

	Clifton - Pathway 1		Renourishment <sup>2,3,6,7</sup> → Managed Retreat <sup>18</sup> → Managed Retreat <sup>18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	4	5	4	5	1	4	4	27	2
<b>Comments</b>	<p>Managed retreat assumes moving out of both erosion and inundation hazard areas.</p> <p>Not a 5 because the effectiveness of nourishment leaves some uncertainty in the short term.</p> <p>High erosion losses mean nourishment material at risk.</p>	<p>Managed retreat assumes moving out of both erosion and inundation hazard areas.</p> <p>Assumes that nourishment keeps pace with erosion losses, until such time as retreat is necessary.</p> <p>Short term in this pathway could be quite short term leading to early managed retreat.</p> <p>Assumption that sufficient supply of material exists in short term.</p>	<p>Managed retreat assumes moving out of both erosion and inundation hazard areas.</p>	<p>No risk transferred.</p>	<p>Nourishment is challenging at Clifton – high wave climate – likely to fall well short of nominal 20-year timeframe as a short-term response.</p> <p>Loss of amenity value, boat ramp and campground and recreational facilities lost when retreat occurs.</p> <p>Large number of truck movements required for nourishment.</p>	<p>Historic pa sites exist up on the hills, a nohonga / fishing village was located on a lagoon that used to exist at the mouth of the maraetotara stream.</p> <p>From a Tangata Whenua perspective, prefer to hold the beach – this pathway achieves this but retreat will cause beach to roll landward.</p>	<p>Allows an adaptive approach, lowest impact on the coast of any of the pathways (i.e. no structures).</p> <p>There will be more impact on the land of this option.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	12	15	12	5	3	12	8	67	

	Clifton – Pathway 2		Renourishment + Control Structures <sup>3,13,14</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Managed Retreat <sup>18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	3	4	3	5	2	4	3	24	3
<b>Comments</b>	Long term managed retreat which fully addresses risk, but in short to medium term control structures not particularly effective at dealing with inundation.	Effective at mitigating erosion risk, but not as effective as Clifton PW1 because in this pathway, retreat occurs much later – risks increase over time so greater chance that an event occurs that overwhelms structures.  Less certain than wall options (Clifton PW5) + nourishment requirements.	Groynes provide good flexibility – can be added to, realigned, or material reused.  Source of nourishment material creates some uncertainty in longer timeframes.	While there may be some impact on sediment transport north, it would not be to the degree that Clifton PW2 would score less than Clifton PW1.	Foreshore vehicle access affected by groynes, but vehicle access along top / base of groyne can be provided for.  Not as bad as Clifton PW1, provides a degree of certainty into the medium term, able to keep using the land for recreation that is protected.	Historic pa sites exist up on the hills, a nohonga / fishing village was located on a lagoon that used to exist at the mouth of the maraetotara stream.  From a Tangata Whenua perspective, prefer to hold the beach – this pathway achieves this but retreat will cause beach to roll landward.	Structures will have some impact on the natural character of the coast, but a groyne can create an environment / habitat for sea life, plus beach is maintained (albeit artificially).		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	9	12	9	5	6	12	6	59	

	Clifton - Pathway 3		Renourishment + Control Structures <sup>3,13,14</sup> →		Renourishment + Control Structures <sup>3,13,14</sup> →		Renourishment + Control Structures <sup>3,13,14</sup>		
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	1	2	3	4	3	5	3	21	4
<b>Comments</b>	Compressed unit, difficult to maintain a groyne with a larger enough footprint to be effective for inundation mitigation.  Renourishment resource in long time may be difficult to source to maintain high enough beach crest.	Risk is present all the way through to the long term, groynes can be exceeded and risks increase over time.  Requires long term nourishment i.e. high volume required uncertainty of supply.  More subject to uncertainty of storms than Clifton PW4 which has a seawall later in pathway.	Lower score than Clifton PW2 because it doesn't respond well to uncertain climate outcomes because it locks in continual maintenance and nourishment in long timeframes.  Only one option being committed to over time frame which decreases future flexibility.	There is a transfer of residual risk to future generations because locked into control structures in the long term.	Foreshore vehicle access affected by groynes, but vehicle access along top / base of groyne can be provided for.  Not as bad as Clifton PW1, provides a degree of certainty into the long term, able to keep using the land for recreation that is protected.	Scores a 5 because maintains beach in the long term.	Structures will have some impact on the natural character of the coast, but a groyne can create an environment / habitat for sea life, plus beach is maintained (albeit artificially).		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	3	6	9	4	9	15	6	52	

	Clifton - Pathway 4		Renourishment + Control Structures <sup>3,13,14</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Sea wall <sup>16</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	2	3	2	3	3	2	2	17	6
<b>Comments</b>	Sea wall would have steeper slope than beach profile, less effective at inundation, limited space available for footprint / foundation.	Improvement over Clifton PW3 because sea wall provides a more certain outcome for erosion mitigation in the long term.	Groynes provide flexibility but sea wall in the long term reduces flexibility.  Once a sea wall is built, particularly as a late investment, it limits opportunities to change course / option.  Committed to holding the line in the long term no matter what.	More risk transferred to future generations than Clifton PW3 because walls are less flexible than groynes and less able to respond to increasing risks.  Also, units 'downstream' would not benefit from nourishment where a sea wall is employed.	Comparable to Clifton PW3.  Note: groynes will catch some sediment flowing north from cliff erosion, once groynes filled up sediment will bypass.	Because pathway involves a sea wall which will cause beach to be lost and prevent potential reinstatement of the historic lagoon.	Lower than Clifton PW3 because the seawall will create a dramatic change in character.		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	6	9	6	3	9	6	4	43	

	Clifton - Pathway 5		Sea wall <sup>16</sup> → Sea wall <sup>16</sup> → Managed Retreat <sup>18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	4	5	4	4	4	3	3	27	1
<b>Comments</b>	<p>Fixed structure so not subject to the abrasion / storm losses of groynes (i.e. Clifton PW2).</p> <p>Designed to prevent inundation although always a storm beyond the design standard.</p> <p>Overall better to Clifton PW2 because there is more design certainty on the height than with groynes.</p> <p>Comparable to Clifton PW1 because both have weaknesses at different time scales.</p>	<p>Effective at erosion mitigation, and accepts that in long term uncertainty increases and therefore shifts to retreat = good balance of defending with uncertainty.</p>	<p>Once a sea wall is built it limits opportunities to change course / option and respond to future changes.</p> <p>Rock revetments can however be added to / built up and therefore this option scores well.</p> <p>Retreat occurs in long term once sea wall becomes ineffective.</p> <p>Relatively, groynes and nourishment are more flexible and adaptable than walls for engineering purposes.</p>	<p>Downstream effects (reduction of sediment supply north) but this will have limited impact given area affected is not occupied.</p> <p>Passing on reduced risk for future generations.</p>	<p>Long term, likely that access to gannets along beach lost due to SLR, regardless of actions taken at Clifton.</p> <p>Gives good certainty for community in the short to medium term.</p> <p>Of all options, appears to be the most practical, gives sea wall every opportunity to be effective, with a fall back to managed retreat if needed.</p>	<p>Ends up at managed retreat which allows coast to return to its natural state.</p> <p>Note: the majority felt that a 3 was preferred because this is not the preferred method of protecting the boat ramp.</p>	<p>Short to medium term change in character with sea wall but reverts to natural coast</p> <p>Seawalls can create habitats for sea life</p> <p>Concern about what coast will be like once wall removed in long term</p> <p>Note: There was small majority in favour of a 3 over a 4 because of the NZCPS preference for natural outcomes, but also discussed that the current Clifton proposal has been designed with natural features. From a relativity point of view a higher score would not be logical e.g. Clifton PW3.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	12	15	12	4	12	9	6	70	

	Clifton - Pathway 6		Sea wall <sup>16</sup> → Sea wall <sup>16</sup> → Sea wall <sup>16</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	3	4	3	3	2	2	2	19	5
<b>Comments</b>	<p>Overall better than Clifton PW3 because there is more design certainty on the height than with groynes.</p> <p>Residual risk of overtopping / breakthrough of wall – storms beyond design standard or known hazard level.</p>	<p>Effective so scores well, but less than Clifton PW5 because more exposed to residual risk from storm damage over long term.</p>	<p>On the assumption that the foundations are sufficient, a sea wall can be adapted to respond to uncertainty</p> <p>Note: a “standard” sea wall would score a 1. The Panel agreed to establish a more flexible structure requiring more engineering and therefore scored this a 3.</p>	<p>Passes on residual risk by committing to a sea wall for a long-time frame.</p>	<p>There is a greater chance of sea wall being overtopped over time – i.e. storm event that exceeds design standard = community exposed to residual risk.</p> <p>Low tide beach access will be lost over time.</p> <p>Amenity impacted by large sea wall for long-term defence.</p> <p>Will require different design from the outset than Clifton PW5.</p>	<p>Artificial intervention, beach lost.</p>	<p>Loose the beach, high price to pay and there are better options from a natural environment perspective.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	9	12	9	3	6	6	4	49	

	Te Awanga - Pathway 1		Renourishment <sup>3</sup> → Retreat the Line <sup>17</sup> → Managed Retreat <sup>18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	4	2	4	4	2	2	2	20	4
<b>Comments</b>	<p>Same rationale as Haumoana PW 1 and Clifton PW1:</p> <p>Managed retreat assumes moving out of both erosion and inundation hazard areas.</p> <p>Not a 5 because the effectiveness of nourishment leaves some uncertainty in the short term.</p> <p>High erosion losses mean nourishment material at risk.</p>	<p>Renourishment without control carries more risk.</p> <p>Retreat the line does not slow or reduce erosion risk (More for inundation).</p> <p>Managed retreat for long term only to retreat line.</p>	<p>Same rationale as Haumoana PW 1 and Clifton PW1:</p> <p>Managed retreat assumes moving out of both erosion and inundation hazard areas.</p>	<p>Same rationale as Haumoana PW 1 and Clifton PW1 (being no risk transferred), however in this unit there is a larger hinterland area that would be adversely effected.</p>	<p>Because it's not protecting existing houses / assets, requires part of the community to move – devastating for Te Awanga – breaks up the fabric of the community, creating artificial division.</p>	<p>Tangata Whenua value natural processes more than artificial intervention. This pathway has minimal intervention and ends up with a natural coastline.</p> <p>Te Awanga PW3 scores better because it holds the beach which is preferred.</p> <p>However, retreat the line is not consistent with whanaungatanga because it splits the community.</p>	<p>Bund (for retreat the line) will impact on the landscape / natural character.</p> <p>Medium term impact on houses seaward of defence line could create a 'demolition zone'.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	12	6	12	4	6	6	4	50	

	Te Awanga - Pathway 2		Renourishment + Control Structures <sup>3,13,14</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Retreat the Line <sup>17</sup>							
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking	
<b>Raw Score</b>	3	4	3	4	3	3	3	23	2	
<b>Comments</b>	<p>Same rationale as Haumoana PW2:</p> <p>More room to move than at Clifton – blow-outs and storm effects can be more readily absorbed, however not to the extent that the scoring is different to Clifton PW2 (which had comments of: Long term managed retreat which fully addresses risk, but in short to medium term control structures not particularly effective at dealing with inundation).</p>	<p>Same rationale as Haumoana PW2 and Clifton PW2:</p> <p>Effective at mitigating erosion risk, but not as effective as Clifton PW1 because in this pathway, retreat occurs much later – risks increase over time so greater chance that an event occurs that overwhelms structures.</p> <p>Less certain than wall options (Clifton PW5) + nourishment requirements.</p>	<p>Retreat the line assumes new line of defence at the road. Groynes are relatively flexible, but spacing of groynes difficult to change. Medium score appropriate</p>	<p>Same rationale as Clifton PW1 (5) (being no risk transferred), however in this unit there is a larger hinterland area that would be adversely effected.</p>	<p>Still end up at retreat the line (i.e. see Te Awanga PW1 comments) but longer timeframe and effort to manage the beach in the interim.</p>	<p>Almost the same as Te Awanga PW1, but better because retreat the line occurs later – in the short to medium term the beach is maintained.</p>	<p>Structures on coast but maintains the beach – still has impacts of retreat the line i.e. bund through Te Awanga.</p> <p>Note: the extent of the groyne field will depend the preferred pathway at Haumoana.</p>			
<b>Weighting</b>	3	3	3	1	3	3	2			
<b>W. Score</b>	9	12	9	4	9	9	6	58		

	<b>Te Awanga - Pathway 3</b>		<b>Renourishment + Control Structures<sup>3,13,14</sup></b> →		<b>Renourishment + Control Structures<sup>3,13,14</sup></b> →		<b>Renourishment + Control Structures<sup>3,13,14</sup></b>		
	<b>Manages the risks of storm surge inundation</b>	<b>Manages the risks of coastal erosion</b>	<b>Ability to adapt to increasing risks</b>	<b>Risk transfer</b>	<b>Socio-economic Impacts</b>	<b>Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga</b>	<b>Natural Environments Impacts</b>	<b>Total</b>	<b>Ranking</b>
<b>Raw Score</b>	1	3	3	3	5	5	4	24	1
<b>Comments</b>	<p>Same rationale as Haumoana PW 4 and Clifton PW3:</p> <p>Compressed unit, difficult to maintain a groyne with a larger enough footprint to be effective for inundation mitigation.</p> <p>Renourishment resource in long time may be difficult to source to maintain high enough beach crest.</p>	<p>Same rationale as Haumoana PW 4 and Clifton PW3:</p> <p>Risk is present all the way through to the long term, groynes can be exceeded and risks increase over time.</p> <p>Requires long term nourishment i.e. high volume required uncertainty of supply.</p> <p>More subject to uncertainty of storms than Clifton PW4 which has a seawall later in pathway.</p>	<p>Same rationale as Haumoana PW 4 and Clifton PW3: Lower score than Clifton PW2 because it doesn't respond well to uncertain climate outcomes because it locks in continual maintenance and nourishment in long timeframes.</p> <p>Only one option being committed to over time frame which decreases future flexibility.</p>	<p>Same rationale as Haumoana PW 4:</p> <p>This pathway seeks to hold the line over the long term, thereby transferring risk to future generations and a wider area (compared with Clifton PW3).</p>	<p>Long term protection for the community.</p> <p>Note residual risk over time.</p> <p>Relative to others this is a good option.</p>	<p>Maintains the beach, maintains access.</p>	<p>Maintains beach with structures – not pristine, you are making a change.</p> <p>Can create ecosystems / habitat.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	3	9	9	3	15	15	8	62	

	Te Awanga - Pathway 4		Renourishment + Control Structures <sup>3,13,14</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Sea wall <sup>16</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	2	4	3	2	4	2	3	20	3
<b>Comments</b>	<p>Same rationale as Haumoana PW5 and Clifton PW4:</p> <p>Sea wall would have steeper slope than beach profile, less effective at inundation, limited space available for footprint / foundation.</p>	<p>Same rationale as Haumoana PW5 and Clifton PW4:</p> <p>Improvement over Clifton PW3 because sea wall provides a more certain outcome for erosion mitigation in the long term.</p>	<p>Groynes provide flexibility but sea wall in the long term reduces flexibility.</p> <p>Once a sea wall is built, particularly as a late investment, it limits opportunities to change course / option, however it will be designed at the medium term and will incorporate design for that time period</p> <p>Committed to holding the line in the long term no matter what.</p>	<p>Same rationale as Haumoana PW5: Renourishing ceases in the long term + edge effects of the wall creates a transfer of risk to future generations plus downstream effects, so scores worse than Haumoana PW4.</p>	<p>Deferring harder structures so for medium term beach is maintained which is a key amenity for Te Awanga – a sea wall in the long term will mean access / amenity lost with sea level rise.</p>	<p>Pathway ends in a sea wall which restricts access, beach lost, and artificial intervention so not favoured.</p>	<p>More intervention than Te Awanga PW3 as changing to a large wall at the long term, less natural outcome, but will maintain a beach through to the medium term, albeit with structures.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	6	12	9	2	12	6	6	53	

	Te Awanga - Pathway 5		Renourishment <sup>3</sup> → Sea wall <sup>16</sup> → Retreat the Line <sup>17</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	3	3	2	3	2	2	2	17	5=
<b>Comments</b>	<p>Renourishment without control carries risk.</p> <p>Seawall same rationale as Clifton PW6:</p> <p>Overall better than Clifton PW3 because there is more design certainty on the height than with groynes.</p> <p>Residual risk of overtopping / breakthrough of wall – storms beyond design standard or known hazard level.</p>	<p>Renourishment without control carries risk.</p> <p>Erosion controlled by seawall in MT.</p> <p>LT increasing risk.</p>	<p>Renourishment in ST leaves options available.</p> <p>Introduction of seawall in MT not responsive to other options.</p>	<p>Same rationale as Haumoana PW6 but with an increase of one-point due to renourishment in ST that provides benefits.</p> <p>Haumoana PW6 rationale:</p> <p>While the same as Clifton PW6, there will be greater edge effects from this pathway as sediment supply from Haumoana beaches to the north with cease – at Clifton this will have less of an effect to the north. Passes on residual risk by committing to a sea wall for a long-time frame.</p>	<p>Loss of amenity from sea wall + retreat the line impacts on community.</p>	<p>Not materially different to Te Awanga PW4, which is:</p> <p>Pathway ends in a sea wall which restricts access, beach lost, and artificial intervention so not favoured.</p>	<p>A lot of disruption in the medium to long term but reasonably natural in the short term – overall relative to Te Awanga PW1.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	9	9	6	3	6	6	4	43	

	Te Awanga - Pathway 6		Sea wall <sup>16</sup> → Sea wall <sup>16</sup> → Sea wall <sup>16</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	3	4	3	2	2	1	1	16	5=
<b>Comments</b>	<p>Same rationale as Haumoana PW6 and Clifton PW6:</p> <p>Overall better than Clifton PW3 because there is more design certainty on the height than with groynes.</p> <p>Residual risk of overtopping / breakthrough of wall – storms beyond design standard or known hazard level.</p>	<p>Same rationale as Haumoana PW6 and Clifton PW6:</p> <p>Effective so scores well, but less than Clifton PW5 because more exposed to residual risk from storm damage over long term.</p>	<p>Same rationale as Clifton PW6:</p> <p>On the assumption that the foundations are sufficient, a sea wall can be adapted to respond to uncertainty</p> <p>Note: a “standard” sea wall would score a 1. The Panel agreed to establish a more flexible structure requiring more engineering and therefore scored this a 3.</p>	<p>Passes on residual risk by committing to a sea wall for a long-time frame.</p> <p>Impoundment effects in an area of current high erosion causes issues to the north</p>	<p>Will protect the community. Message to community is that we will protect and provide confidence so better than retreat the line but a long-term wall will be a large structure with potentially significant amenity impacts.</p>	<p>Has implications for access with the sea wall in the long-term.</p> <p>Allows no option for the establishment of wetlands as the coast shifts.</p> <p>Beach lost early, limiting cultural practices.</p>	<p>High intervention, loss of beach, modified environment.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	9	12	9	2	6	3	2	43	

	Haumoana - Pathway 1		Renourishment <sup>2,3,6,7</sup> → Managed Retreat <sup>18</sup> → Managed Retreat <sup>18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	4	5	4	4	1	3	3	24	3=
<b>Comments</b>	<p>Same rationale as Clifton PW1: Managed retreat assumes moving out of both erosion and inundation hazard areas.</p> <p>Not a 5 because the effectiveness of nourishment leaves some uncertainty in the short term.</p> <p>High erosion losses mean nourishment material at risk.</p>	<p>Same rationale as Clifton PW1: Managed retreat assumes moving out of both erosion and inundation hazard areas. Assumes that nourishment keeps pace with erosion losses, until such time as retreat is necessary.</p> <p>Short term in this pathway could be quite short term leading to early managed retreat</p> <p>Assumption that sufficient supply of material exists in short term.</p>	<p>Same rationale as Clifton PW1: Managed retreat assumes moving out of both erosion and inundation hazard areas.</p>	<p>Same rationale as Clifton PW1 (which is: no risk transferred), however in this unit there is a larger hinterland area that would be adversely effected.</p>	<p>Lack of certainty, disruption to community, loss of amenities, loss of access = high social impact.</p> <p>Note assume that where retreat occurs Cape Coast access is maintained – alternative route.</p> <p>H21 houses will need separate consideration as part of this pathway.</p>	<p>Historic fishing village / papakainga at the end of Grange Road + pa site further inland but severely modified by flood control works.</p> <p>No effect of this option on historic sites of significance because already modified.</p> <p>Limited intervention in the coastal environment is positive however retreat will split the community.</p>	<p>Low intervention, minimal structures.</p> <p>However significant impacts on the lagoon and whitebait spawning areas in mouth of Tukituki – given the width of the river mouth at this point there is significant habitat but if pushed inland there is less width / space for this habitat. Even where habitat can be recreated further inland, losses will likely exceed any gains.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	12	15	12	4	3	9	6	61	

	Haumoana - Pathway 2		Renourishment + Control Structures <sup>2,3,13,14</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Managed Retreat <sup>18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	3	4	4	4	4	5	4	28	1
<b>Comments</b>	More room to move than at Clifton – blow-outs and storm effects can be more readily absorbed, however not to the extent that the scoring is different to Clifton PW2 (which had comments of: Long term managed retreat which fully addresses risk, but in short to medium term control structures not particularly effective at dealing with inundation).	Same rationale as Clifton PW2: Effective at mitigating erosion risk, but not as effective as Clifton PW1 because in this pathway, retreat occurs much later – risks increase over time so greater chance that an event occurs that overwhelms structures. Less certain than wall options (Clifton PW5) + nourishment requirements.	Moving out of hazard area in later time period + groynes & nourishment are adaptable to changing circumstances	Same rationale as Clifton PW1 (which is, no risk transferred), however in this unit there is a larger hinterland area that would be adversely effected.	Protects amenities at Cape Coast Cnr, protects access to TA / Clifton, commercial centre. Addresses uncertainty for the community.  Long term retreat will create stress / uncertainty so not a 5.  H21 houses will need separate consideration as part of this pathway.	Creates beach area in the short to medium term and then allows the coastline to return to its natural state.	Protects the beach, wetlands and lagoon, plus the flood gate will protect the arm of the estuary the goes up beside Haumoana, maintain nesting sites and inanga spawning locations.  But not a 5 because it's a structure.		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	9	12	12	4	12	15	8	72	

	Haumoana - Pathway 3		Renourishment + Control Structures <sup>2,3,13,14</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Retreat the Line <sup>17</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	3	4	4	4	3	3	3	24	3=
<b>Comments</b>	Stop banks are attempting to manage inundation hazards but same long timeframe as Haumoana PW2.	Comparable to Haumoana PW2.	There is flexibility retained because properties seaward of the new defence are able to move as and when required.  If sea levels rose higher than expected, a controlled breach of the stopbanks could occur to allow managed realignment of the shoreline.	Transferring some risk to the medium term, but managing risks in the long term, therefore comparable to Haumoana PW2.	Social impact high because it divides the community in the long term– same as Te Awanga PW2.	While similar to Haumoana PW2, this option is worse than Haumoana PW2 because it leaves some people behind – this is not consistent with the principle of whanaungatanga and ahi ka.	From a natural environment perspective, slightly worse than Haumoana PW4.		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	9	12	12	4	9	9	6	61	

	Haumoana - Pathway 4		Renourishment + Control Structures <sup>2,3,13,14</sup> →		Renourishment + Control Structures <sup>3,13,14</sup> →		Renourishment + Control Structures <sup>3,13,14</sup>		
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	1	3	3	3	5	5	4	24	2
<b>Comments</b>	<p>Same rationale as Clifton PW3: Compressed unit, difficult to maintain a groyne with a larger enough footprint to be effective for inundation mitigation: Renourishment resource in long time may be difficult to source to maintain high enough beach crest:</p>	<p>Same rationale as Clifton PW3: Risk is present all the way through to the long term, groynes can be exceeded and risks increase over time. Requires long term nourishment i.e. high volume required uncertainty of supply. More subject to uncertainty of storms than Clifton PW4 which has a seawall later in pathway.</p>	<p>Same rationale as Clifton PW3: Lower score than Clifton PW2 because it doesn't respond well to uncertain climate outcomes because it locks in continual maintenance and nourishment in long timeframes. Only one option being committed to over time frame which decreases future flexibility.</p>	<p>This pathway seeks to hold the line over the long term, thereby transferring risk to future generations and a wider area (compared with Clifton PW3).</p>	<p>Addresses the social impacts of Haumoana PW2. H21, while benefiting I the short term, likely need consideration in the medium to long term.</p>	<p>Not materially different to Haumoana PW2 – scores the same. Holds the line future out and protecting beach so better than Haumoana PW1.</p>	<p>Protects ecosystems and builds up the beach but is an engineered structure.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	3	9	9	3	15	15	8	62	

	Haumoana - Pathway 5		Renourishment + Control Structures <sup>2,3,13,14</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Sea wall <sup>16</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	2	4	2	2	3	3	3	19	4
<b>Comments</b>	Same as Clifton PW4: Sea wall would have steeper slope than beach profile, less effective at inundation, limited space available for footprint / foundation.	Same as Clifton PW4: Improvement over Clifton PW3 because sea wall provides a more certain outcome for erosion mitigation in the long term.	Same as Clifton PW4: Groynes provide flexibility but sea wall in the long term reduces flexibility. Once a sea wall is built, particularly as a late investment, it limits opportunities to change course / option. Committed to holding the line in the long term no matter what.	Renourishing ceases in the long term + edge effects of the wall creates a transfer of risk to future generations plus downstream effects, so scores worse than Haumoana PW4.	Same pathway as Te Awanga PW4 – however the profile of the beach at Haumoana is different and the loss of amenity is greater in this location than would be experienced at Te Awanga, therefore scores less than 4.	Has implications for access with the sea wall in the long term. Allows no option for the establishment of wetlands as the coast shifts.	Equivalent to Te Awanga PW4.		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	6	12	6	2	9	9	6	50	

	Haumoana - Pathway 6		Sea wall <sup>16</sup> → Sea wall <sup>16</sup> → Sea wall <sup>16</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	3	4	3	2	2	2	1	17	5
<b>Comments</b>	<p>Same rationale as Clifton PW6:</p> <p>Overall better than Clifton PW3 because there is more design certainty on the height than with groynes.</p> <p>Residual risk of overtopping / breakthrough of wall – storms beyond design standard or known hazard level.</p>	<p>Same rationale as Clifton PW6:</p> <p>Effective so scores well, but less than Clifton PW5 because more exposed to residual risk from storm damage over long term.</p>	<p>Same rationale as Clifton PW6:</p> <p>Once a sea wall is built it limits opportunities to change course / option and respond to future changes.</p>	<p>While the same as Clifton PW6, there will be greater edge effects from this pathway as sediment supply from Haumoana beaches to the north with cease – at Clifton this will have less of an effect to the north.</p> <p>Passes on residual risk by committing to a sea wall for a long-time frame.</p>	<p>Equivalent to Te Awanga PW6 with similar adverse effects</p> <p>Sea wall may protect H21 at Cape Cnr.</p>	<p>Has implications for access with the sea wall in the long term.</p> <p>Allows no option for the establishment of wetlands as the coast shifts.</p> <p>Beach lost early, limiting cultural practices.</p>	<p>Equivalent to Te Awanga PW6.</p>		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	9	12	9	2	6	6	2	46	

	Clive / East Clive - Pathway 1		Status Quo <sup>1,2</sup> → Renourishment + Control Structures <sup>3,13,14</sup> → Retreat the Line / Managed Retreat <sup>17,18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	5	5	5	4	3	4	4	30	1
<b>Comments</b>	Area at risk fairly localised and pathway provides adequate protection in to the LT by keeping assets out of the risk area.	Area at risk fairly localised and pathway provides adequate protection in to the LT by keeping assets out of the risk area.	Flexible options allow for ability to adapt should the need arise.	Additional renourishment would largely compensate for any transfer of risk. Assets further in land not at risk providing stopbanks upgraded.	This option would mean retreating both the WWTP and a number of houses, however protection provided in the medium for the entire length of coastline in this unit	There is minimal intervention on the coast No effect of this option on historic sites of significance Does not allow for long term protection of wetland areas which are spawning habitat / mahinga kai / present day site of significance	Minimal intervention, allows coast to return to natural character, soft intervention for medium term		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	15	15	15	4	9	12	8	78	

	Clive / East Clive - Pathway 2		Status Quo <sup>1,2</sup> →		Renourishment + Control Structures <sup>3,13,14</sup> →		Renourishment + Control Structures <sup>3,13,14</sup>		
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	4	4	4	4	5	5	3	29	2
<b>Comments</b>	Increase in risk during the LT, consequence of failure greater when compared to PW1.	Increase in risk during the LT, consequence of failure greater when compared to PW1.	Fairly adaptable but limits on the practicality of continuing to raise beach heights.	This pathway seeks to hold the line over the long term, thereby transferring risk to future generations and a wider area.	Will protect infrastructure and houses for long term.	No effect of this option on historic sites of significance  Protects wetlands for longer - which are spawning habitat / mahinga kai / present day site of significance	See rationale for Clifton PW3 -		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	12	12	12	4	15	15	6	76	

	Clive / East Clive - Pathway 3		Status Quo <sup>1,2</sup> → Sea wall <sup>16</sup> → Retreat the Line / Managed Retreat <sup>17,18</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	5	5	3	4	2	3	2	24	3
<b>Comments</b>	Area at risk fairly localised and pathway provides adequate protection in to the LT by keeping assets out of the risk area.	Area at risk fairly localised and pathway provides adequate protection in to the LT by keeping assets out of the risk area.	Sea wall less adaptable to increased risks.	Seawall tied in to groyne and stopbank so limited end effects. Retreating the line removes assets from hazard zones.	Requires a retreat in the long term – shouldn't need to get to this point if the beach was controlled properly. Note that sea wall will restrict access to beach in medium term therefore scores lower than Clive PW1	No effect of this option on historic sites of significance Loss of wetland / habitat in front of wall a concern, although note this will be temporary in the long term as we shift to managed retreat	While allows coast to return to natural character in long term, medium term wall creates significant change to natural character, wetlands will likely be lost in front of sea walls		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	15	15	9	4	6	9	4	62	

	Clive / East Clive - Pathway 4		Status Quo <sup>1,2</sup> → Sea wall <sup>16</sup> → Sea wall <sup>16</sup>						
	Manages the risks of storm surge inundation	Manages the risks of coastal erosion	Ability to adapt to increasing risks	Risk transfer	Socio-economic Impacts	Relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga	Natural Environments Impacts	Total	Ranking
<b>Raw Score</b>	4	4	2	3	3	2	1	19	4
<b>Comments</b>	Increase in risk during the LT, consequence of failure greater when compared to Clive/East Clive PW1.	Increase in risk during the LT, consequence of failure greater when compared to Clive/East Clive PW1.	Status Quo provides short term flexibility, however seawall relatively inflexible when compared to other options.	Passes on residual risk by committing to a sea wall for a long-time frame.	Scores lower because access to beach is lost, however does protect the community	No effect of this option on historic sites of significance Loss of wetland / habitat in front of wall a concern – present day site of significance – mahinga kai Also, a concern about impoundment effects on Waitangi – i.e. less sediment traveling north.	Natural character is compromised by sea wall out to long term, wetlands certainly lost		
<b>Weighting</b>	3	3	3	1	3	3	2		
<b>W. Score</b>	12	12	6	3	9	6	2	50	