

PORT BAY BARRIER BAR

Final Public Meeting – July 20, 2019

AGENDA

- Outline Goal of Study
- Project History/Evolution
- Presentation of Study Results - Bergmann
- Current Status & Next Steps - DEC
- Q & A



STUDY GOAL AND OUTCOMES

Study Goal:

Utilize the **best available science** to identify and assess management alternatives for the Port Bay east barrier bar breach and surrounding nearshore areas, while considering the variety of complex **ecological, social (economic)** and **environmental** factors that are supported by this unique embayment community.



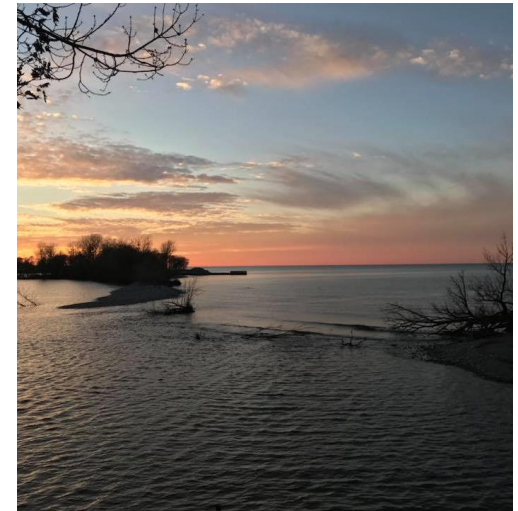
Outcomes:

Proposed alternatives that strive to achieve a **balance** of the following:

- Maintain natural coastline features
 - Nearshore area, beach, barrier bar
- Maintain fish and wildlife habitats
- Maintain natural coastal processes, including sediment transport
- Minimize damage to public and private property
 - DEC Wildlife Management Area
 - Port Bay residents
- Ensure human health and safety
- Ensure continued fishing and boating access

HISTORY AND EVOLUTION

- 2014 – PBIA and WCSWCD begin initial discussions of actions to protect barrier bar
- 2015 – Formation of PBIA for erosion issues along East Barrier Bar
 - Members include: Town of Wolcott, Town of Huron, PBIA, WCSWCD, Sodus Bay Improvement Association, Port Bay residents, NY Sea Grant, Wayne County
 - Later expanded to include: NYSDEC, USACE, and NYSOGS
- Late 2015 – NY Sea Grant awarded to WCSWCD / Work Group for planning of East Barrier Bar resiliency project
- January 2016 – Working Group initialized project
- April 3, 2016 – Storm caused 1st breach in East Barrier Bar
- April – Nov 2016 – WCSWCD began work on designing, permitting, and installing nature-based protection measures to close breach in East Barrier Bar
- November 2016 – Wood stumps, vegetation, stone placed to close bar
- March 2017 – East bar breaches again, east of previous breach repair
- 2017 – High water levels in Lake Ontario (June 2017 peak level = 248.7)
- February 2018 – NYSDEC requests Bergmann conduct coastal engineering analysis on effects of barrier bar breach and alternatives
- March 2018 – Breach closes naturally



HISTORY AND EVOLUTION

- September 8, 2018 – Initial Public Meeting
- October 18, 2018 – Draft Report (Chapters 1-3) Submitted
- January 18, 2019 – Draft Report (Chapter 4) Submitted
- March 15, 2019 – Workshop Meeting/Call with DEC
- May 2, 2019 – Final Report Submitted
- May 21, 2019 – Barrier Bar Breached.....Again!
- Early June 2019 – Peak High Water of 249.0 is reached
- June 17, 2019 – PAC Comments Received
- June 21, 2019 – Final PAC Call
- July 20, 2019 – Final Public Meeting for Study Phase



ROLES OF PROJECT PARTNERS

- NYSDEC
 - Owner / Bar Management
 - Protection of Waters Permits
 - Coastal Management
 - Wildlife Management Area
 - Fisheries
- NYSOGS
 - Project Management
- NYSDOS
 - Permits for Coastal Consistency
- NY Sea Grant
 - Advisory
- Wayne County Soil and Water
 - Project background
 - Advisory
- Port Bay Improvement Association (PBIA)
 - Advisory / Public Input
- Bergmann, EcoLogic, Prudent
 - Engineering team for analysis of existing conditions and potential alternatives



DATA ACQUISITION AND ANALYSES



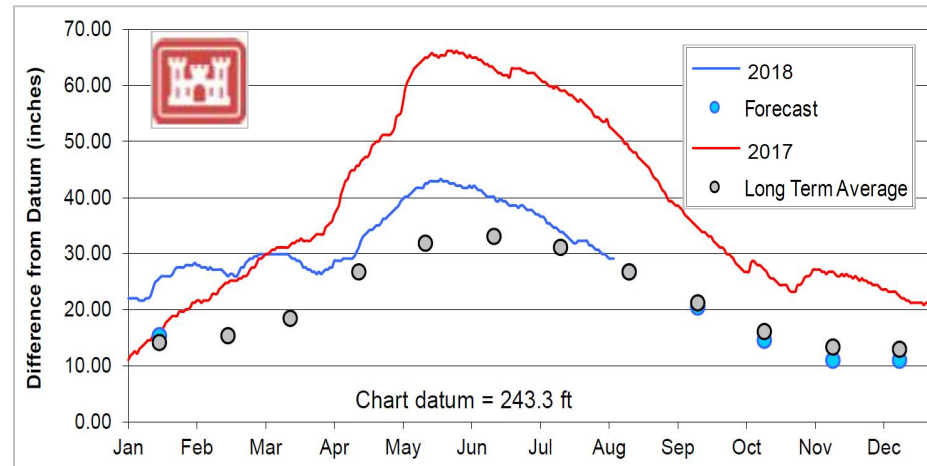
DATA ACQUISITION

- Topographic survey of current bar condition and both lake and bay bed surface elevations
- Sediment samples from bar and dredged materials
- In-Bay Habitat Assessment
 - Fish Community
 - Rare, Threatened & Endangered Species
 - Aquatic Macrophytes
 - East Barrier Bar
- Damage Assessment (survey, permits)
- Coastal Characterization

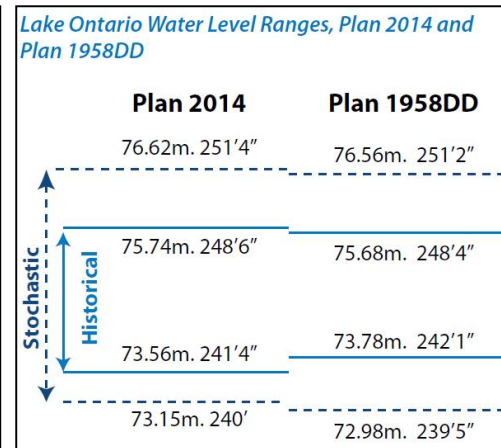
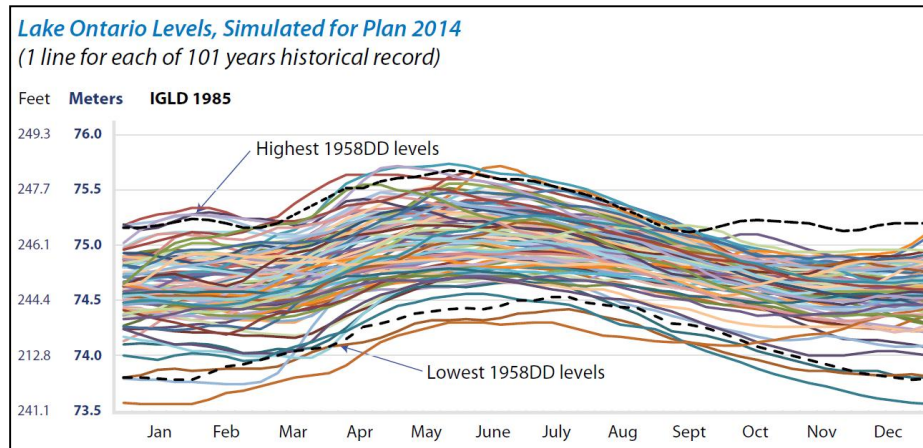


WATER LEVELS (WL)

- Have been rising in all the Great Lakes in the last few years.
- IJC 2014 Plan Max. WL set at 6 cm (a little more than 2 in) more than in the previous plan (1958DD).



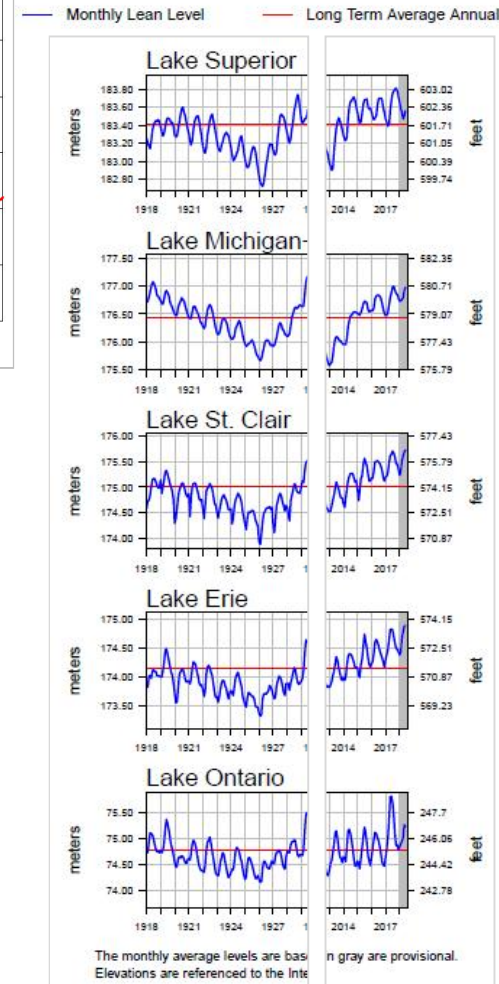
Daily WL variation in 2017-2018, Lake Ontario



IJC Plan 2014 Simulations



Great Lakes Water Levels (1918-2018)

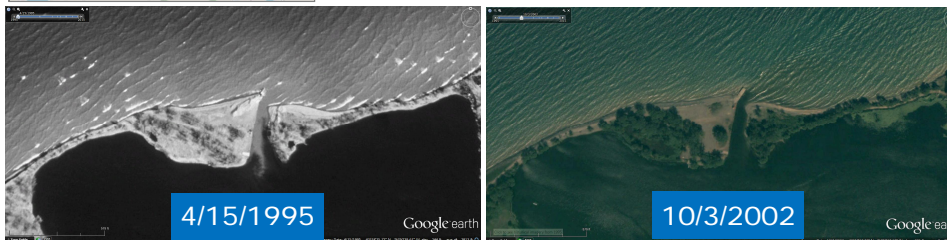
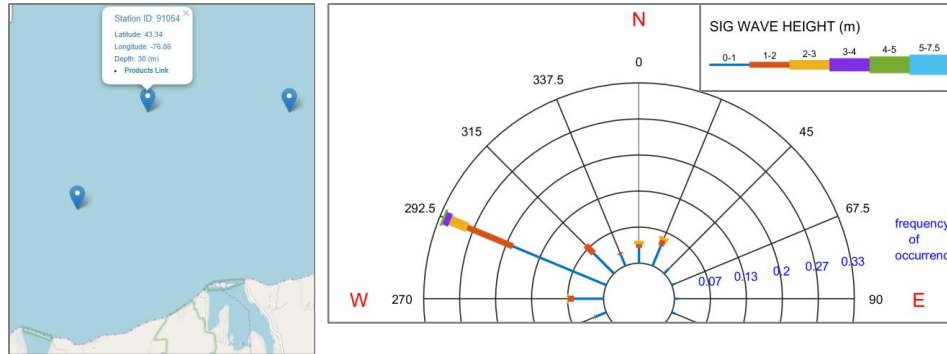


NATIONAL FIRM. STRONG LOCAL CONNECTIONS.

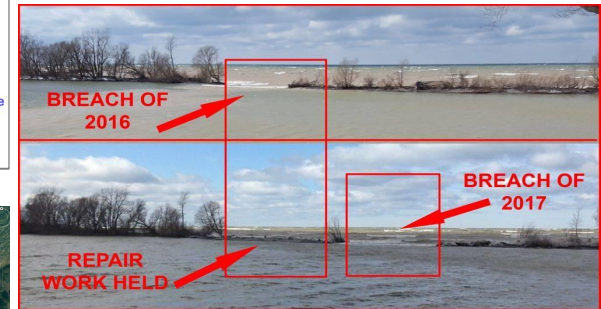


WAVES

- Predominant wave direction is from north west, normal to the pier.
- Maximum observed wave height offshore of Port Bay is 24 ft.
- Combination of high WL's and large storms has led to a few breaches along south shore of Lake Ontario (Port Bay, Blind Sodus Bay, Charles Point/Crescent Beach, Sodus Bay, and Blind Sodus Bay).

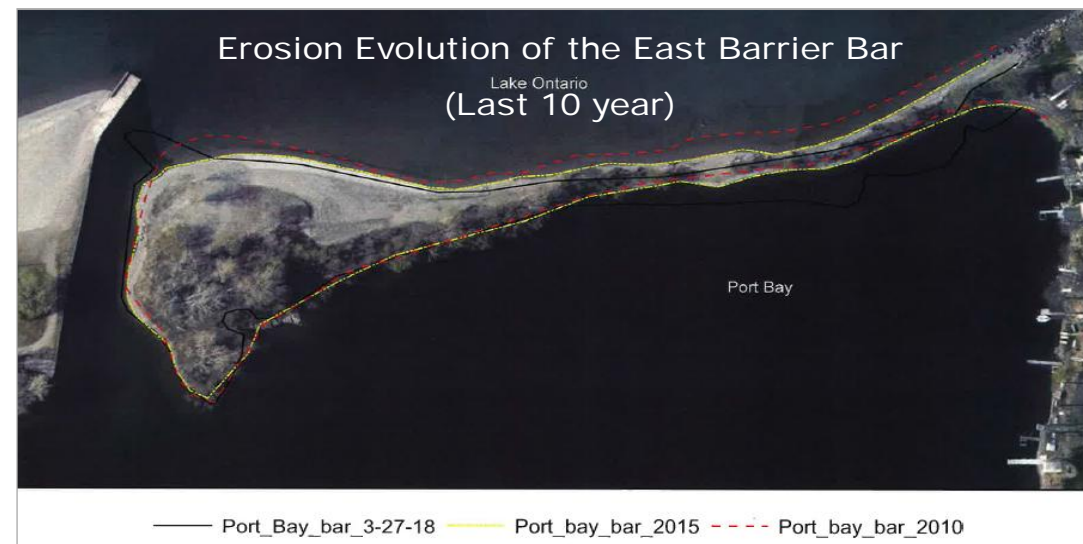
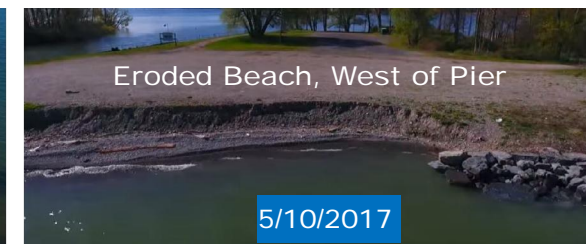
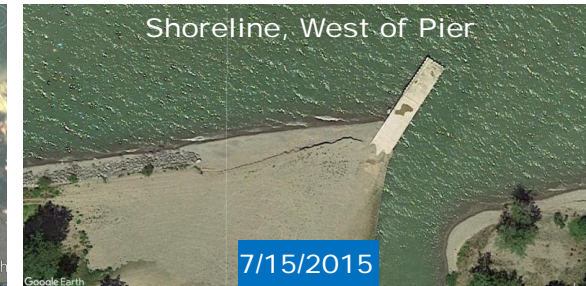
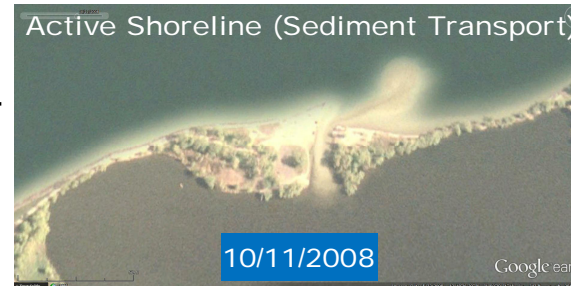


Predominant wave direction from northwest



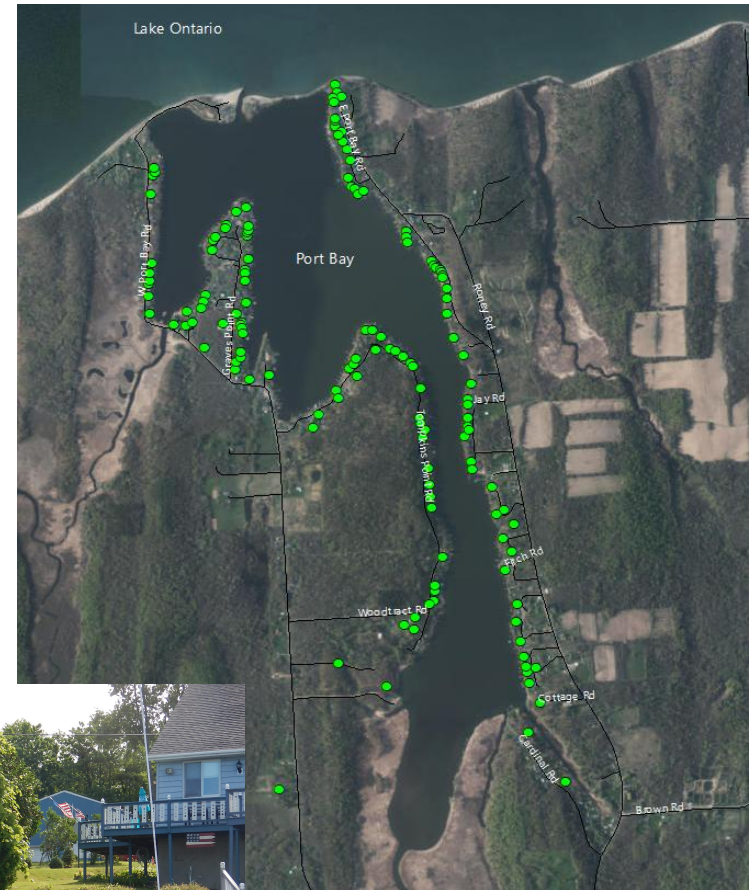
ACTIVE SEDIMENT TRANSPORT

- Sediment transport has always been active along the shoreline and near the navigation channel outlet.
- West Barrier Bar protection of 1999 with rock revetment has performed well except for a region behind the pier which is exposed to natural, fairly-cyclic erosion and deposition.
- In general, the lake face of the East Barrier Bar has been receding.



DAMAGE ASSESSMENT

- Conducted an online survey of Port Bay residents trying to identify
 - Damage during 2016 breach
 - Damage during 2017 breach / high water
 - Damage during 2018 breach
 - Typical cost of repairs
 - Type of shoreline protection in place
 - Age of existing shoreline protection
- Over 180 respondents
- Reviewed all DEC in-water permits for 2017 – 2018 around Port Bay
- Reviewed some key historical permit applications
- Looking for:
 - Purpose and need of work → Cause
 - Frequency of erosion-based work
 - Damage photos
 - Repair options
- Conducted visual assessment of the shoreline looking for signs of continued damage, remaining damage, repairs, etc.

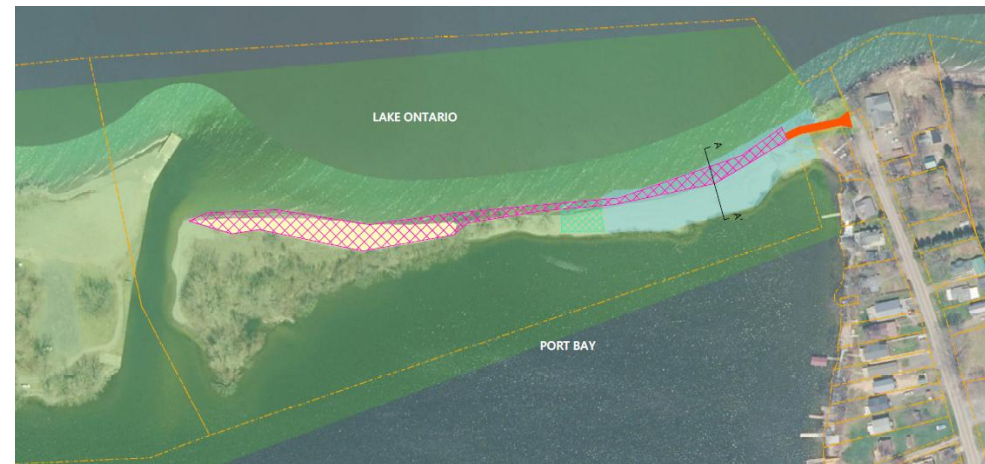


ALTERNATIVES



ALTERNATIVES (REPORT CHAPTER 3)

- Alternative A – Null / Do Nothing
- Alternative B – Implement Limited Sediment Management Measures
- Alternative C – Nature-Based Barrier Protection
- Alternative D – Adaptive Management
- Alternative E – Infrastructure Protection
- Alternative F – Rock Revetment
- Alternative G – Rock Revetment with Armored Overflow
- Alternative H – Rock Revetment with Culvert(s)



EVALUATION PROCESS (CHAPTER 4)

Table 4.1-1 Project Goals and Indicators Used to Screen Management Alternatives

Goals	Indicators
Maintain natural/dynamic coastal features in the nearshore area, beach, and barrier bar.	<ul style="list-style-type: none"> • Minimizes disturbance to east barrier bar • Minimizes disturbance to nearshore area • Reduces long-term breaching or loss of east barrier bar
Maintain and restore natural coastal processes, including sediment transport.	<ul style="list-style-type: none"> • Maintains natural shoreline • Promotes longshore transport (LST) • Maintains low gradient shoreline slopes • Minimizes impacts to downdrift neighbors
Maintain and protect natural habitat areas.	<ul style="list-style-type: none"> • Protects turtle habitat • Protects shorebird habitat / nearshore habitat in lake • Protects fisheries habitat in bay • Protects wildlife habitat in bay • Minimizes impacts to bat habitat
Minimize damage to property and infrastructure, both public (NYSDEC WMA) and private (shoreline residents).	<ul style="list-style-type: none"> • Maintains a continuous east barrier bar • Minimizes potential damage to shoreline properties from debris • Protects against wave action



EVALUATION PROCESS (CHAPTER 4)

Table 4.1-1 Project Goals and Indicators Used to Screen Management Alternatives

Goals	Indicators
Ensure human health and safety.	<ul style="list-style-type: none"> • Improves water quality circulation in bay • Minimizes risks to recreational users (boaters, anglers, hikers, beachgoers) • Ensures boaters and other users continued shielding from extreme lake conditions in the bay (i.e., storm events)
Ensure continued fishing and boat access.	<ul style="list-style-type: none"> • Minimizes impacts to boaters in the bay • Maintains shoreline access across east barrier bar
Ensure feasibility of implementation.	<ul style="list-style-type: none"> • Grant funding availability • Minimizes management time commitment • Minimizes risk of emergency responders and maintenance personnel • Maintains equipment access to east barrier bar for dredging / maintenance purposes • Construction Cost (<i>From Phase 2 of evaluation</i>) • Operation and Maintenance Cost (<i>From Phase 2 of evaluation</i>)



EVALUATION PROCESS (CHAPTER 4)

Figure 4.2-1 Color Ramp for Project Goal Evaluation



PROJECT GOALS EVALUATION									
		Alternatives							
		A	B	C	D	E	F	G	H
Goals	Indicators	Do Nothing	Sediment Management	Nature-Based Protection	Adaptive Management	Infrastructure Protection	Rock Revetment	Rock Revetment with Overflow	Rock Revetment with Culverts
Maintain natural/dynamic coastal features (nearshore area, beach, barrier bar)	Minimize disturbance to east barrier bar	High	Moderate to High	Moderate	Moderate	High	None	None	None
	Minimize disturbance to nearshore area	High	Moderate to High	High	Moderate	High	Low	Low	Low
	Reduces long-term breaching or loss of east barrier bar	None	Moderate	Moderate to High	Moderate	Moderate	High	High	High
Maintain and restore natural coastal processes, including sediment transport	Maintains natural shoreline	High	High	High	High	High	Low	Low	Low
	Promotes long-shore transport (LST)	Low	Moderate to High	High	Low	Low	High	High	High
	Maintains low gradient shoreline slopes	High	High	Moderate to High	High	High	Low	Low	Low
	Minimizes impacts to downdrift neighbors	Low	Moderate	Moderate to High	Moderate	Low	High	High	High



PROJECT GOALS EVALUATION

		Alternatives							
		A	B	C	D	E	F	G	H
Goals	Indicators	Do Nothing	Sediment Management	Nature-Based Protection	Adaptive Management	Infrastructure Protection	Rock Revetment	Rock Revetment with Overflow	Rock Revetment with Culverts
Maintains and protects natural habitat areas	Protects turtle habitat	Low	Low	Moderate	Low	Low	None	None	None
	Protects shorebird habitat / nearshore habitat in lake	Low to Moderate	Low to Moderate	High	Moderate	Low to Moderate	Low	Low	Low
	Protects fisheries habitat in bay	Low to Moderate	Low to Moderate	High	Moderate	Low	High	High	High
	Protects wildlife habitat in bay	Low to Moderate	Low to Moderate	High	Low	Low	Moderate	Moderate	Moderate
	Minimizes impacts to bat habitat	Moderate to High	Moderate to High	High	Moderate	Moderate to High	None	None	None
Minimize damage to public (DEC WMA) and private (shoreline residents) property / infrastructure	Maintains a continuous barrier bar	Low	Low to Moderate	Moderate to High	Low to Moderate	Low to Moderate	High	High	High
	Minimizes potential damage to shoreline properties from debris	Low	Low to Moderate	Moderate to High	Low to Moderate	High	High	High	Moderate to High
	Protects against wave action	Low	Low to Moderate	Moderate to High	Low to Moderate	Low to Moderate	High	Moderate to High	High
Ensure human health and safety	Improves water quality circulation in bay	Moderate to High	Low	Low	Low	Moderate to High	None	Moderate	Moderate
	Minimizes risks to recreational users (boaters, anglers, hikers, beachgoers)	Low to Moderate	Moderate	Moderate to High	Low to Moderate	Low	Moderate to High	Moderate to High	Moderate to High
	Ensuring continued shielding of boaters and other users from extreme lake conditions in the bay (i.e., storm events)	None	Moderate	High	Low	Moderate	High	High	High
	Minimizes risk of internal bay flooding during winter/spring	Moderate to High	Moderate	None	Moderate	Moderate to High	None	High	Moderate to High

B

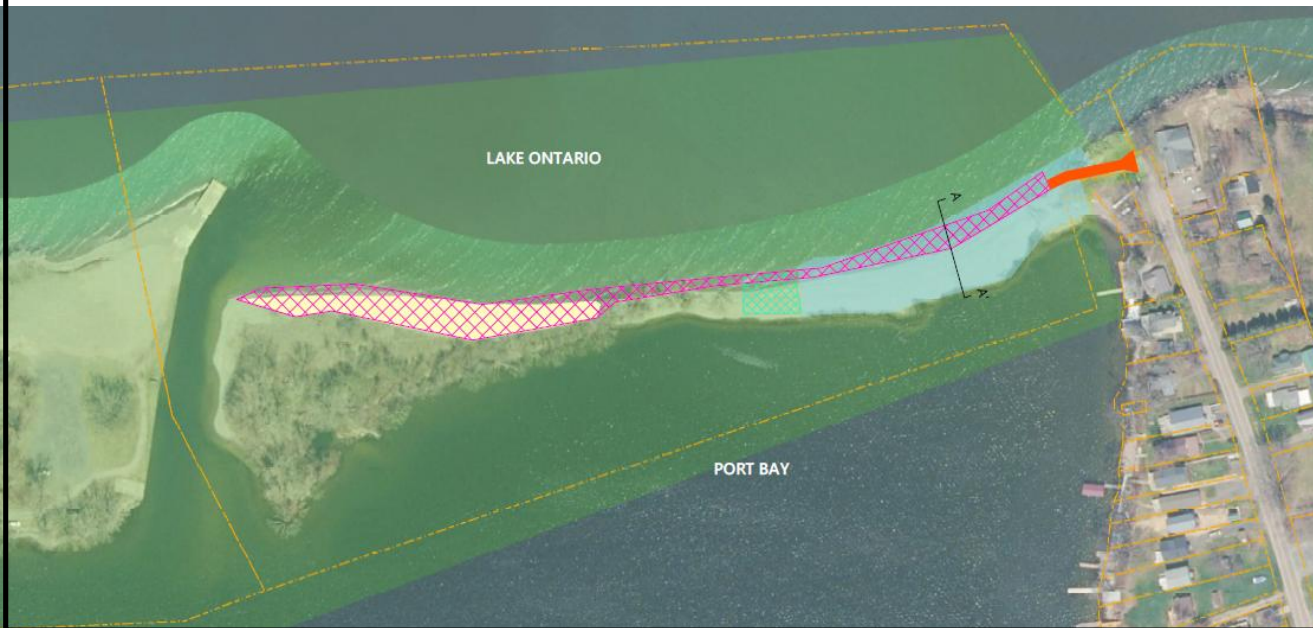
EVALUATION PROCESS (CHAPTER 4)

PROJECT GOALS EVALUATION									
		Alternatives							
		A	B	C	D	E	F	G	H
Goals	Indicators	Do Nothing	Sediment Management	Nature-Based Protection	Adaptive Management	Infrastructure Protection	Rock Revetment	Rock Revetment with Overflow	Rock Revetment with Culverts
Ensure continued fishing & boat access	Minimizes impacts to boaters in the bay	None	Moderate	High	Low	Moderate	High	Moderate to High	High
	Maintains shoreline access across east barrier bar	Low	Moderate	High	Moderate	Low to Moderate	Moderate to High	Moderate to High	Moderate to High
Ensure feasibility of implementation	Grant funding availability	High	Low	High	Low	Low	Low	Low	Low
	Minimize management time commitment	High	Moderate to High	Moderate to High	Low	Moderate	High	Moderate to High	Low
	Minimize risk of emergency responders and maintenance personnel	Low	Low to Moderate	High	Low	Low	High	Moderate to High	Low to Moderate
	Maintains equipment access across east barrier bar for dredging / maintenance purposes	None	Moderate	Moderate to High	Moderate	Moderate	High	High	High
	Construction Cost	High	High	Moderate	N/A	Moderate to High	None	N/A	N/A
	Operation and Maintenance Cost	High	High	Low to Moderate	N/A	Low to Moderate	High	N/A	N/A



EVALUATION PROCESS (CHAPTER 4)

NATURE-BASED BARRIER PROTECTION AND ENHANCED SEDIMENT MANAGEMENT



		PROJECT GOALS EVALUATION							
		Alternatives							
Goals	Indicators	A	B	C	D	E	F	G	H
		Do Nothing	Sediment Management	Nature-Based Protection	Adaptive Management	Infrastructure Protection	Rock Revetment	Rock Revetment with Overflow	Rock Revetment with Culverts
Maintain natural/dynamic coastal features (beach/shore area beach barrier bar)	Minimize disturbance to east barrier bar	High	Moderate to High	Moderate	Moderate	High	None	None	None
	Minimize disturbance to nearshore area	High	Moderate to High	High	Moderate	High	Low	Low	Low
	Reduces long-term breaching or loss of east barrier bar	None	Moderate	Moderate to High	Moderate	Moderate	High	High	High
Maintain and restore natural coastal processes, including sediment transport	Maintains natural shoreline	High	High	High	High	High	Low	Low	Low
	Promotes long-shore transport (LST)	Low	Moderate to High	High	Low	Low	High	High	High
	Maintains low gradient shoreline slopes	High	High	Moderate to High	High	High	Low	Low	Low
	Minimizes impacts to down-drift neighbors	Low	Moderate	Moderate to High	Moderate	Low	High	High	High
Maintain and protect natural habitat areas	Protects turtle habitat	Low	Low	Moderate	Low	Low	None	None	None
	Protects shorebird habitat / nearshore habitat in lake	Low to Moderate	Low to Moderate	High	Moderate	Low to Moderate	Low	Low	Low
	Protects fisheries habitat in bay	Low to Moderate	Low to Moderate	High	Moderate	Low	High	High	High
	Protects wildlife habitat in bay	Low to Moderate	Low to Moderate	High	Low	Low	Moderate	Moderate	Moderate
	Minimizes impacts to bat habitat	Moderate to High	Moderate to High	High	Moderate	Moderate to High	None	None	None
Minimize damage to public (DEC, WMA) and private (shoreline residents) property/infrastructure	Maintains a continuous barrier bar	Low	Low to Moderate	Moderate to High	High to Moderate	Low to Moderate	High	High	High
	Minimizes potential damage to shoreline properties from debris	Low	Low to Moderate	Moderate to High	High to Moderate	High	High	High	Moderate to High
	Protects against wave action	Low	Low to Moderate	Moderate to High	High to Moderate	Low to Moderate	High	Moderate to High	High
Secure human health and safety	Improves water quality circulation in bay	Moderate to High	Low	Low	Low	Moderate to High	None	Moderate	Moderate
	Minimizes risks to recreational users (boaters, anglers, bikers, beachgoers)	Low to Moderate	Moderate	Moderate to High	High to Moderate	Low	Moderate to High	Moderate to High	Moderate to High
	Ensures continued shielding of boaters and other users from extreme lake conditions in the bay (i.e., storm events)	None	Moderate	High	Low	Moderate	High	High	High
Secure continued fishing & boat access	Minimizes risk of internal bay flooding during winter/icing	Moderate to High	Moderate	None	Moderate	Moderate to High	None	High	Moderate to High
	Minimizes impacts to boaters in the bay	None	Moderate	High	Low	Moderate	High	Moderate to High	High
Secure feasibility of implementation	Maintains shore line access across yard barrier bar	Low	Moderate	High	Moderate	Low to Moderate	Moderate to High	Moderate to High	Moderate to High
	Grant funding availability	High	Low	High	Low	Low	Low	Low	Low
	Minimize management time commitment	High	Moderate to High	Moderate to High	Low	Moderate	High	Moderate to High	Low
	Minimize risk of emergency responders and maintenance personnel	Low	Low to Moderate	High	Low	Low	High	Moderate to High	Low to Moderate
	Maintains equipment access across yard barrier bar for dividing / maintenance purposes	None	Moderate	Moderate to High	Moderate	Moderate	High	High	High
Construction Cost	High	High	Moderate	N/A	Moderate to High	None	N/A	N/A	
Operation and Maintenance Cost	High	High	Low to Moderate	N/A	Low to Moderate	High	N/A	N/A	

EVALUATION PROCESS (CHAPTER 4)

The following summarizes the concept level initial construction cost estimates for each of the elevated alternatives

■ Alternative A: No Action	\$0
■ Alternative B: Limited Sediment Management	\$200,000
■ Alternative C: Nature-Based Barrier Bar	\$600,000
■ Alternative E: Infrastructure Protection Measures	\$400,000
■ Alternative F: Fortification Using Rock Revetment	\$2,100,000



EVALUATION PROCESS (CHAPTER 4)

Table 4.3-1 Maintenance Activities Summary

Maintenance Activity	Recurrence Interval	Alternative				
		A	B	C	E	F
Employ limited sediment management to east barrier bar (typical year)	1 year		X	X	X	X
Employ limited sediment management to each barrier bar (difficult year)	10 years		X		X	
Initial maintenance of Nature-Based Barrier Bar	5 years for 2 cycles			X		
Remaining maintenance of Nature-Based Barrier Bar	10 years for 2 cycles			X		
Installation / removal of boom	2X per year				X	
Replacement of boom	15 years				X	
Debris removal from boom	2X per year				X	
Revetment crest maintenance	1 year					X
Biennial inspection	2 years		X	X	X	X



EVALUATION PROCESS (CHAPTER 4)

Table 4.3-2 Life Cycle Analysis Costs

	Initial Construction Cost	Life Cycle Cost (Present Value)	Total
Alternative A: No Action	\$0	--	--
Alternative B: Limited Sediment Management	\$200,000	\$340,000	\$940,000
Alternative C: Nature-Based Barrier Bar	\$600,000	\$550,000	\$1,550,000
Alternative E: Infrastructure Protection Measures	\$400,000	\$560,000	\$1,320,000
Alternative F: Fortification Using Rock Revetment	\$2,100,000	\$340,000	\$2,440,000



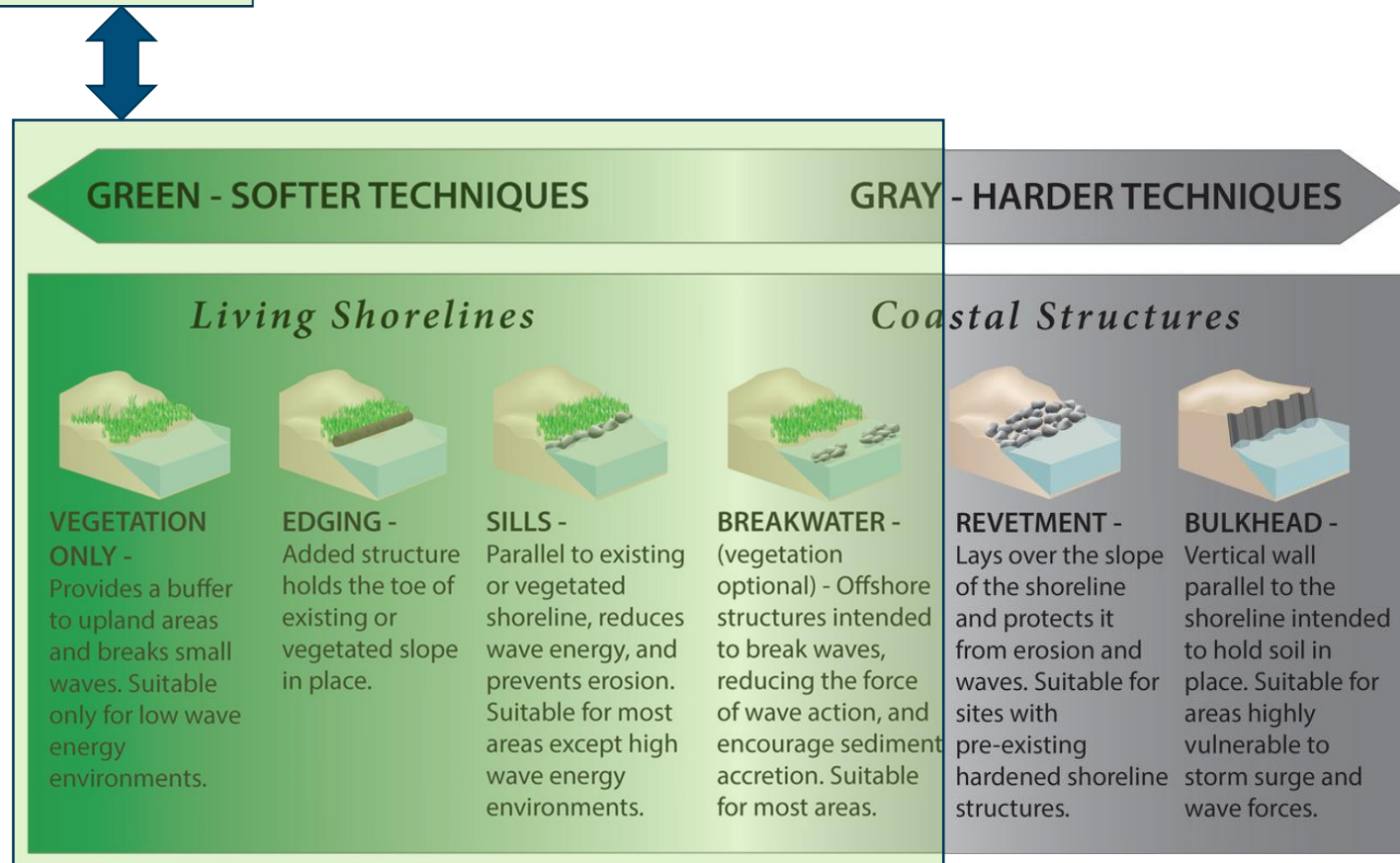
NATURE-BASED BARRIER PROTECTION



NATIONAL FIRM. STRONG LOCAL CONNECTIONS.

NATURE-BASED SHORELINES

- Unlike “gray coastal structures”, NB shorelines use little or no concrete, steel and rock.
- Use soft and natural materials (logs, native plants, etc.) and bio-engineering techniques to protect against wave energy & erosion
- Depending on wave energy level, NB solutions may be:
 - Non-structural (bank re-grading, planting vegetation ...) for low-wave-energy shorelines;
 - Structural (living breakwaters, toe stone) for high-energy shorelines

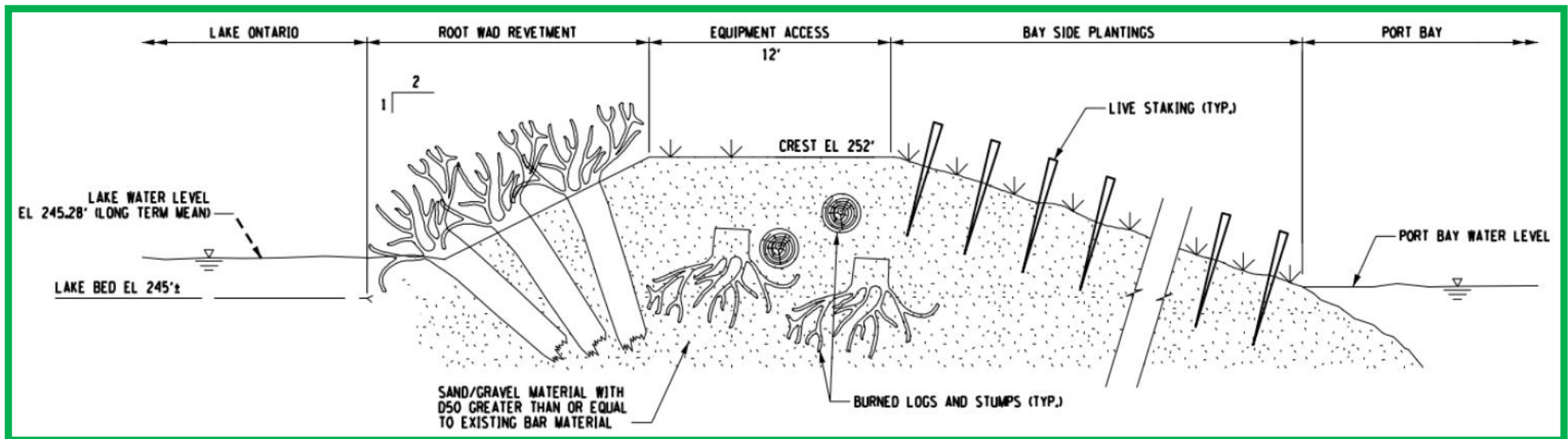


Reference: https://www.fisheries.noaa.gov/insight/living-shorelines#what_is_a_living_shoreline



NATURE-BASED CONCEPT FOR PORT BAY EAST BARRIER BAR

- Port Bay shoreline is associated with:
 - ✓ High-energy waves (fetch: 10's of miles);
 - ✓ Design wave height > 4 ft; and
 - ✓ Several recent breaches in the east barrier bar.
- Therefore, a nature-based barrier bar is recommended.

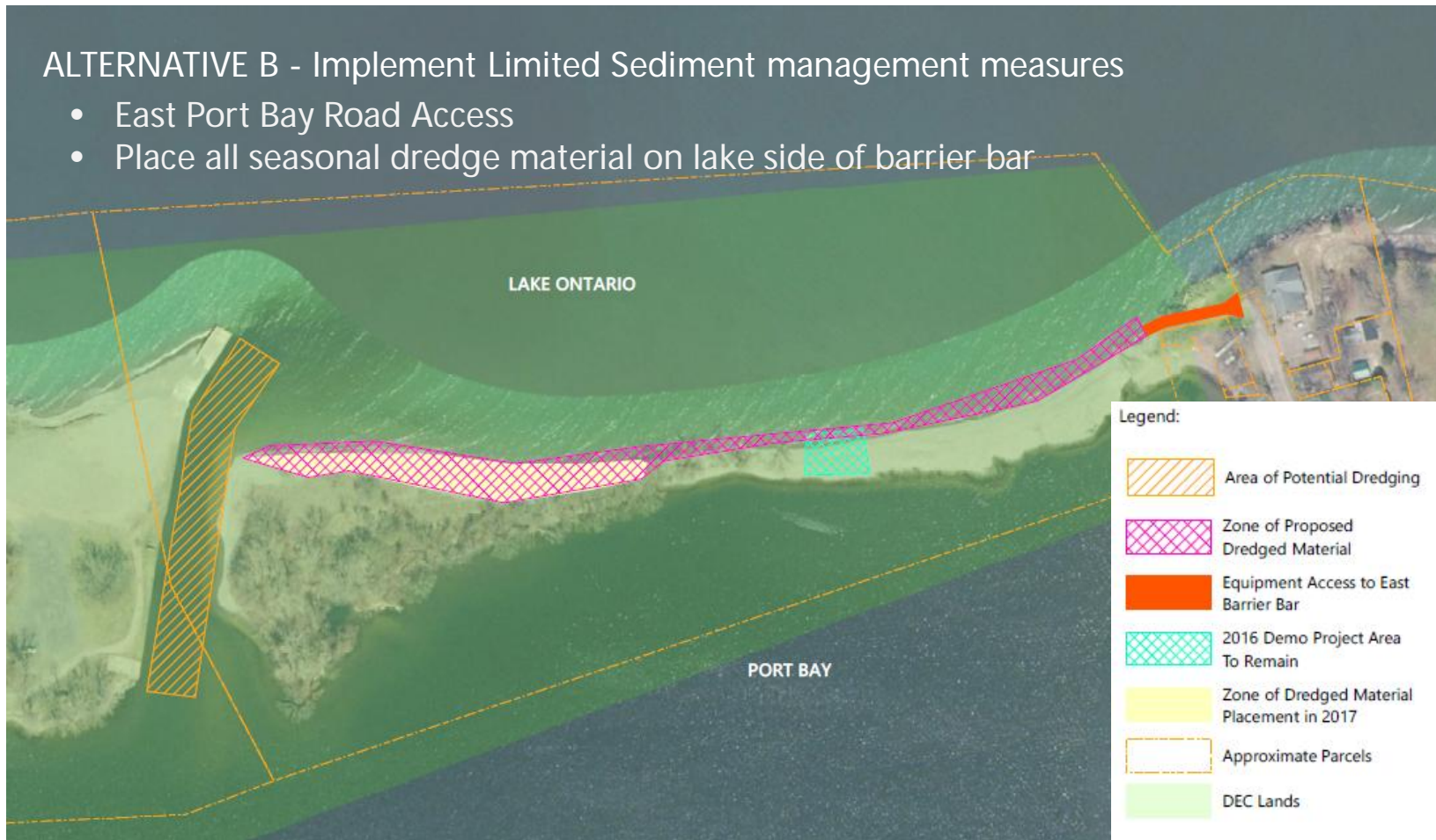


Note: Preliminary Design only.

ENHANCED SEDIMENT MANAGEMENT

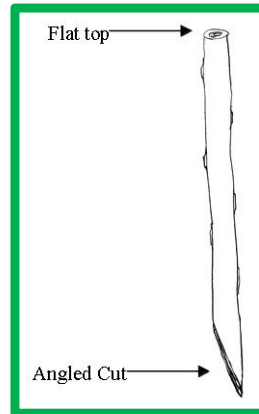
ALTERNATIVE B - Implement Limited Sediment management measures

- East Port Bay Road Access
- Place all seasonal dredge material on lake side of barrier bar

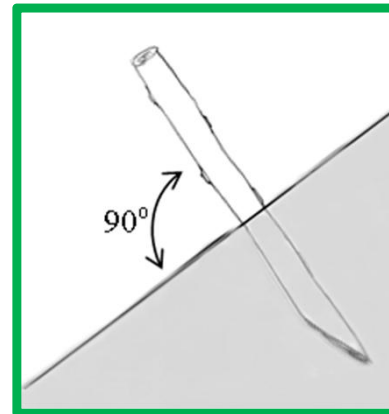


LIVE STAKING

- The bay side of the proposed stabilization is not exposed to wave attacks. It is typically subjected to surface runoff due to rainfall or, under extreme storms, due to wave overtopping.
- Live stakes are harvested from local trees
- Benefits of live stakes:
 - ✓ Hold soil by a root network
 - ✓ Soak up nutrients
 - ✓ Absorb rainwater
 - ✓ Provide habitat for local wildlife



(1)



(2)



(3)



(4)



(5)



ROOT WADS

- Root wads include the root mass or root ball of a tree plus a portion of the trunk.
- Root wads provide for:
 - ✓ Armoring the slope (trunks)
 - ✓ Absorbing part of the wave energy (roots)
 - ✓ Resisting longshore-current-induced erosion (roots)
 - ✓ Habitat for aquatic animals (roots)



Root wad



Installation of root wads; Imbedded into the revetment

Reference: http://www.newsminer.com/news/local_news/project-uses-root-wad-technique-to-restore-bank-of-chena/article_384c758e-395e-11e3-99f7-001a4bcf6878.html



NEXT STEPS



NEXT STEPS

- Study Team Prepares Final Report.
 - Comments will be recorded and included within the final report.
- Pursue Final Design and Implementation of:
 - Nature-based Barrier Bar &
 - Enhanced Sediment Management.



QUESTIONS?



NATIONAL FIRM. STRONG LOCAL CONNECTIONS.



For additional information or questions:

KEN AVERY, BERGMANN

280 E. Broad Street, Suite 200
Rochester, NY 14604

(585) 498-7766
kavery@bergmannpc.com

SHANNON DOUGHERTY, NYSDEC

270 Michigan Ave
Buffalo, NY 14203

(716) 851-7070
Shannon.Dougherty@dec.ny.gov