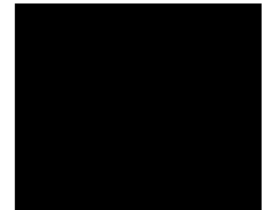


Technical Note



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[REDACTED]

Project title	Barmouth North Promenade OBC	Job number
cc		File reference
		4-70
Prepared by		Date
		29 October 2021
Subject	Response to Welsh Government comments on Outline Business Case	

[REDACTED]
[REDACTED]

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1 Welsh Government Queries 13-Aug and Responses

Welsh Government comment	Response																																							
Are you able to confirm the estimated present day SOP provided by the preferred option?	The economically preferred approach is Pathway G, which offers a Benefit Cost Ratio of at least 1:2.7 (ref OBC P52) Pathway G SOP varies see Table 33: <table><tr><th colspan="3">Table 33. Adaptive pathway scenarios considered for the economic assessment</th></tr><tr><th></th><th>Epoch 1 0-20 years</th><th>Epoch 2 20-50 years</th><th>Epoch 3 50-100 years</th></tr><tr><td>Pathway A</td><td colspan="2">Option 2: Betterment of defences <i>Precautionary SOP reducing to 1 in 50 by 2069</i></td><td>Option 4: Managed Realignment (SMP2) <i>Adaptive SOP 1 in 200</i></td></tr><tr><td>Pathway B</td><td>Option 2: Betterment of defences <i>SOP 1 in 200 in 2019</i></td><td colspan="2">Option 4: Managed Realignment (SMP2) <i>Adaptive SOP 1 in 200</i></td></tr><tr><td>Pathway C</td><td colspan="2">Option 2: Betterment of defences <i>Precautionary SOP reducing to 1 in 50 by 2069</i></td><td>Option 3: Beach Management <i>Adaptive SOP 1 in 200</i></td></tr><tr><td>Pathway D</td><td>Option 2: Betterment of defences <i>SOP 1 in 200 in 2019</i></td><td colspan="2">Option 3: Beach Management <i>Adaptive SOP 1 in 200</i></td></tr><tr><td>Pathway E</td><td colspan="3">Option 3: Beach Management <i>Adaptive SOP 1 in 200</i></td></tr><tr><td>Pathway F</td><td colspan="3">Option 2 + Option 3 <i>Adaptive SOP 1 in 200</i></td></tr><tr><td>Pathway G</td><td colspan="2">Option 2: Betterment of defences <i>Precautionary SOP reducing to 1 in 50 by 2069</i></td><td>Option 4b: Managed Realignment (North Only) <i>Adaptive SOP 1 in 200</i></td></tr><tr><td>Pathway H</td><td>Option 2: Betterment of defences <i>SOP 1 in 200 in 2019</i></td><td colspan="2">Option 4b: Managed Realignment (North Only) <i>Adaptive SOP 1 in 200</i></td></tr></table> Therefore present day SOP >1:200.	Table 33. Adaptive pathway scenarios considered for the economic assessment				Epoch 1 0-20 years	Epoch 2 20-50 years	Epoch 3 50-100 years	Pathway A	Option 2: Betterment of defences <i>Precautionary SOP reducing to 1 in 50 by 2069</i>		Option 4: Managed Realignment (SMP2) <i>Adaptive SOP 1 in 200</i>	Pathway B	Option 2: Betterment of defences <i>SOP 1 in 200 in 2019</i>	Option 4: Managed Realignment (SMP2) <i>Adaptive SOP 1 in 200</i>		Pathway C	Option 2: Betterment of defences <i>Precautionary SOP reducing to 1 in 50 by 2069</i>		Option 3: Beach Management <i>Adaptive SOP 1 in 200</i>	Pathway D	Option 2: Betterment of defences <i>SOP 1 in 200 in 2019</i>	Option 3: Beach Management <i>Adaptive SOP 1 in 200</i>		Pathway E	Option 3: Beach Management <i>Adaptive SOP 1 in 200</i>			Pathway F	Option 2 + Option 3 <i>Adaptive SOP 1 in 200</i>			Pathway G	Option 2: Betterment of defences <i>Precautionary SOP reducing to 1 in 50 by 2069</i>		Option 4b: Managed Realignment (North Only) <i>Adaptive SOP 1 in 200</i>	Pathway H	Option 2: Betterment of defences <i>SOP 1 in 200 in 2019</i>	Option 4b: Managed Realignment (North Only) <i>Adaptive SOP 1 in 200</i>	
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Can you please confirm the number of properties benefitting from the preferred option including a breakdown residential vs non-residential	OBC Table 28 shows baseline at risk numbers																																							

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	Table 28. Baseline (assuming no breach) property count for the epochs including climate change¹⁹ <table><tr><th></th><th colspan="6">NCC (Present day, no climate change (CC))</th><th colspan="6">CC2069</th><th colspan="6">CC2119</th></tr><tr><th>Return Period</th><th>1</th><th>10</th><th>50</th><th>100</th><th>200</th><th>1000</th><th>1</th><th>10</th><th>50</th><th>100</th><th>200</th><th>1000</th><th>1</th><th>10</th><th>50</th><th>100</th><th>200</th><th>1000</th></tr><tr><th>Baseline</th><td>14</td><td>300</td><td>322</td><td>757</td><td>760</td><td>761</td><td>261</td><td>>261</td><td>>538</td><td>>757</td><td>>760</td><td>>761</td><td>>261</td><td>>261</td><td>>538</td><td>>757</td><td>>760</td><td>>761</td></tr></table> OBC AppA1 Table34 outlines the number of properties incurring damages – 447 properties benefiting. Table 34 Predicted numbers of properties incurring damage <table><tr><th></th><th colspan="3">Epoch</th><th colspan="6">NCC (Present day, no climate change)</th><th colspan="6">CC2069</th><th colspan="6">CC2119</th></tr><tr><th rowspan="2">Option</th><th colspan="2">Standard of Protection</th><th rowspan="2">Return Period</th><th rowspan="2">1</th><th rowspan="2">10</th><th rowspan="2">50</th><th rowspan="2">100</th><th rowspan="2">200</th><th rowspan="2">1000</th><th rowspan="2">1</th><th rowspan="2">10</th><th rowspan="2">50</th><th rowspan="2">100</th><th rowspan="2">200</th><th rowspan="2">1000</th><th rowspan="2">1</th><th rowspan="2">10</th><th rowspan="2">50</th><th rowspan="2">100</th><th rowspan="2">200</th><th rowspan="2">1000</th></tr><tr><th>Return Period</th><th>Climate Change Allowance</th></tr><tr><td>DoM</td><td colspan="2">None</td><td>FC1</td><td>14</td><td>300</td><td>322</td><td>757</td><td>760</td><td>761</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td></tr><tr><td>Op1</td><td>1 in 200yr</td><td>None</td><td>FC1</td><td>0</td><td>0</td><td>0</td><td>311</td><td>760</td><td>761</td><td>0</td><td>0</td><td>538</td><td>541</td><td>541</td><td>541</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td></tr><tr><td>Op2</td><td>1 in 100yr</td><td>None</td><td>FC1</td><td>0</td><td>0</td><td>0</td><td>757</td><td>760</td><td>761</td><td>0</td><td>0</td><td>538</td><td>541</td><td>541</td><td>541</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td></tr><tr><td>Op3</td><td>1 in 50yr</td><td>None</td><td>FC1</td><td>0</td><td>0</td><td>322</td><td>757</td><td>760</td><td>761</td><td>0</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td></tr><tr><td>Op4</td><td>1 in 200yr</td><td>50 years</td><td>FC1</td><td>0</td><td>0</td><td>0</td><td>311</td><td>313</td><td>317</td><td>0</td><td>0</td><td>310</td><td>313</td><td>541</td><td>541</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td></tr><tr><td>Op5</td><td>1 in 100yr</td><td>50 years</td><td>FC1</td><td>0</td><td>0</td><td>0</td><td>311</td><td>313</td><td>761</td><td>0</td><td>0</td><td>0</td><td>541</td><td>541</td><td>541</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td></tr><tr><td>Op6</td><td>1 in 50yr</td><td>50 years</td><td>FC1</td><td>0</td><td>0</td><td>0</td><td>311</td><td>313</td><td>761</td><td>0</td><td>0</td><td>538</td><td>541</td><td>541</td><td>541</td><td>261</td><td>261</td><td>538</td><td>541</td><td>541</td><td>541</td></tr></table> Note that the number of properties incurring damage in the present day for the 1 in 200yr and 1 in 1000yr event greatly exceeds that of CC2069 and CC2119. This is due to the scenarios modelled, and the limitations encountered in assessing wave overtopping as discussed in both [redacted] wave modelling report and [redacted] modelling report.		NCC (Present day, no climate change (CC))						CC2069						CC2119						Return Period	1	10	50	100	200	1000	1	10	50	100	200	1000	1	10	50	100	200	1000	Baseline	14	300	322	757	760	761	261	>261	>538	>757	>760	>761	>261	>261	>538	>757	>760	>761		Epoch			NCC (Present day, no climate change)						CC2069						CC2119						Option	Standard of Protection		Return Period	1	10	50	100	200	1000	1	10	50	100	200	1000	1	10	50	100	200	1000	Return Period	Climate Change Allowance	DoM	None		FC1	14	300	322	757	760	761	261	261	538	541	541	541	261	261	538	541	541	541	Op1	1 in 200yr	None	FC1	0	0	0	311	760	761	0	0	538	541	541	541	261	261	538	541	541	541	Op2	1 in 100yr	None	FC1	0	0	0	757	760	761	0	0	538	541	541	541	261	261	538	541	541	541	Op3	1 in 50yr	None	FC1	0	0	322	757	760	761	0	261	538	541	541	541	261	261	538	541	541	541	Op4	1 in 200yr	50 years	FC1	0	0	0	311	313	317	0	0	310	313	541	541	261	261	538	541	541	541	Op5	1 in 100yr	50 years	FC1	0	0	0	311	313	761	0	0	0	541	541	541	261	261	538	541	541	541	Op6	1 in 50yr	50 years	FC1	0	0	0	311	313	761	0	0	538	541	541	541	261	261	538	541	541	541
	NCC (Present day, no climate change (CC))						CC2069						CC2119																																																																																																																																																																																																																																																					
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DoM	None		FC1	14	300	322	757	760	761	261	261	538	541	541	541	261	261	538	541	541	541																																																																																																																																																																																																																																													
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Op2	1 in 100yr	None	FC1	0	0	0	757	760	761	0	0	538	541	541	541	261	261	538	541	541	541																																																																																																																																																																																																																																													
Op3	1 in 50yr	None	FC1	0	0	322	757	760	761	0	261	538	541	541	541	261	261	538	541	541	541																																																																																																																																																																																																																																													
Op4	1 in 200yr	50 years	FC1	0	0	0	311	313	317	0	0	310	313	541	541	261	261	538	541	541	541																																																																																																																																																																																																																																													
Op5	1 in 100yr	50 years	FC1	0	0	0	311	313	761	0	0	0	541	541	541	261	261	538	541	541	541																																																																																																																																																																																																																																													
Op6	1 in 50yr	50 years	FC1	0	0	0	311	313	761	0	0	538	541	541	541	261	261	538	541	541	541																																																																																																																																																																																																																																													

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				The following table shows the breakdown by residential and non-residential properties:																						
Option	Epoch	Standard of Protection	Epoch	Property type	NCC						CC2069						CC2119									
			Return Period Flood cell		1	10	50	100	200	1000	1	10	50	100	200	1000	1	10	50	100	200	1000				
DoM			FC1	Residential	7	267	285	627	628	629	229	229	440	441	441	441	229	229	440	441	441	441				
			FC1	Non-residential	7	33	37	130	132	132	32	32	98	100	100	100	32	32	98	100	100	100				
			FC2	Residential	0	0	0	193	207	217	0	0	157	157	157	157	0	0	157	157	157	157				
			FC2	Non-residential	1	8	11	85	86	90	0	11	74	74	74	74	12	11	74	74	74	74				
Op1	NCC (Present day, 2019)	1 in 200yr	FC1	Residential	0	0	0	237	628	629	0	0	440	441	441	441	229	229	440	441	441	441				
			FC1	Non-residential	0	0	0	74	132	132	0	0	98	100	100	100	32	32	98	100	100	100				
			FC2	Residential	0	0	0	157	207	217	0	0	157	157	157	157	0	0	157	157	157	157				
			FC2	Non-residential	0	0	0	64	86	90	0	0	74	74	74	74	12	11	74	74	74	74				
Op2	NCC (Present day, 2019)	1 in 100yr	FC1	Residential	0	0	0	627	628	629	0	0	440	441	441	441	229	229	440	441	441	441				
			FC1	Non-residential	0	0	0	130	132	132	0	0	98	100	100	100	32	32	98	100	100	100				
			FC2	Residential	0	0	0	193	207	217	0	0	157	157	157	157	0	0	157	157	157	157				
			FC2	Non-residential	0	0	0	85	86	90	0	0	74	74	74	74	12	11	74	74	74	74				
Op3	NCC (Present day, 2019)	1 in 50yr	FC1	Residential	0	0	285	627	628	629	0	229	440	441	441	441	229	229	440	441	441	441				
			FC1	Non-residential	0	0	37	130	132	132	0	32	98	100	100	100	32	32	98	100	100	100				
			FC2	Residential	0	0	0	193	207	217	0	0	157	157	157	157	0	0	157	157	157	157				
			FC2	Non-residential	0	0	11	85	86	90	0	11	74	74	74	74	12	11	74	74	74	74				
Op4	CC2069	1 in 200yr	FC1	Residential	0	0	0	237	238	241	0	0	237	238	441	441	229	229	440	441	441	441				
			FC1	Non-residential	0	0	0	74	75	76	0	0	73	75	100	100	32	32	98	100	100	100				
			FC2	Residential	0	0	0	157	157	165	0	0	157	158	157	157	0	0	157	157	157	157				
			FC2	Non-residential	0	0	0	64	64	66	0	0	64	64	74	74	12	11	74	74	74	74				
Op5	CC2069	1 in 100yr	FC1	Residential	0	0	0	237	238	629	0	0	0	441	441	441	229	229	440	441	441	441				
			FC1	Non-residential	0	0	0	74	75	132	0	0	0	100	100	100	32	32	98	100	100	100				
			FC2	Residential	0	0	0	157	157	217	0	0	0	157	157	157	0	0	157	157	157	157				
			FC2	Non-residential	0	0	0	64	64	90	0	0	0	74	74	74	12	11	74	74	74	74				
Op6	CC2069	1 in 50yr	FC1	Residential	0	0	0	237	238	629	0	0	440	441	441	441	229	229	440	441	441	441				
			FC1	Non-residential	0	0	0	74	75	132	0	0	98	100	100	100	32	32	98	100	100	100				
			FC2	Residential	0	0	0	157	157	217	0	0	157	157	157	157	0	0	157	157	157	157				
			FC2	Non-residential	0	0	0	64	64	90	0	0	74	74	74	74	12	11	74	74	74	74				
				Note erosion losses comprise up to 60 properties affected, however conservatively excluded to avoid double-counting..																						

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Economic

Optimism Bias is set at 26%. This is a very specific figure, is there a calculation behind this? This is fairly low for this stage of assessment, can you please provide your justification for this figure.

Yes, calculation is below. EA Risk Guidance for capital flood risk management project has been used to estimate the proposed figure.

Risk components contributing to above factors		% for Barmouth North Promenade	Average % for FCD projects	Notes
(% , summing to 100 – see next page for definitions)				
Procurement	Late contractor involvement in design	0%	1%	ECI on board
	Dispute and claims occurred	5%	11%	NEC contract
	Other	1%	1%	
Project-specific	Design complexity	2%	4%	
	Degree of innovation	2%	4%	Assumes that appropriate physical model is undertaken as part of detailed design
	Environmental impact	13%	13%	
	Other	9%	9%	
Client specific	Inadequacy of the business case	23%	23%	
	Funding availability	2%	2%	
	Project management team	1%	1%	
	Poor project intelligence	8%	8%	Ground Investigation not completed
Environment	Public relations	5%	5%	
	Site characteristics	2%	4%	
External influences	Economic	5%	5%	
	Legislation/regulations	4%	4%	
	Technology	2%	4%	
	Other	1%	1%	
TOTAL		85%	100%	
Default Optimism Bias (pre-detailed design)		30%	30%	
Adjusted Optimism Bias for Barmouth		26%	30%	

- The risk components (except for those described "Other") may be reduced for individual strategies or schemes if demonstrable action to minimise risks has been taken, or other evidence is provided that risks are not applicable to the degree indicated. In which case, the revised sum of risk components should be divided by 100 and multiplied by either 60 or 30 to obtain the new Optimism Bias factor.

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	FCERM BCG - The Northern Ireland Department of Finance and Personnel has an optimism bias spreadsheet calculator, based on Green Book supplementary guidance, that can be used for bespoke calculation of uplift values, https://www.finance-ni.gov.uk/publications/optimism-bias-calculators Flood and Coastal Erosion Risk Management — Business Case Guidance 86 Annex A: Supplementary Technical NotesSTN03: OPTIMISM BIAS Table 1: Optimism Bias uplift values for capital expenditure in FCERM projects <table><tr><th rowspan="2">Optimism Bias uplift (%)</th><th colspan="4">Stage</th></tr><tr><th>Design</th><th>Option assessment</th><th>Project</th><th>Business Case</th></tr><tr><td>66 (Upper Value)</td><td>Feasibility</td><td>Long List</td><td>Gateway review 1</td><td>Strategic Outline Case (SOC)</td></tr><tr><td>30</td><td>Concept or Outline</td><td>Short List</td><td>Gateway Review 2</td><td>Outline Business Case (OBC)</td></tr><tr><td>6 (Lower Value)</td><td>Detailed</td><td>Preferred Option</td><td>Gateway Review 3</td><td>Full Business Case (FBC)</td></tr></table>	Optimism Bias uplift (%)	Stage				Design	Option assessment	Project	Business Case	66 (Upper Value)	Feasibility	Long List	Gateway review 1	Strategic Outline Case (SOC)	30	Concept or Outline	Short List	Gateway Review 2	Outline Business Case (OBC)	6 (Lower Value)	Detailed	Preferred Option	Gateway Review 3	Full Business Case (FBC)
Optimism Bias uplift (%)	Stage																								
	Design	Option assessment	Project	Business Case																					
66 (Upper Value)	Feasibility	Long List	Gateway review 1	Strategic Outline Case (SOC)																					
30	Concept or Outline	Short List	Gateway Review 2	Outline Business Case (OBC)																					
6 (Lower Value)	Detailed	Preferred Option	Gateway Review 3	Full Business Case (FBC)																					

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Technical While the approach is broadly supported in the SMP, the SMP recommends Managed Realignment from Epoch 2. Does this constitute a change in policy and has the coastal group been consulted?	The OBC preferred option is in line with the SMP. While the current policy (epoch 1) for the frontage of Barmouth North Promenade is to continue to 'hold the line', the proposed solutions developed recognise the long-term aspirations of the SMP2 'Managed Realignment', with consideration of short to medium term adaptive options along the frontage and the policy change seen as a continual process. The West of Wales Shoreline Management Plan 2 (SMP2) (2011) sets out the coastal management policy. In the short-term (Epoch 1 Year 0-20), the frontage is to continue to 'hold the line'. However, due to implications of climate change, the present alignment was considered '<i>likely to become increasingly difficult to sustain</i>'. Therefore for the medium and long term the SMP2 sets out a change in approach to 'managed realignment'. The SMP2 notes; '<i>consideration should be given to widening the overall defence system in this area. This may require nearshore or shore connected structures to reduce wave energy but is also likely to require some future realignment of the defences, quite probably with the loss of property. This would require a more integrated approach to management, considering how the northern seafront could be developed to better advantage both in term of use and shoreline management.</i>' Adjacent policy areas (i.e. Llanaber and Barmouth South) are 'Hold the Line'. All three are intrinsically linked - forming a single flood-cell with interacting coastal processes. Discussions have been held with [REDACTED] (Chair of Coastal Group) to seek compliance with SMP policy through adaptive pathway. Formal consultation is outside the remit of the Coastal Group for OBC assurance.
The preferred option proposes some works to the north of the site to tie-in to Network Rail. What is this tie-in expected to look like? Does the current track/embankment level provide a sufficient standard of protection to avoid outflanking of the defence? Is it anticipated that works will require a line possession? I am aware that booking a possession has a long lead in time. How far have discussion with	What is this tie-in expected to look like? Proposed primary and set-back walls to follow the footprint of the existing references. The coastal erosion protection (most likely a rock revetment at this location) would potentially follow the return. Does the current track/embankment level provide a sufficient standard of protection to avoid outflanking of the defence? Topographic survey will be required in the next stage to confirm track/embankment levels and develop the tie-in to prevent water outflanking the defence.

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Welsh Government comment	Response
Network Rail progressed on this matter? Most of this work can be left to detailed design phase but it would be good to understand current assumptions.	Is it anticipated that works will require a line possession? Design development and engagement with Network Rail is required. How far have discussion with Network Rail progressed on this matter? Initial discussions with Network Rail [REDACTED] have been held to inform the OBC Financial Case - whilst proposals afford protection to NR assets and happy to accommodate within consenting process, no contribution. The Council will enter into a BAPA and engage in detail during the FBC.
I couldn't find and utilities drawings. Has a service search been completed within the promenade?	Yes, a service search was undertaken to inform OBC. The services search showed that the majority of the utilities are located to the landward side of the existing tertiary wall. The exceptions are: - 2No. Welsh Water outfalls which cross the promenade between Heol Meiron and Heol-Y-Plas roads (see attached to this note) - BT cables located between the existing secondary and tertiary wall at the north end of the scheme (see attached to this note) The returns are provided.
What is the expected change in beach levels in the 50 years, before managed realignment? Is renourishment envisioned over this time? Have overtopping rates for the preferred option been considered in this worst case scenario, with beach levels following draw down?	Yes, the beach levels are expected to change before managed realignment. After 25 yrs the initial beach berm, which level is proposed at +5mODN, is expected to partially lost but still more than enough protection to toe of the defence. 1 to 2No. maintenance campaigns are expected (Please refer to Appendix C2 for further details). Yes, wave overtopping rates for future scenarios have been calculated accounting for bed lowering.
Appendix B – validation (Figure 17 and 18). The model result shows a significant area of flooding near the intersection of Park Road and Bryn Mynach Road in the modelled 1 in 10 (Figure 17) that is not shown in NRWs zone 2 and 3, which represent significantly larger events (Figure 18) (See below Figure). I appreciate that this is a validation exercise not a verification exercise but is there a known reason for this difference?	Flooding near the intersection of Park Road and Bryn Mynach Road is due to the modelling representation capturing local factors omitted from FZ mapping such as the surface water flood risk from culverts and also the risk of breach of the primary wall. Validated through adhoc commentary at the public drop-in meeting with local residents and land owners. Ref Appendix B2.

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2 Welsh Government Queries 23-Sept and Responses

Welsh Government comment	Response
Can you please confirm the standard of protection and the numbers of residential and non-residential properties benefitting from Phase 1 Split 1 and Phase 1 Split 2?	Split 1 delivers Phase 1 flood risk management benefits to properties but for a limited duration due to the residual erosion/breach risk. Please see table provided earlier for the split between residential and non-residential.
Is it an option to pause all works and construct the whole scheme in 2025, what would be the advantages and disadvantages of this approach compared to the preferred option?	Yes, it is an option. The advantages and disadvantages of building the whole scheme in 2025 are: Advantages: - Minimises risks associated to programme/funding driven by the requirement of starting the works on site by March 2022 - Reduces the programme duration and allows some construction activities to overlap which could have a positive impact in cost (e.g. reduced preliminaries). - Reduces the cost of mobilisation and demobilisation. - Reduces disruption to public. Disadvantages: - Increased risk of the existing defences breaching - Increased risk of flooding and damage to people and properties. - Increased uncertainty on the cost of the scheme driven by uncertainty on material costs and inflation. However phase 1 is sizeable in the context of the WG/Council programme budget and also the community/access. Splitting phase 1 is attractive: • Increases affordability by reducing in year budget commitments and allows flexibility. • Reduces intensity of disruption / impact on local community whilst increasing duration. • Increases function of existing defences to better protect properties from flood risk at the earliest opportunity. Engagement with Planners, Highways and NRW ongoing. All view split approach positively, subject to further details noting majority of consenting risk relates to split two 'intertidal' works.
What is the risk of storm damage to the Split 1 defences in the three years between completion of the first Split and start of the Second? What is the	The risk of storm damage to Split 1 defences between completion of Split 1 and Split 2 is low to medium. The risk of storm damage is reduced by including maintenance and void filling of the existing defences as part of Split 1. We note the northern stretch of the North Promenade has benefited from emergency repairs recently.

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likelihood of remedial works being required and what is the likely severity or extent? How would this compare to damage to existing defences under the same conditions.	Remedial works are likely to affect existing revetment, toe, primary defence and promenade and remedial works to the secondary wall are less likely to required. Remedial works to the tertiary wall are unlikely. Damage to the existing defenced under the same conditions are likely to affect all key elements of the existing defences: toe, revetment, primary wall, promenade, secondary and tertiary wall.
Split 2 works are going to be difficult to justify in the main capital programme due to its large size and that most properties will have already been claimed under Split 1. Will delaying Split 2 help unlock potential external funding, for example from Network Rail?	Split 1 benefits are for flood risk management to the hinterland. The benefits rely on long term works (Split 2) to manage coastal erosion risks. Please see: Phase 1 split 1. This comprises: • Maintenance and void filling that will not require consent implications and will immediately reduce the risk of defence collapse/breach. • Set-back flood walls that will require consenting (most likely under Town and Country Planning Act) and detailed design (RIBA4). They will provide short-term flood risk management benefits to the hinterland. Phase1 split 2. This is to include: • Beach nourishment/ rock revetment will require consenting (most likely under Town and Country Planning Act and also the extensive, not less than four months, marine licence) and detailed design informed by HRA and likely EIA. They will provide long-term erosion and flood risk management benefits to the hinterland.
Can you please provide more detail on the approach and assumptions used for the economics in this appendix? • Do the cost benefit ratios presented in this report and specifically Table 6 include managed realignment in 2069.	OBC Table 6 captures the BCR for the adaptive pathways over the appraisal period, including MR where within the option.

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- What is the updated cost benefit ratio of the whole scheme over the 100 year appraisal period, assuming the two stage split and the managed realignment in 2069 (the preferred option). - In Table 6 how has the cost benefit ratio for Phase 1 Split 2 been calculated? Why are the damages the same for Split 1 and Split 2? What is the time period these benefits are counted for in Split 2, e.g. does this run from year 10 to year 99, or year 10 to 2069, or from 2025 to 2069?	Table 6. Summary of Economic Appraisal (Please refer to Appendix A for details) <table><tr><th>Pathway</th><th>PV Flood Damages (£k)</th><th>PV Flood Benefits (£k)</th><th>PV Costs (£k)</th><th>Benefit Cost Ratio</th><th>Incremental Benefit Cost Ratio</th></tr><tr><td>Baseline</td><td>£99,867</td><td>£0</td><td></td><td></td><td></td></tr><tr><td>Pathway G</td><td>£29,221</td><td>£70,304</td><td>£26,395</td><td>2.7</td><td></td></tr><tr><td>Pathway A</td><td>£26,681</td><td>£58,409</td><td>£30,639</td><td>1.9</td><td>0.0</td></tr><tr><td>Pathway C</td><td>£29,229</td><td>£70,538</td><td>£31,384</td><td>2.2</td><td>0.0</td></tr><tr><td>Pathway H</td><td>£16,596</td><td>£82,929</td><td>£37,540</td><td>2.2</td><td>1.1</td></tr><tr><td>Pathway B</td><td>£16,194</td><td>£68,896</td><td>£46,949</td><td>1.5</td><td>0.0</td></tr><tr><td>Pathway D</td><td>£16,604</td><td>£83,163</td><td>£48,668</td><td>1.7</td><td>0.7</td></tr><tr><td>Pathway E</td><td>£16,604</td><td>£83,163</td><td>£62,453</td><td>1.3</td><td>0.0</td></tr><tr><td>Pathway F</td><td>£16,604</td><td>£83,163</td><td>£79,676</td><td>1.0</td><td>0.0</td></tr></table> AppR Table 6 is a little confusing. It shows different benefits depending on the row which relate to the option evaluated. Table 6: Present Value Benefits and BCR expected for single stage and split approach <table><tr><th>Approach</th><th>Present Value Damages (PVD) (£k)</th><th>Present Value Benefits (£k)</th><th>Benefit/cost ratio</th></tr><tr><td>Baseline</td><td>£99,867</td><td>-</td><td>-</td></tr><tr><td>Single stage (as per OBC)</td><td>£29,221</td><td>£70,304</td><td>3.0</td></tr><tr><td colspan="4">Staged</td></tr><tr><td>Phase 1 Split 1</td><td rowspan="2">£90,516</td><td>£9,251</td><td>1.0</td></tr><tr><td>Phase 1 Split 2</td><td>£61,053</td><td>3.6</td></tr></table> Below is an update which shows more clearly the BCR of elements including the full adaptive pathway G (row 4)	Pathway	PV Flood Damages (£k)	PV Flood Benefits (£k)	PV Costs (£k)	Benefit Cost Ratio	Incremental Benefit Cost Ratio	Baseline	£99,867	£0				Pathway G	£29,221	£70,304	£26,395	2.7		Pathway A	£26,681	£58,409	£30,639	1.9	0.0	Pathway C	£29,229	£70,538	£31,384	2.2	0.0	Pathway H	£16,596	£82,929	£37,540	2.2	1.1	Pathway B	£16,194	£68,896	£46,949	1.5	0.0	Pathway D	£16,604	£83,163	£48,668	1.7	0.7	Pathway E	£16,604	£83,163	£62,453	1.3	0.0	Pathway F	£16,604	£83,163	£79,676	1.0	0.0	Approach	Present Value Damages (PVD) (£k)	Present Value Benefits (£k)	Benefit/cost ratio	Baseline	£99,867	-	-	Single stage (as per OBC)	£29,221	£70,304	3.0	Staged				Phase 1 Split 1	£90,516	£9,251	1.0	Phase 1 Split 2	£61,053	3.6
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		PV Benefit (£k)	PV Cost (£k)	Benefit Cost Ratio
	Phase 1 Split 1 (Epoch 1-2)	£9,251	£9,561	1.0
	Phase 1 Split 2 (Epoch 1-2)	£61,053	£17,027	3.6
	Phase 1 Split 1+2 (Epoch 1-2)	£70,304	£26,588	2.6
	Phase 1 Split1+2 (Epoch 1-2) and Epoch 3	£70,304	£33,412	2.1
	<i>Sensitivity Analysis - Phase 1&2 (Epoch 1-2) and</i>			
	Increased costs +20%	£70,304	£40,094	1.8
	Benefits reduced +20%	£56,243	£33,412	1.7
Are increases in cost related purely to the construction work or are there also changes in design and development costs (such as the cost of drafting two sets or reporting). It would be good to see an exploration of the risks and benefits/opportunities associated with phasing approach. I can see several potential risks which are not included in the risk register: • Reputation risk of double the disruption from doing works on the same frontage twice in a relatively short timeline. • Failure to meet the CRMP deadline for Split 1 • NRW objecting to splitting the works for Marine license purposes • Risk of not being able to find funding for Split 2 or delays in finding funding	It will also have an impact on cost and development costs. At this stage, design and developing cost have been estimated as a 5% of the construction cost. The risk register will be a live document and can be updated.			
In particular it would be good to see some further information and discussion on the following	See earlier response.			

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Welsh Government comment	Response
The 1.0 BCR for Phase 1 in highly dependent on the life of the existing defences how certain is this?	

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name	████████████████████	████████████████	██████████████
Signature			

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