

# PORT DARLINGTON SHORELINE HAZARD STUDY

---

MARCH 19, 2019

CLOCA BOARD OF DIRECTORS MEETING

*Healthy watersheds for today and tomorrow*



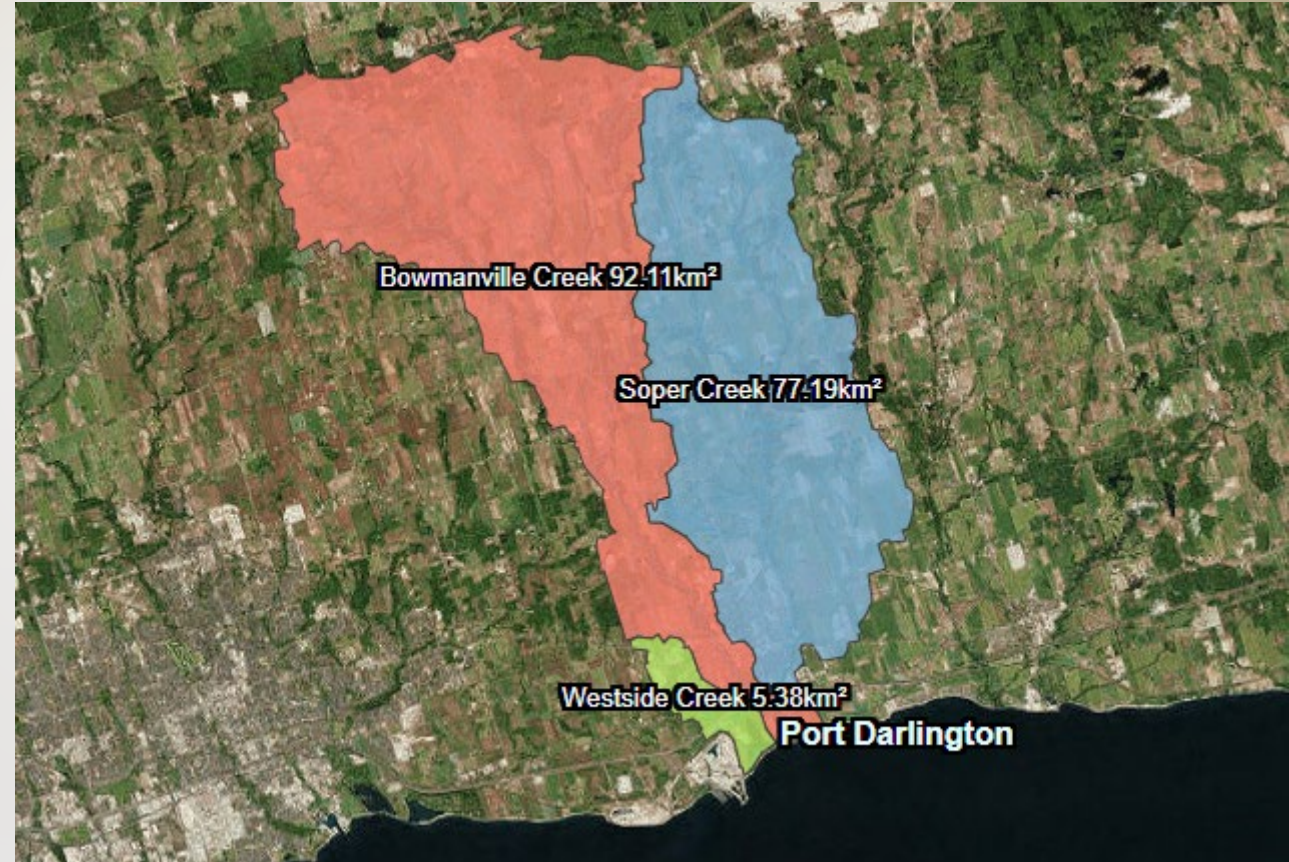


04/26/2017 17:02

Bowmanville Pier

# LOCATION: WHERE WATERSHEDS MEET THE LAKE

- **Three Watersheds**
- Bowmanville Creek 92.1 km<sup>2</sup>
- Soper Creek 77.2 km<sup>2</sup>
  - Total **169.3** km<sup>2</sup>
- Westside Creek 5.38 km<sup>2</sup>



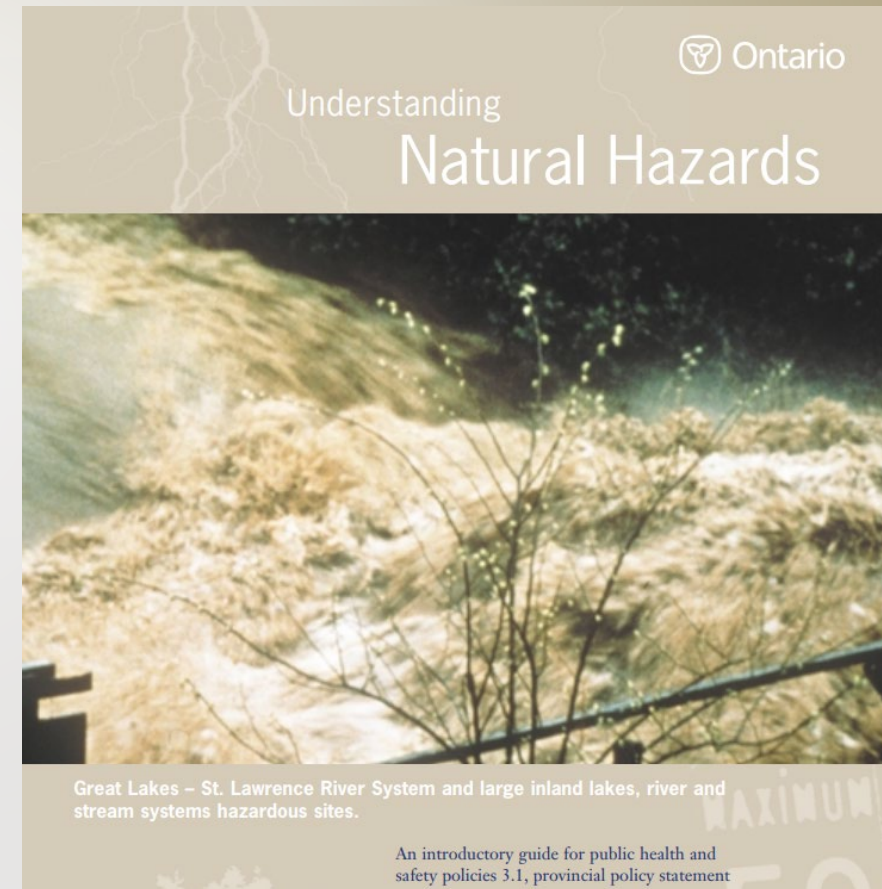
# PROVINCIALY SIGNIFICANT COASTAL WETLANDS

- **Bowmanville Coastal Wetland Complex** at Bowmanville/Soper Creeks
- **Westside Coastal Wetland Complex** at Westside Creek



# NATURAL HAZARDS AT PORT DARLINGTON

- **Great Lakes Related Hazards**
  - **Flooding Hazards**
  - **Erosion Hazards**
  - **Dynamic Beach Hazards**
- **River and Stream Related Hazards**
  - **Flooding Hazards**
  - **Erosion Hazards**



# VISUALIZATIONS OF LAKE ONTARIO AND RIVERINE FLOODING

---

- [https://www.youtube.com/watch?time\\_continue=4&v=LtjYykUD5NE](https://www.youtube.com/watch?time_continue=4&v=LtjYykUD5NE)
- Maximum Daily Mean Water Level 2017
- <https://youtu.be/GnU7X-Kjb4k>
- Riverine Regulatory Flood
- <https://youtu.be/UNsT5lxCzN4>
- Lake Ontario 100 Year Flood

# FLOOD HAZARD

---

Flood Risk= Vulnerability+Frequency+Social Impacts+ Economic Impacts+ Environmental Impacts

Table 2.0: Flood related hazards

Flood		Hazard
Depth	Depth x Velocity	
d>0.1m	n/a	Interior property damage, electrical hazards
d>0.3m	n/a	no access or egress by personal vehicles
d>0.8m	n/a	structural damage to homes
d>1.0m	d x v >0.4m <sup>2</sup> /s	personal safety

# FLOOD MITIGATION

---

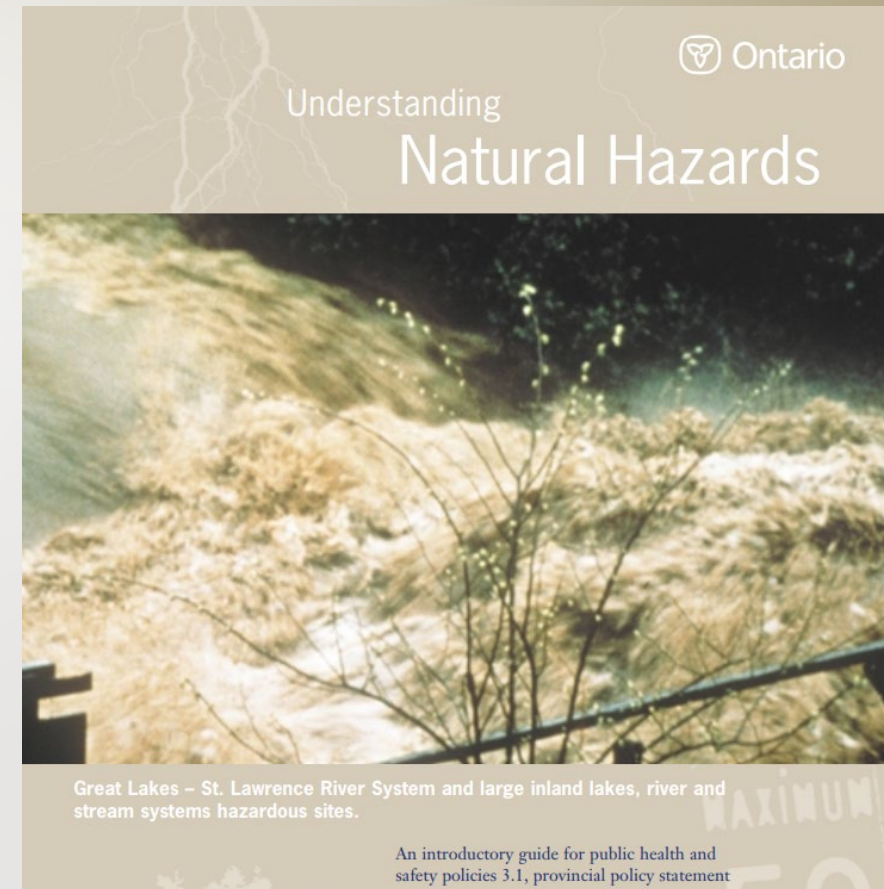
- West Beach and Cedar Crest Beach will continue to be flood damage centres with significant flood risk
- The frequency of flooding and safe access during more frequent flood events can be improved by elevating the road elevation
- Detailed feasibility analysis will be required





# NATURAL HAZARDS AT PORT DARLINGTON

- **Great Lakes Related Hazards**
  - Flooding Hazards
  - **Erosion Hazards**
  - Dynamic Beach Hazards
- **River and Stream Related Hazards**
  - **Flooding Hazards**
  - **Erosion Hazards**



# EAST BEACH COTTAGES ORIGINALLY SET BACK FROM BLUFF CREST

---



*Healthy watersheds for today and tomorrow*

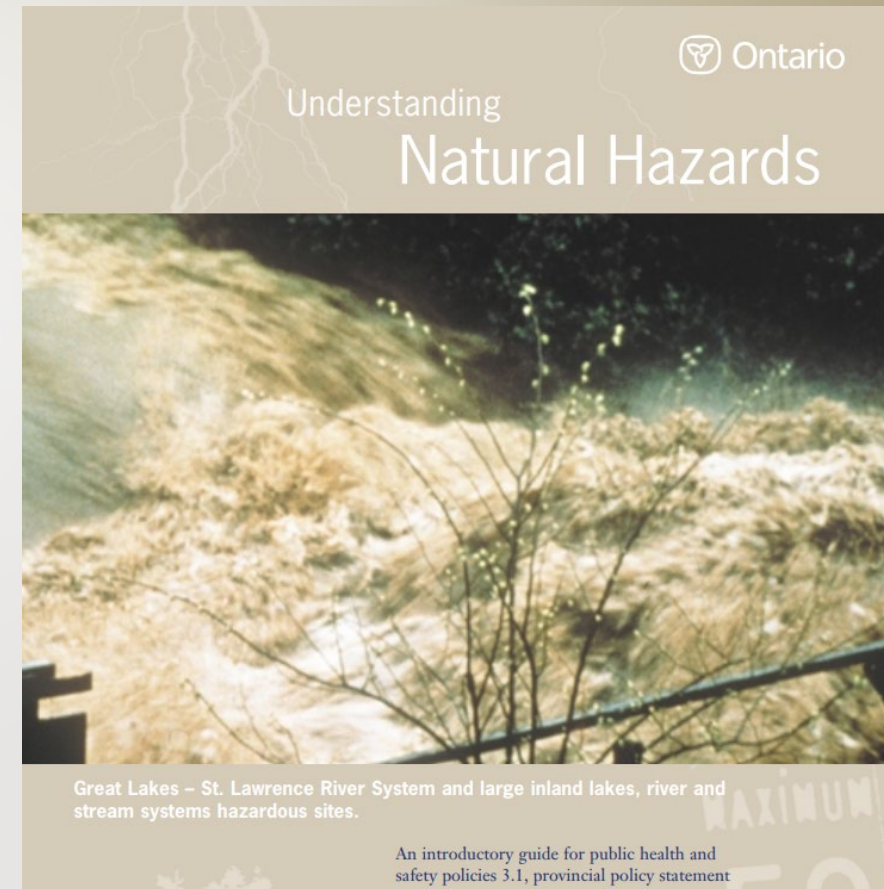
# ALL SHORELINES ERODE



*Healthy watersheds for today and tomorrow*

# NATURAL HAZARDS AT PORT DARLINGTON

- **Great Lakes Related Hazards**
  - Flooding Hazards
  - Erosion Hazards
  - **Dynamic Beach Hazards**
- **River and Stream Related Hazards**
  - **Flooding Hazards**
  - **Erosion Hazards**



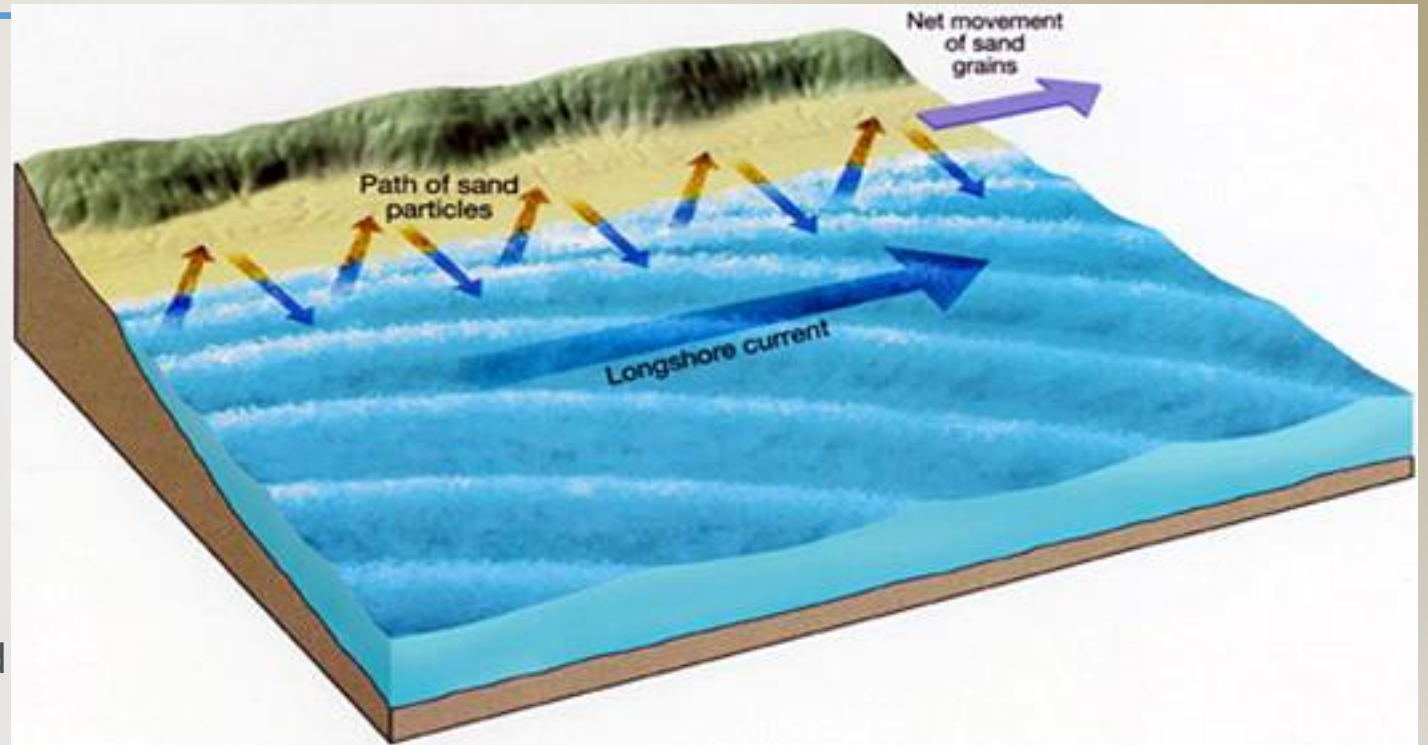
# COASTAL SEDIMENT PROCESSES – WHERE DOES BEACH MATERIAL COME FROM?

- Bluffs composed of glacial till (mixtures of clay, sand, gravel, and cobbles left behind by glaciers) are eroded by the combination of waves and high tides.
- Inland glacial deposits can be eroded by water and deposited in the Lake by rivers and streams.
- When waves converge on the headlands of rocky shores by the process of refraction, they erode the rock and sediment from these areas and deposit it in beaches.



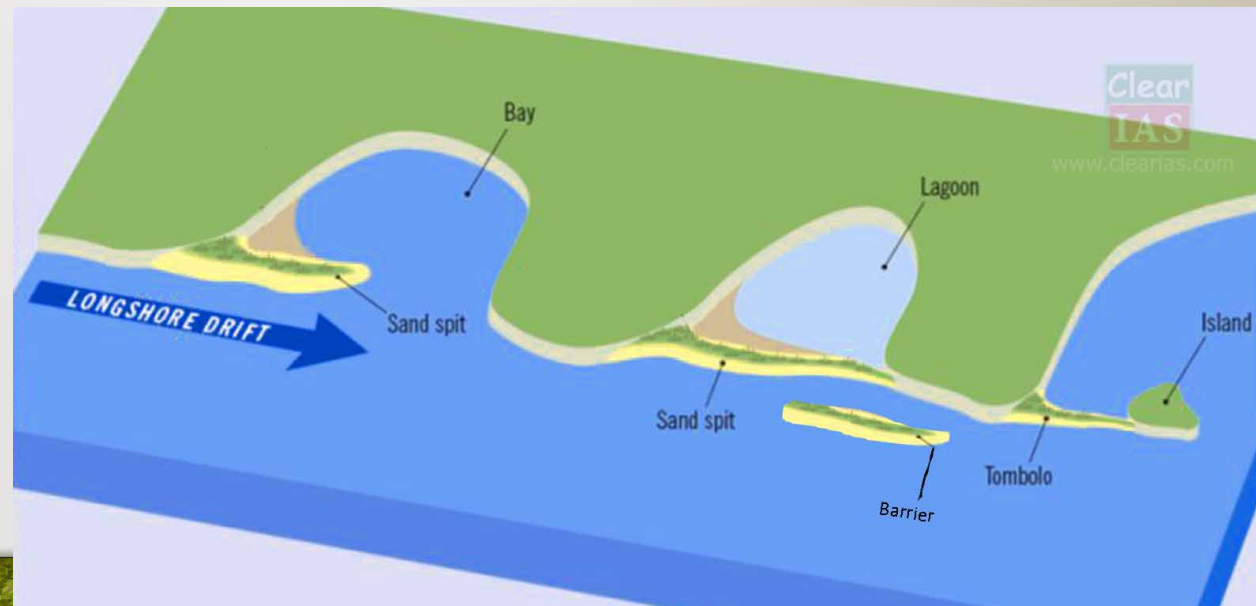
# COASTAL SEDIMENT PROCESSES – HOW DOES SEDIMENT MOVE?

- Waves, driven by the prevailing wind, contacts the shoreline on an angle
- The water driven over the beach by the wave, retreats back to the Lake taking the steepest, shortest route – perpendicular to the beach
- Sediment moved by the wave energy over the beach is moved parallel to the shore, between the breaking waves and the shoreline. As these waves break and recede along a shoreline, they erode and deposit sediment in a zigzag pattern called long shore transport.



# COASTAL SEDIMENT PROCESSES - LANDFORMS

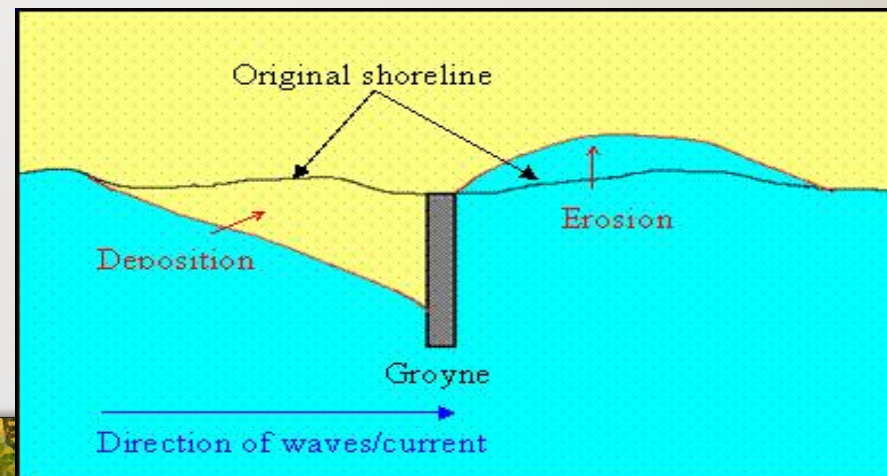
- Long shore transport can create landforms such as various types of beaches, bars, spits and barrier islands.
- Sand spits, formed by long shore sediment transport, enclose inlets and create coastal marshes.



# COASTAL SEDIMENT PROCESSES – HUMAN IMPACTS

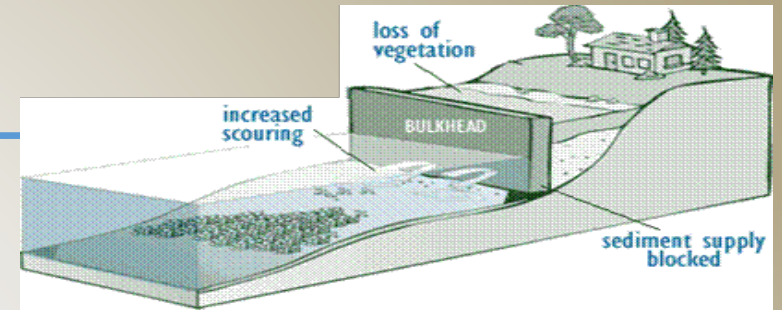
- Groynes, piers that jut out perpendicular to the beach disrupt the longshore drift
- Sediments will be trapped and deposited on the up-current side of the pier, and the removal of the sediment from the longshore drift will lead to erosion of the down-current side

Alteration of sediment transport by a groyne





# COASTAL SEDIMENT PROCESSES – HUMAN IMPACTS



- Natural erosion and deposition are necessary to maintain shorelines.
- A common strategy to prevent or reduce shoreline erosion is to “armour” shorelines with rock, seawalls, and other hard structures.
- Seawalls are built along shorelines and are used to reduce erosion caused by waves. They can be effective in the short term, but they substantially alter sediment processes.
- Over the long term, seawalls may actually increase erosion due to increased scouring at the base. In a long seawall, this can result in a total loss of beach sediment. The fine sediment is removed first, and gradually, a beach that was predominantly sand changes to gravel, cobble and finally bedrock or clay.
- Small seawalls in front of individual lots can also cause erosion, particularly at the sides, where wave energy is concentrated. This can lead to a “chain reaction” of seawall installation as adjacent property owners feel compelled to protect their own shorelines from erosion caused by neighbouring seawalls.

# BARRIER DYNAMIC BEACHES PORT DARLINGTON (WESTSIDE CREEK AND BOWMANVILLE CREEK)

---



*Healthy watersheds for today and tomorrow*

# SHORELINE EROSION MITIGATION

- Shore Protection Concepts- Baird
- Alternatives ranging from off shore breakwaters, jetties, beach creation, and armour stone revetments
- Estimated \$4M to \$16M cost
- Environmental Assessment process



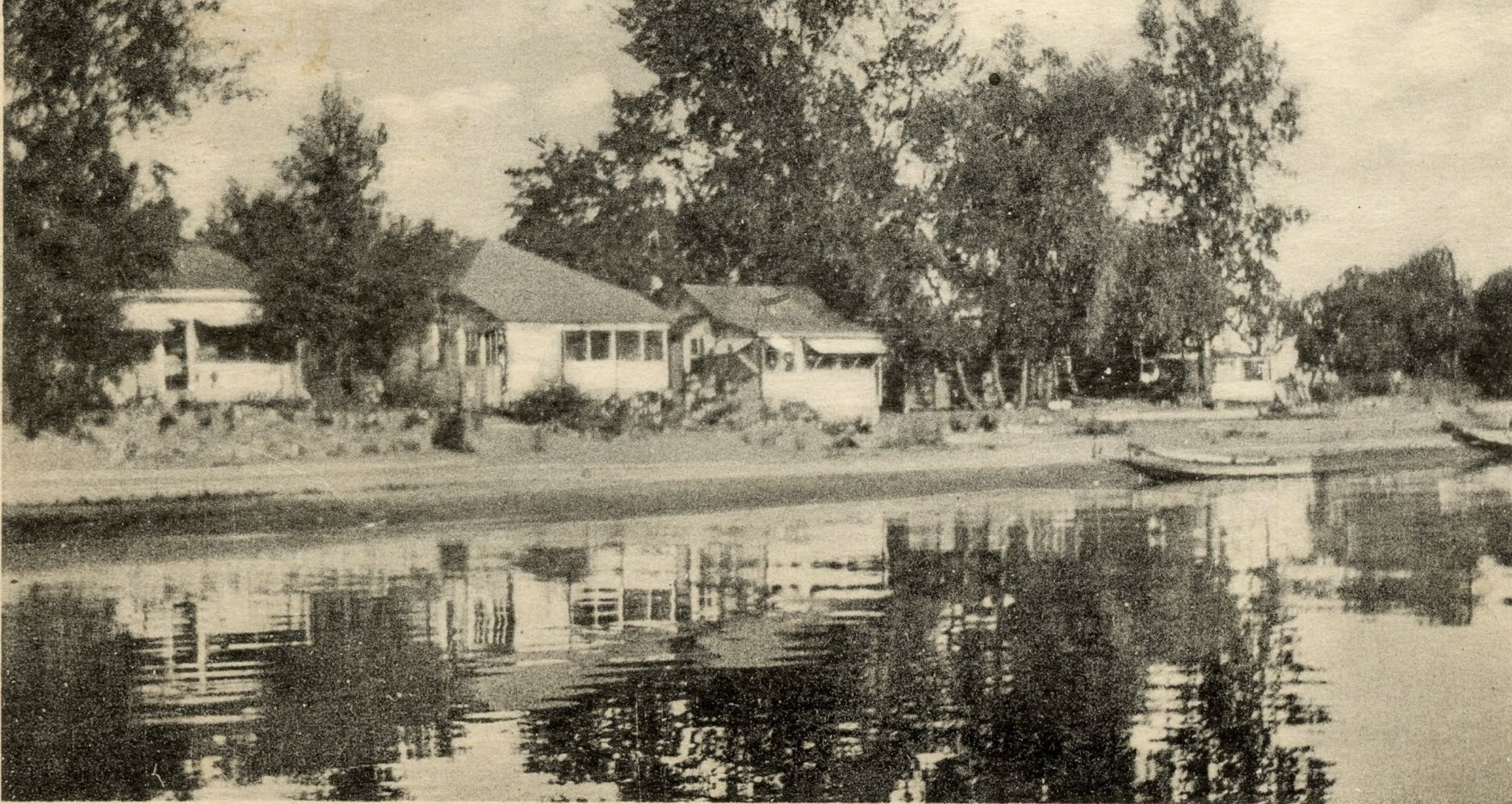
Figure 3.3: Concept 3 – Sand and cobble beach with offshore breakwaters and jetties at Westside Creek, flood channel

## DEVELOPMENT AT PORT DARLINGTON: FROM SMALL AND SEASONAL TO LARGER AND PERMANENT



*Healthy watersheds for today and tomorrow*

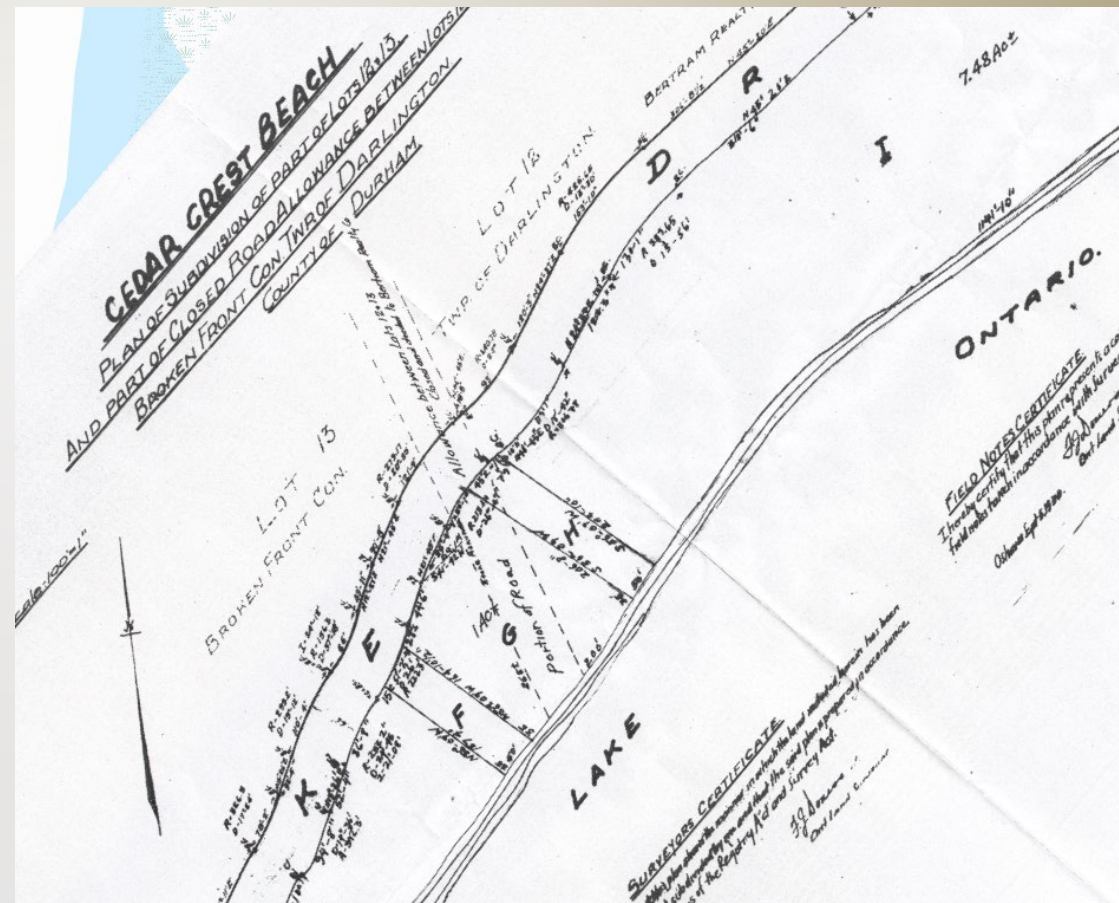




The Beach, Bowmanville, Ontario.—9.

# DEVELOPMENT AT PORT DARLINGTON: FROM SMALL AND SEASONAL TO LARGER AND PERMANENT

- Various Plans of Subdivision were Registered to Subdivide the Original Township Lots between 1917 and 1962



# PLAN OF SUBDIVISION 318 (1932) WITH PRESENT DAY LOT FABRIC





# PLAN OF SUBDIVISION 318 (1932) WITH PRESENT DAY AIR PHOTO

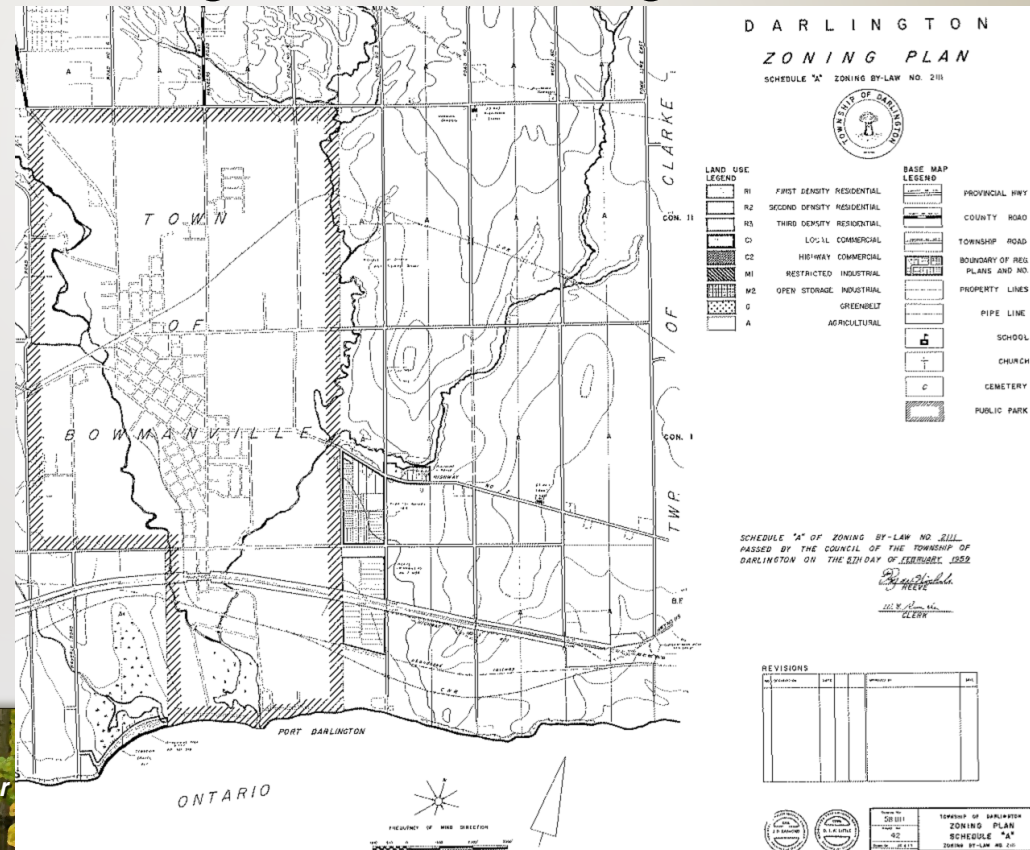
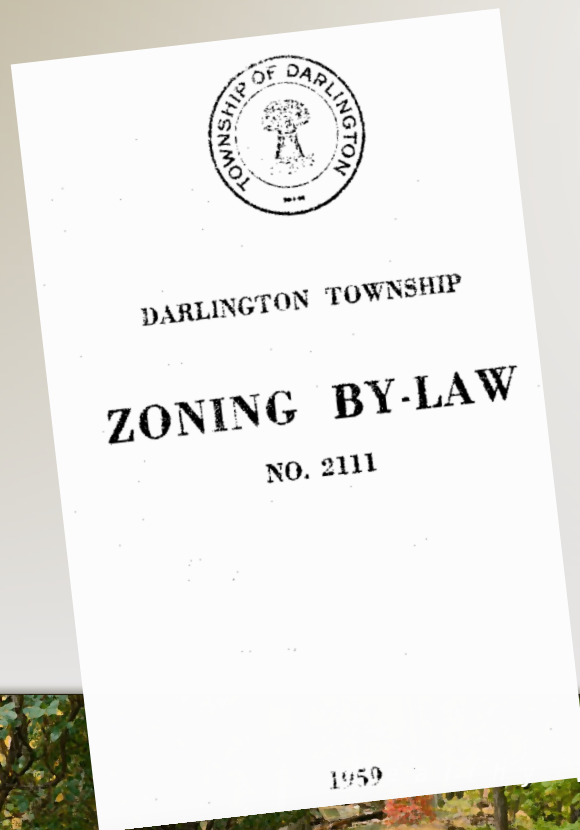


*Healthy watersheds for today and tomorrow*



# HISTORY OF PLANNING AND DEVELOPMENT CONTROLS

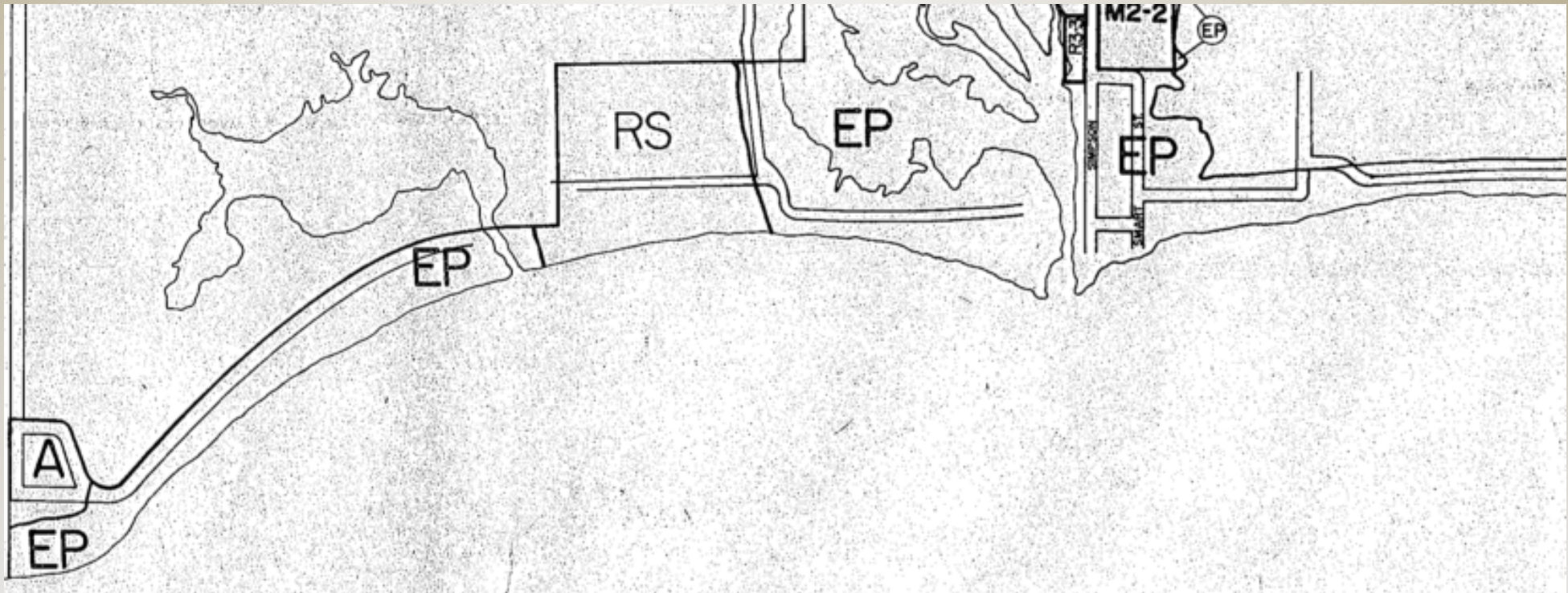
- In 1959 the Former Township of Darlington Zones Cedar Crest Beach Lands "A" – Agricultural, permitting a permanent "single detached dwelling" in all "A" Zoned Land



# HISTORY OF PLANNING AND DEVELOPMENT CONTROLS

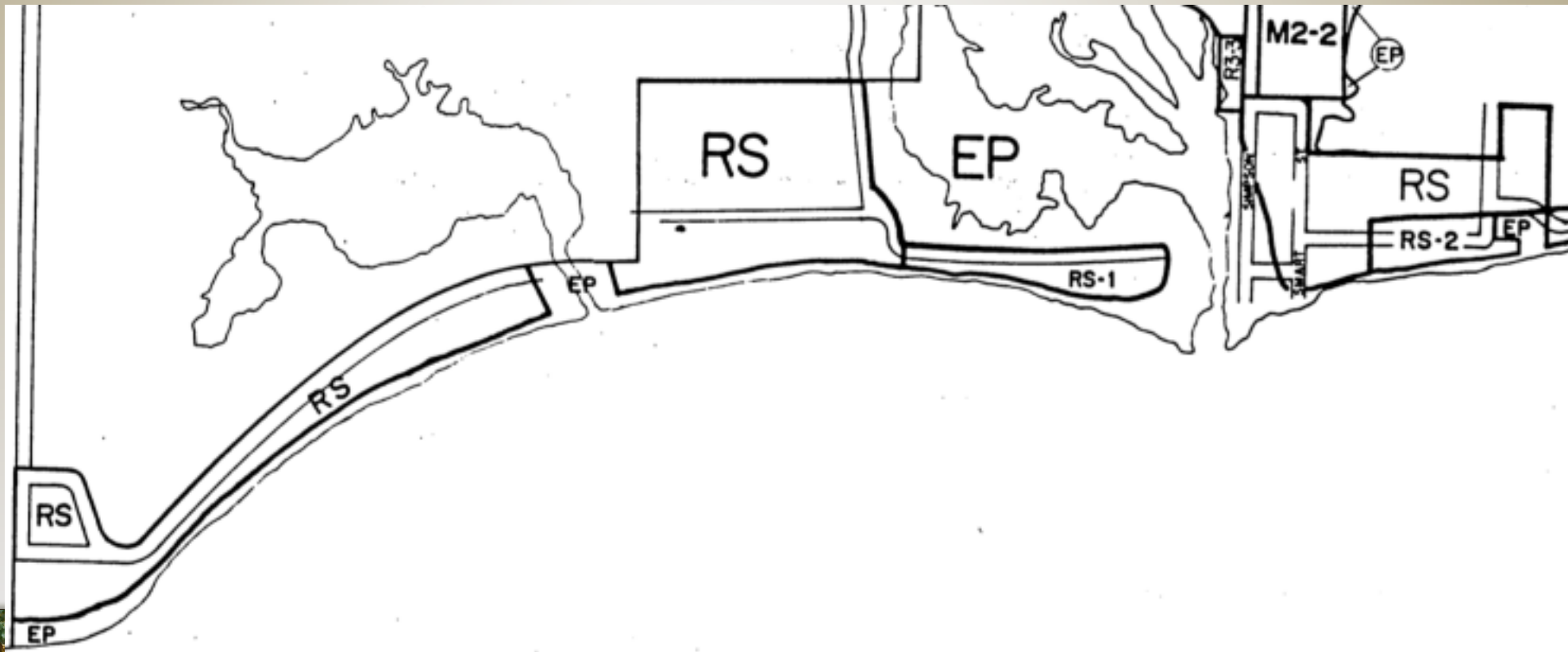
---

- In June 1984 Draft Zoning By-law Proposes to Zone Regionally Designated Hazard Lands "EP"



# HISTORY OF PLANNING AND DEVELOPMENT CONTROLS

- Final 1984 Zoning By-law Zones Hazard Lands as Residential: Continuing 1959 Permissions

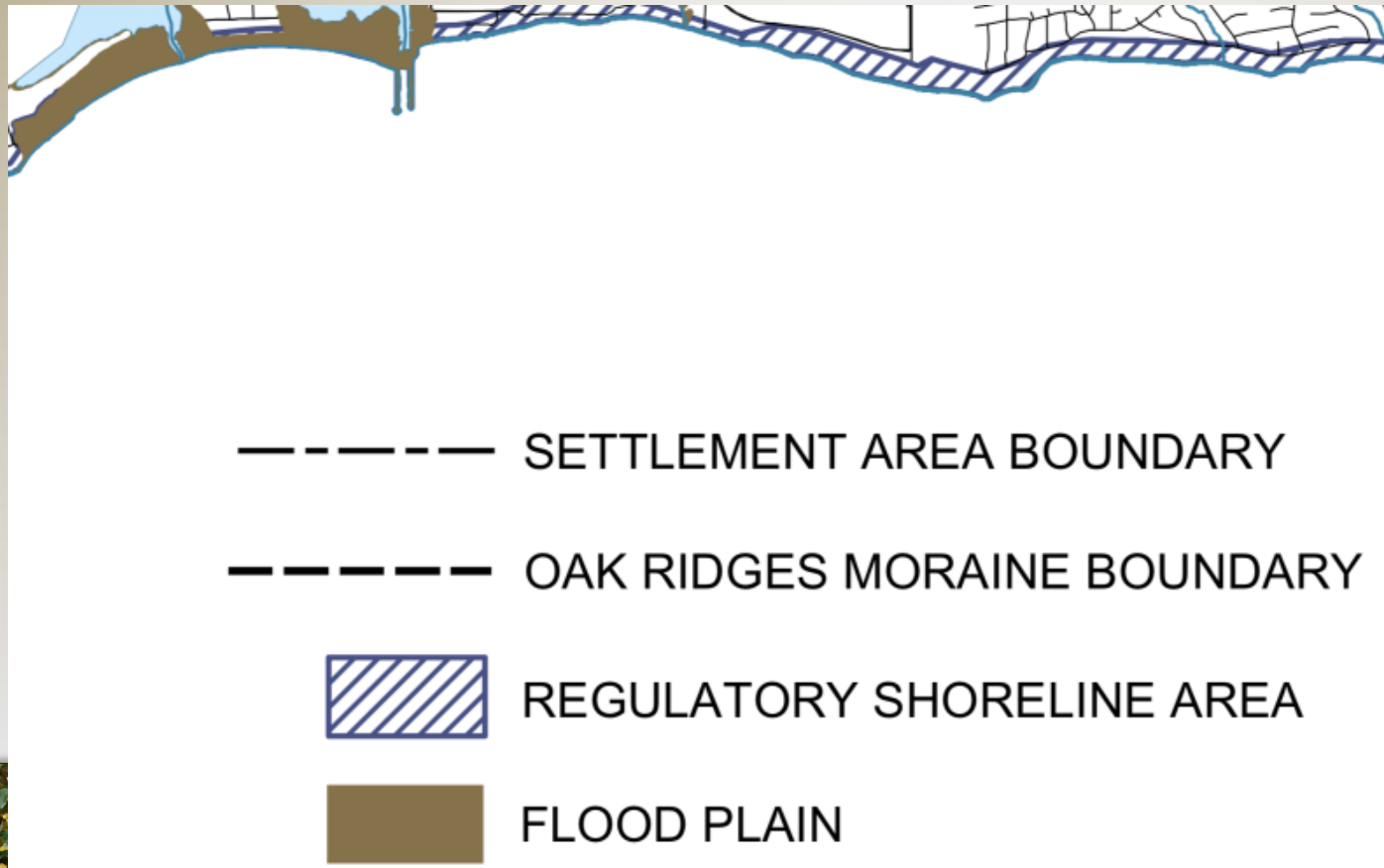


*Healthy watersheds for today and tomorrow*

# HISTORY OF PLANNING AND DEVELOPMENT CONTROLS

---

- 1996 Clarington Official Plan Incorporates a Regulatory Shoreline Area and Policy recognizing shoreline natural hazards



# HISTORY OF PLANNING AND DEVELOPMENT CONTROLS

- 2017 Amended Clarington Official Plan Incorporates Environmental Protection Designations



Healthy watersheds for today and

# CASE STUDY EXAMPLES

---

- Frenchmans Bay Harbour
- Burlington Beach
- Long Point



*Healthy watersheds for today and tomorrow*







*Healthy watersheds for today and tomorrow*



# CASE STUDY EXAMPLE: FRENCHMANS BAY, CITY OF PICKERING (1956 AIR PHOTO)

---



*Healthy watersheds for today and tomorrow*

# CASE STUDY EXAMPLE: FRENCHMANS BAY, CITY OF PICKERING (1956 AIR PHOTO)



*Healthy watersheds for today and tomorrow*



*Healthy watersheds for today and tomorrow*



# CASE STUDY EXAMPLE: FRENCHMANS BAY, CITY OF PICKERING (CURRENT DAY)

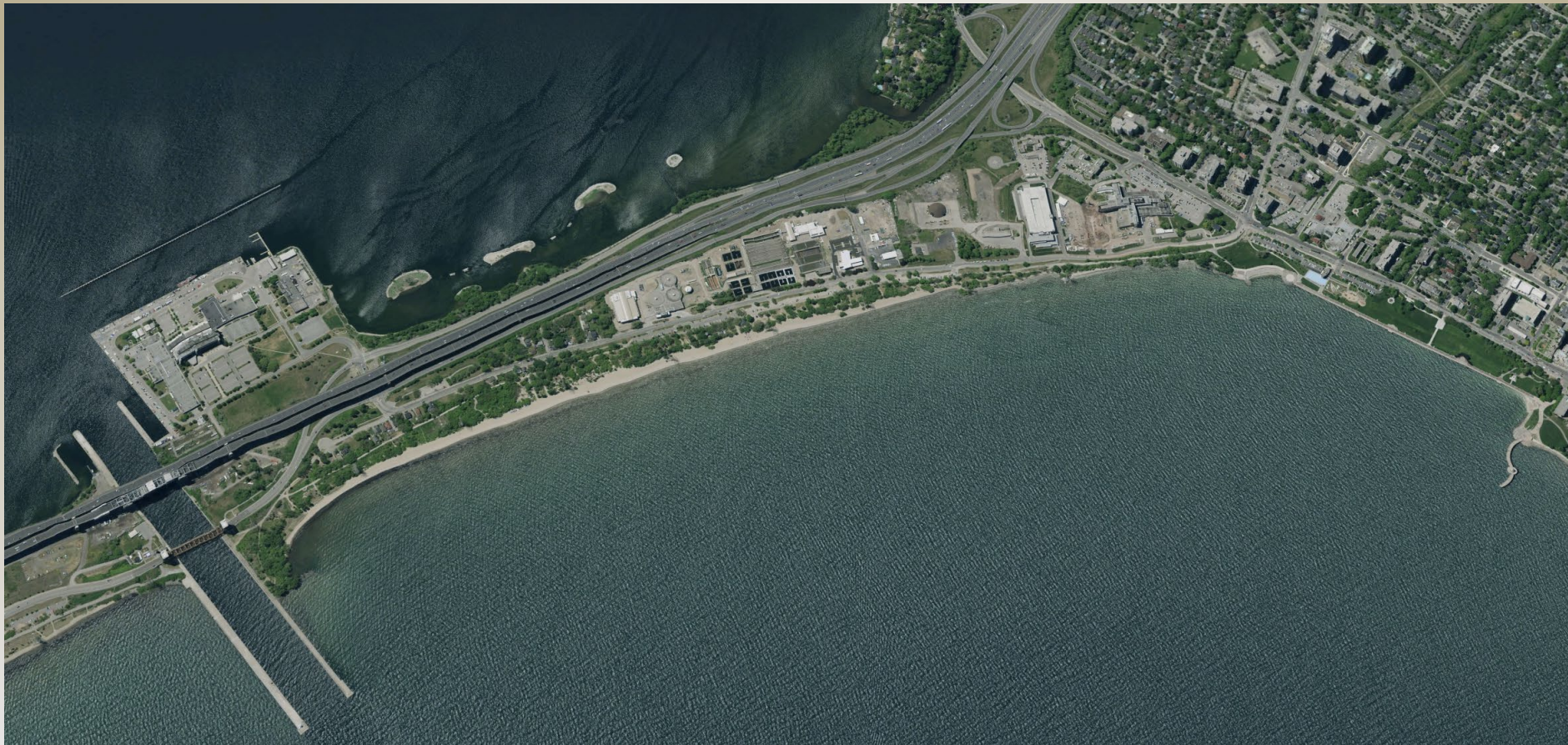


*Healthy watersheds for today and tomorrow*



# CASE STUDY EXAMPLE: BURLINGTON BEACH HALTON REGION

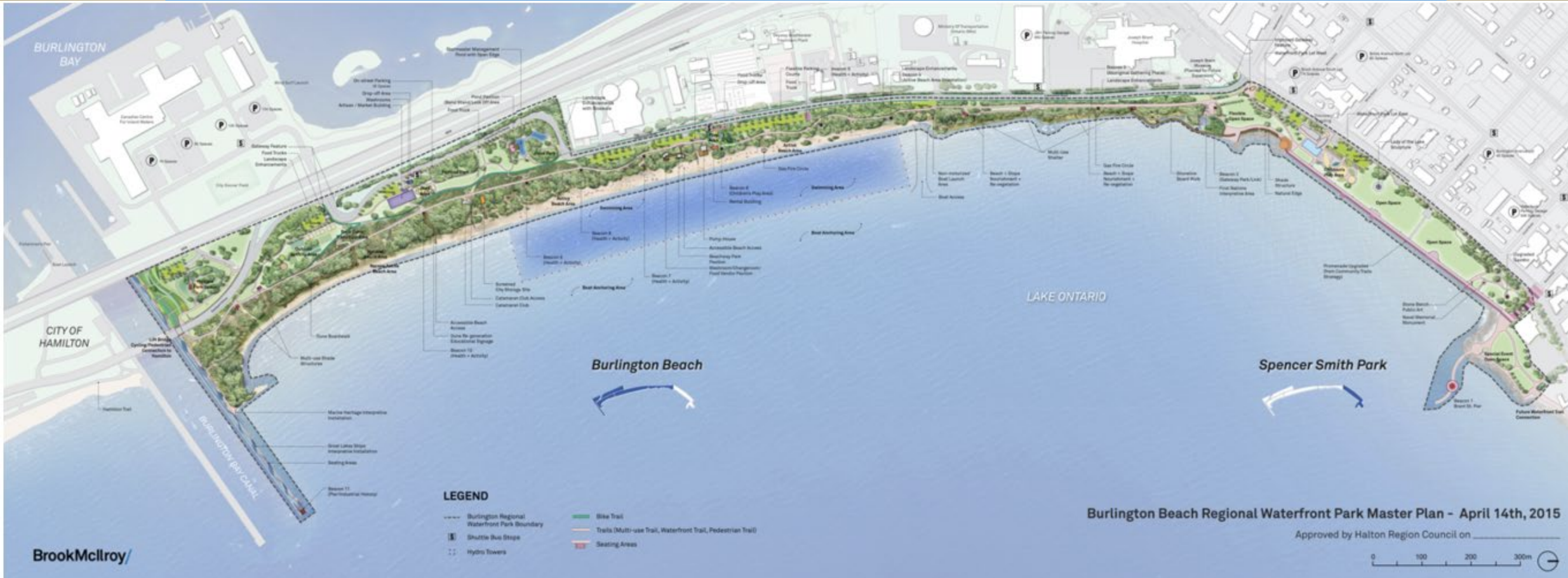
---



*Healthy watersheds for today and tomorrow*



# CASE STUDY EXAMPLE: BURLINGTON BEACH HALTON REGION



Healthy watersheds for today and tomorrow



# CASE STUDY EXAMPLE: HASTINGS DRIVE LONG POINT, LAKE ERIE



Healthy watersheds for today and tomorrow





# CASE STUDY EXAMPLE: HASTINGS DRIVE LONG POINT, LAKE ERIE

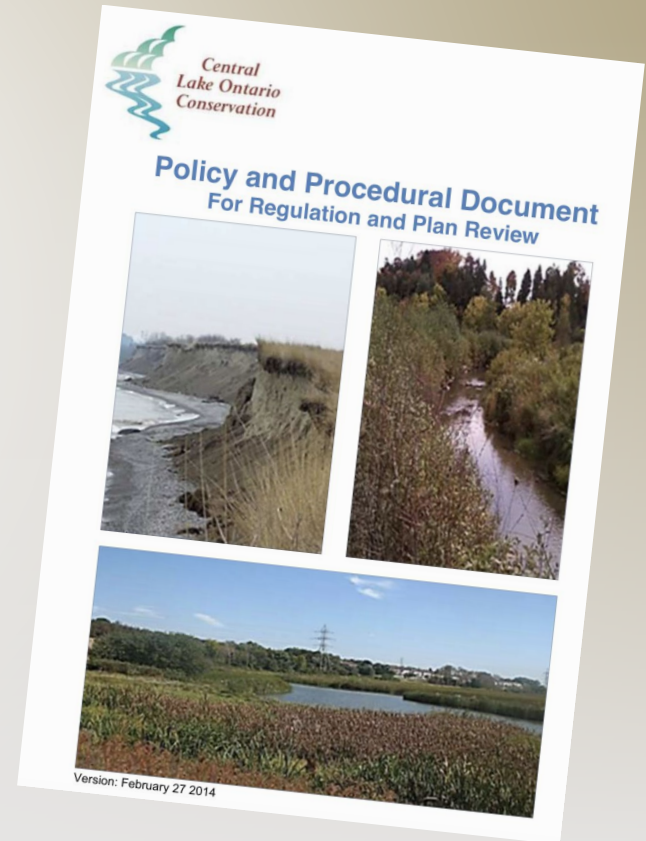
---



*Healthy watersheds for today and tomorrow*



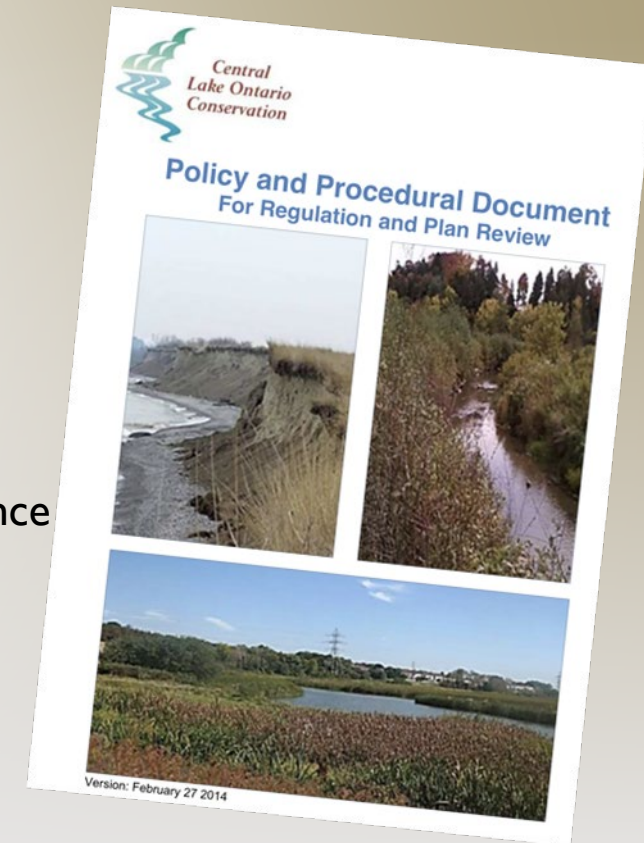
# PROPOSED POLICY CHANGES TO CLOCA POLICY AND PROCEDURAL DOCUMENT



# PROPOSED POLICY CHANGES TO CLOCA POLICY AND PROCEDURAL DOCUMENT

---

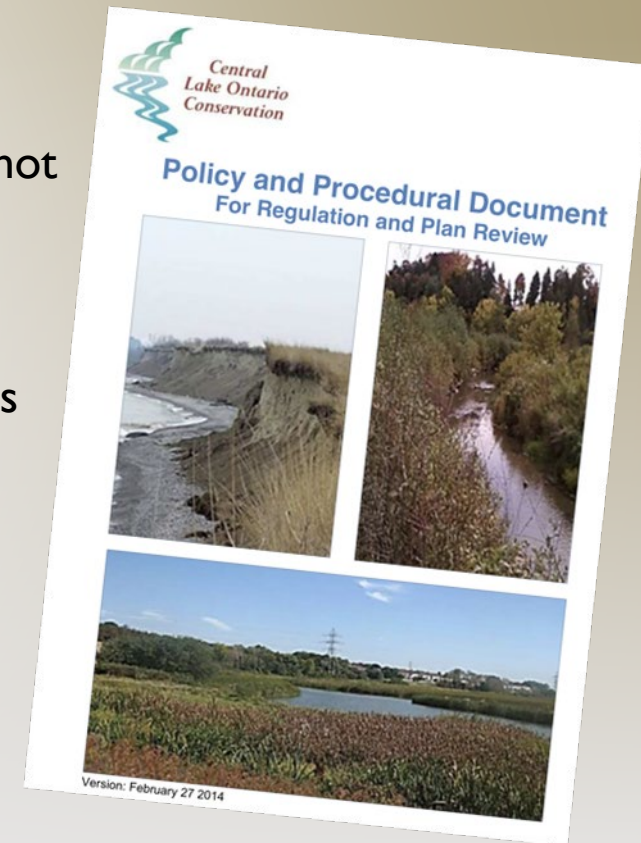
- New Port Darlington (West Shore) Shoreline Management Policy Area
- 13 new policies that implement the *Shoreline Management Report*
- Respond to resident comments and established property rights to ensure that the following *may be permitted*:
  - Development to **mitigate vulnerability** of existing dwellings
  - **Replacement dwellings** destroyed by forces other than natural hazards
  - Interior alterations and **renovations** including general upkeep and maintenance
  - Non-habitable **accessory structures**
  - Repairs, replacements or maintenance of **existing septic systems**
  - Private **shoreline protection works**







# PROPOSED POLICY CHANGES TO CLOCA POLICY AND PROCEDURAL DOCUMENT

---

- Three key development controls:
  - Replacement dwellings destroyed by forces of flooding and/or erosion is not permitted
  - Development on vacant parcels of land is not permitted
  - Redevelopment, replacement or expansion of existing habitable structures within Shoreline and/or Riverine Natural Hazards is not permitted
- Consistent with existing Planning Act, Provincial Policy Statement and Clarington Official Plan requirements



## Legend

-  Lake Ontario Erosion Hazard Line (Estimated)
-  Regulated Area Limit (Estimated)
-  Lots Subject to Policy 4.7.1
-  Assessment Parcel



# RECOMMENDED IMPLEMENTATION ACTIONS

---

- Voluntary disposition:
  - *THAT the CLOCA Board of Directors Recommends to the Council of the Municipality of Clarington that consultations be commenced, to be led in collaboration between the Municipality of Clarington, Region of Durham and CLOCA, for the development of a Long-Term Incremental Voluntary Land Disposition Program for lands in the Port Darlington Area that are deemed to have unacceptable risk from natural hazards , based on the principle of willing seller-willing buyer;*

# RECOMMENDED IMPLEMENTATION ACTIONS

---

- Local Improvements – Shoreline Erosion Protection
  - *In the event that the Board of Directors does not support staff recommended Item No. 3 (voluntary disposition) staff would recommend the following as an alternative:*
    - *THAT The CLOCA Board of Directors Recommends to the Council of the Municipality of Clarington that in collaboration with Municipality of Clarington, Region of Durham and CLOCA staff, landowners on Cedar Crest Beach Road be polled as to whether or not they wish to proceed with a formal petition for a Local Improvement for the purposes of conducting an Environmental Assessment and establishing comprehensive erosion protection works along the Lake Ontario shoreline.*

# RECOMMENDED IMPLEMENTATION ACTIONS

---

- Local Improvements – Flood Mitigation
  - *THAT the CLOCA Board of Directors recommends that the Council of the Municipality of Clarington consider the options to improve safe access along municipal road in the Port Darlington area as part of capital planning and budgeting and that the implementing road works be constructed where feasible and appropriate.*



# RECOMMENDED IMPLEMENTATION ACTIONS

---

- *Planning policy:*
  - *THAT the CLOCA Board of Directors Requests that the Municipality of Clarington implement the Clarington Official Plan Regulatory Shoreline Policies, as amended by Official Plan Amendment 107, and the CLOCA Policy and Procedural Document for Regulation and Plan Review, through a Zoning By-law enacted under the Planning Act;*