CLIMAtlantic

Coastal Adaptation Tool

CLIMAtlantic

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What's Included

Natural Resources Canada | Ressources naturelles Canada

Canada

Environment and Climate Change Canada | Environnement et Changement climatique Canada

Supported by the Government of Canada and Natural Resources Canada's Building Regional Adaptation Capacity and Expertise (BRACE) Program

Disclaimer

The toolkit is intended for informational purposes only. The information provided is not a substitute for site-specific professional advice, nor does the information contained in the online tools replace consultation with engineering, land use planning, and/or earth science professionals. The information provided in this website does not preclude the need to engage with relevant jurisdictions in regulatory and permitting processes.

If you have any questions about your results or would like help interpreting them, please contact the CLIMAtlantic Helpdesk (info@climatlantic.ca).

Your Responses

Question	Answer
What would you like to call your site?	233 Water Street
1. In which province is your community located?	New Brunswick
1.1 What is your community type in New Brunswick?	Town
2. What issues are happening at the site?	Coastal erosion
3. Are there any natural features (e.g., sand dunes) or engineered structures (e.g., breakwater, dyke) that are currently, or that were previously, protecting the site?	No
4. Do properties or sites adjacent to yours have any engineered structures originally installed to protect them from flooding and/or erosion?	Yes
4.1. What kind of structures are present on the adjoining properties or sites?	Shore parallel structures (revetments, seawalls, nearshore breakwaters, sills, etc.). Shore perpendicular structures (groynes, jetties, perpendicular breakwater).
4.2. Of the structures that you identified in question 4.1, are any failing or being damaged?	None are experiencing damage.
5. Managed retreat is a long-term strategy for adapting to issues caused by flooding or erosion in high-risk areas. This strategy increases public safety and is used in place of installing or replacing expensive protection measures over time. Are there other areas where existing or at-risk coastal activities or infrastructure (e.g., your home, shed, etc.) within the site could be located?	No, there are absolutely no other locations where any of the existing or at-risk coastal activities or infrastructure can be located.
6. How long do you have to adapt to the climate change issue before it threatens your safety (e.g., a street or roadway is no longer safe for vehicle traffic)?	Long-term (10+ years)
8. What type of erosion is occurring at the site?	Ongoing erosion that does not cause immediate danger.
8.1 What is being eroded at the site?	Engineered coastal protection structure.
8.3 Where is the erosion occurring around the built or engineered structure at this site?	Edges or sides of structure.

Question	Answer
9. What is the slope of the shore at this site?	Moderately Steep
10. Is there a foreshore present at this site?	No
11. How exposed is the site to waves during a storm?	Somewhat protected
12. Some coastal engineering structures require a supply of sediment material (e.g., sand, gravel, rocks, etc.). Is there a supply of material available?	Yes, material can be shipped, trucked, or brought using a dredging barge and pump from an external source.
13. What are the most common types of coastal environment at the site?	Intertidal flat (sand or mud) Gravel/cobble Bank Rock cliff Built (developed waterfronts)

Coastal Intervention and Engineering Measures - Part 1

Good
Some concerns
Apply with caution
Avoid

Option	Rank	Description	Cost	Environmental Impacts	Typical Issues (Maintenance and/or negative impacts)	Typical Maintenance Strategies
Artificial reefs *	Some concerns	Artificial reefs attempt to mimic natural forms and use naturally occurring material and help restore natural reef systems.	Low	Seabed footprint	Damage or failure	Add more/larger rock Raise crest
Drainage ditch	Some concerns	Drainage ditches are made up of a network of open trenches often connected by culverts. They will provide routes for water to drain from an area.	Low	Increasing drainage upstream in the watershed may increase flooding risks downstream.	Does not provide protection from extreme flooding, only increases recovery after the event.	Ditch clearing
Relocate infrastructure *	Some concerns	The decision to relocate or abandon a coastal road, building or other type of infrastructure must be based on a complex cost-benefit analysis that includes socio-economic aspects. The value of services provided must be accounted for.	High	Removal of infrastructure may cause temporary distrurbance to habitat	Socio-economic challenges	N/A
Scour protection	Apply with caution	Scour protection prevents erosion (i.e. scouring) from around the base of infrastructure.	Medium	May cause increased erosion in surrounding areas.	Damage or failure	Add more/larger rock
Rip-rap armouring	Apply with caution	Rip-rap refers to loose rock or other material piled on the shoreline to limit erosion, typically end-dumped from a truck.	Medium	May cut off sediment supply and cause erosion downdrift. May induce scour at the base.	Damage or failure	Add more/larger rock Raise crest
Detached breakwaters	Apply with caution	Detached breakwaters are designed to provide shelter from waves to reduce erosion of the shoreline and can be designed to increase sediment build-up in desired locations.	High	Downdrift erosion if not pre-filled with enough imported sand Rip currents potentially hazardous to swimmers	Damage or failure Downdrift erosion	Add more/larger rock Raise crest Downdrift beach nourishment Shorten/remove structure
Seawall	Apply with caution	Seawalls are structural barriers that resist the full force of waves and storm surge.	High	Poor energy absorption may cause scour and beach erosion for exposed areas. Also decreases the release of sediment from protected area, which may increase erosion in surrounding areas.	Flooding Damage or failure	Rebuild higher / stronger Consider more flexible design (e.g. rock revetment

* These options can be applied more broadly

Option	Rank	Description	Cost	Environmental Impacts	Typical Issues (Maintenance and/or negative impacts)	Typical Maintenance Strategies
						rather than timber/concrete)
Engineered revetment	Avoid	Revetments break wave energy, stopping erosion. Water can seep through.	High	May cut off sediment supply and cause erosion downdrift. May induce scour at the base.	Damage or failure Downdrift erosion	Add more/larger rock Raise crest Downdrift beach nourishmnent
Groynes (groins)	Avoid	Groynes/Groins trap sand moving along the shoreline (littoral drift) and help grow the beach on the updrift of the groyne.	High	Downdrift erosion if not pre-filled with enough imported sand Rip currents potentially hazardous to swimmers	Damage or failure Downdrift erosion	Add more/larger rock Raise crest Downdrift beach nourishment Shorten/remove structure
Shore perpendicular breakwater	Avoid	Shore-perpendicular breakwaters extend out from the shore. They provide shelter from waves to the shoreline and can be designed to increase sediment build-up in desired locations.	High	If built on a straight sandy coast, may cause downdrift erosion if not pre-filled with enough imported sand Rip currents potentially hazardous to swimmers	Damage or failure Downdrift erosion	Add more/larger rock Raise crest Downdrift beach nourishment Shorten/remove structure
Retaining wall	Avoid	Retaining prevents land from sliding into the sea. The secondary purpose is to limit the impact of waves on the shore.	Medium	Not appropriate for wave exposure due to high scour potential.	Damage or failure	Rebuild higher / stronger Consider more flexible design (e.g. rock revetment rather than timber/concrete)
Perched beach (sill)	Avoid	A perched beach can be created where the natural profile of a beach comes too close to valuable infrastructure or property.	Medium	Seabed footprint	Erosion / damage	Re-nourish Re-planting
Beach nourishment *	Avoid	Beach Nourishment adds sediment to the coastal system by depositing along the shoreline. It acts as a storm buffer. It involves periodic renourishment because it does not reduce	Medium	Does not reduce background erosion rate.	Erosion / damage	Re-nourish Re-planting

* These options can be applied more broadly

Option	Rank	Description	Cost	Environmental Impacts	Typical Issues (Maintenance and/or negative impacts)	Typical Maintenance Strategies
		background erosion rate.				
Plant stabilization *	Avoid	Planting certain vegetation to stabilize coastline is a cost effective option in relatively protected shorelines.	Low	Using the wrong type of vegetation may be ineffective or choke out existing native vegetation; experts should be consulted.	Erosion / damage	Re-nourish Re-planting
Buried revetment *	Avoid	A buried revetment uses the hard protection of a revetment and the soft protection of a dune to create a barrier against flooding and erosion.	High	Does not reduce background sand erosion rate, therefore may require regular re-nourishment.	Post-construction sink holes Erosion Flooding	Fill holes with coarse material Re-nourishment Replace with more/larger rock Raise crest
Living shoreline/ wetlands *	Avoid	Saltmarshes are a way to maintain a natural shoreline balance as sea levels rise; reducing impacts of flooding and erosion reduced. It can be combined with low-crested reef breakwaters in front.	Low	Restores habitat for wildlife and fish spawning and increases water quality along the coast. Wetlands can adapt to sea- level rise without maintenance (if the rate of sea level rise is not too rapid to keep pace). Increased buildup of sediments should allow the height of the wetland to rise with changes in sea level.	Erosion / damage. Not effective for exposed high wave energy areas unless combined with other measures.	Re-plant
Dune building *	Avoid	Dunes act as a flexible buffer between the ocean and the upland, protecting from both erosion and flooding.	Medium	Does not reduce background sand erosion rate, therefore may require regular re-nourishment.	Erosion / damage Flooding	Re-nourishment Re-planting Raise crest
Dyke *	Avoid	Dykes prevent the flooding of coastal lowlands during extreme high tides and storm events.	High	Requires significant land area. Heightening requires extra land take. Loss of intertidal zone.	Poor drainage of runoff Overtopping	Upgrade aboiteaux Install pumps Stormwater management Raise dyke
Dredging *	Avoid	Dredging is the act of digging up the bottom of a channel to remove sediment that has built up in an estuary or harbour mouth, keeping channels open for floodwater drainage.	High	Does not prevent (and may increase) erosion. Represents a departure from a natural equilibrium between erosion and deposition. Therefore maintenance dredging would generally be required if there is a regular natural supply of sediment.	Infilling	Re-dredge or reconsider practice
Detainment ponds *	Avoid	Detainment ponds store excess water during extreme rainfall.	Low	Requires large land areas.	Overflows Limited volume	N/A
Rain Garden / Constructed Wetland *	Avoid	A rain garden is a planted depression or a hole that allows rainwater runoff from impervious urban areas, like roofs, driveways, walkways,	Low	Provides habitat and biodoversity	Multiple rain gardens typically recommended	Maintaining plant health

* These options can be applied more broadly

Option	Rank	Description	Cost	Environmental Impacts	Typical Issues (Maintenance and/or negative impacts)	Typical Maintenance Strategies
		parking lots, and compacted lawn areas, the opportunity to be absorbed.				
Stormwater management *	Avoid	Stormwater management reduces runoff by promoting infiltration natural and man made pipes and streams.	Low	Storm water management has a relatively neutral impact on the environment. The location of the drainage systems could disrupt habitat and biodiversity but depending on the footprint of those plans, may be minimal.	Overflows	Increase infiltration, storage and/or conveyance capacity Install pumps
Tide barrier/aboiteau *	Avoid	Tidal or storm surge barriers are moveable barriers or gates that is closed to prevent flooding when extreme water levels or storm surges are forecast. Aboiteau provide one-way freshwater drainage.	High	Intertidal habitat loss.	Sedimentation blockage	Dredge Raise bottom of structure if it does not impact upstream floods
Dry flood proofing building *	Avoid	Material and structures used to prevent floodwater or storm surge from impacting the more valuable structures within.	High	May increase flooding and erosion for surrounding properties.	Damage to floodproofing elements, or flood level exceeds design criteria	Structural Maintenance Raise design flood level
Wet flood proofing building *	Avoid	Wet flood proofing accommodates the possibility of flooding into the structure. This technique allows water to flow in and out of the lower level of the buildings.	High	Cleanup and maintenance required after flood events.	Damage to floodproofing elements, or flood level exceeds design criteria	Structural Maintenance Raise design flood level
Raised infrastructure *	Avoid	A building's elevation can be increased through the use of stilts or raised foundation to create non-living space under the house (i.e. garage) or by increasing the height of the land with fill before the building is constructed.	High	Access to the structure could be limited during flood events.	Damage to floodproofing elements, or flood level exceeds design criteria	Structural Maintenance Raise design flood level
Floating building *	Avoid	Floating buildings are located on a floating base allowing water to flow underneath during flood situations.	High	Access to the structure could be limited during flood events. Erosion may still impact support infrastructure. Only suitable for low wave energy environments.	Damage to floodproofing elements, or flood level exceeds design criteria	Structural Maintenance Raise design flood level

* These options can be applied more broadly

Coastal Intervention and Engineering Measures - Part 2

Good
Some concerns
Apply with caution
Avoid

Option	Rank	Maintenance Interval	Wave Climate		Sediment supply required?		Maximum slope	Ideal position in coastal profile (Nearshore/Foreshore/Backshore)
			Maximum Wave Exposure (Protected: Hs < 1m, Moderate: 1m < Hs > 3m, Exposed: Hs > 3m)	Wave crests angle with shoreline	Initial fill	Natural background supply		
Artificial reefs *	Some concerns	VARIABLE	MODERATE	N/A	NO	NO	N/A	N
Drainage ditch	Some concerns	LONG	N/A	N/A	NO	NO	N/A	B
Relocate infrastructure *	Some concerns	LONG	EXPOSED	N/A	NO	NO	N/A	B
Scour protection	Apply with caution	VARIABLE	N/A	N/A	NO	NO	40	F
Rip-rap armouring	Apply with caution	VARIABLE	PROTECTED	N/A	NO	NO	40	F, B
Detached breakwaters	Apply with caution	LONG	EXPOSED	N/A	YES	NO	N/A	N
Seawall	Apply with caution	VARIABLE	EXPOSED	N/A	YES	NO	90	B
Engineered revetment	Avoid	LONG	EXPOSED	N/A	NO	NO	35	F, B
Groynes (groins)	Avoid	VARIABLE	EXPOSED	OBLIQUE	YES	NO	N/A	N
Shore perpendicular breakwater	Avoid	LONG	EXPOSED	OBLIQUE	YES	NO	N/A	N
Retaining wall	Avoid	LONG	PROTECTED	N/A	NO	NO	90	B
Perched beach (sill)	Avoid	VARIABLE	MODERATE	PARALLEL	YES	YES	N/A	N
Beach *	Avoid	SHORT	MODERATE	N/A	YES	YES	N/A	B

* These options can be applied more broadly

Option	Rank	Maintenance Interval	Wave Climate		Sediment supply required?		Maximum slope	Ideal position in coastal profile (Nearshore/Foreshore/Backshore)
			Maximum Wave Exposure (Protected: Hs < 1m, Moderate: 1m < Hs > 3m, Exposed: Hs > 3m)	Wave crests angle with shoreline	Initial fill	Natural background supply		
nourishment								
Plant stabilization *	Avoid	VARIABLE	PROTECTED	N/A	NO	NO	60	B
Buried revetment *	Avoid	VARIABLE	EXPOSED	N/A	YES	YES	35	B
Living shoreline/ wetlands *	Avoid	LONG	PROTECTED	N/A	YES	NO	10	F, B
Dune building *	Avoid	VARIABLE	EXPOSED	N/A	YES	YES	20	B
Dyke *	Avoid	VARIABLE	EXPOSED	N/A	NO	NO	25	F
Dredging *	Avoid	SHORT	PROTECTED	N/A	NO	NO, AVOID	N/A	F
Detainment ponds *	Avoid	LONG	N/A	N/A	NO	NO	N/A	B
Rain Garden / Constructed Wetland *	Avoid	LONG	N/A	N/A	NO	NO	N/A	B
Stormwater management *	Avoid	VARIABLE	N/A	N/A	NO	NO	N/A	B
Tide barrier/aboiteau *	Avoid	VARIABLE	MODERATE	N/A	NO	NO	N/A	F
Dry flood proofing building *	Avoid	VARIABLE	PROTECTED	N/A	NO	NO	N/A	B
Wet flood proofing building *	Avoid	VARIABLE	PROTECTED	N/A	NO	NO	N/A	B
Raised infrastructure *	Avoid	VARIABLE	PROTECTED	N/A	NO	NO	N/A	B
Floating building *	Avoid	VARIABLE	PROTECTED	N/A	NO	NO	N/A	B

* These options can be applied more broadly

Coastal Intervention and Engineering Measures - Part 3

Good
Some concerns
Apply with caution
Avoid

Option	Rank	Degree of Regulatory Approval Requirements			
		Municipal	Provincial	Federal	Cumulative
Artificial reefs *	Some concerns	Low	Low	Medium	Medium
Drainage ditch	Some concerns	Low	Low	Low	Low
Relocate infrastructure *	Some concerns	High	High	Medium	High
Scour protection	Apply with caution	Low	Medium	Medium	Medium
Rip-rap armouring	Apply with caution	Low	Medium	Medium	Medium
Detached breakwaters	Apply with caution	Low	Low	High	High
Seawall	Apply with caution	Low	Medium	Medium	Medium
Engineered revetment	Avoid	Low	Medium	Medium	Medium
Groynes (groins)	Avoid	Low	Prohibited	High	High
Shore perpendicular breakwater	Avoid	Low	Medium	High	High
Retaining wall	Avoid	Low	Medium	Medium	Medium
Perched beach (sill)	Avoid	Low	Low	Medium	Medium
Beach nourishment *	Avoid	Low	Medium	Medium	Medium
Plant stabilization *	Avoid	Low	Low	Low	Low
Buried revetment *	Avoid	Low	Medium	Medium	Medium
Living shoreline/wetlands *	Avoid	Low	Medium	Low	Medium
Dune building *	Avoid	Low	Medium	Low	Medium
Dyke *	Avoid	Medium	High	High	High
Dredging *	Avoid	Low	Medium	High	High
Detainment ponds *	Avoid	Medium	Medium	Low	Medium

* These options can be applied more broadly

Option	Rank	Degree of Regulatory Approval Requirements			
		Municipal	Provincial	Federal	Cumulative
Rain Garden / Constructed Wetland *	Avoid	Low	Low	Low	Low
Stormwater management *	Avoid	Low to Medium	Low to Medium	Low	Low to Medium
Tide barrier/aboiteau *	Avoid	Medium	High	High	High
Dry flood proofing building *	Avoid	Medium	Low	Low	Medium
Wet flood proofing building *	Avoid	Medium	Low	Low	Medium
Raised infrastructure *	Avoid	Medium	Medium	Low	Medium
Floating building *	Avoid	Medium	Medium	Low	Medium

* These options can be applied more broadly

Coastal Intervention and Engineering Measures - Part 4

Good
Some concerns
Apply with caution
Avoid

Option	Rank	Protection				Impacts		Sustainability & preservation	
		Coast (above HT protection)	Natural tidal zone protection/reestablishment	Flood Defence	Downdrift beach	Aesthetics	Swimming safety	Coastal morphology	Habitat/biodiversity
Artificial reefs *	Some concerns	✔	✔	–	–	✔	✖	✖	✔
Drainage ditch	Some concerns	–	–	✔	–	–	–	–	–
Relocate infrastructure *	Some concerns	–	✔	✔	–	–	–	–	✔
Scour protection	Apply with caution	✔	✔	–	✖	✖	–	✖	–
Rip-rap armouring	Apply with caution	✔	✖	–	✖	✖	–	✖	–
Detached breakwaters	Apply with caution	✔	✔	–	✖	✖	✖	✖	–
Seawall	Apply with caution	✔	✖	✔	✖	✖	–	✖	–
Engineered revetment	Avoid	✔	✖	–	✖	✖	–	✖	–
Groynes (groins)	Avoid	✔	✔	–	✖	✖	✖	✖	–
Shore perpendicular breakwater	Avoid	✔	✔	–	✖	✖	✖	✖	–
Retaining wall	Avoid	✔	–	–	–	✖	–	✖	✖
Perched beach (sill)	Avoid	–	✔	–	✔	✔	✖	✖	–
Beach nourishment *	Avoid	✔	✔	–	✔	✔	–	✖	–

Protection

- ✔ Good protection
- – Neutral
- ✖ Causes erosion

Impacts

- ✔ High recreation value
- – Neutral
- ✖ Negative impact

Sustainability & preservation

- ✔ Enhances sustainability
- – Neutral
- ✖ Unsustainable

* These options can be applied more broadly

Option	Rank	Protection			Impacts			Sustainability & preservation	
		Coast (above HT protection)	Natural tidal zone protection/reestablishment	Flood Defence	Downdrift beach	Aesthetics	Swimming safety	Coastal morphology	Habitat/biodiversity
Plant stabilization *	Avoid	✔	✔	–	–	✔	–	–	✔
Buried revetment *	Avoid	✔	✔	✔	✔	✔	–	–	–
Living shoreline/ wetlands *	Avoid	–	✔	✔	–	✔	–	✔	✔
Dune building *	Avoid	✔	–	✔	–	✔	–	–	–
Dyke *	Avoid	–	–	✔	–	✖	–	–	✖
Dredging *	Avoid	–	✖	✔	✖	✖	–	–	✖
Detainment ponds *	Avoid	–	–	✔	–	–	–	–	✔
Rain Garden / Constructed Wetland *	Avoid			✔		✔			✔
Stormwater management *	Avoid	–	–	✔	–	–	–	–	–
Tide barrier/aboiteau *	Avoid	✔	–	✔	–	–	–	–	✖
Dry flood proofing building *	Avoid	–	–	✔	–	–	–	–	–
Wet flood proofing building *	Avoid	–	–	✔	–	–	–	–	–
Raised infrastructure *	Avoid	–	–	✔	–	–	–	–	–
Floating building *	Avoid	–	–	✔	–	–	–	–	–

Protection

- ✔ Good protection
- – Neutral
- ✖ Causes erosion

Impacts

- ✔ High recreation value
- – Neutral
- ✖ Negative impact

Sustainability & preservation

- ✔ Enhances sustainability
- – Neutral
- ✖ Unsustainable

* These options can be applied more broadly

Coastal Intervention and Engineering Measures - Part 5

Good
Some concerns
Apply with caution
Avoid

Option	Rank	Professional Expertise Typically Required						Information Typically Required							
		Civil Engineering	Geotechnical	Coastal Processes	Water Resources	Marine/Aquatic Biology or Plant Biology	Geoscience or Geomorphology	Land topography	Local bathymetry (i.e. water depths)	Erosion rates	Flood mapping	Extreme water levels	Wave heights	Extreme currents	Sediment transport
Artificial reefs *	Some concerns			✔		✔			✔				✔	✔	
Drainage ditch	Some concerns				✔			✔			✔	✔		✔	
Relocate infrastructure *	Some concerns							✔		✔	✔	✔			
Scour protection	Apply with caution	✔						✔	✔			✔	✔	✔	✔
Rip-rap armouring	Apply with caution	✔						✔	✔	✔		✔	✔	✔	✔
Detached breakwaters	Apply with caution			✔					✔	✔		✔	✔	✔	✔
Seawall	Apply with caution		✔	✔				✔	✔	✔	✔	✔	✔		
Engineered revetment	Avoid			✔				✔	✔	✔		✔	✔	✔	✔
Groynes (groins)	Avoid			✔					✔	✔		✔	✔	✔	✔
Shore perpendicular breakwater	Avoid			✔					✔	✔		✔	✔	✔	✔
Retaining wall	Avoid		✔					✔		✔		✔			
Perched beach	Avoid			✔					✔	✔		✔	✔		✔

* These options can be applied more broadly

Option	Rank	Professional Expertise Typically Required						Information Typically Required							
		Civil Engineering	Geotechnical	Coastal Processes	Water Resources	Marine/Aquatic Biology or Plant Biology	Geoscience or Geomorphology	Land topography	Local bathymetry (i.e. water depths)	Erosion rates	Flood mapping	Extreme water levels	Wave heights	Extreme currents	Sediment transport
(sill)															
Beach nourishment *	Avoid			✔				✔	✔	✔		✔	✔		✔
Plant stabilization *	Avoid					✔		✔		✔		✔	✔		
Buried revetment *	Avoid			✔				✔	✔	✔	✔	✔	✔		✔
Living shoreline/ wetlands *	Avoid			✔		✔		✔	✔	✔	✔	✔	✔		
Dune building *	Avoid			✔				✔		✔	✔	✔	✔		✔
Dyke *	Avoid		✔	✔	✔			✔			✔	✔	✔		
Dredging *	Avoid		✔	✔	✔			✔			✔	✔		✔	✔
Detainment ponds *	Avoid				✔			✔			✔	✔		✔	
Rain Garden / Constructed Wetland *	Avoid				✔	✔	✔	✔			✔	✔		✔	
Stormwater management *	Avoid		✔	✔	✔			✔	✔		✔	✔	✔	✔	
Tide barrier/aboiteau *	Avoid	✔						✔			✔	✔			
Dry flood proofing building *	Avoid	✔						✔			✔	✔			
Wet flood proofing building *	Avoid	✔						✔			✔	✔			
Raised infrastructure *	Avoid	✔						✔			✔	✔			
Floating building *	Avoid	✔						✔			✔	✔			

* These options can be applied more broadly

Guide Documents

Title	Link
Part 1, Guidance for Selecting Adaptation Options	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Part-1-Guidance-for-Selecting-Adaptation-Options-Jan-24-2023.pdf
Part 2, Land Use Planning Tools Adaptation Options	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Part-2-Land-Use-Planning-Tools-Adaptation-Options-Jan-24-2023.pdf
Part 3, Coastal Intervention Options and Engineering Considerations	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Part-3-Engineering-Tools-Adaptation-Options-Jan-24-2023.pdf
Artificial reefs	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Artificial-reefs-3.7.pdf
Beach nourishment	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Beach-nourishment-3.5.pdf
Buried revetment	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Buried-revetment-3.9.pdf
Detached breakwaters	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Detached-breakwater-3.13.pdf
Detainment ponds	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Detainment-pond-3.26.pdf
Drainage ditch	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Drainage-ditch-3.25.pdf
Dredging	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Dredging-3.19.pdf
Dry flood proofing building	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Dry-flood-proofing-3.20.pdf
Dune building	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Dune-building-3.4.pdf
Dyke	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Dyke-3.16.pdf
Engineered revetment	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Engineered-revetment-3.8.pdf
Floating building	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Floating-buildings-3.23.pdf
Groynes (groins)	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Groynes-3.11.pdf
Living shoreline/wetlands	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Living-shoreline-3.2.pdf
Perched beach (sill)	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Perched-beach-3.6.pdf
Plant stabilization	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Plant-stabilization-3.3.pdf
Rain Garden / Constructed Wetland	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Rain-garden-3.27.pdf
Raised infrastructure	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Raised-infrastructure-3.22.pdf

Title	Link
Relocate infrastructure	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Relocate-infrastructure-4.11.pdf
Retaining wall	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Retaining-wall-3.14.pdf
Rip-rap armouring	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Rip-rap-armouring-3.10.pdf
Scour protection	https://climatlantic.ca/wp/wp-content/uploads/2023/01/3.17-Scour-protection.pdf
Seawall	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Seawall-3.15.pdf
Shore perpendicular breakwater	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Shore-perpendicular-breakwater-3.12.pdf
Stormwater management	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Shore-perpendicular-breakwater-3.12.pdf
Tide barrier/aboiteau	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Tide-barrier-3.18.pdf
Wet flood proofing building	https://climatlantic.ca/wp/wp-content/uploads/2023/01/Wet-flood-proofing-3.21.pdf