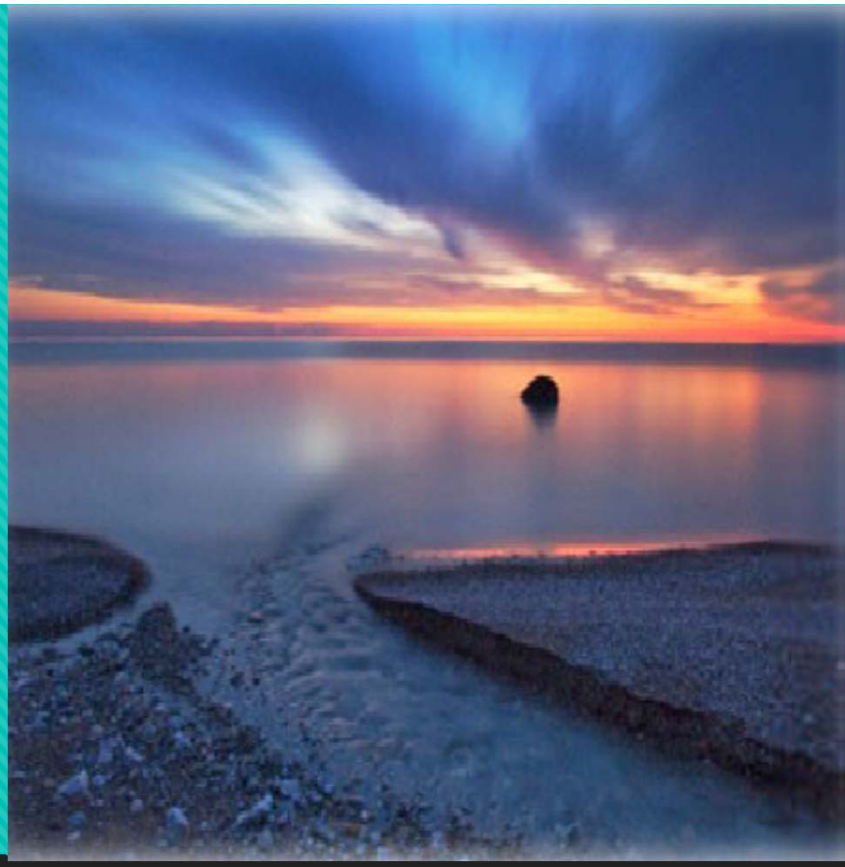
Ausable Bayfield Conservation Authority – Shoreline Management Plan Update



Steering Committee Meeting: July 2016

Context & Overview

Karen Wianecki

Key Messages

1. This is a draft document.
2. This is a Consultant Recommendations Report to ABCA.
3. This document has not been shared or endorsed with the ABCA Board of Directors.
4. We are seeking Steering Committee direction to release as a draft for public comment.
5. Input from the public should focus on the recommended policy approach.

Overview of ‘the Process’

- Process of updating the Shoreline Management Plan (SMP) began in July 2015
- Project Team & Steering Committee
- Adopted a pragmatic and science focused approach
  - Recession Rate calculation
  - Climate Change & Potential Implications
  - Cohesive Bluffs
  - Field Visits
  - Comprehensive Review of current Policy (no new hazards, no aggravation of existing hazards and no adverse environmental impacts)
  - Approaches in other jurisdictions

‘The Process’ continued

- Also adopted an ‘engagement’ mindset
  - Steering Committee is multi-representational (government, industry and community)
  - Those directly affected have been not only informed but engaged since the inception of the project
  - Draft document recognizes that those most directly affected – the landowner – need to be aware of the issues and the recommended approaches
  - Full disclosure of all material as it became available – this document has not been shared with the ABCA Board of Directors – it is being presented first to the Steering Committee in honour of our commitment to work with you
  - Community Newsletters and updates to keep everyone informed

Draft SMP – Format & Structure

1.0 Background & Introduction
2.0 The Legislative Authority – Policy & Technical Direction
3.0 A New Vision, Goals, Objectives & Principles
4.0 Shoreline Description
5.0 Understanding Shoreline Hazards
6.0 Special Considerations
7.0 Managing the Shoreline Responsibly
8.0 Recommendations for Further Action
9.0 Additional References and Resources

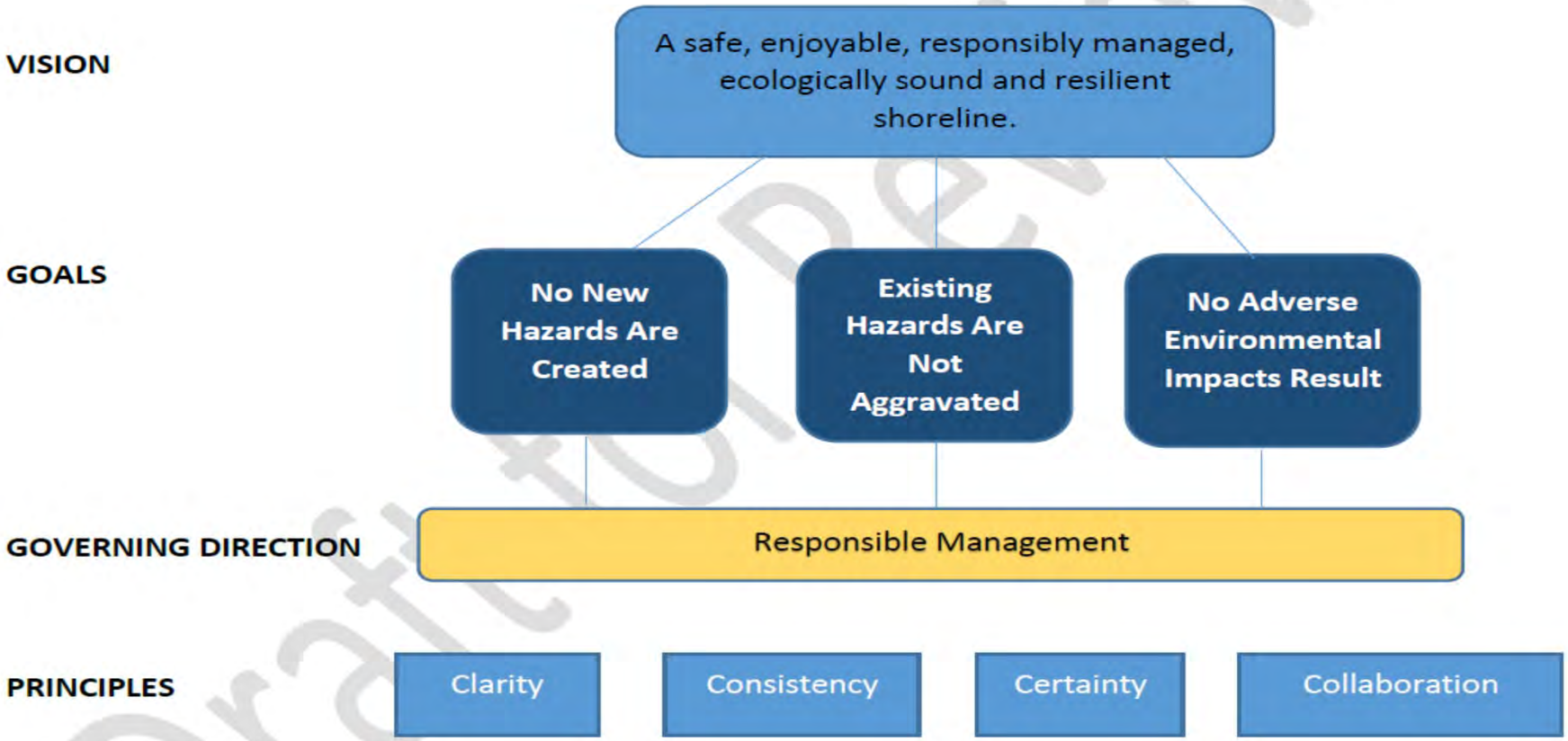
What has changed along the ABCA shoreline?

- The broader ‘environment’ (climate change)
- The shoreline itself
- The nature of development
- The Policy platform

Community Survey –October 2015 – February 2015

Vision and Goals

Shoreline Management Plan Vision, Goals & Guiding Principle



Responsible Management Approach

What does Responsible Management Mean?

- ABCA to work collaboratively with landowners who are affected and with municipal and provincial partners
- ABCA to reduce risks from the hazard but to ensure the risks to the hazard do not increase

Key Changes from Current Practice

- No development in the hazard zone
  - Recommended that a prevention-first philosophy be adopted – this is entirely consistent with Cabinet approved policy and supported by municipal Official Plans
- Stronger stand on minor alterations/changes to existing uses
  - Currently, minor alterations are permitted in Lakeshore Area 1 and 2
  - Recommended that alterations be phased out over time
- Stronger stand on shoreline protection works
  - Recommended that no new shoreline protection works be permitted

Brief Overview Field Observations

Judy Sullivan & Robin Davidson-Arnott

The ABCA Shoreline - Field Observations

- Shoreline field observations were carried out over a two-day period in September (29th & 30th), 2015
- 1st day - examine flooding and dynamic beach hazards

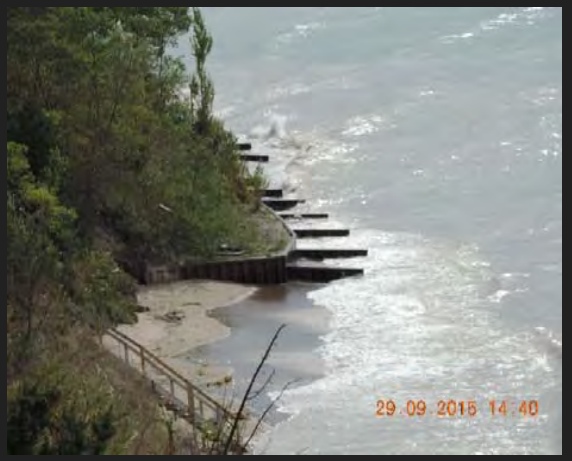
The ABCA Shoreline - Field Observations

- Transition zones from the Dynamic Beach to the Erosion Hazard areas.

The ABCA Shoreline - Field Observations

1st Day - several erosion hazard sites

- bluffs and unstable slopes (e.g. Poplar Beach).



The ABCA Shoreline - Field Observations

2nd day focused on:

- erosion hazards associated with bluffs and unstable slopes.

The ABCA Shoreline - Field Observations

Existing Works:

- variety of inconsistent, piecemeal and ad hoc works.

The ABCA Shoreline - Field Observations

Existing Works:

- deteriorated gabion baskets, wooden frames
- insufficient or undersized rock materials

Protection Works with Unstable Slopes

Protection works can give a false sense of security:

Photo Indicates protection works at toe of slope BUT the entire slope is still unstable and failing

Cohesive Bluff Erosion

Robin Davidson-Arnott

Cohesive Bluff Erosion Processes

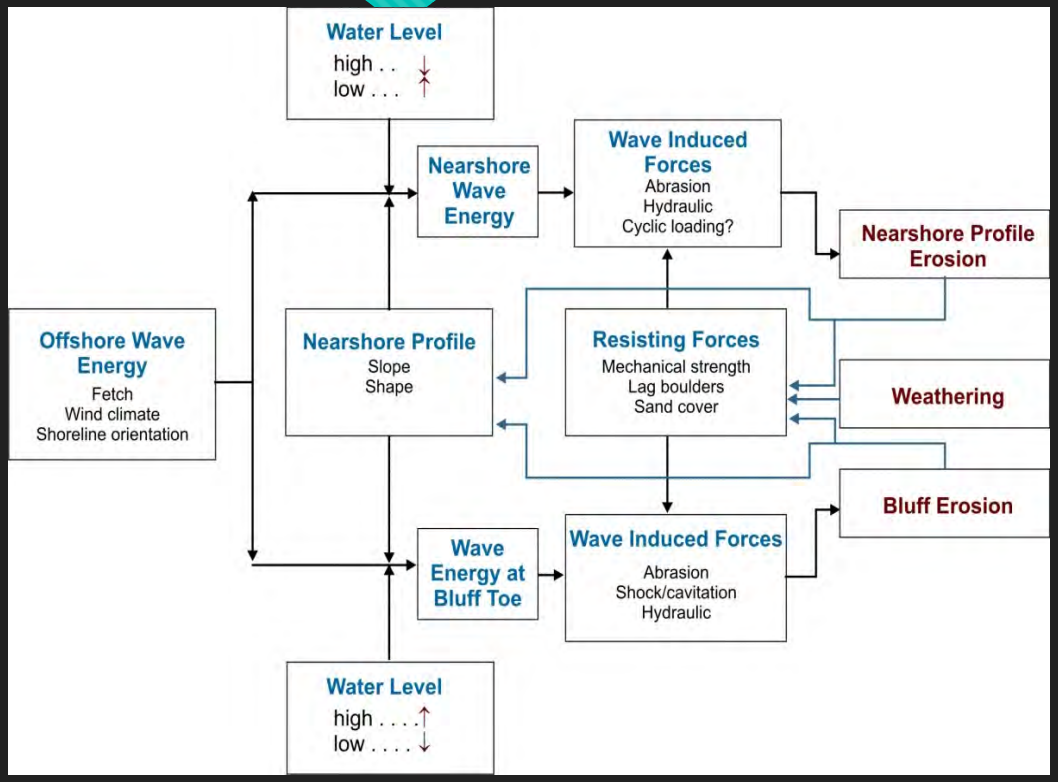
- Three components of cohesive bluff profile

1. Bluff toe – affected by waves during storms
2. Bluff slope – affected by slumping and flowing water
3. Underwater profile – subject to wave action to depth of 6-10 m

Cohesive Bluff Erosion Processes

- Initiated through toe erosion by waves during storms
- Toe erosion leads to steeper bluff slope, triggers slumping as well as erosion by water on upper slope
- Underwater erosion allows waves to continue to reach bluff toe
- Longshore transport removes eroded material and reduces build up of protective sand cover

Cohesive Bluff Erosion Model



- Recession reflects relative effectiveness of "assailing" vs. "resisting" forces
- Assailing forces begin with offshore wave energy, transform across nearshore – erosion of nearshore – may reach bluff toe
- Resisting forces begin with strength of till, effects of weathering and protection provided by surficial sediment cover

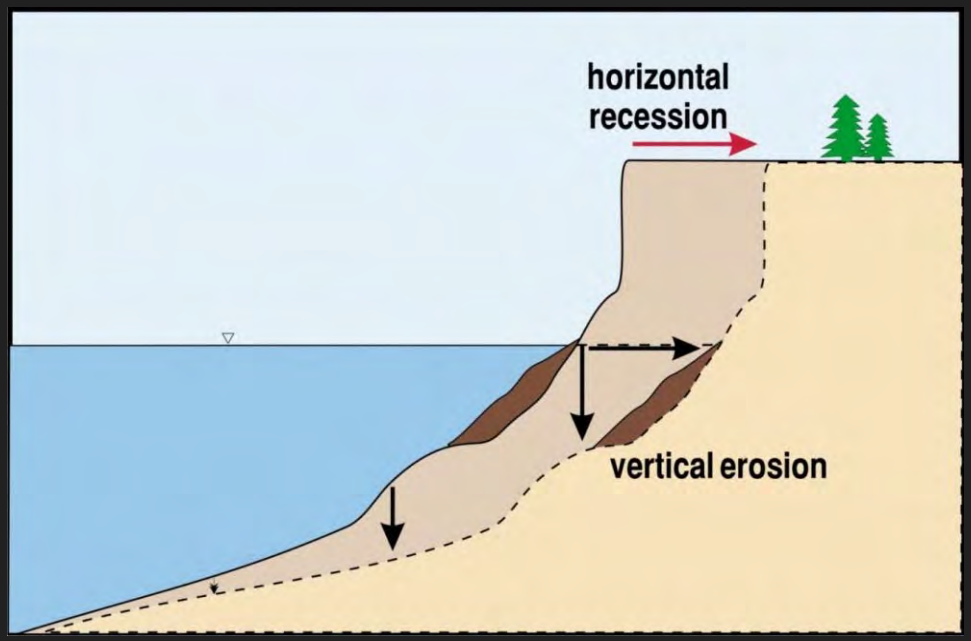
Toe erosion

- Waves erode bluff toe through impact, fluid forces and particularly by abrasion due to sand and gravel
- Erosion aided by weathering of till which leads to a reduction in strength
- More erosion during high lake level

Bluff Slope erosion

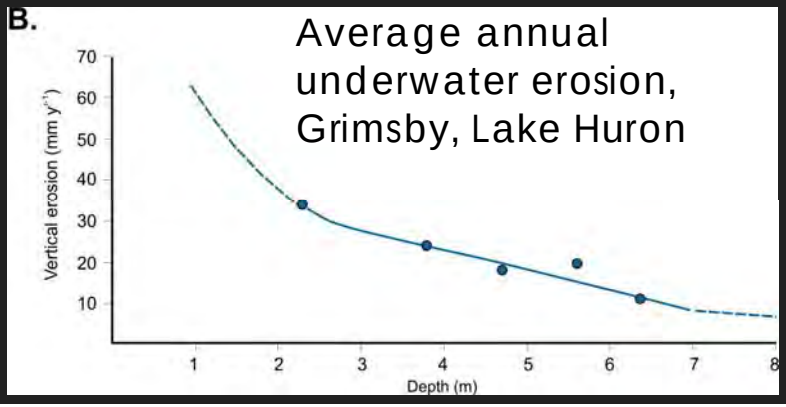
- Shallow slumps and slides in weathered layer – especially during snow melt and heavy rain
- raindrop impact, sheet flow and rill development where vegetation disturbed
- Occasional deep-seated failure
- More frequent during high lake level due to more frequent undercutting by toe erosion

Underwater profile erosion



- Waves erode exposed till on nearshore profile through fluid forces and by abrasion due to movement of sand and gravel
- Erosion prevents development of a platform in front of bluff - allows for wave action at toe to continue
- Shore protection structures subject to increased wave energy over time

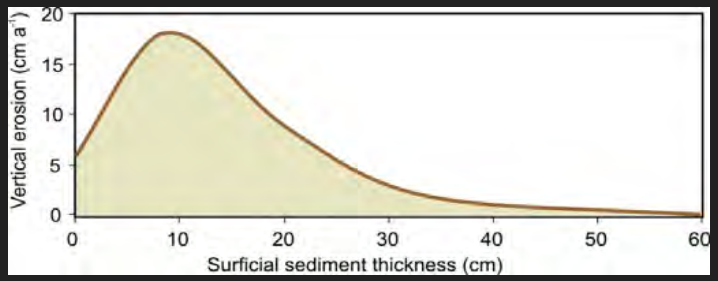
Underwater profile erosion

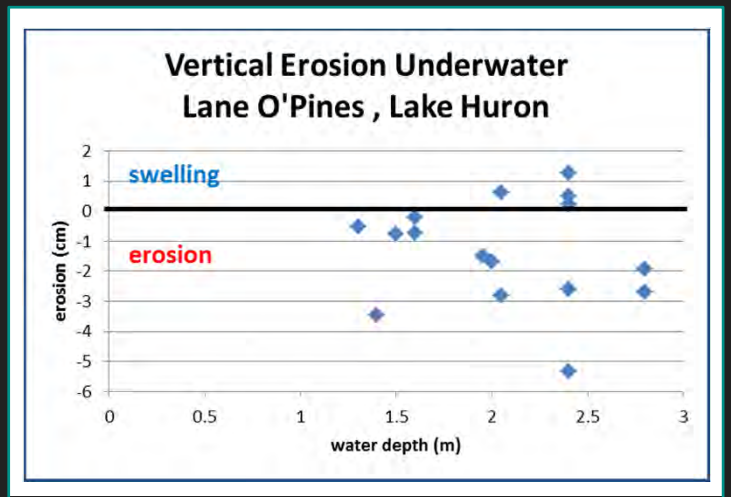


Average annual underwater erosion, Grimsby, Lake Huron

- Waves erode exposed till on nearshore profile through fluid forces and by abrasion due to movement of sand and gravel
- Erosion aided by softening of till due to expansion and pumping action of waves
- Some erosion occurs whenever there is wave action – 1-20 mm
- Where sand cover is thin average annual erosion greatest close to shore and decreases offshore

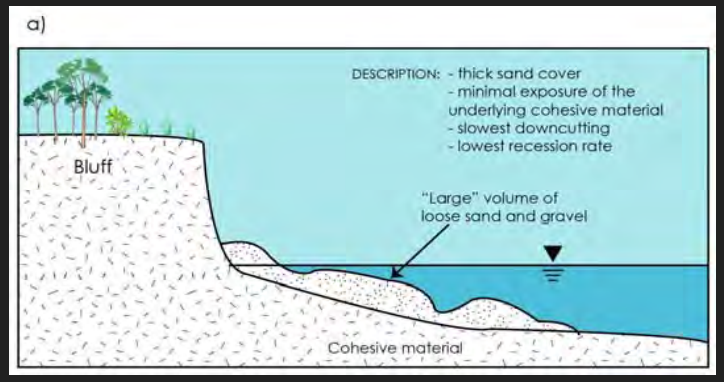
Underwater profile erosion

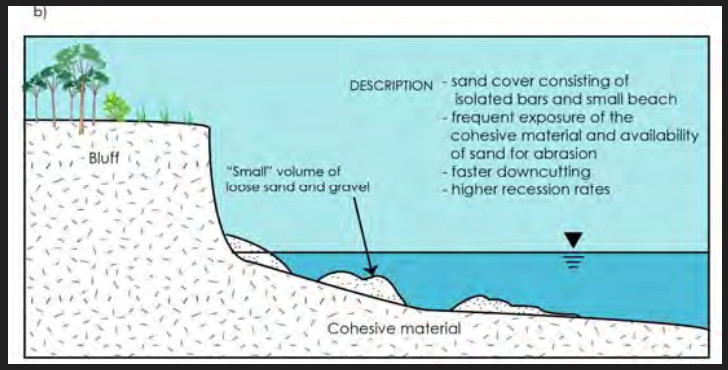


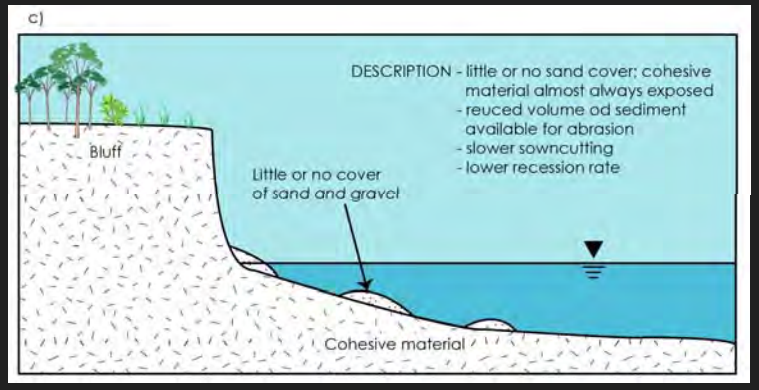


- Erosion enhanced by thin cover of sand and gravel (2-20 cm)
- Thick covering of sand and gravel reduces temporal and spatial exposure of till and therefore reduced erosion rate
- Variations in beach width and thickness of sediments in nearshore explains relatively low rates of erosion along parts of ABCA cohesive bluff shoreline

Cohesive Shorelines: Role of Sand/Gravel Cover







Recession Rates

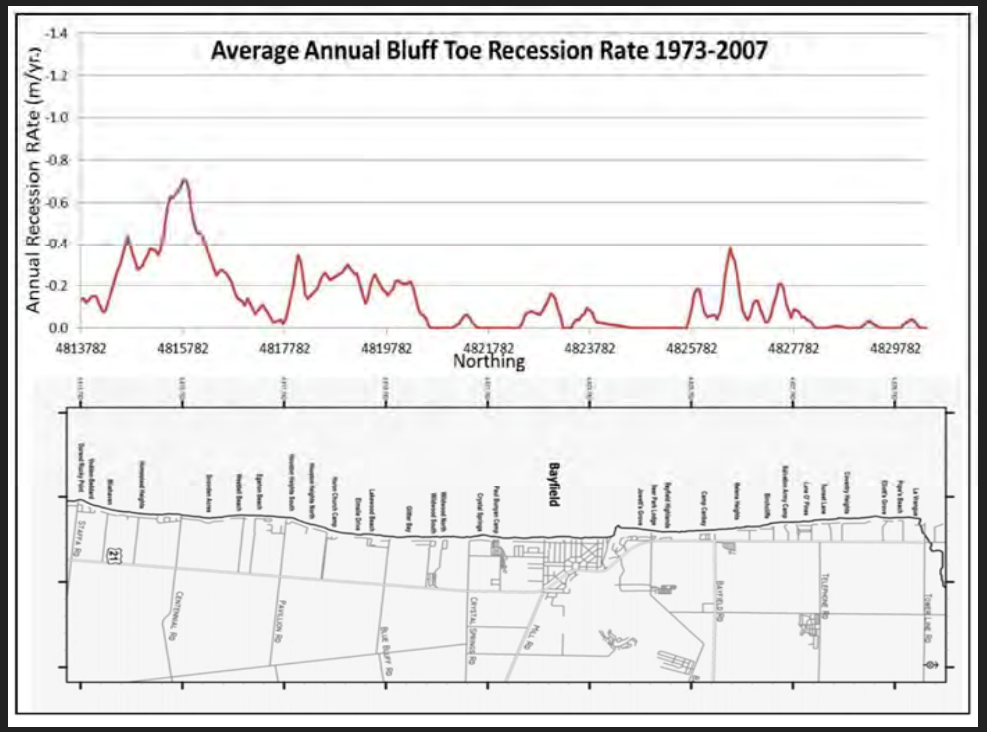
Dr. Robin Davidson-Arnott

Recession Rates 1973-2007

- Recession rate calculations based on the 1973 Shore Damage Survey and the 2007 ABCA mapping were completed
- Data are now uploaded to the ABCA geodatabase and can be incorporated into new calculations of setbacks along the cohesive bluff shoreline
- Actual smoothed rates are shown on maps of northern and southern sections of the ABCA cohesive bluff shoreline in the SMP

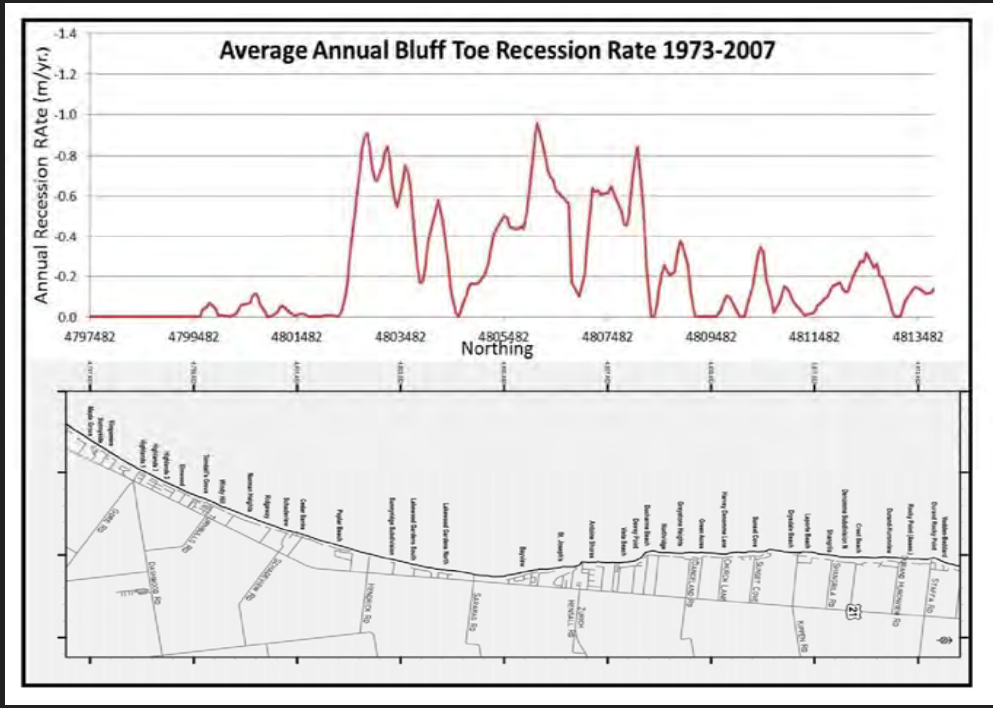
Recession Rates – Northern Section

- Northern Recession Rate Map – Average Annual Bluff Toe Erosion Rates 1973-2007.



Recession Rates – Southern Section

- Southern Recession Rate Map – Average Annual Bluff Toe Recession Rates 1973-2007.



Proportion of ABCA Shoreline by Recession Rate Class

Average Annual Recession Rate (m/yr.)	% of ABCA Cohesive Bluff Shoreline	MNRF Classification
>1.2	0	High
0.71-1.2	6.1	Substantial
0.31-0.7	22.2	Moderate
0.01-0.3	71.7	Low

Climate Change & Potential Impacts of Lake Huron Coastal Process

Dr. Robin Davidson-Arnott

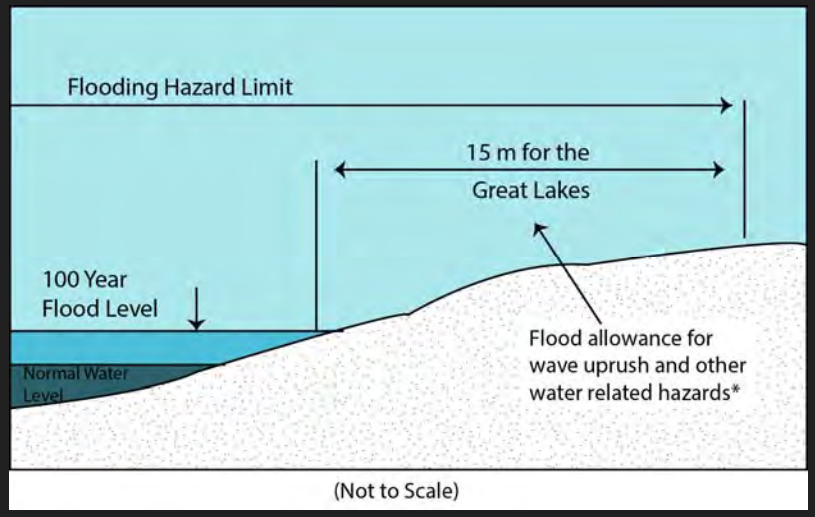
ABCA Shoreline Hazards

Often a combination of Hazards are found

2 Main Types of Flooding Hazards

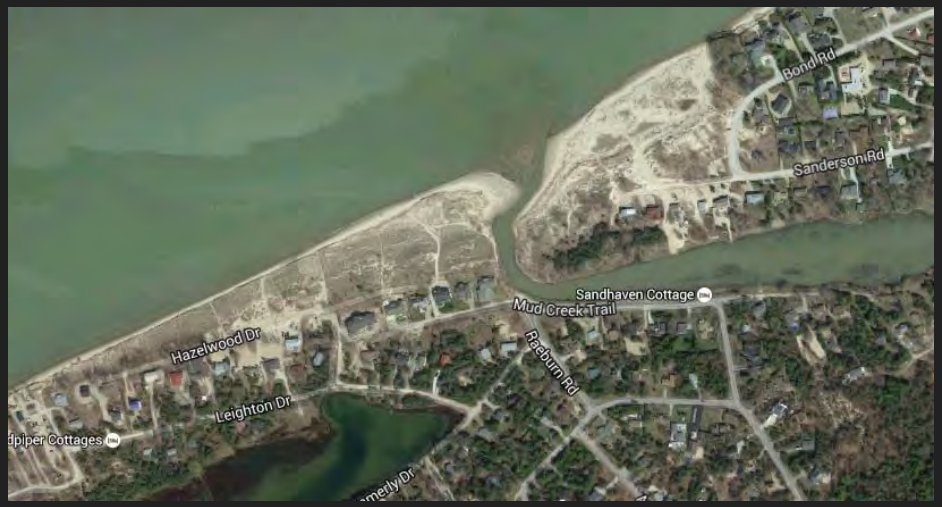
Most of the Flooding Hazards occur in the Port Franks Area:

1. Issues are related to River Flooding and
2. Flooding where the Dynamic Beaches are also at the mouths of rivers (I.e. Barrier Beaches)



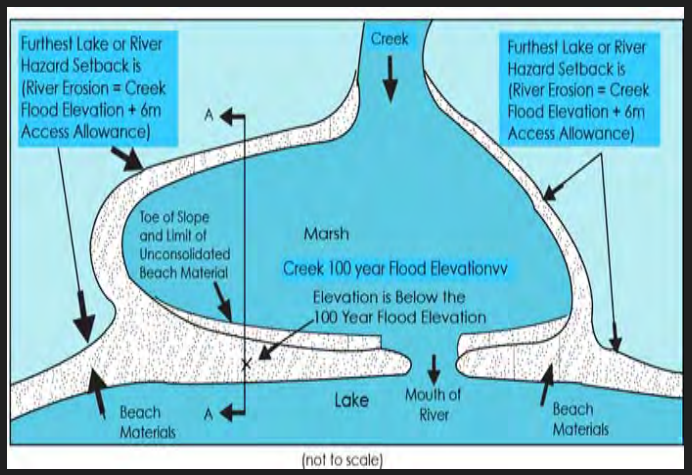
Flooding and Dynamic Beach Hazards

Flooding occurs in the Port Franks Area is related to the combination of the River & Low Lying Dynamic Beach Areas



Barrier Dynamic Beach System

Barrier beaches are extremely dynamic and may be completely overwashed during storm events. Especially in the Port Franks area where the Flooding Hazard is also an issue from the river behind the Barrier System



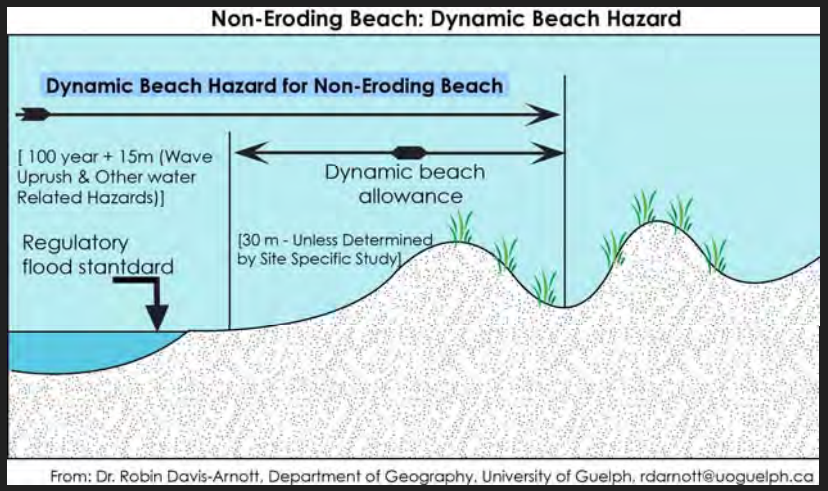
Dynamic Beach Hazard – 2 main types

- Dynamic Beach with Sand Dunes
- Cohesive Bluff Shoreline with Dynamic Beach in Front

Dynamic Beach Hazard

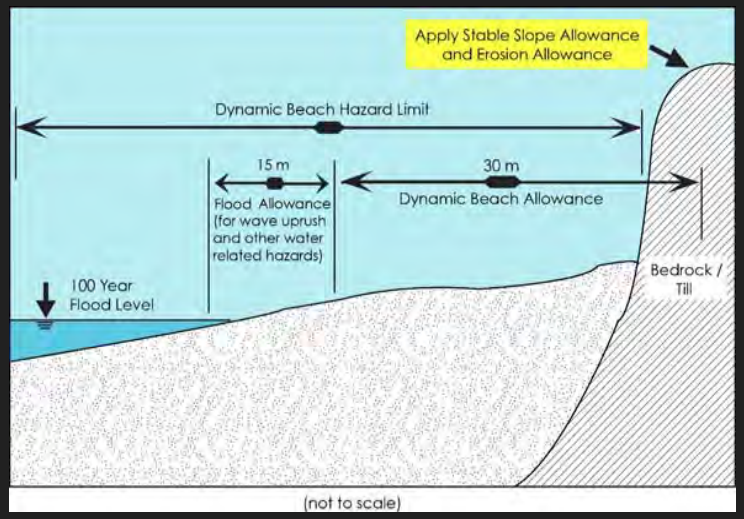
Non-Erosional Dynamic Beaches Hazard limit:

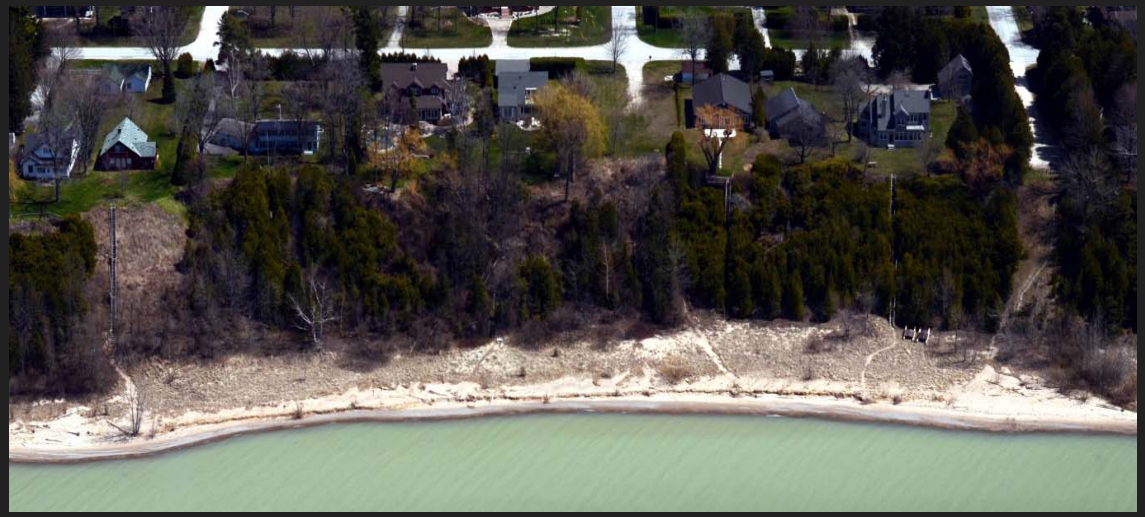
- **Flooding hazard limit**, the **100-year flood level** plus an allowance for wave uprush and other water related hazards of **15 metres** on Great Lakes,
- **plus** the **Dynamic Beach Allowance (30 m)** on the Lake Huron system.



Main Type of Hazards Found:
Dynamic Beach (DB) Backed by Bluff

'***Dynamic Beach Hazard backed by a Bluff/Cliff'*** then
ADD the Erosion Hazard
an additional erosion allowance + Slope Stability Allowance associated with the Bluff Erosion





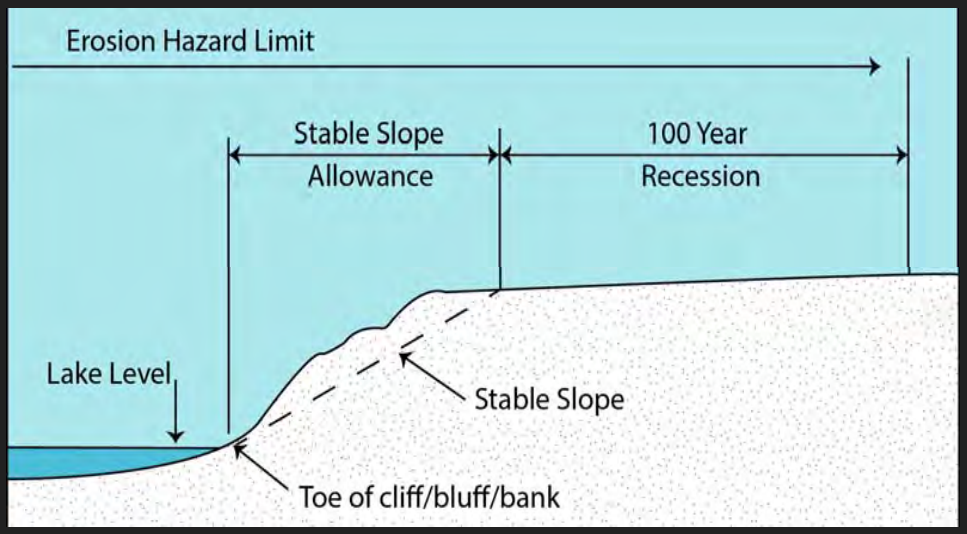
Dynamic Beach (DB) Backed by Bluff

- Oblique aerial photograph of a portion of the ABCA shoreline south of Bayfield showing a dynamic beach backed by an eroding cohesive bluff.

Erosion Hazard

Stable Slope Allowance

PLUS 100 Year Average Annual Recession Rate (AARR)



Erosion Hazard along Cohesive Shore

- toe erosion and
- downcutting underneath water along the cohesive shores

Unstable Slope Indicators

Unstable/Failing Slopes:

- Failing & Slumping materials, tension cracks,
- scarps, bumps, bulges on the slope face
- Fallen trees, unstable staircases

Unstable Slope Indicators

Unstable/Failing Slopes:

- Cracks in structures,
- Shifting fences
- Unstable staircases

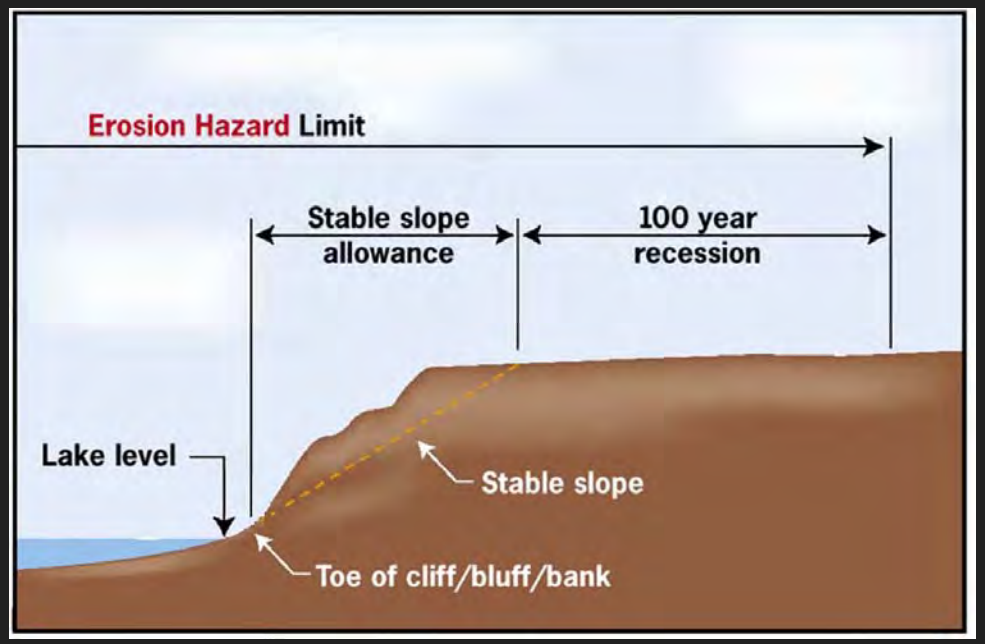
Slope Stability Issues

Slope Stability Issues

The Issue:

- After a field review of the ABCA shoreline, the consulting team has expressed significant concern about the number of dwellings that were within Lakeshore Area 1 in the bluff area north of Grand Bend.

Schematic showing erosion hazard limit...



Slope Stability Issues (continued)

- ABCA undertook a mapping exercise (no field work verification) and found…

Distance to Top of Bank	Total Number of Dwelling Units	Total Number of Accessory Buildings/ Structures	Total Buildings	Additional Comments
5 m	108	126	234	Structures within 5 metres of the top of bank are generally scattered along the shoreline rather than being clustered in specific subdivisions.
10 m	153	55	208	Structures within 10 and 15 metres of the top of bank are generally clustered in specific subdivisions rather than being scattered along the shoreline.
15 m	274	83	357	

Early Warning Fact Sheet for Property Owners – Shoreline Stability Issues

- Terraprobe developing a Landowner Fact Sheet

Slope Stability Issues: Homes at Risk

- Homes are extremely close to an eroding shoreline and unstable bluff and a further geotechnical investigation has been recommended to qualify and quantify the safety issues, and the extent of these problems.

Slope Stability Issues (continued)

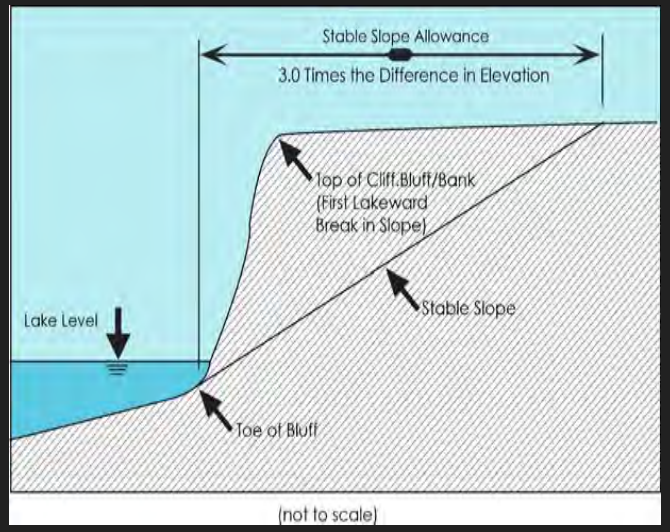
- **A detailed investigation of the degree of risk was not part of the scope of work assigned to the consulting team - if this issue arose in the context of their work, Terraprobe was identified in the original Proposal submission.**
- **Unsolicited Proposal received from Terraprobe (attached to your Agenda material)**
- **Terraprobe proposing two-phase approach:**
  - *Phase 1: A desktop review of the available information (topographic maps provided by the client, aerial photographic data and published geological subsurface information comprising shoreline slopes) and consultation with Aqua Solutions 5 Inc. to identify the Areas of Concern within the study limits requiring further assessment.*
  - *Phase 2: A higher level review of the available information for the Areas of Concern in conjunction with site visit, slope mapping, site measurements of the setbacks of selected structures from the existing crest, and consultation with Aqua Solutions 5 Inc., to categorize zone of Significant (Zone of Pending Failure) and Zone of Higher Slope Instability Risks.*

Erosion & Slope Stability Hazard Options

- 3 Options:
  1. Do Nothing
  2. Do Something
  3. Do Everything

Slope Stabilization on Cohesive Shores

- Slope stabilization may not be feasible on some shorelines such as cohesive shores due to continuous undercutting and erosion occurring offshore (under water) which may impact the long-term stability of the slope.



Slope Stabilization on Cohesive Shores

- On the ABCA cohesive shores, a long term stabilization of the toe of a bluff/slope with shoreline protection works, are not feasible because of this offshore undercutting and erosion.
- Bluff Measures are possible but are only temporary and will not stop the downcutting that is occurring underwater and ultimately will reach the toe of the slope, eventually causing further slope instability

Bluff Measures and Best Management Practices

- It is imperative that any signs of slope instability are brought to the immediate attention of the ABCA and the municipality.
- All approvals and permits must be secured from applicable regulatory authorities prior to any site construction.
- The configuration of the slope should not be altered without prior consultation with a professional qualified geotechnical engineer and approval from the appropriate authorities.
- Appropriate safety fencing should be installed and maintained near the slope crest in the areas of slope failures, over- steepened and near vertical scarps to keep occupants/people away until the condition has been assessed by a qualified professional geotechnical engineer and mandated regulatory agencies.
- The property use should be conducted in a manner which does not result in surface erosion of the slope.

Bluff Measures and Best Management Practices

- In particular, site grading and drainage should prevent direct concentrated or channelized surface runoff from flowing directly over the slope.
- Water drainage from down-spouts, sumps, swimming pools, road drainage, and the like, should not be permitted to flow over the slope, but a minor sheet flow may be acceptable.
- In order to promote vegetation growth on the slope face, yard and other waste must not be discarded over the slope.
- A temporary silt fence should be erected and maintained around or downside of any work area during construction as approved by regulatory agencies.
- Coordination with adjacent properties to eliminate imposing any impacts on neighboring properties is extremely important.

River Mouth Dredging

River Mouth Dredging

- Issues relating to river dredging in locations:
  - Port Franks
  - Grand Bend
  - Bayfield
  - Small Creek Outlets

Dredging: Port Franks

The area of concern is currently being propeller washed every, 2 to 3 times a week.

This process is not a deep dredging activity - a layer of sediment is blown off the underwater surface by the propeller.

Updrift Side (Left Hand Side) of River Mouth

Downdrift Side (Right Hand Side) of River Mouth

Dredging: Port Franks

- General recommendation to direct the material to the south side of the mouth of the river, in this way the sediment would assist in providing material for the properties along this section whose owners feel they are experiencing reduced materials on their beach

Dredging: Grand Bend

Recommendation: any dredged materials should be returned to the system on the downdrift/ shadow side of the creek or river mouth.

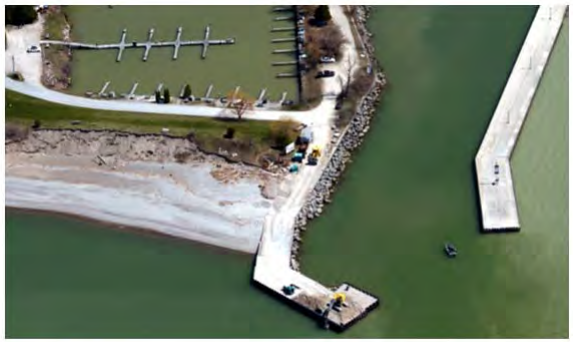
The downdrift/shadow side is on the right hand side of the river mouth.

Updrift side of River Mouth

Downdrift Side of River Mouth

Dredging: Bayfield

The beach is built up on the updrift- (Left hand side)side of the river mouth.



Left Hand Side is the Updrift side of River Mouth

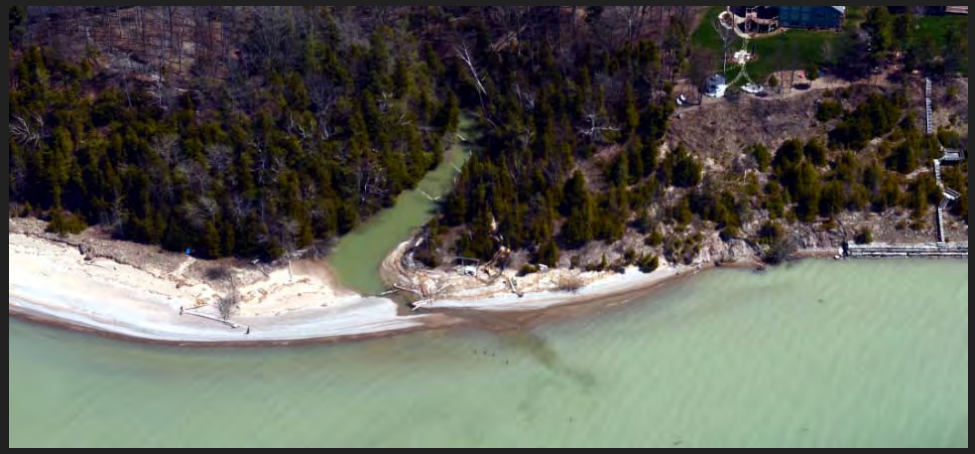
Dredging: Bayfield

Recommendation: Any dredged materials should be returned to the system on the downdrift/ shadow side of the river mouth.

Right Hand Side of the River Mouth – Downdrift Side

Small Creek Outlets

- Each individual site should be examined by a qualified coastal engineer or geomorphologist to determine appropriate site specific recommendations.
- In general however, any dredged materials should be returned to the system on the downdrift/ shadow side of the creek or river mouth.



Shoreline & Bluff Protection Works

Shoreline Protection Works

- Defensible policy/position on shoreline protection works
- Looked at:
  - Permit none?
  - Permit some?
  - Permit all?
  - Have a different approach for construction of new works and repair of existing?

Addressing the Hazard – Cohesive Bluff Erosion

- Recession Rates along ABCA Cohesive Bluff Shoreline highly variable
- Range from low to moderate and to substantial in some areas
- Much of shoreline used by “cottagers” situated on top of bluff – usually 1 row of cottages, occasionally up to 3
- Originally set back from bluff crest but many older subdivisions now have dwellings within 3:1 slope limit – some have been lost
- Over last 4-5 decades many property owners have put in some form of hard shore protection
- Wide range of structures – ranging from rubble to wood, block or steel sheet pile seawalls, to groynes
- Common in Great Lakes (US and Canada) but unusual world wide

Addressing the Hazard – A Digression

- Erosion and Bluff recession is a hazard to human life and properties – similar to other natural hazards such as hurricanes, flooding and volcanic eruptions
- Coastal erosion in a natural process – neither good nor bad – and the shoreline does not need 'protection' from it any more than a river floodplain needs protection against floods
- Shore Protection Structures are a hard engineering response to the impact of bluff recession on human activities - but as with other forms of natural hazard, there are a range of possible responses, or combination of responses, and there is now a lot of information available on how to assess them and to develop the best approach for a particular region.

Addressing the Hazard – Cohesive Bluff Erosion

- Development of Ontario Great Lakes Policy and Technical Guidelines in early 1990s – regulation by CAs
- Recognition of hazard on eroding cohesive bluff shores – setback for all new development including allowance for stable slope and erosion over 100 years – assumed lifespan of structure
- Underlying assumption of no protection and 'managed retreat' for new development
- Continued allowance of protection for existing structures in part because of uncertainty over need to consider environmental impacts and of how to deal with existing buildings and shore protection
- Updated and expanded policy and mandate for CAs must be incorporated in revised SMP for ABCA
- Including assessment of addressing the hazard on cohesive shoreline and in particular the use of private shore protection structures

Addressing the Hazard
Proposed ABCA Policy

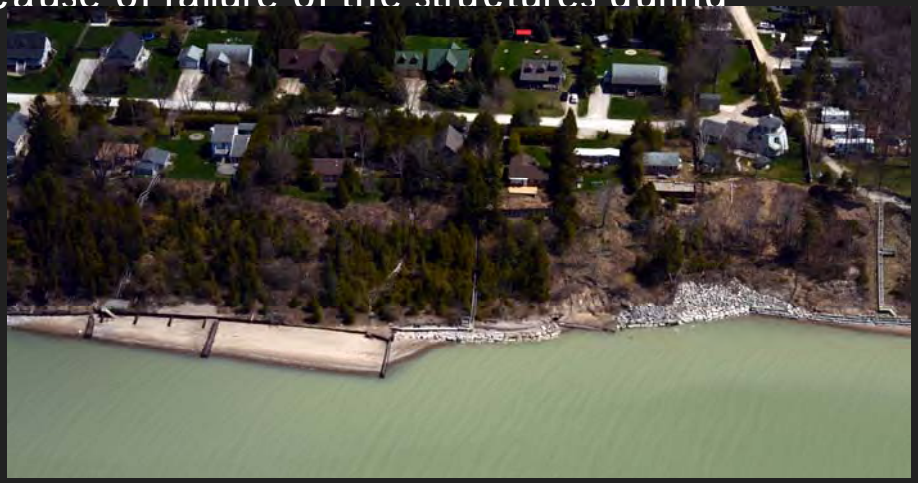
- We have assessed the range of responses to bluff recession in the ABCA jurisdiction in light of updated Provincial Policy, the natural features and human use of the whole shoreline, and the literature on hazards generally and coastal erosion in particular
- Our conclusions are:
  1. Hard shore protection structures put in place and maintained by private property owners should no longer be permitted;
  2. Hard shore protection structures may be used, if appropriate, within the main urban centres of Grand Bend and Bayfield . These will be constructed and maintained by the municipality and/or county to protect public, commercial and private property within those urban limits. Hard structures may also be used outside Grand Bend and Bayfield to protect municipal infrastructure that has to be located close to the shoreline. In all cases the structures must be designed and construction supervised by a qualified coastal engineer following an appropriate study of alternative measures and potential environmental impacts.
  3. Soft shore protection , such as beach nourishment, enhancement of coastal dunes and slope stabilisation, may be used by private property owners subject to approval by the ABCA

Why No Private Hard Shore Protection

- Considered a number of issues within the context of "Managing Responsibly" and of ensuring that no new hazards are created, existing hazards are not aggravated, and adverse environmental impacts do not result:
  1. How effective are private shore protection structures in slowing or stopping erosion?
  2. What is the typical Benefit/Cost ratio for private shore protection?
  3. Is there any requirement for a private land owner to put shore protection in place or to maintain a structure once it is put in place?
  4. Are there potential adverse impacts on the beach and on properties in the immediate vicinity?
  5. Are there legal implications for the ABCA in the event that an approved structure does have an adverse impact e.g. on an adjacent property?
  6. Are there potential adverse impacts on the downdrift coast?
  7. What are the potential cumulative/collective impacts of allowing individual hard shore protection?

How Effective are Private Shore Protection Structures?

- Hard shore protection structures work best when they are designed by a coastal engineer for the particular coastal conditions, constructed of uniform materials, are continuous alongshore and properly tied in
- Private shore protection along the ABCA coast generally does not meet any of these criteria. They are often unsuited for the environmental conditions, are put in at different times, vary in materials and construction, are poorly tied in alongshore and to the base of the bluff, and thus their lifespan is shortened because of failure of the structures during storms and/or failure of adjacent protection.



How Effective are Private Shore Protection Structures?

- Private shore protection is often poorly maintained between high lake level periods so is vulnerable when there is a sudden rise in lake level as occurred in 2015. In addition, it is often poorly designed to accommodate the downcutting in the nearshore that occurs during low lake levels and is subject to overtopping by waves

How Effective are Private Shore Protection Structures?

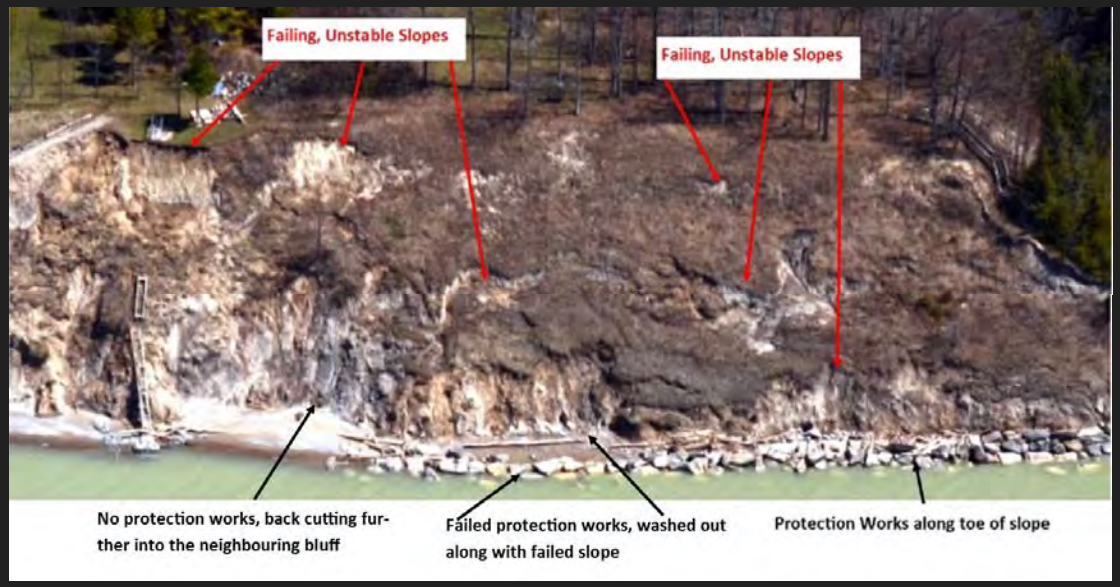
- Ongoing downcutting in the nearshore results in structures being subjected to greater wave attack and erosion of foundations over time. Vertical seawalls are particularly vulnerable to both overtopping and erosion of the foundation as a result
- Practice in the Great Lakes has shown that the most durable and effective structure is an armourstone revetment which has armourstone extending onto the nearshore profile
- These structures cost $4-6 million dollars per kilometre to construct

Benefit/Cost Ratio

- All major shore protection works are typically required to undergo a formal *Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects* (Class EA) which would require a full assessment of all potential measures, their potential environmental impact and an examination of the benefit/cost ratio associated with each.
- While the scale of shore protection associated with individual properties is too small to warrant this, the cumulative impacts of granting permission to construct shore protection over extensive areas of the shoreline is comparable to a very large project and as such requires some assessment of the benefit/cost ratio
- Such a calculation would normally include the costs associated with studies of the site and processes affecting it, the design and construction of the structure , and the cost of maintaining the structure over its lifespan. Additionally, some costing of the potential environmental impacts would be included and some of these impacts might prohibit construction altogether
- In the case of most private shore protection structures no formal benefit/cost assessment is undertaken and very few of them include a formal design and costing by a qualified coastal engineer. In general on a largely rural coast such as this it is likely that the ratio, even without assessment of environmental impacts is too small to support construction.

Requirement to put in and/or maintain structures?

- The ABCA cannot require any property owner to put in shore protection or participate in a group seeking to do this. This makes it difficult to get the alongshore continuity necessary to enhance the design and durability of structures.
- The ABCA cannot enforce maintenance of existing structures which may be necessary to enhance their durability and the level of protection provided



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Adverse local impact?

- The presence of structures can have two forms of impact on adjacent properties:
  1. Updrift structures can increase erosion on the adjacent downdrift property by refraction of waves around vertical structures whenever the structures are subject to wave attack. Both vertical structures and groynes can divert sediment away from the downdrift adjacent property thus reducing the protective beach cover;
  2. During periods of high lake level water may reach the base of vertical structure and reflection from the structure enhances the depth of water in front of the structure. As a result the amenity provided by the presence of a beach is affected since it is no longer possible to 'walk the beach' . Because of ongoing underwater erosion these period occur even during moderate to low lake level in some locations.

Are there potential adverse impacts on the downdrift coast?

- If large stretches of the cohesive coast have shore protection this reduces the overall supply of sand and gravel to beaches downdrift. This may lead to a decrease in beach width and the thickness of sediment in the nearshore thus enhancing erosion of the bluff toe and downcutting of the nearshore in areas where sediment cover is responsible for relatively low recession
- It may also have the effect of reducing the size of the filet beaches at Bayfield and Grand Bend so that some areas that currently have no erosion may switch to being erosional
- It may also have an impact on the overall stability of the major Pinery sand dune coast.

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What are the potential cumulative/collective impacts of individual shore protection?

- All major shore protection works are typically required to undergo a formal Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects (Class EA) which would require a full assessment of all potential measures, their potential environmental impact and an examination of the benefit/cost ratio associated with each.
- While each individual shore protection structure is small the total length of shoreline already protected is several km which adds up to a significant portion of the shoreline. Large enough that it should trigger a full EA. In the absence of this, can the ABCA continue to permit all property owners to have the opportunity to protect the shoreline in front of their property without proper assessment.

Environmental Considerations: No adverse environmental impacts will result

This is a key consideration which must be fully assessed with any protection works

- The physical impacts associated with shoreline management approaches located in onshore, backshore and nearshore areas, can effect the habitats affected (e.g., terrestrial, aquatic and wetland).

An alteration of erosion and deposition patterns may result in changes to existing habitat areas.

- The reduction in a new supply of surficial sediments (e.g., sand, gravel, cobble, boulders) may reduce the amount and distribution of this substrate in the nearshore area.
- Structures which occupy or impact the nearshore can have a direct negative impact on the fish and aquatic habitat as the sedimentation process are disturbed and can directly cover the bottom substrate. This can result in the direct loss of fish habitat.
- A number of other impacts are discussed in the Draft Updated SMP

ABCA Shoreline Development Guidelines

For Existing and New Development

ABCA Updated Shoreline Management Plan 2016

Consultant Recommended Shoreline Development Guidelines

Development Activity Permitted (Yes/No)	Lakeshore Area 1				Lakeshore Area 2	
	Flood		Dynamic Beach	Erosion	Dynamic Beach	Erosion
	100 Year Flood Allowance	15 m (Wave Uprush + OWRH)	100 year flood allowance + 15 m (Wave Uprush+OWRH)	Stable Slope Allowance 3:1	Defined Portion of DBH - 30 m	Erosion Allowance = 100 x AARR
Existing Development						
Additions (including external alterations) to existing habitable dwellings, unattached garages, accessory buildings and/or boat houses	No	No	No	No	No	Yes, provided: (i) the addition is minor[7]; and (ii) condition[8] is met; and (iii) transitional provision[2] applies.
External repairs and/or maintenance to existing buildings or structures (no intensification of use and no additional dwelling units)[1]	No	No	No	No	Yes but apply transitional provisions[2]	Yes, provided transitional provision[2] or[3] *applies.
Interior alterations (renovations, repairs) to existing habitable and non-habitable buildings and structures including unattached garages and/or accessory buildings provided no increase in habitable space[4]	Yes	Yes	Yes	Yes	Yes	Yes
Rebuilding of destroyed habitable or non-habitable building or structure whether destroyed by natural shoreline hazard or other factors[5]	No	No	No	No	No	Yes, provided: (i) condition[8] is met; and (ii) transitional provision[2] applies

[1] Intensification means conversion of existing use, a change from single family to multi-family use and/or the conversion of accessory buildings and structures to habitable space. Intensified can also mean the change of use of space from non-habitable (e.g. exterior sun room/deck) to habitable (e.g. enclosed sun room/deck, bedroom etc.)

[2] ABCA to identify sunset clause for additions, alterations, repairs and/or maintenance (e.g. 10 years) after which none permitted in Lakeshore Area 2.

[3] ABCA to identify sunset clause for additions, alterations, repairs and/or maintenance (e.g. something other than 10 years) after which none permitted in Lakeshore Area 2.

[4] Encourage relocation outside of the hazard over time through voluntary landowner compliance.

[5] Existing and new development are subject to the same development guidelines.

Development Activity Permitted (Yes/No)	Lakeshore Area 1				Lakeshore Area 2	
	Flood		Dynamic Beach	Erosion	Dynamic Beach	Erosion
	100 Year Flood Allowance	15 m (Wave Uprush + OWRH)	100 year flood allowance + 15 m (Wave Uprush+OWRH)	Stable Slope Allowance 3:1	Defined Portion of DBH - 30 m	Erosion Allowance = 100 x AARR
Existing Development (Continued)						
Relocation of habitable dwellings away from the shoreline	Yes	Yes	Yes	Yes	Yes	Yes
Relocation of accessory buildings or structures away from the shoreline including unattached garages, accessory buildings or structures	Yes	Yes	Yes	Yes	Yes	Yes
Expansion of existing septic systems	No	No	No	No	No	No
Repairs and/or maintenance to existing septic systems	Yes but apply transitional provision[7]	Yes but apply transitional provision[7]	Yes but apply transitional provision[7]	Yes but apply transitional provision[7]	Yes but apply transitional provision[7]	Yes provided transitional provision applies[7]
Alterations or repairs to existing swimming Pools	No	No	No	No	Yes but apply transitional provision[7]	Yes, provided condition[9] is met; and transitional provision[7] applies.

[6] Intensified use means conversion of existing seasonal to year-round use, a change from single family to multi-family use and/or the conversion of accessory buildings and structures to habitable space. Intensified can also mean the change of use of space from non-habitable (e.g. exterior sun room/deck) to habitable (e.g. enclosed sun room/deck, bedroom etc.)

[7] Minor additions: less than 30% of area of existing dwellings/footprint (excluding the garage(s). An example would be if 30% was 9m^2 allowed on the ground floor, or it could allow 4.5 m^2 on 2 floors.

[8] Permitted provided: the erosion rates are <0.3 m/yr or 1) a minimum setback of 7.5 m from stable slope crest; and 2) it does not increase occupancy of existing structure; and 3) maintenance access to existing protection works is not diminished.

[9] Permitted provided (for Pools): the erosion rates are <0.3 m/yr or 1) a minimum setback of 7.5 m from stable slope crest; and 2) drainage is addressed; 3) maintenance access to existing protection works is not decreased; and 4) existing ingress/egress is not reduced.

[10] Advise landowner of erosion risk. Permitted provided safety concerns due to erosion hazards are addressed considering site conditions and nature and use of structure and maintenance access to any existing protection works is not decreased. It is recommended if any structure is within 5 m of stable slope crest, that surcharge effects on slope stability be assessed by a geotechnical engineer. Provided no adverse environmental impacts will result.

[11] Seasonal/temporary/removal Frames or Ramps to hold sail boat/canoe/ boards etc. provided no adverse impacts to dune areas or the environment.

Development Activity Permitted (Yes/No)	Lakeshore Area 1				Lakeshore Area 2	
	Flood		Dynamic Beach	Erosion	Dynamic Beach	Erosion
	100 Year Flood Allowance	15 m (Wave Uprush + OWRH)	100 year flood allowance + 15 m (Wave Uprush+OWRH)	Stable Slope Allowance 3:1	Defined Portion of DBH - 30 m	Erosion Allowance = 100 x AARR
Existing Development (Continued)						
Additions to existing stairs and/or boardwalks.	No	No	No	No	No	No
Alterations, repairs and/or maintenance to existing stairs and/or boardwalks.	No	No	Yes	Yes	Yes	Yes
Additions, alterations, repairs and/or maintenance of existing in water structures.	No	No	No	No	No	No
New Development						
New habitable buildings or structures	No	No	No	No	No	No
New accessory building or structure (non-habitable, movable, not connected to main structure) including a decks, shed and/or gazebo	No	No	No	No	No	Yes provided condition[10] is met.
New Unattached Garage	No	No	No	No	No	No
Creation of a new lot (severance, subdivision)	No	No	No	No	No	No
Parks or open space use with no buildings or structures located in the hazard and no alteration of grade	Yes	Yes	Yes	Yes	Yes	Yes
Boat Houses (deemed to be non-habitable, temporary/seasonal, less than 4m X 3m)	No	Yes	No	Yes	No – N/A	No – N/A
Boat Ramps/Frames (deemed to be seasonal, temporary and removable.)	No	Yes provided condition[11] is met.	No	Yes provided condition[11] is met.	Yes provided condition[11] is met.	N/A
In-Water Docks	Yes	Yes	No	No – N/A	No – N/A	No – N/A
Swimming Pools	No	No	No	No	No	Yes, provided condition[9] is met.

Development Activity Permitted (Yes/No)	Lakeshore Area 1				Lakeshore Area 2	
	Flood		Dynamic Beach	Erosion	Dynamic Beach	Erosion
	100 Year Flood Allowance	15 m (Wave Uprush + OWRH)	100 year flood allowance + 15 m (Wave Uprush+OWRH)	Stable Slope Allowance 3:1	Defined Portion of DBH - 30 m	Erosion Allowance = 100 x AARR
New Development (Continued)						
Creation of a technical severance (e.g. a boundary adjustment where no new lot is created).	Yes	Yes	Yes	Yes	Yes	Yes
Lot consolidation	Yes	Yes	Yes	Yes	Yes	Yes
Land use designation/zoning changes	Support changes to planning documents to recognize Hazard, Natural Environment or Open Space designations and zoning. No support for intensification of use. (See footnote condition 6).			Support changes to planning documents to promote inclusion of a Lakeshore Overlay (L) designation and zoning provisions. No support for proposed land use designation, official plan changes or zoning provisions that intensify use. (See footnote condition 6).		
New in water structures and shoreline protection works.	No	No	No	No	No	No
Bluff Works for temporary Stabilization of Slope (Includes drainage works, placement of Fill and/or Re-grading of slope).	No - N/A	No - N/A	No - N/A	Yes as part of geotechnical engineered bluff works.	No – N/A	Yes as part of geotechnical engineered bluff works.
Placement of Artificial Beach Material (e.g. beach nourishment).[1]	Yes	Yes	Yes	No - N/A	Yes	No - N/A
Large scale placement of fill not associated with on-site development or redevelopment (e.g. commercial fill).	No	No	No	No	No	No
Removal of Beach Material	No	No	No	No - N/A	No	No – N/A
Lot re-grading.	No	No	No	No unless associated with bluff or slope stability works.	No	No unless associated with bluff or slope stability works.

[1] Provided no new hazards are created, existing hazards are not aggravated and no adverse environmental impacts will result. Must be designed by a qualified professional engineer and/or coastal geomorphologist.
OWRH = Other Water Related Hazards
N/A = Not Applicable

*NOTE: Footnote # [3] was added as an Option to Consider an Additional Provision for Implementation, this could also apply to the other Footnote [2] items throughout the chart if the ABCA could like to change the suggested Implementation time frame: ABCA to identify sunset clause for additions, alterations, repairs and/or maintenance (e.g. something other than 10 years) after which none permitted in Lakeshore Area 2.

Recommendations for Further Actions

They are beyond the scope of this study however they offer an important focus for future action.

Recommended Further Actions

1. ABCA consider the development of an Applicant's Guide to explain the permitting process and the regulatory responsibilities assigned to ABCA for natural hazards along the Lake Huron shoreline.

2. That a roster of pre-approved Geotechnical Engineers be developed by ABCA and made available on the ABCA website for those who may be interested in securing the services of a professionally qualified Geotechnical Engineer.

3. ABCA enter into an agreement with professional qualified Geotechnical Engineers who could respond immediately in the event of an emergency situation. It is further recommended that ABCA consider the approach that has been adopted by Maitland Valley CA in this regard.

Recommended Further Actions

4. ABCA develop a roster of specialized contractors and qualified professional consulting firms who offer a range of highly specialized services including coastal engineering, geotechnical engineering and coastal geomorphology.

5. ABCA ensure that any Emergency Preparedness Plans include notification to riparian landowners of the hazards and risks associated with existing buildings and activities that may be negatively impacted as a result of natural shoreline hazards including flooding, erosion and dynamic beach hazards.

6. ABCA explore the opportunities to work with other conservation authorities, Conservation Ontario, municipal and provincial partners to explore the options associated with voluntary resettlement including fiscal support through comprehensive provincial funding support and/or tax rebates as well as non-fiscal service-related incentives including expedited planning and permitting approvals and the public acquisition of unstable shoreline areas for open space park and passive recreational use.

Next Steps

- Advise ABCA Board of Directors
- Upload to ABCA website
- Public Review & Comment Period
  - Recommend a transparent and accessible process for public input
  - Comment period – what is reasonable?
  - Public information sessions (2) – August 20th
- Community Newsletter announcing the draft document and its availability
- Municipal meetings?

Thank You!

We Look Forward to Continuing To Work With You...Thank You So Much For Your Time Today!