

Plan Review and The Regulations

Between a bluff and a no build zone

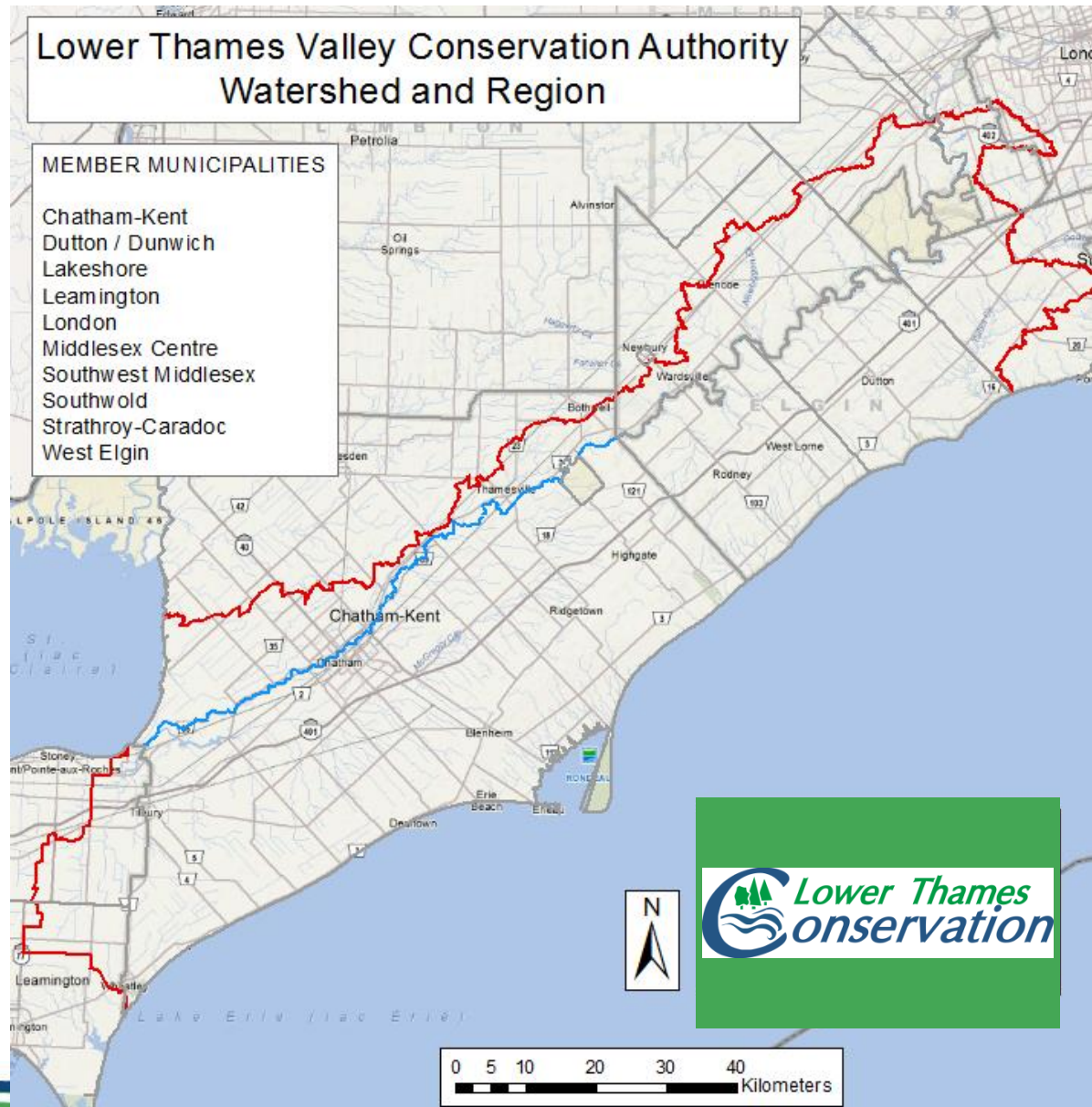
The 'Generic Regulations'

- ▶ The Development, Interference to Wetlands and Alteration to Shorelines & Watercourses Regulation came into effect with R.S.O. 152/06
- ▶ From that date moving forward, the Authority went from dealing with approximately 40 to 50 permits in a year to well over 200 a year since 2006.
- ▶ This increase in the number of permits being dealt with put a huge strain on staff resources and response times back to proponents.

New 'issues'

- ▶ The Lake Erie and Lake St. Clair shorelines were now a new topic to be addressed by the regulations. Staff had always commented on municipal planning applications but on a courtesy basis using municipal setbacks provided for in their respective plans
- ▶ Also new to staff was the Interference to Wetlands component of the regulations

The total shoreline perimeter for both Lake St. Clair and Lake Erie within the jurisdiction of the LTVCA is approx. 165 km.



Shoreline Characteristics

Lake Erie

Type	Length (km)
high bluff - non flood prone	85
moderate bluff - flood prone	2
marsh	16
dyked	3
fully developed beach	15
Total	121

Lake St. Clair

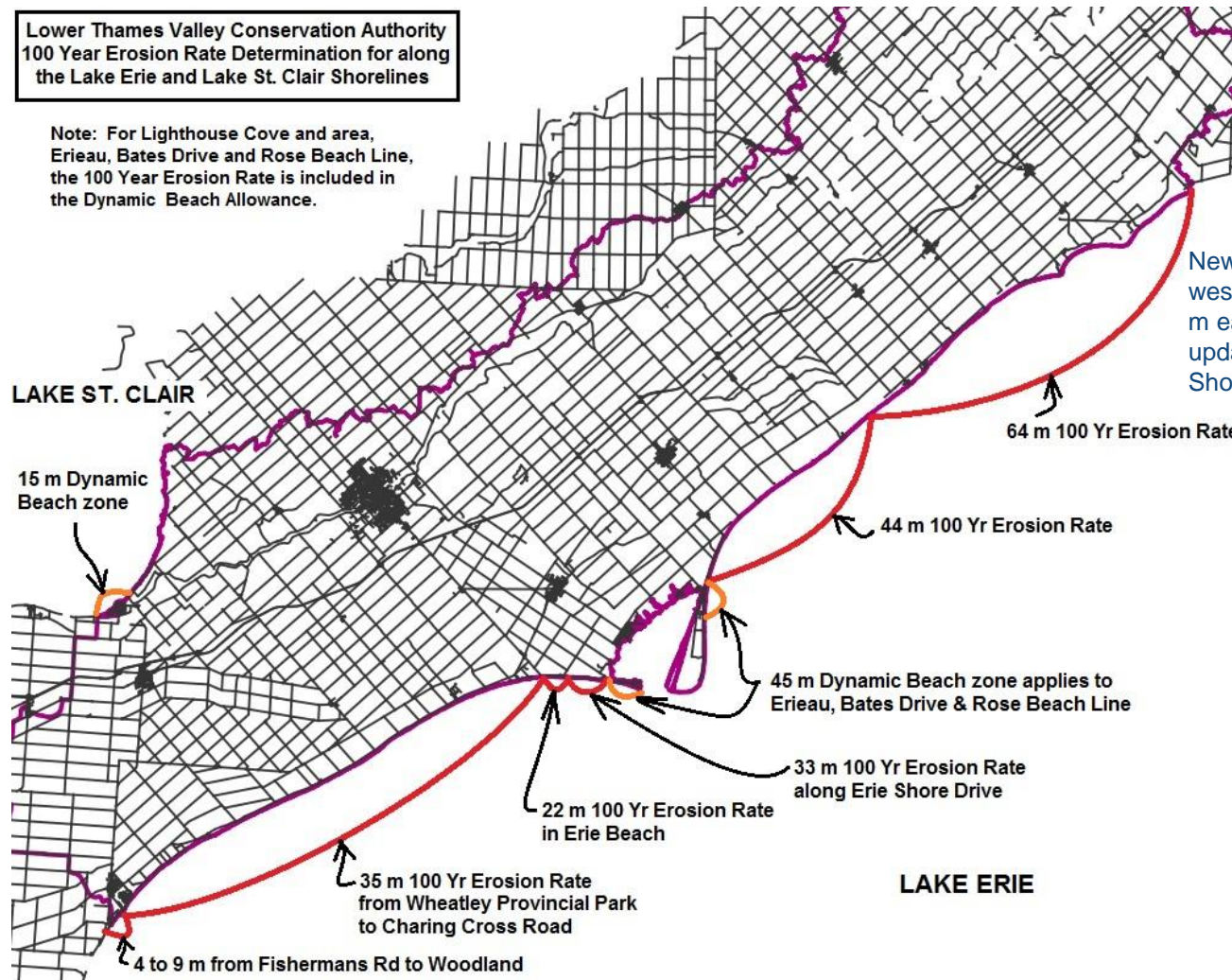
Type	Length (km)
low bank - flood prone	6
marsh	2
dyked	8
Total	16

There is an additional 26 km of shoreline within the boundary of Rondeau Bay. This area consists of a mix of Provincially Significant Wetland, bermed / dyked farmland and residential lands.

100 Year Erosion Rates

Lower Thames Valley Conservation Authority
100 Year Erosion Rate Determination for along
the Lake Erie and Lake St. Clair Shorelines

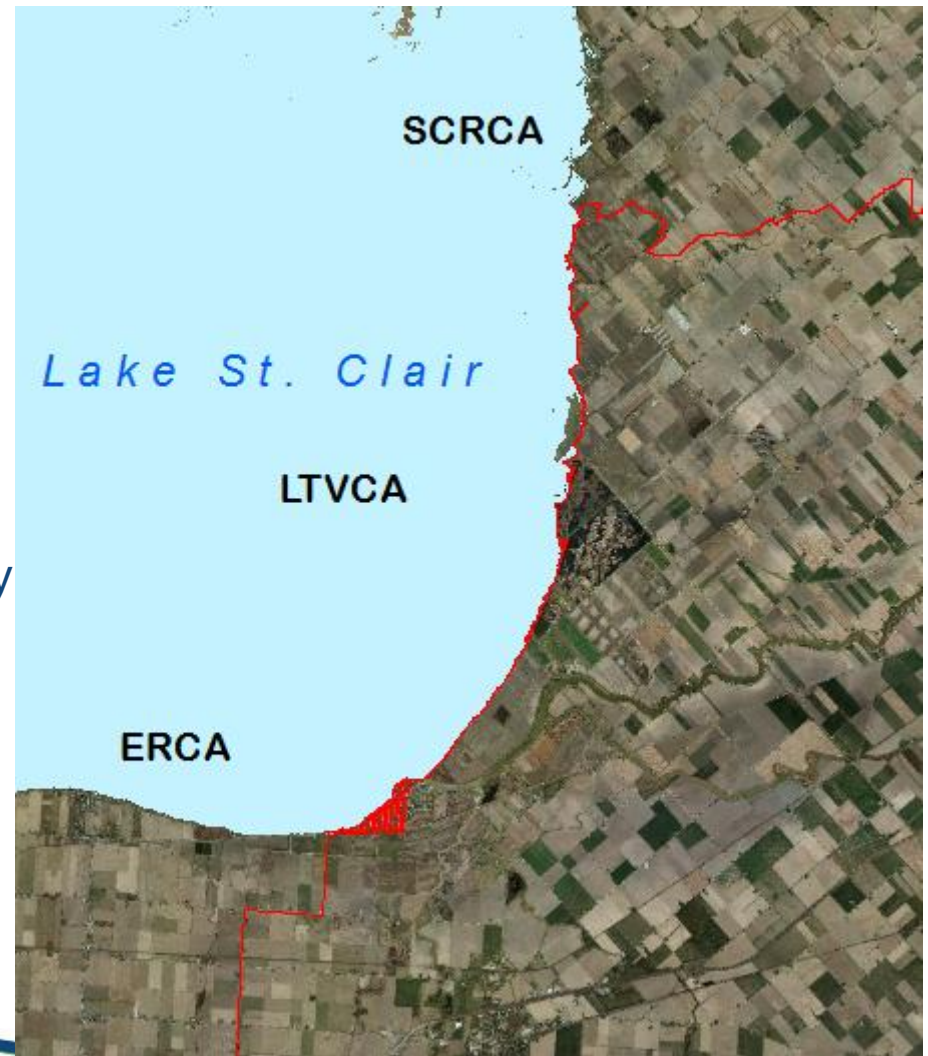
Note: For Lighthouse Cove and area,
Erieau, Bates Drive and Rose Beach Line,
the 100 Year Erosion Rate is included in
the Dynamic Beach Allowance.



New erosion rate of 100 m west of Port Talbot and 160 m east of Port Talbot with update of the Elgin County Shoreline Management Plan

Lake St. Clair Shoreline

- ▶ North of the Thames River, the shoreline consists of a few cottage structures along a stretch of low beach and beyond that, Provincially Significant Wetland bound by municipal and private dyking systems with farmland surrounding the area. This area accounts for 14 km of shoreline.
- ▶ The remaining 2 km consist of highly developed lands mostly within the community of Lighthouse Cove. Steel walls, concrete shore protection, fox blocks and other means of shoreline protection have been installed along this shoreline zone.



Shoreline from Two Creeks outlet to just west of Erie Beach



Shoreline from Erie Beach to the east end of Rondeau Bay



East Chatham-Kent to Elgin County Boundary



Western portion of Elgin County, West Elgin & Dutton-Dunwich



Shoreline components

- ▶ Low dyked zone with wetlands contained behind
- ▶ Hardened shoreline zone around residential development (< 1 m high banks)
- ▶ Beach / low bank zone (1 – 2 m high banks)
- ▶ Moderate bluff zone (10 – 20 m high bluffs)
- ▶ Low beach / dune system (subject to lake flooding)
- ▶ Point Aux Pins (Rondeau)
- ▶ Accreting dune system (subject to lake flooding)
- ▶ Moderate to high bluffs (20 – 35 m high bluffs)

Erosion and its impacts

- ▶ The bluff shoreline can see from up to a 1 metre to a 1.6 metre loss on average per year.
- ▶ Typically don't see an incremental loss in any given year, but when the bluff does fail, it can stretch for over 30 metres in length and 10 to 20 metres in depth back into lots along the high bluff zone.
- ▶ This high rate of erosion can have a devastating impact on shoreline properties and the individuals that own them.

Rotational failure of the bluff in Romney (Lot 207) in early 1990's

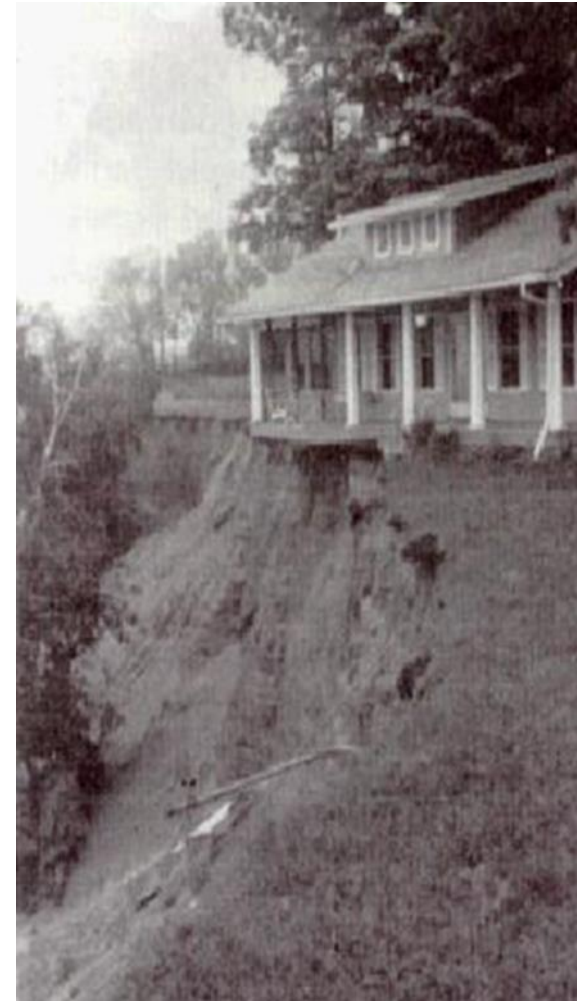


Rotational bluff failure of sandy soils.

Pre-failure



June 1991



February
1997

Bluff failure in 2009

A slump impacting an older cottage structure. Question arises of who is responsible for undertaking a review of structures along the shoreline for the removal of these dwellings before failure occurs. The increased 'risk' associated with their removal elevates the cost once they get to this state.



Private vs. Public

It's not just private landowners that have to deal with erosion issues. Municipalities face elevated costs when erosion impacts roads and associated infrastructure. The costs of installing and maintaining shoreline works is prohibitive in high bluff areas and as a result, more often than not roads and services are relocated further away from the hazard.



No simple solution

- ▶ Bluff shoreline erosion differs from the lower coastal dune systems in that the soil, once slumped out into the lake, cannot be regained in the high bluff zones. Therefore these properties will always be in a deficit zone.
- ▶ The materials then become trapped in the littoral cells and help nourish down drift low coastal zones such as Point Pelee, Rondeau and Long Point.

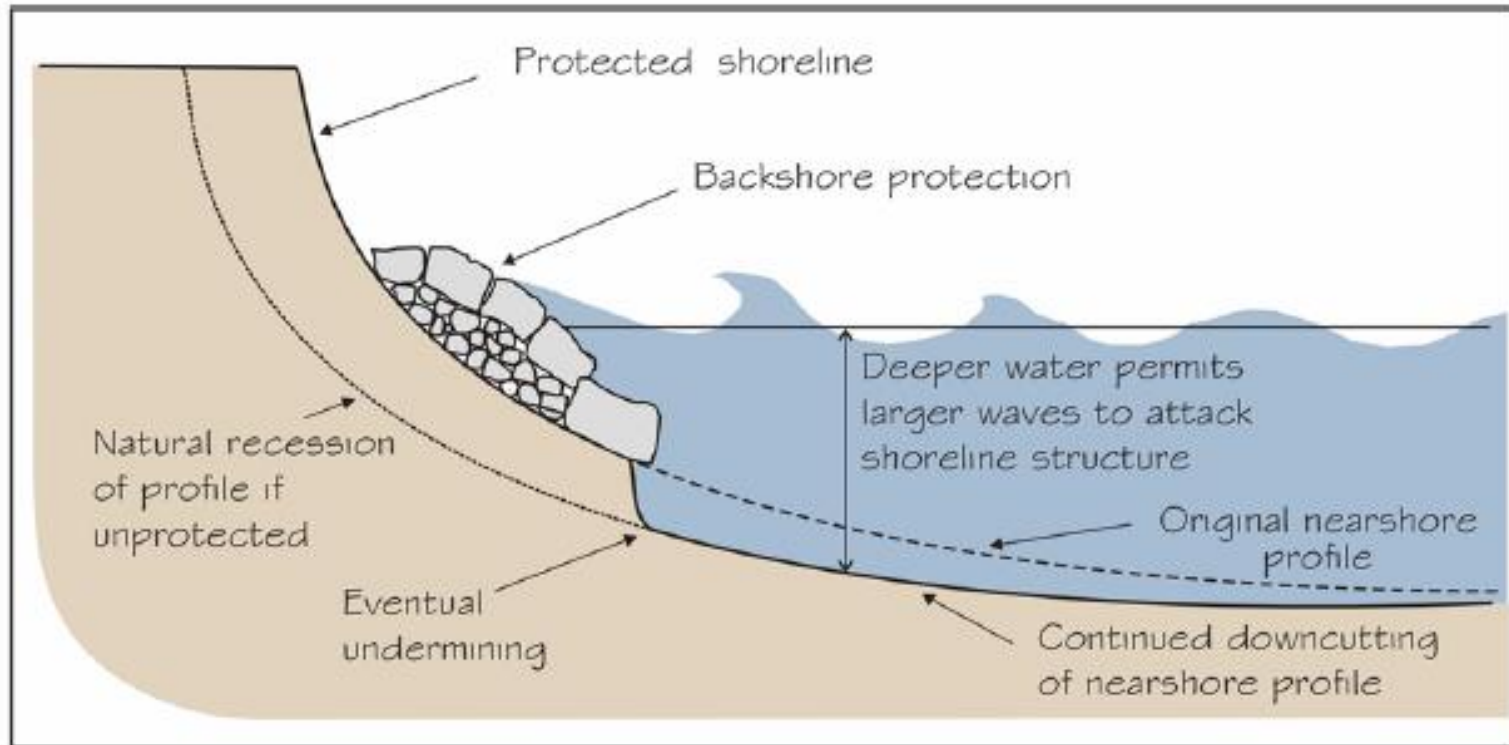
Staff always inform prospective purchasers of lake front property that they are buying an eroding asset. What they have today they may not have tomorrow, next year or twenty years from now. The bluff will continue to erode back in an unpredictable fashion, in spite of what protective measures are in place at the toe. Erosion occurs on various levels on a bluff:

- Overland or sheet flows from the top table lands (if mowing in the vicinity of the bluff, staff always recommend leaving a 1 to 2 metre wide buffer if not more of longer vegetation along the edge of the bluff for this reason);
- Erosion due to rain / snow directly impacting the face of the bluff (staff recommend leaving all vegetation on the face of the bluff to help buffer this effect);
- Erosion that occurs from water flowing through the soil layers;
- Erosion that occurs at the toe of the bluff during storm events; and
- Down cutting of the lake bed due to offshore processes.

To protect or not to protect!

- ▶ More often than not, the constant request from shoreline property owners is ‘how can I stop the erosion to my property’...simple answer, ‘you can’t’.
- ▶ Erosion is an on-going process that will continue to occur despite and/or as a result of what protective measures or ‘devices’ that are installed at the base of a bluff.
- ▶ Jetties (aka groynes), seawalls along the base of the bluff, or other devices intended to ‘stop’ erosion may end up having negative impacts to the property in question, or worse, increasing erosion rates to down drift properties. Who is liable?!?!
- ▶ Staff must be cognizant of this fact when dealing with landowner requests of this nature.

Shoreline protection, friend or foe!



Lakebed Downcutting at the Toe of a Shore Parallel Structure

Indiscriminate placement of 'shoreline protection' occasionally occurs in high bluff areas without a permit. In most cases the structures are quickly compromised by wave events, rendering the structures useless and in some cases, increasing the rate of erosion at these sites. This gabion basket wall was installed in 2007 as a result of a bluff failure in 2006. In 2013 when discovered it was already 1.5 m out from the toe of the new bluff location.

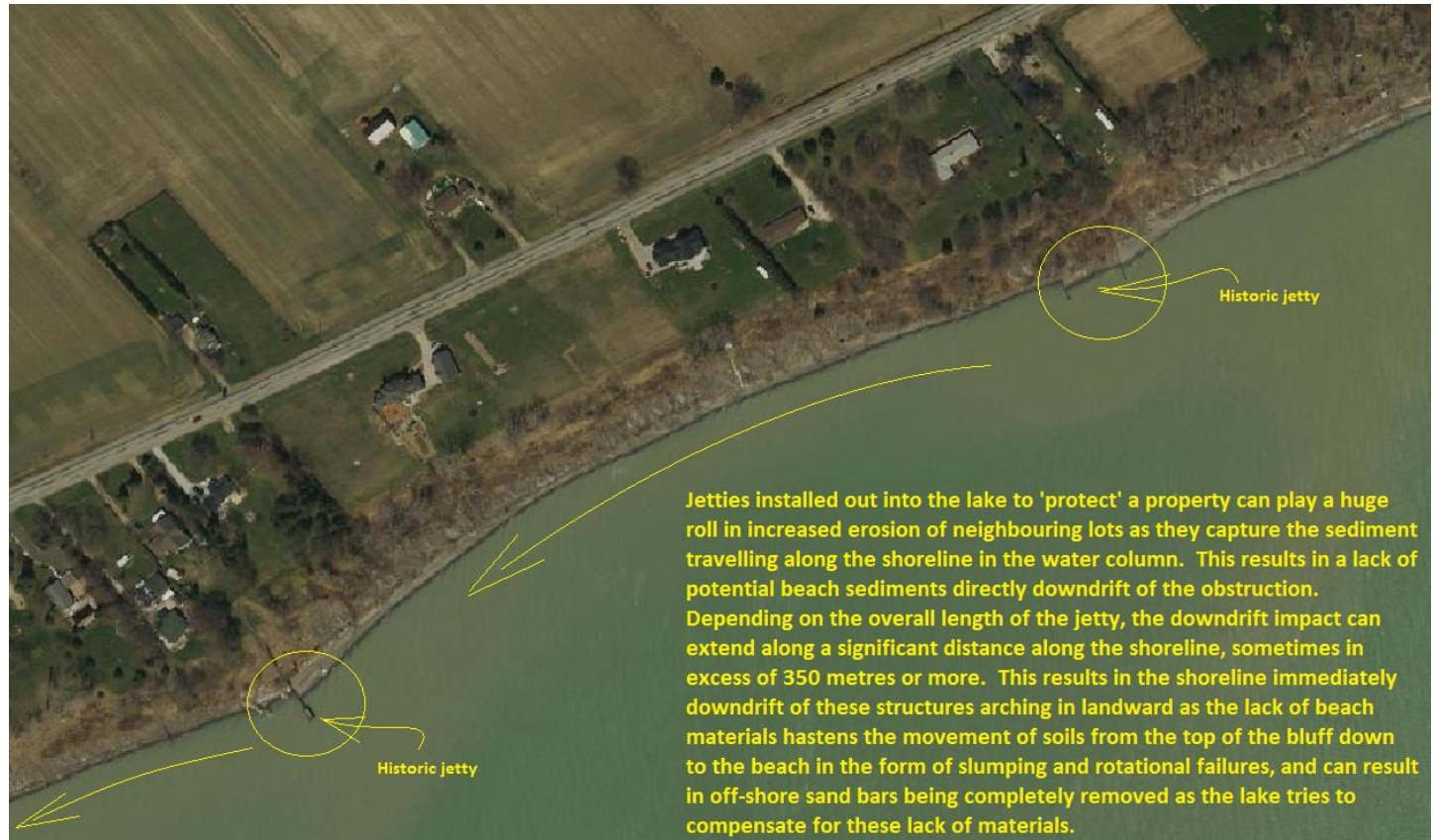


Even with approvals, landowners insistence that a shoreline wall will provide protection to their property inevitably ends with failure from either wave action around the ends of the wall during storm upset events, or from the weight of the bluff upon failure pushing the wall out into the lake.



Jetties = Sand hoarders

Jetties can have the effect of starving down drift properties, resulting in an increased rate of down cutting of the lake bed, starving the zone of protective sediment at the toe of the bluff, and resulting in the reach 'arching' back landward into the bluff as the bank slumps down in an attempt to stabilize the toe.



Other causes of erosion

Municipal tile outlets can also play a role in increases in erosion, particularly if tile structures fail or 'leaks' at any point along its length occur. This can compromise existing residential, agricultural and municipal structures (i.e. roads) by placing them within a hazard zone faster than if the structure wasn't present. Maintenance is key!



Sediment loss, not always lost

- ▶ Slumping of the lake bluffs is a natural process and is crucial to down drift properties in the form of beach accumulation at the toe of bluffs and for the continued health of point formations such as Point Aux Pins (Rondeau)
- ▶ Without the constant supply of sediments nourishing these areas, wave action and storm events will eventually erode away these protective barriers.

Starving of shorelines



A loss or trapment of sediment further up drift can have a negative impact on down drift shoreline zones, resulting in an increased rate of erosion of existing materials.

Calm lake conditions



Wind generated wave damage



May 1, 1997



May 1, 1997



'It's just a minor renovation'

This photo is of the same location taken in 2014. The property underwent major 'restoration' work in the early 2000's and a steel wall was built out into the lake to 'protect' the 'restored' residence from lake effect damages.



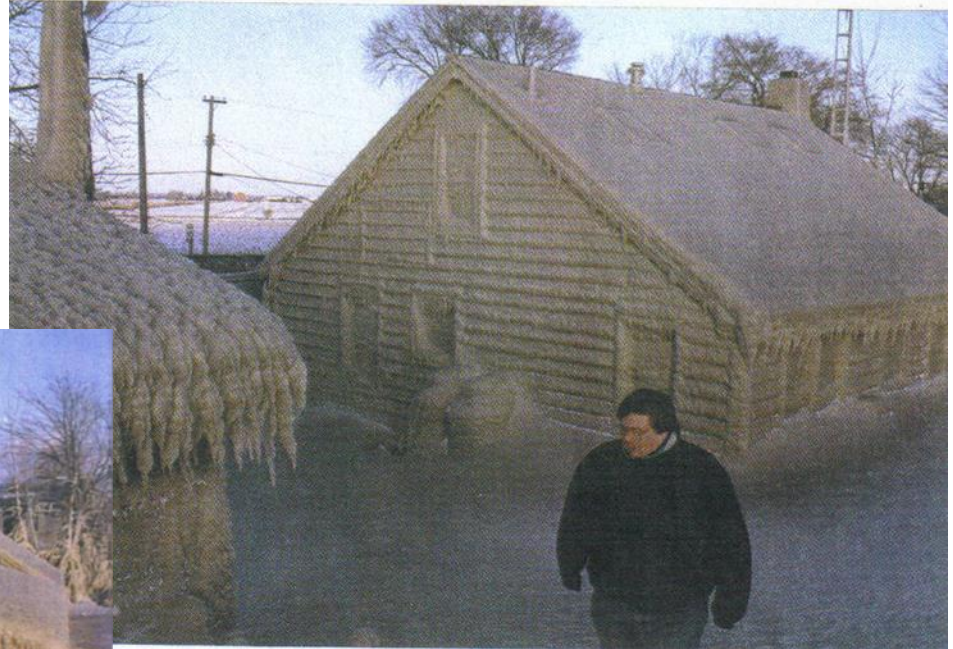
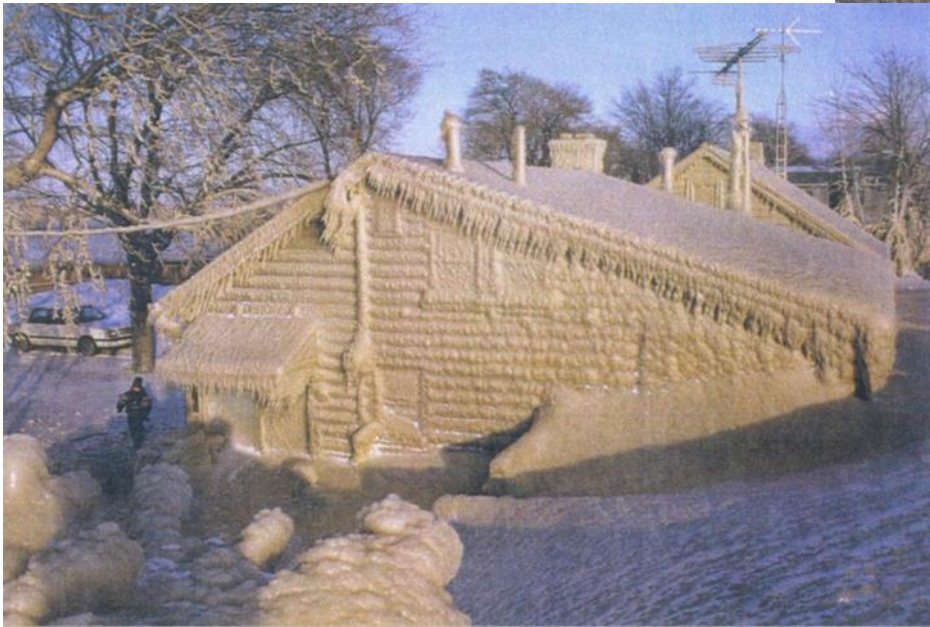
Wave uprush

Concerns of damage to the structures when waves directly hit the homes (knock off foundations or undermine foundations) and saturated septic beds, but also standing water around dwellings (mold / rotting foundations / water damage).



Winter Wave Uprush

Concerns of ice damming, ice loading (weight increase on the structures) and damage to the residential structures as the ice and sand mixture melts.



Sand Uprush



Structures negatively impacted when built in areas that would normally be an active dune system. Sand pushed up past shoreline protection measures, breaking windows and forcing doors open. Clean up of the interior and exterior repairs can be costly!

Erosion

When lake storm generated waves become so forceful, they can quickly remove vast quantities of sediments from areas otherwise considered protected under normal lake conditions.



Flooding



Impacts of wave generated storms results in water ponding behind protective lakeshore measures, holding the water in place. Pumping is required to alleviate flooding.

Infrastructure



Municipalities have responsibilities to rate payers in the form of associated municipal infrastructure, ensuring that safe ingress and egress is possible under storm related conditions. In this case the road was closed due to the water flowing over the surface eroding the base and sides. Pumping was not only needed to relieve standing water around the homes, but to prevent the road from failing completely.

Temporary dykes and high water levels during flooding result in concerns with road stability.



What does this mean for the CA?

- ▶ Indiscriminate filling for the purposes of 'protection'
- ▶ Illegal jetty / seawall installations
- ▶ Additions/new development pressures in hazard zones
- ▶ Minor renovations that result in an almost new structure within hazard (flood & erosion) zones
- ▶ Infilling out into the lakes causing down drift issues



The End



Home on Temporary Piles (assumed relocation due to bluff recession)