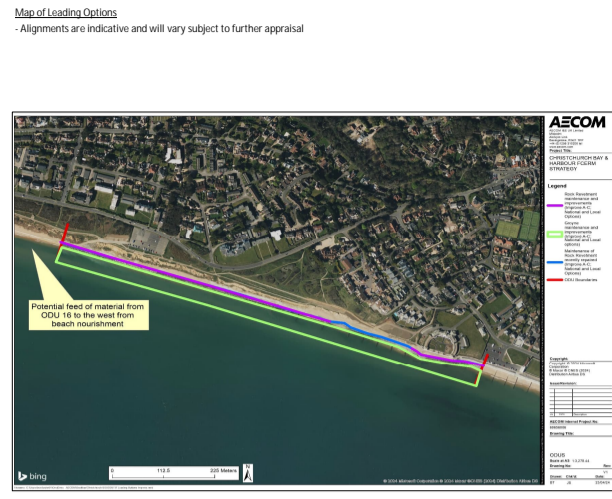
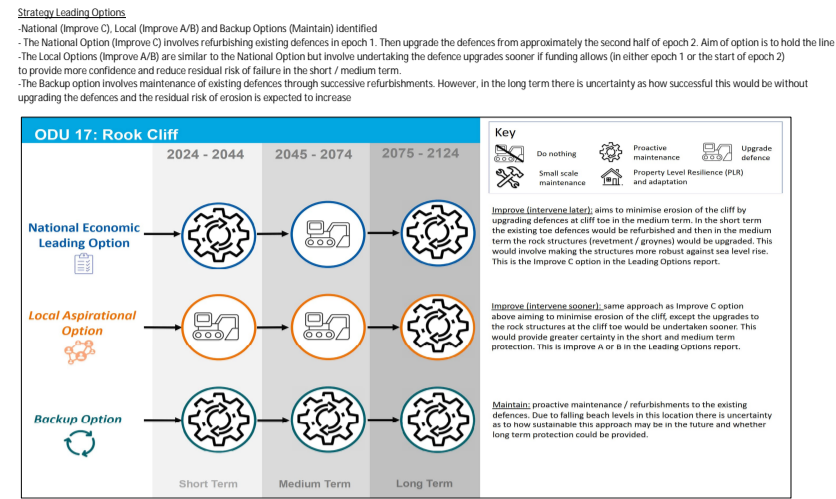
Category	Influence on	Details of key decisions when implementation options	Triggers
Beach nourishment / cliff erosion	Timing of local strong point construction / beach nourishment in National / Local Options	The beach is a key component of the defence system in this location and it helps to control rates of cliff erosion. Where the beach is narrower it provides less protection to the cliff toe. Over time there is a risk that the beach profile could change further in response to storms / sea level rise which could reduce the effectiveness of the defence system further. It is recommended that rates of cliff erosion and the beach profile in ODU 16 continue to be monitored on a regular basis (i.e. every 6 months and in response to storms). The National / Local options aim to allow some erosion of the cliff to occur in the future to create more space for a wider beach. However, the options will ensure that this erosion will be in a controlled manner with the aim of stopping erosion reaching Cliff Road and the properties behind it. The cliff erosion / beach profile trends should therefore be monitored so that the local strong point / beach nourishment scheme as part of these options can be timed appropriately so that the roadway / properties do not become at risk. The timing of the local strong point / beach nourishment will need to be carefully considered so that a buffer zone of land is retained seaward of Cliff Road. This will ensure that any further erosion in the future (after the scheme is in place) does not threaten the Road and properties. It is recommended that the trigger for undertaking the local strong point / beach nourishment is when the cliff toe reaches a distance from Cliff Road that puts the road at risk from erosion within a 20 year period. This will need to consider the rate of erosion that is occurring and beach profile changes based on monitoring results, as well as the distance between the cliff top and Cliff Road. The local strong point / beach nourishment could be undertaken sooner (for example in epoch 1 if funding allows), but it should be undertaken no later than the trigger level in order to retain a buffer zone of open space at the cliff top after the scheme is constructed. A long term record of beach profile / cliff erosion monitoring is required to enable long term engagement trends to be identified relative to typical seasonal variations. This will also be important after the local strong point / beach nourishment is undertaken because the cliff / beach may continue to erode and the monitoring will inform future interventions to help manage this process.	Cliff erosion & beach profile trends that threaten Cliff Road & properties within 20 years (i.e. need to intervene before the cliff toe is projected to be at risk within a 20 year period of time)
Defence condition	Timing of defence refurbishments and defence upgrades	The condition of the defences in ODU 16 varies but are typically 'fair' or 'poor' and are sensitive to presence and supply of beach material to protect the toe. The condition of the defences can inform the timing of refurbishments and defence upgrades. For defence refurbishments it is recommended that refurbishments are undertaken once defences reach a 'poor' condition. Similarly, if a defence upgrade scheme is scheduled within several years and the defences reach a 'poor' condition then this could also be a trigger for undertaking the scheme sooner. It is recommended that detailed defence condition surveys are undertaken on a regular basis to inform the defence condition and changes over time.	Condition rating of Poor
Funding	Decision on Local or National or Backup Option	The timing of the scheme for the Local and National Options should primarily be determined by the beach profile / cliff erosion trigger threshold. However if it is recognised that funding availability may delay the construction of the scheme if funding is not available. If the scheme is delayed, then there is a risk of an increased cost for the scheme as more works may be required to stabilise the cliff position if it gets closer to Cliff Road. The National, Local and Backup Options will have a funding shortfall as FCERM GIA will not cover the full cost. The Funding Strategy will need to outline how the scheme / refurbishments will be funded. Funding for undertaking the local strong point / beach nourishment for Managed Realignment A (local option) in epoch 1 is not available. Then the Strategy could revert to the undertaking these improvements at later date - i.e. either Managed Realignment B (local option) or Managed Realignment C (National Option). The exact timing will need to be determined by the erosion risk / beach profile trends. There is a risk that the longer the defence scheme is left, the greater the cost of the scheme as more works may be needed to stabilise the cliff position. Funding for the local strong point / beach nourishment as part of the Local / National options is not available, then the Strategy could revert to the Backup option (Maintain) and only undertake defence refurbishments. However, this would likely result in increased risk of erosion to Cliff Road / properties and adaptation plans would be required to manage the consequences of this erosion.	Funding availability. Undertaking the local strong point / beach nourishment scheme at a later date if funding is not likely to be immediately available. Revert to Backup option if it is unlikely that any funding can be found for the local strong point / beach nourishment in the future.

Decision Tree



ODU 17 - Rook Cliff

Key features / risks
 Open coast frontage between the start of the Rook Cliff defences and the Hunt Road West car park (including the White House)
 Variety of coastal defences including a concrete seawall fronted by a rock revetment, timber and rock groynes
 Recent emergency work completed at Westover to stabilise the defences following a failure. Undermining risk with falling beach levels
 Main risk is from coastal erosion, with 20' properties expected to be at risk over the next 100 years (cumulative)
 Car parks and open space between the defence line and the properties at risk



Works required to deliver leading options*

Option	Epoch 1				Epoch 2	Epoch 3
	Years 2025 - 2029	Years 2030 - 2034	Years 2035 - 2039	Years 2040 - 2044		
National	Service leading strategy Sea defences refurbishment, repair, commissioning and landing of substructures and portable design Review RFP policy to align with the option if this is the option delivered	Understand condition of defences	Understand defences maintenance as required	High planning for defence upgrade and beach nourishment in epoch 2 (only red spots) Intermittent defences maintenance as required	Review cost effectiveness Design and commissioning, design and construction of defence upgrade scheme in epoch 2	Defence refurbishment / refurbishments as required
Local (Improve A/B - Aspirational reference)	Service leading strategy Sea defences upgrade and develop business case as an independent commercial scheme Review RFP policy to align with the option if this is the option delivered	Design defences upgrade Construct scheme	Understand defences maintenance as required		Defence refurbishment / refurbishments as required	Defence refurbishment / refurbishments as required
Backup	Service leading strategy Funding for defences upgrade in the future is unlikely therefore aspirational reference Review RFP policy to align with the option if this is the option delivered	Understand condition of defences	Understand defences maintenance as required		Defence refurbishment / refurbishments as required Defence upgrade may be required to increase risk of defence failure and undermine existing defences in preparation for local community if necessary in the future	Defence refurbishment / refurbishments as required Defence upgrade may be required to increase risk of defence failure and undermine existing defences in preparation for local community if necessary in the future

*Note: Not shown in table above, but monitoring and small scale / patch repair maintenance on existing defences and assets should be undertaken annually / as required
 *Timings of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Indicative option cost (£k) - cash														
	Epoch 1 (years)			Epoch 2 (years)			Epoch 3 (years)			Total					
	2025-2029	2030-2034	2035-2039	2040-2044	2045-2049	2050-2054	2055-2059	2060-2064	2065-2069	2070-2074	2075-2084	2085-2094	2095-2114	2115-2124	
National	50	3,830	50	50	50	50	17,521	50	50	50	100	100	100	100	24,985
Local	50	13,675	50	50	50	50	50	50	50	50	2,828	100	100	100	17,353
Backup	50	2,733	50	1,121	50	50	50	50	2,828	1,121	100	1,444	100	100	13,298

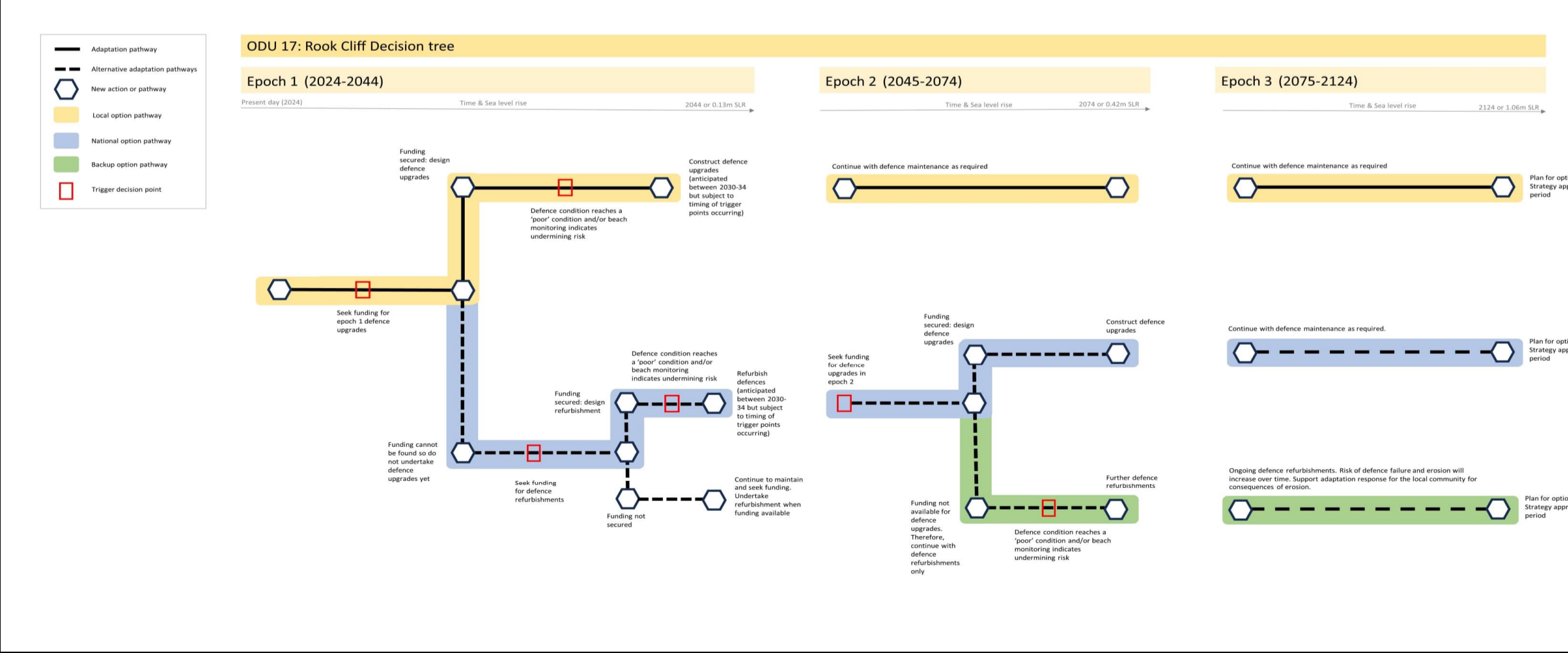
FCERM GIA funding availability

Indicative FCERM GIA funding availability calculated for scheme as part of the local option in epoch 1, and the national option in epoch 2
 Indicative amount of FCERM GIA available for defence scheme estimated to be in region of £2.4 million (local option scheme) to £3.4 million (national option scheme)
 See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

Category	Influence on	Details of key decisions when implementing option	Triggers
Beach monitoring	Timing of defence refurbishments and defence upgrades	The beach is a key component of the defence system as it helps to defend the toe of the defences. When the beach level falls, and the toe of the defences becomes exposed, it can increase the risk of the defences failing. This strategy has a risk investment along its full length and undermining risk can cause risks in the lower section of the rock slope to slump or collapse into the ocean zone, decreasing the defence performance. It is recommended that the beach profiles in ODU 17 continue to be monitored on a regular basis (i.e. every 6 months and in response to storms). This will help to identify any trends in beach levels and identify undermining risk. If a trend in beach levels develops which increases undermining risk and threatens the integrity of the defences then this should be a trigger for undertaking defence refurbishments to rebuild the rock slope or upgrades that could improve the toe protection.	Beach profile trends that increase undermining risk and threaten defence integrity
Defence condition	Timing of defence refurbishments and defence upgrades	The condition of the defences in ODU 17 varies between 'very good' and 'poor'. The condition of the defences can inform the timing of refurbishments and defence upgrades. For defence refurbishments it is recommended that refurbishments are undertaken once defences reach a 'poor' condition. Similarly, if a defence upgrade scheme is scheduled within several years and the defences reach a 'poor' condition then this could also be a trigger for undertaking the scheme sooner. It is recommended that detailed defence condition surveys are undertaken on a regular basis to inform the defence condition and changes over time.	Condition rating of Poor
Funding	Decision on Local vs National or Backup Option	The National, Local and Backup Options will have a funding shortfall (i.e. FCERM GIA will not cover the full cost) and if funding cannot be secured then this could delay the timing of defence upgrades and refurbishments. The funding strategy will need to outline how the scheme / refurbishments will be funded. If funding for undertaking the defence upgrade for Improve A (local option) in epoch 1 is not available, then the Strategy could revert to the Backup option (Maintain) and only undertake defence refurbishments. If funding for the defence upgrade as part of the Local / National option is not available, then the Strategy could revert to the Backup option (Maintain) and only undertake defence refurbishments. However, this could result in increased risk of erosion in the future as it is unclear how long existing defences could be refurbished for without compromising performance. Adaptation plans would be required to manage the consequences of any erosion that occurs with this option.	Funding availability Underpinning the defence upgrade scheme if a later date of funding is not likely to be immediately available (revert to Backup option if it is unlikely that any funding can be found for the defence upgrades in the future)

Decision Tree



ODU 18 - Milford on Sea

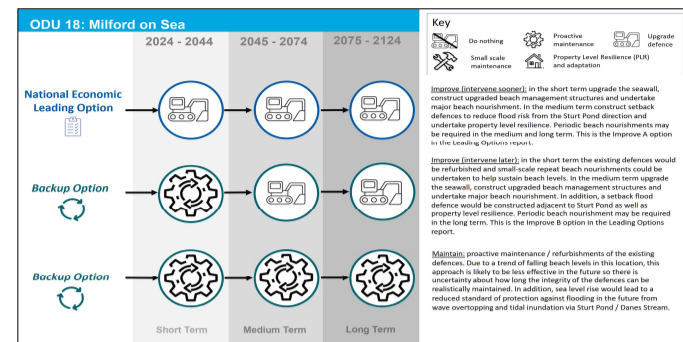
Key features / risks

- Operational strategy between Start Flood West end and the eastern end of Start Flood (Start Flood West end)
- Variety of coastal defences including timber and rock groynes and a concrete seawall / revetment
- Expected residual life for most of the defences in this option - 10 years and a trend of lowering beach levels increasing undermining risk
- Main risk is from coastal erosion, however, there is also a risk of coastal flooding from wave overtopping (Start Flood) and tidal inundation (Start Flood)
- 12 properties expected to be at risk from erosion over the next 10 years. 10 properties at risk from flooding every 2-32.6 UKSL A&D event
- The beach is important for recreation / amenity and has disabled access
- The key is to be based to the east of the coast and the risk with the key is to be managed to the west of this feature



Key of Lead Options

- National Option (Improve A) and Backup Option (Improve B or Maintain) identified
- The National Option (Improve A) involves upgrading the seawall, constructing new beach nourishment (B.g. groyne) and undertaking beach nourishment from epoch 1.
- The National Option would also include a setback of the defences at the eastern end of the open coast to epoch 2, involving beach nourishment from Start Flood
- The Backup Option (Improve B) follows a similar approach to Improve A, except the defence upgrade and beach nourishment would be in epoch 2, in the interim during epoch 1, existing defences would be refurbished
- The Backup Option (Maintain) would involve refurbishing existing defences and undertaking beach management
- Due to the lowering beach levels there is significant uncertainty as to how effective this option would be in the long term and there is increased risk of defences failing / erosion occurring



Key of Lead Options

- Agreements are indicative and will vary subject to further appraisal
- Only National Option shown



Works required to deliver leading options*

Option	Years 2025 - 2029	Epoch 1	Years 2030 - 2034	Years 2035 - 2039	Epoch 2	Epoch 3
National	<ul style="list-style-type: none"> Define leading design options Develop business case and design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment 	<ul style="list-style-type: none"> Construction of defence / beach nourishment 		<ul style="list-style-type: none"> Refurbish defence / maintenance and engagement / management in support 	<ul style="list-style-type: none"> Define and construct design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment 	<ul style="list-style-type: none"> Define and construct design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment
Backup (Improve B)	<ul style="list-style-type: none"> Define leading design options Develop business case and design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment 	<ul style="list-style-type: none"> Refurbish / construction of defence Upgrade / management in support 		<ul style="list-style-type: none"> Refurbish defence / maintenance and beach management in support 	<ul style="list-style-type: none"> Define and construct design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment 	<ul style="list-style-type: none"> Define and construct design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment
Backup (Maintain)	<ul style="list-style-type: none"> Define leading design options Develop business case and design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment 	<ul style="list-style-type: none"> Refurbish / construction of defence Upgrade / management in support 		<ul style="list-style-type: none"> Refurbish defence / maintenance and beach management in support 	<ul style="list-style-type: none"> Define and construct design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment 	<ul style="list-style-type: none"> Define and construct design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment Develop business case / design options / beach nourishment

*Not all aspects of lead options / backup options / maintain options are existing defences and assets should be undertaken primarily as required

*Items of works subject to trigger points such as funding and condition of existing defences

Cost profile for capital works and maintenance (not including pre-business case / support work)

Leading Option	Investment options (M£ / year)													
	Epoch 1 (years)			Epoch 2 (years)			Epoch 3 (years)			Total				
	2025-2029	2030-2034	2035-2039	2025-2029	2030-2034	2035-2039	2025-2029	2030-2034	2035-2039	2025-2029	2030-2034	2035-2039		
National	80	1,121	80	80	1,121	80	80	1,121	80	2,352	420	1,452	114	21,486
Backup (Improve B)	80	1,121	80	80	1,121	80	80	1,121	80	1,728	228	120	420	21,113
Backup (Maintain)	1,328	4,472	376	133	376	376	4,407	376	376	4,877	753	753	4,833	21,810

FCERM GIA funding availability

- Indicative FCERM GIA funding availability calculated for scheme as part of the national option in epoch 1
- Indicative amount of FCERM GIA available for defence scheme estimated to be in region of £1.3 million
- See economics report for assumptions when calculating indicative GIA availability (such as baseline year)

Trigger Points

Category	Sub-category	Details of key decisions when implementing options	Triggers
Beach monitoring	Timing of defence refurbishments / defence upgrades and beach management	<ul style="list-style-type: none"> The beach is a key component of the defence system as it helps to defend the line of the defences When the beach level falls and the top of the defences becomes exposed, it can increase the risk of the defences failing The strategy has a 'seawall' / revetment along its full length and undermining risk can occur as a result of the defences leading to collapse and defences failure It is recommended that the beach profiles in ODU 18 continue to be monitored on a regular basis (i.e. every 6 months and in response to storms). This will help to identify any trends in beach levels and identify underlying risk It is recommended that the beach profiles in ODU 18 continue to be monitored on a regular basis (i.e. every 6 months and in response to storms). This will help to identify any trends in beach levels and identify underlying risk It is recommended that the beach profiles in ODU 18 continue to be monitored on a regular basis (i.e. every 6 months and in response to storms). This will help to identify any trends in beach levels and identify underlying risk It is recommended that the beach profiles in ODU 18 continue to be monitored on a regular basis (i.e. every 6 months and in response to storms). This will help to identify any trends in beach levels and identify underlying risk 	<ul style="list-style-type: none"> Beach profiles trends that increase underlying risk and threaten defence integrity
Defence condition	Timing of defence refurbishments and defence upgrades	<ul style="list-style-type: none"> The condition of the defences in ODU 18 varies between 'good' and 'poor' The condition of the defences in ODU 18 varies between 'good' and 'poor' The condition of the defences in ODU 18 varies between 'good' and 'poor' The condition of the defences in ODU 18 varies between 'good' and 'poor' The condition of the defences in ODU 18 varies between 'good' and 'poor' The condition of the defences in ODU 18 varies between 'good' and 'poor' The condition of the defences in ODU 18 varies between 'good' and 'poor' 	<ul style="list-style-type: none"> Condition rating of 'Poor'
Sea level rise	Timing of defence refurbishments and defence upgrades	<ul style="list-style-type: none"> The National and Local options involve upgrading the defences along the open coast to reduce wave overtopping risk, and constructing a setback flood defence adjacent to Start Flood to reduce the tide flood risk from this direction The defence upgrades along the open coast should be undertaken when the seawall / revetment is upgraded in epoch 1 or 2. Any residual flood risk from wave overtopping prior to the scheme construction should be managed with property flood resilience measures (in epoch 1 and 2) to be an interim case to do works to reduce wave overtopping risk at a separate time to the broader defence upgrades which also provide an interim benefit The construction of the setback flood wall adjacent to Start Flood should be informed by rates of sea level rise and the extent of flood risk in the future. The flood modelling of this area suggests that the flooding from the Start Flood direction increases in severity in epoch 2 due to sea level rise Existing UKCP18 SLR projections indicate 0.13m of sea level rise is expected to occur by the start of epoch 2. Therefore a 0.13m trigger for sea level rise is recommended for undertaking planning / construction for the setback defence construction Any residual risk of flooding in this location prior to the defence being upgraded / setback defence construction should be managed with property flood resilience measures. Subject to alignment of the setback defences, it may also be necessary to continue with property flood resilience measures after construction if it may not be possible to include all properties at risk from flooding within the scheme alignment 	<ul style="list-style-type: none"> Begin scheme planning / business case development for setback flood defence when SLR is 0.13m
Funding	Decision on National vs Backup Options	<ul style="list-style-type: none"> The National and Backup Options will have a funding shortfall (i.e. FCERM GIA will not cover the full cost) and if funding cannot be secured then this could delay the timing of defence upgrades and refurbishments The funding strategy will need to outline how the scheme / refurbishments will be funded If funding for the defence upgrades is not available (Improve B), then the strategy could revert to the alternative Backup option (Maintain) and only undertake defence refurbishments However, due to the trend of lowering beach levels in this location, this approach could result in increased risk of erosion in the future as it is uncertain how long existing defences could be refurbished for before no longer becomes feasible Adaptation plans would be required to manage the consequences of any erosion that occurs with this option 	<ul style="list-style-type: none"> Funding availability Underpinning the defence upgrade scheme at a later date / funding is not likely to be immediately available Revert to Maintain option if it is unlikely that any funding can be found for the defence upgrades in the future

Decision Tree

