

West Harbour Waterfront

Bayfront Beach Water Quality Investigation

APRIL 20, 2017



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Presentation Overview

- **Study Process**
 - Background Review
 - Specialists Workshop
 - Public and Stakeholder Participation
 - Option Development and Evaluation
 - Analysis and Modelling
 - Preliminary Recommendations
- **Study Report**



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Board of Health Direction

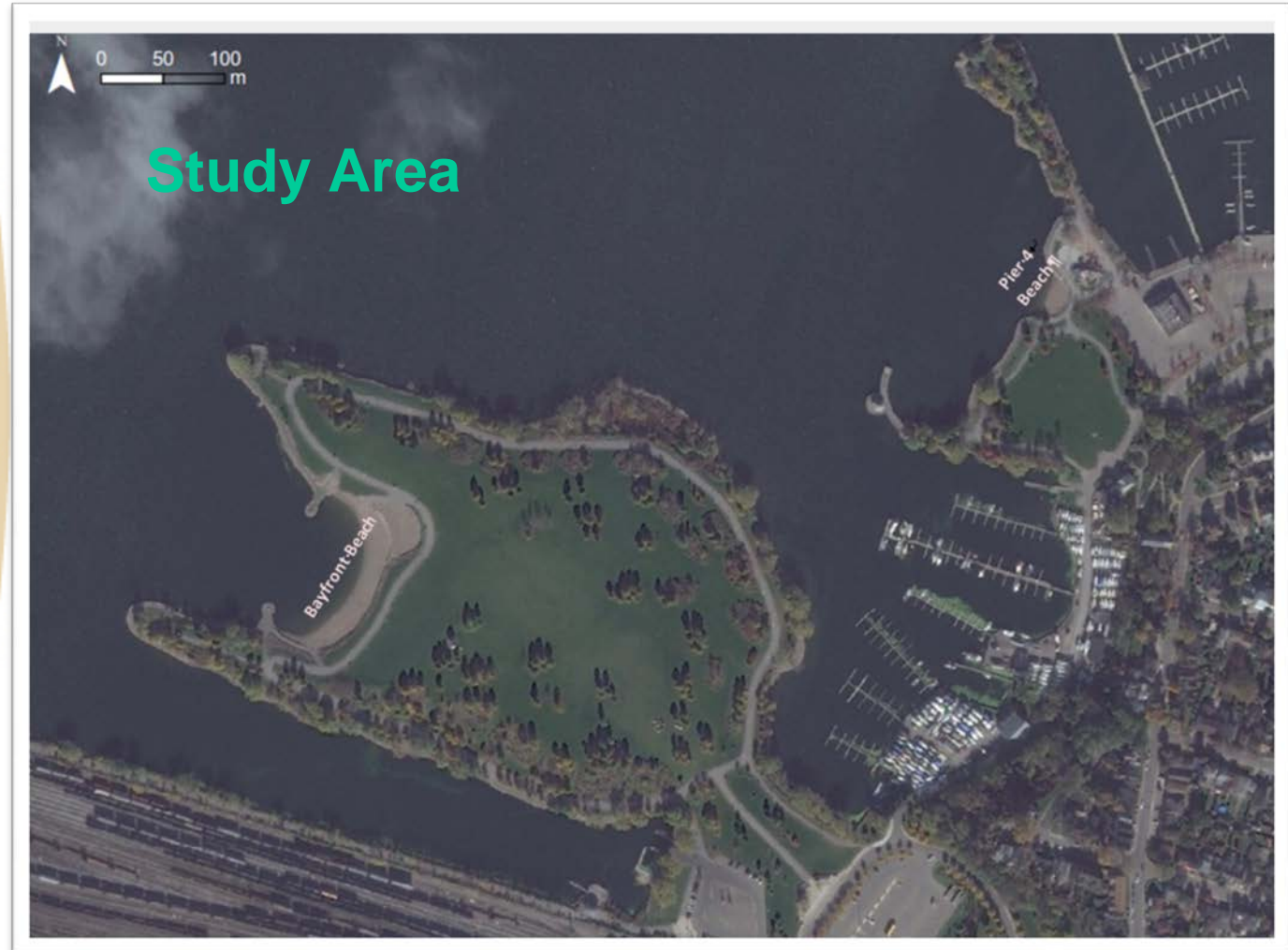
“That staff be directed to provide the Board of Health with a presentation on the outcome of the study on the Suitability of Bayfront Beach as a Public Beach.”



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Vision for Bayfront Beach*:

- “Swimming area with enviro-safe technology and bird management.”
- Implementation of “a form of acceptable technology, such as separation curtain, environmentally safe treatment and stormwater management to improve beach water quality.”

* *Hamilton West Harbour Waterfront Recreation Master Plan (2010)*



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Water Quality Conditions

- In 2015, the Bayfront Beach was not safe for swimming 78% of the time between Victoria Day and Labor Day
- The cause of unsafe water quality in 2015 was either excessive concentrations of E-coli bacteria or the presence of microcystin-producing Cyanobacteria
- Conversely, water quality in the harbour proper (beyond the beach area) is generally suitable for recreational swimming

** Hamilton West Harbour Waterfront Recreation Master Plan (2010)*



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Water Quality Conditions

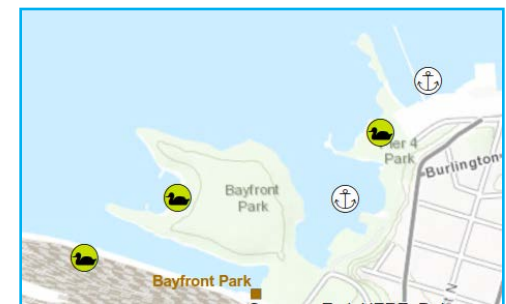
- Study Findings - water quality at Bayfront Beach is not suitable for use as a swimming area without an intervention to improve the water quality.
- The intervention(s) should mitigate the following factors that are adversely affecting the water quality at Bayfront Beach
 - Physical characteristics of the beach (beach slope, sand moisture and grain size) and water circulation near the beach.
 - Sources of pollution near the beach (waterfowl faeces) and within the general watershed of Hamilton Harbour.
 - The occurrence of cyanobacteria blooms.



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Water Quality Problem- Potential Sources

- Watersheds
 - Wastewater Treatment Plants
 - Combined Sewer Overflows
 - Internal Loading (Algae, Sediment)
 - Waterfowl and Gull Droppings
 - Direct and Runoff
 - Beach Sand (Secondary)
 - Boats in Marina
- OTHER FACTORS:
- Water Circulation
 - Park Maintenance
 - Beach Maintenance
 - Drainage Patterns at Beach
 - Algae



Point Sources

- ▲ CSO
- CSO with Tank
- WWTP



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Consultation

- Stakeholders / Specialists
- Public



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Specialists Workshop - Input on Issues

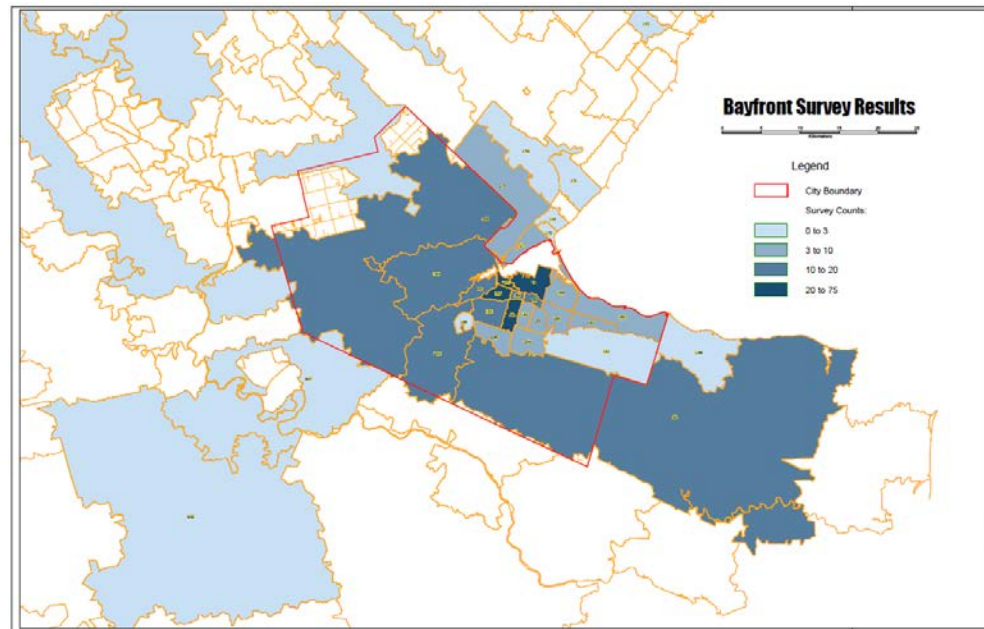
- Poor Circulation
- Point Sources – WWTP, CSO's, Other
- Waterfowl and Gulls
- Watershed Runoff
- Beach Sand Contamination
- Internal Loads of Nutrients
- Beach Slope(drainage)
- Cladophora and Other Algae
- Cyanobacteria Blooms
- Climate Change



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Public Participation

- Swimmable beach is valued
- Need to consider overall area (no distinction between Bayfront and Pier 4)
- Water quality is an area-wide concern



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Option Development and Evaluation

- Physical / Circulation Alterations
- Source Reduction / Treatment Strategies
- Change of Use



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Physical / Circulation Alterations

Move the beach out further to the Harbour

Taking the major headlands off to increase water exchange

Construction of a trench to facilitate circulation at the beach

Mechanical circulation (5 cm/s)

Conversion of the basin into a managed 'pool' area with internal recirculation and treatment

Source Reduction / Treatment Strategies

Upgrades to WWTPs and CSOs (existing programs)

Waterfowl control

Sloping land drainage away from the beach and drainage intercept

Sand de-contamination or replacement

Treatment of blue-green algae

Improving water quality in urban and agricultural watersheds

Limiting iron input to the harbour

Change of Use

Deep water swimming

Beach relocation through expansion of Pier 4 beach

Closing of the beach and conversion to a manmade wetland



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Water Quality

- Water is “Cleaner” Off Shore
- Cyanobacteria Blooms on the Rise
- Maximum Bacteria Count at Ankle Depth

Sources of Contamination

- Primary Source – Waterfowl and Gulls; Opportunities to Enhance Waterfowl and Gull Control
- Work Being Done to Decrease WWTP loading (CSO work done in past)
- CSO Overflow every 2 to 3 years
- Watershed Loadings (not a Significant Source for Beach)
- Concern over Indirect Source (Sediment)
- Marina is a potential source of Bacteria
- Potential for Sand Contamination as a Source

Processes

- Wind – Current – Bacteria
- Circulation Rate Exceeds Mortality of Bacteria
- Grooming of Sand appears to Increase Bacteria Count
- Circulation Pattern Changes depending on Wind Direction
- Could have Containment with a Specific Wind Pattern
- Off Shore Bathymetry a Barrier to Circulation
- Removal of the north arm has most significant impact on currents – also impacts on pier 4
- Understanding of Cause and Effect needs more work
- Potential use of ultrasound for Cyanobacteria control



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Preliminary Recommendations and Relationship to Findings

Proposed Measure

- Enhanced waterfowl control
- Improve drainage at Beach
- Beach sand alteration and maintenance

Discussion

- Build on past experience
- Extend duration and level of effort
- Further education needed
- Direct runoff away from Beach
- Change characteristics to mitigate



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Preliminary Recommendations and Relationship to Findings Cont'd

Proposed Measure

- Monitoring and additional analysis of factors affecting bacteria levels
- Control Cyanobacteria (pilot project - ultrasound)

Discussion

- Continue to evaluate cause and effect between water currents and bacteria
- Some concern with regard to secondary impacts

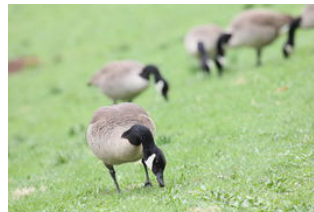


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Enhanced Waterfowl & Gull Control

Existing Control Practices

- “Do not feed the birds” signs;
- Off-shore buoy lines;
- Shrubs and armour rock;
- Harassment/hazing: lasers, dogs, pyrotechnics, distress calls and effigies;
- Beach grooming and sweeping of paved pedestrian pathway; and
- Egg oiling.



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- 1) **Year-round** application of existing control practices;
- 2) **Implement monitoring program** to assess effectiveness and correlate waterfowl and gull abundance with E. coli;
- 3) **Refine** control practices.

Additional / Alternative Measures

- Less frequent mowing;
- Reducing / discontinue use of fertilizers;
- Planting trees along waterfront trail;
- Monofilaments over the beach;
- Treating grass with taste deterrents;
- Falconry or drones; and
- Relocation.



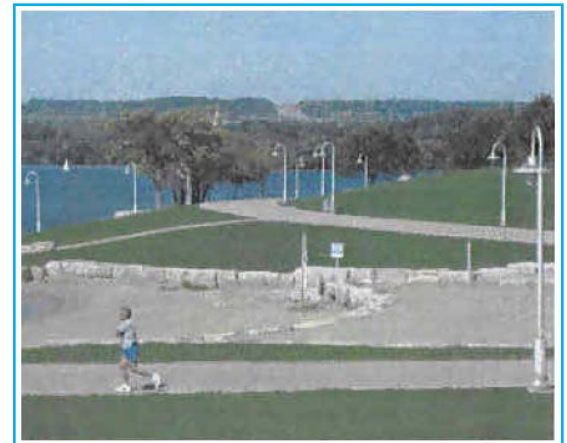
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Next Steps

- Circulate final report to specialists / stakeholders for comment and consensus re recommended approach
- Formalize Implementation Strategy
- Report back to PWC with recommendations



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Thank You

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