

PAA MCDA CRITERIA – EFFECTIVELY MANAGES THE RISK OF COASTAL INUNDATION

Management Unit	Pathway	Pathway Description			Effectively manages coastal inundation risk	
		Short term	Medium term	Long term	Score	Notes
Management Unit 11A: Paekākāriki (Erosion Unit)	1	Status Quo ¹ and Community Education and Emergency Management ⁴	Sea wall ¹³ (Protect – Hard Engineering)	Re-establish the line with a setback protection structure ¹⁰ (Retreat & Protect)	2	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations. •Some of the properties that are retreated with the re-establish the line option could also be impacted by wave runup overtopping, and therefore this option would reduce some risk.
	2	Status Quo ¹ and Community Education and Emergency Management ⁴	Sea wall ¹³ (Protect – Hard Engineering)	Enhance Sea wall ² (Protect – Hard Engineering)	1	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations.
	3	Status Quo ¹ and Community Education and Emergency Management ⁴	Re-establish the line with a setback protection structure ¹⁰ (Retreat & Protect)	Enhance protection structure ² (Protect – Hard Engineering)	2	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations. •Some of the properties that are retreated with the re-establish the line option could also be impacted by wave runup overtopping, and therefore this option would reduce some risk.
	4	Status Quo ¹ and Community Education and Emergency Management ⁴	Re-establish the line with a setback protection structure ¹⁰ and Dune reconstruction ¹¹ (Retreat & Protect)	Beach renourishment ¹⁰ (Protect – Soft Engineering)	2	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If the constructed dunes are designed and constructed to high elevations then they will help reduce the runup elevations and reduce wave overtopping. •Some of the properties that are retreated with the re-establish the line option could also be impacted by wave runup overtopping, and therefore this option would reduce some risk.

Management Unit 12A: Paekākāriki (Erosion Unit)	1	Status Quo ¹ and Community Education and Emergency Management ⁴	Enhance existing protection structure ² , Community Education and Emergency Management ⁴ (Enhance)	Re-establish the line with a setback protection structure ¹⁰ (Retreat & Protect)	2	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations. •Some of the properties that are retreated with the re-establish the line option could also be impacted by wave runup overtopping, and therefore this option would reduce some risk.
	2	Enhance existing protection structure ² , Community Education and Emergency Management ⁴ (Enhance)	Sea wall ¹³ (Protect – Hard Engineering)	Re-establish the line with a setback protection structure ¹⁰ (Retreat & Protect)	2	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations. •Some of the properties that are retreated with the re-establish the line option could also be impacted by wave runup overtopping, and therefore this option would reduce some risk.
	3	Enhance existing protection structure ² , Community Education and Emergency Management ⁴ (Enhance)	Re-establish the line with a setback protection structure ¹⁰ (Retreat & Protect)	Enhance sea wall ² (Protect – Hard Engineering)	2	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations. •Some of the properties that are retreated with the re-establish the line option could also be impacted by wave runup overtopping, and therefore this option would reduce some risk.
	4	Enhance existing protection structure ² , Community Education and Emergency Management ⁴ (Enhance)	Re-establish the line with a setback protection structure ¹⁰ and Dune reconstruction ¹² (Retreat & Protect)	Beach renourishment ¹⁰ (Protect – Soft Engineering)	2	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If the constructed dunes are designed and constructed to high elevations then they will help reduce the runup elevations and reduce wave overtopping. •Some of the properties that are retreated with the re-establish the line option could also be impacted by wave runup overtopping, and therefore this option would reduce some risk.
	5	Sea wall ¹³ (Protect – Hard Engineering)	Enhance Sea wall ² (Protect – Hard Engineering)	Enhance Sea wall ² (Protect – Hard Engineering)	1	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations.

	6	Status Quo ¹ and Community Education and Emergency Management ⁴	Enhance existing protection structure ² , Community Education and Emergency Management ⁴ (Enhance)	Sea wall ¹³ (Protect – Hard Engineering)	1	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations.
	7	Status Quo ¹ and Community Education and Emergency Management ⁴	Sea wall ¹³ (Protect – Hard Engineering)	Enhance Sea wall ² (Protect – Hard Engineering)	1	<ul style="list-style-type: none"> •Pathway not designed to deal with the coastal inundation hazard, however potential for increased elevation of future seawalls to reduce the overtopping hazard along the coastline. •If future hard protection structure is not vertical, then there is opportunity for better energy dissipation at the coast to further reduce overtopping and wave runup elevations.

Management Unit	Pathway	Pathway Description			Effectively managed coastal inundation risk	
		Short term	Medium term	Long term	Score	Notes
Management Unit 11B: Paekākāriki (Inundation Unit)	1	Status Quo ¹ and Community Education and Emergency Management ⁴	Enhance Existing Inundation Protection ³ and Community Education and Emergency Management ⁴ (Enhance)	Additional Hard Protection (e.g. Stopbanks ¹³ , Culverts ¹⁴ , Pumpstations ¹⁵) (Protect)	5	<ul style="list-style-type: none"> •There is currently very low risk to coastal inundation, and therefore the short-medium term actions are proportionate to the scale of the hazard and risk. •By the long term, additional hard protection in the form of small bunding/stop banking by the Waikakriki Stream would be proportionate to the scale of the hazard and effectively manage the water coming from the sea up the low lying land. •Options considered in this pathway are unlikely to exacerbate the hazard elsewhere.
	2	Status Quo ¹ and Community Education and Emergency Management ⁴	Enhance Existing Inundation Protection ³ and Community Education and Emergency Management ⁴ (Enhance)	Elevate floor levels of buildings ⁸ or Flood proofing buildings and infrastructure ⁶ (Accommodate)	5	<ul style="list-style-type: none"> •There is currently very low risk to coastal inundation, and therefore the short-medium term actions are proportionate to the scale of the hazard and risk. •By the long term, raising the isolated pockets of houses which could be impacted by flooding would be proportionate to the scale of the hazard. •Raising the floor levels of homes or flood proofing properties could result in some potential exacerbation of hazard to neighbouring properties, however this would likely be dealt with through design and consenting to ensure these impacts were minimised. •Raising floor levels would be effective as most road levels were assessed as being high enough that properties could still be accessed during a significant event.
	3	Status Quo ¹ and Community Education and Emergency Management ⁴	Additional Hard Protection (e.g. Stopbanks ¹⁴ , Pumpstations ¹⁵) (Protect)	Enhance Existing Inundation Protection ³ (Enhance)	4	<ul style="list-style-type: none"> •There is currently very low risk to coastal inundation, and therefore the short term actions are proportionate to the scale of the hazard and risk. •Installing additional hard protection in the medium term may be disproportionate to the scale of the hazard at that timeframe, however would be effective in managing any potential risks to private property from coastal flooding, especially around the Waikakariki mouth. •The enhancement of the new and existing infrastructure over the long term is proportionate to the scale of the hazard in this area. •This option scores slightly lower than the above pathway because it may not be completely necessary to install additional hard protection in the medium term, and therefore the response is not to scale.
	4	Enhance Existing Inundation Protection ³ and Community Education and Emergency Management ⁴ (Enhance)	Additional Hard Protection (e.g. Stopbanks ¹⁴ , Pumpstations ¹⁵) (Protect)	Enhance Existing Inundation Protection ³ (Enhance)	3	<ul style="list-style-type: none"> •Enhancement in the short term would include installing non-return valves on stormwater outfalls, which could be a low-cost exercise and effectively manage the risks over the short term (even though risks are low). •Installing additional hard protection in the medium term may be disproportionate to the scale of the hazard at that timeframe, however would be effective in managing any potential risks to private property from coastal flooding, especially around the Waikakariki mouth. •The enhancement of the new and existing infrastructure over the long term is proportionate to the scale of the hazard in this area. •This option scores slightly lower than the pathway above which begins with status quo because it may not be completely necessary to undertake any physical works until the long term, and therefore the response is not to scale.

	5	Enhance Existing Inundation Protection ³ and Community Education and Emergency Management ⁴ (Enhance)	Elevate floor levels of buildings ⁸ or Flood proofing buildings and infrastructure ⁶ (Accommodate)	Additional Hard Protection (e.g. Stopbanks ¹⁴ , Pumpstations ¹⁵) (Protect)	3	<ul style="list-style-type: none"> •Enhancement in the short term would include installing non-return valves on stormwater outfalls, which could be a low-cost exercise and effectively manage the risks over the short term (even though risks are low). •By the medium term, raising the isolated pockets of houses which could be impacted by flooding would be proportionate to the scale of the hazard, however it is likely that the number of properties required to be lifted would be small. •Raising the floor levels of homes or flood proofing properties could result in some potential exacerbation of hazard to neighbouring properties, however this would likely be dealt with through design and consenting to ensure these impacts were minimised. •Raising floor levels would be effective as most road levels were assessed as being high enough that properties could still be accessed during a significant event. •By the long term, additional hard protection in the form of small bunding/stop banking by the Waikakariki Stream would be proportionate to the scale of the hazard and effectively manage the water coming from the sea up the low lying land.
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