

# **St. Clair River Area of Concern**

## **Engineering and Design Plan for Management of Contaminated Sediment**

Community Information Session

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# Overview

Background Information - Actions To Date



Sediment Management Goals and Remedial Objectives



Scope, Results & Conclusions from  
2019/2020 Pre-Design Investigation

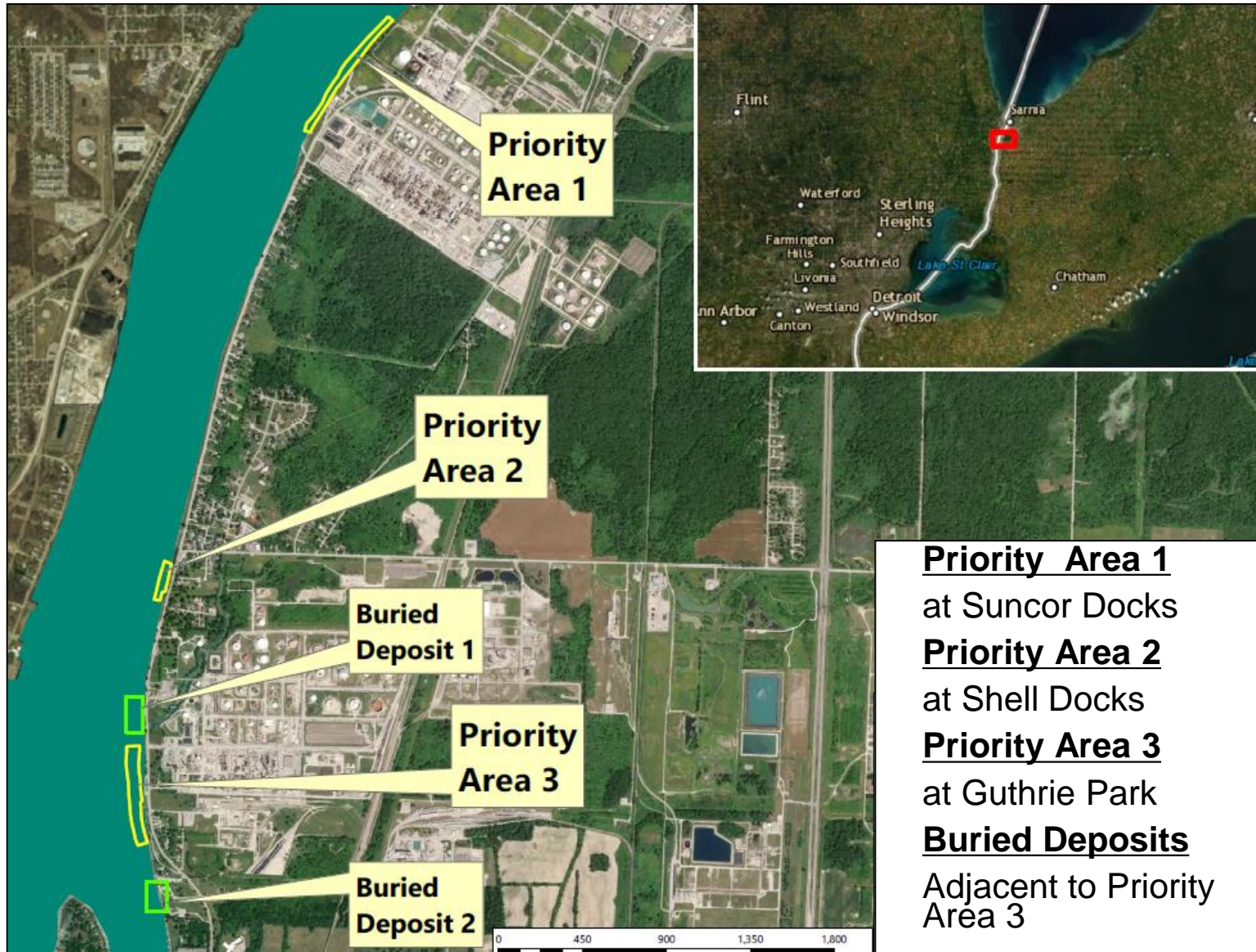


Recommended Remedial Approach



Next Steps

# Priority Areas and Buried Deposits



# Project Timeline

- **2005** – Clean-up of river sediment adjacent to the Dow Canada property completed
- **2007** - Technical team established to develop a management strategy for remaining contaminated sediments
- **2009** – Sediment assessment of three remaining priority areas completed.
- **2013** – Sediment Management Options report completed and extensive community engagement conducted
- **2016** – Technical group developed risk-based sediment goal for mercury – recommended active remediation in some portions of the Priority Areas



# Project Timeline

(Continued)

- **December 2018** - St. Clair Region Conservation Authority granted funding from Environment and Climate Change Canada, the Ontario Ministry of Environment, Conservation and Parks, and Dow to lead preparation of a detailed engineering and design plan.
- **April/May/June/October 2019** - Public, Indigenous, stakeholder/water-lot owner information sessions were held to announce the project's initiation. Sessions led by the SCRCA with support from project partners.
- Key messages during information sessions:
  - Remove sediment via hydraulic dredging or, in targeted areas, mechanical dredging where mercury concentrations in surface sediment exceed 10 mg/kg;
  - Replace with a layer of clean backfill so the average mercury concentration in surface sediments in each priority area is < 3 mg/kg;
  - In areas inaccessible for dredging, consider capping to cover contamination;
  - Details will be refined based on additional data collection during detailed engineering design of the remedy.

# Project Timeline

(Continued)

- **August 2019** - Parsons Inc. hired to begin the pre-design investigation and design.
- **2019 & 2020** – Extensive data collection conducted as part of pre-design investigation, leading to development of the recommended approach.
- Field activities included:
  - water velocity measurements and sampling of surface sediment to assess sediment stability;
  - collection of numerous shallow sediment samples and deep core sediment samples to measure mercury concentrations at various depths;
  - a bathymetry survey to measure sediment surface elevations in the targeted areas.

# Sediment Management Goals

- Support local risk reduction.
- Limit downstream transport of sediment with elevated mercury concentrations and the re-exposure of buried sediment with elevated mercury concentrations.
- Contaminant mass removal/isolation where feasible.

## Remedial Objectives

- Objective established in 2016 by a Technical Team incorporating MECP data for sediment, worms and fish.
- Achieve a **surface-weighted average concentration (SWAC) of 3 mg/kg** in surface (0-15 cm) sediment after remediation for protection of local fish.
- Target those areas where mercury concentrations in surface sediment are **10 mg/kg or more.**



# New Information – 2019 Extensive & 2020 Pre-Design Investigations

## Priority Areas

- Mercury analysis from 94 sample locations
- Grain size analysis from 3 sample locations
- Water velocity measurement at 9 locations
- Bathymetric survey

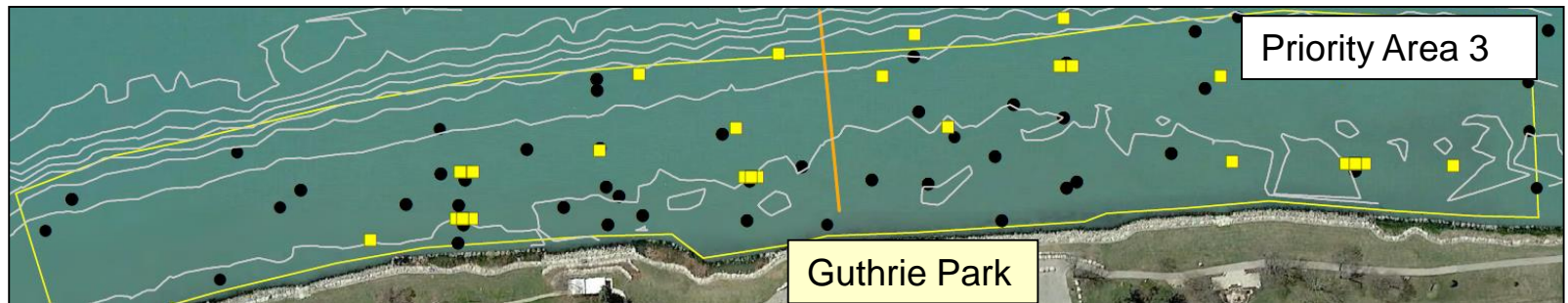
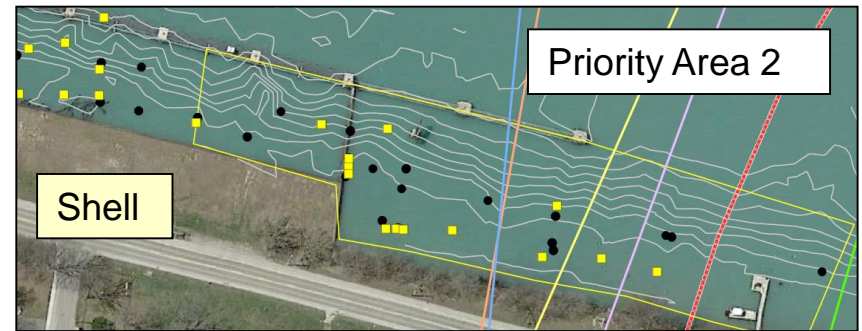
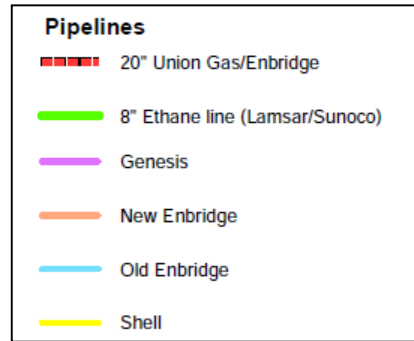
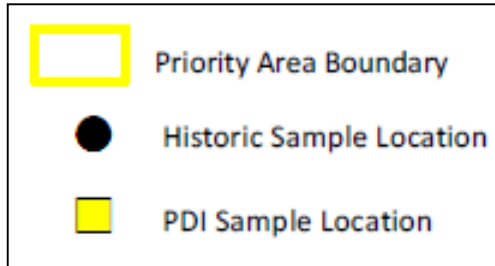
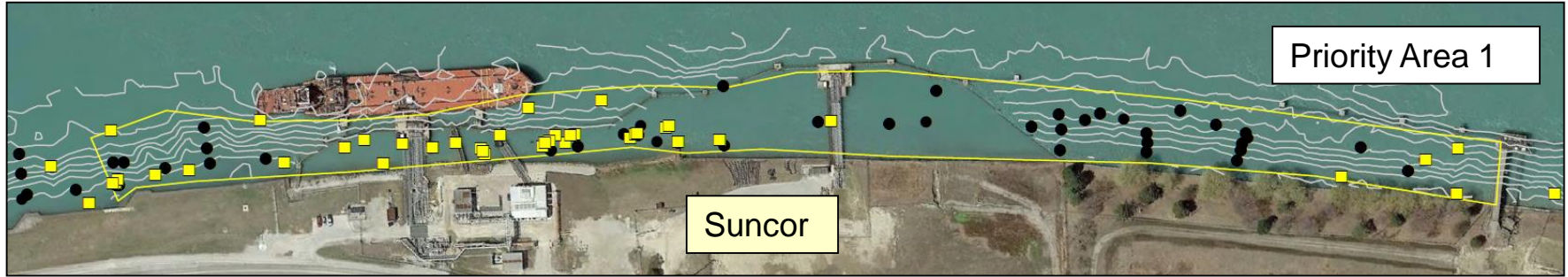


## Buried Deposits

- Mercury analysis from 5 locations co-located with historical samples
- Grain size analysis from 7 sample locations
- Water velocity measurement at 6 locations
- Bathymetric survey

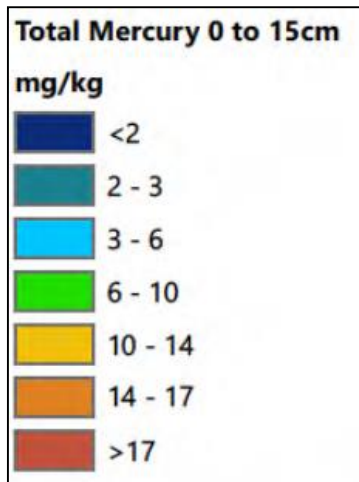
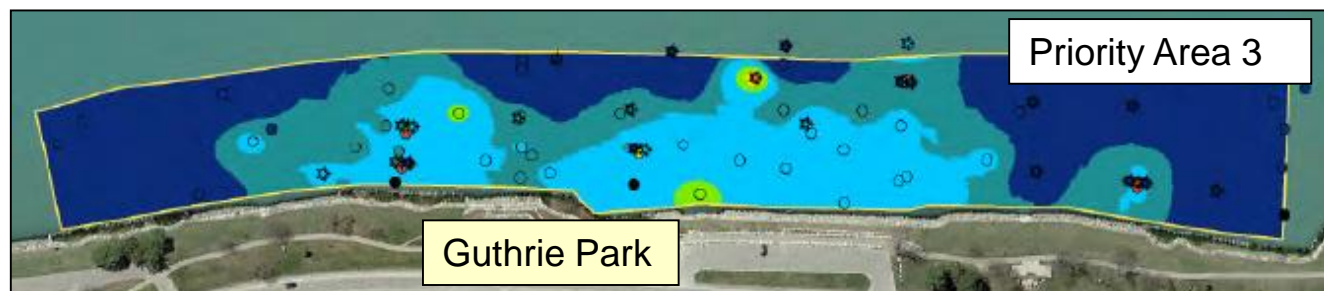
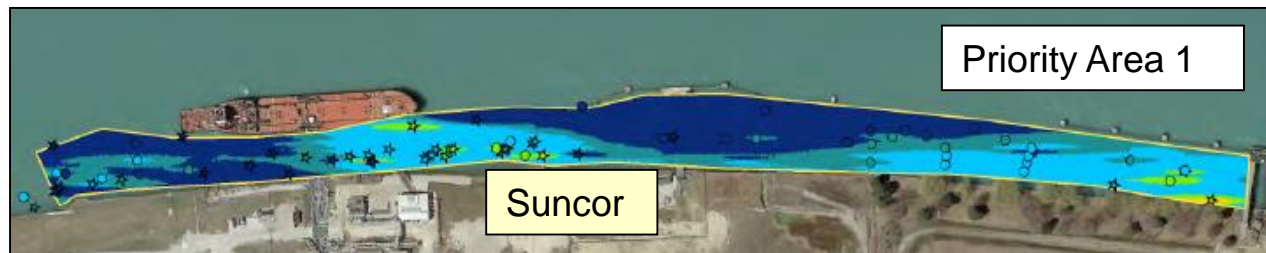


# Extensive Sediment Sampling Completed During 2019/2020 Pre-Design Investigation



# Mercury Concentrations in Surface Sediment

Area	SWAC (mg/kg)
PA-1	2.6
PA-2	2.4
PA-3	2.3

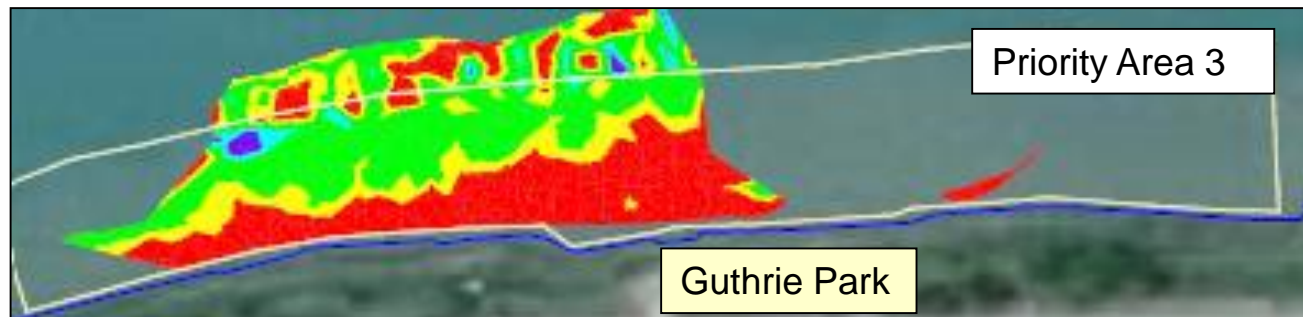
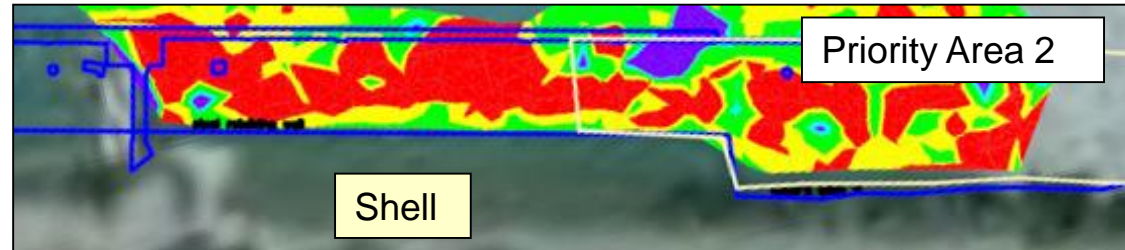
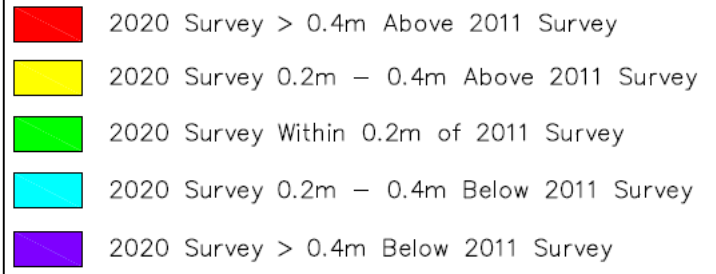
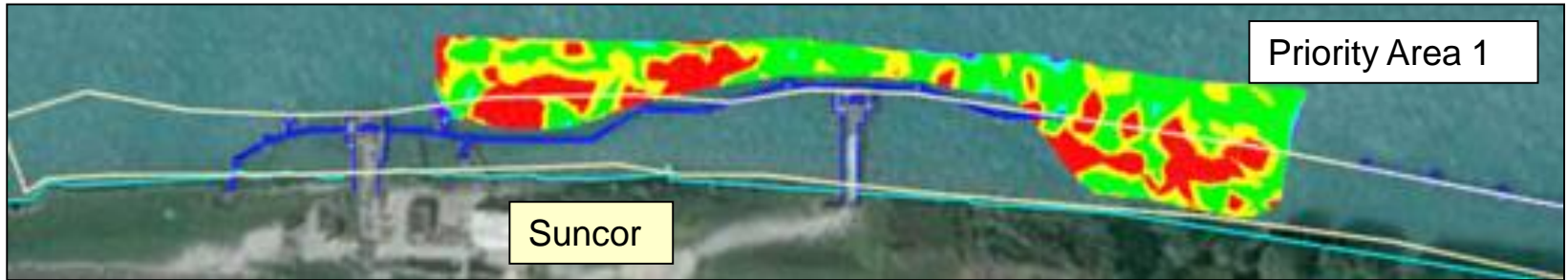


## Natural Recovery – Lines of Evidence

- Mercury concentrations in surface sediment have decreased over time.
- Highest mercury concentrations are typically buried.
- Bathymetry (sediment surface elevation) changes show net sediment deposition over time.
- Sediment sampling and bathymetry survey were conducted following a 100-year high river flow event in 2019 when the potential for sediment erosion was high.

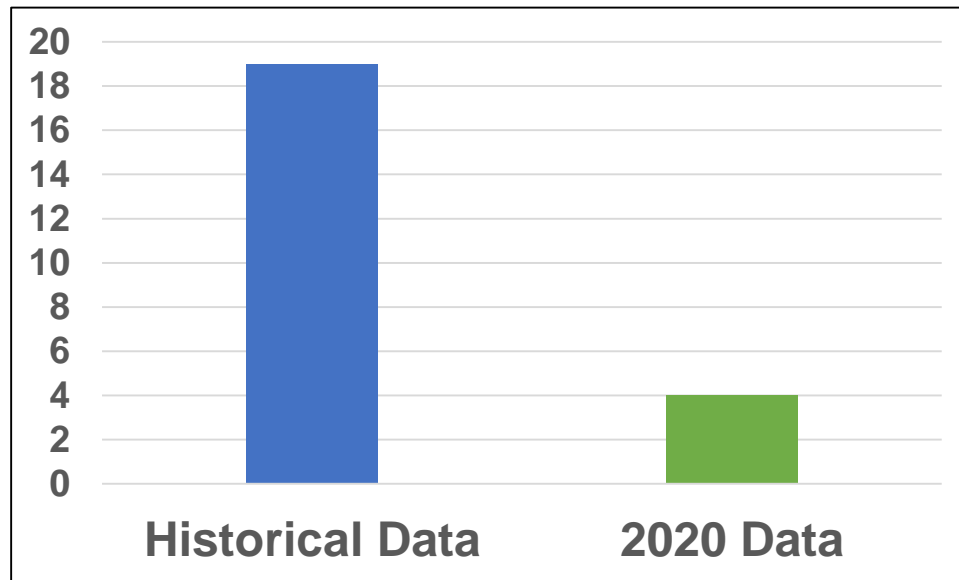
# Sediment Net Deposition Over Time

- Based on comparison of 2011 & 2020 bathymetry survey overlapping areas



# Mercury Concentrations in Surface Sediment Have Decreased Over Time

- Average mercury concentration in surface sediment decreased at locations that were resampled in 2020 during the PDI



- SWACs decreased based on inclusion of recent data

Priority Area	SWAC (Data thru 2014) (mg/kg)	SWAC (Data thru 2020) (mg/kg)
PA-1	4.0	2.6
PA-2	4.1	2.4
PA-3	3.1	2.3

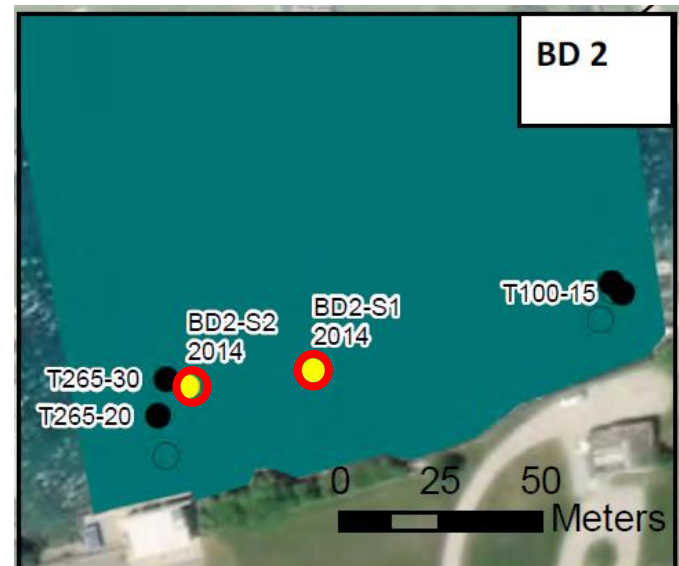
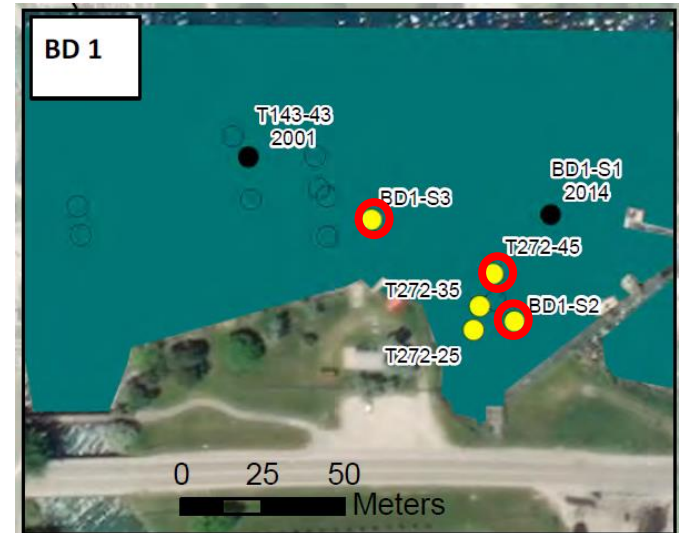
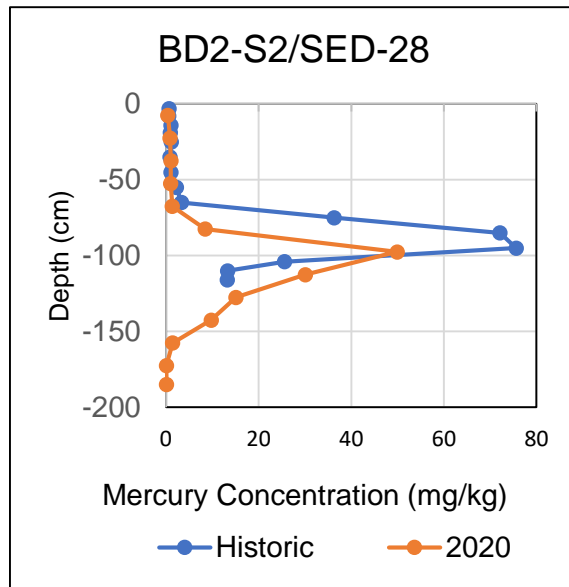
# Sediment Stability Assessment Conclusions

- High flows have occurred in the St. Clair River over the past few years.
  - Including 100-year flow events
- Measurements of near shore velocities were performed during a high flow event in 2019.
  - Velocities and computed bed shear stresses were very low
- Sediment resuspension potential is low.
- Historical bathymetry comparisons show deposition.
- Multiple sampling events show that highest concentrations continue to be at depth, even after a 100-year flow event.

New data and detailed analysis indicate that re-exposure of subsurface buried mercury is unlikely.

# Buried Deposits

- Cores collected from 5 historic sample locations
- Peak mercury concentrations buried deeper than historic results, even after multiple 100-year high flow events
- Deposits are stable and no further action required





# Conclusions & Recommended Remedial Approach

- No measurable risks presented to fish by mercury in sediment.
- Risk–based SWAC goal of 3 mg/kg mercury in surface sediment has been met in all Priority Areas and Buried Deposit Areas.
- Significant decreases in mercury concentrations in surface sediment compared to historical results due to natural recovery following remediation of upstream sources.
- Re-exposure of subsurface buried mercury is unlikely.
- An **Erosion Resistant Cover** is recommended in focused areas to enhance erosion protection and further decrease mercury concentrations in surface sediment.

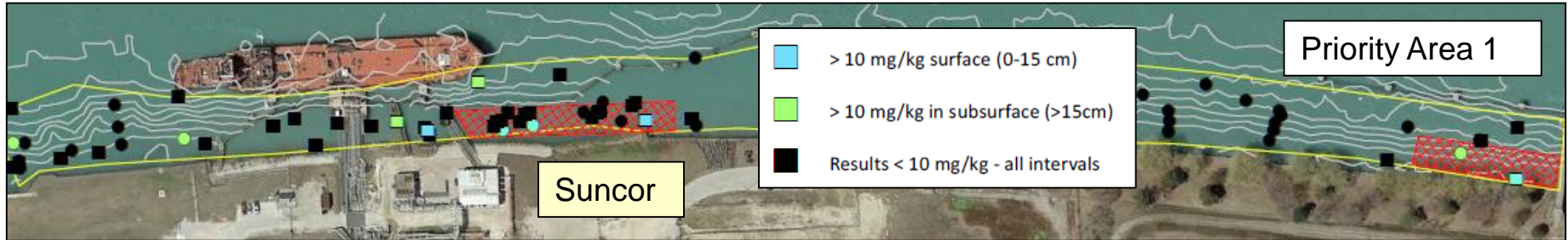
# Erosion Resistant Cover

- Will consist of washed fine gravel to provide erosion resistance and provide fish habitat.
- To be placed in areas with highest mercury concentrations in surface sediment to further reduce mercury concentrations in surface sediment.
- Minimum thickness of 15 cm, average thickness of approximately 25 cm.
- Preferred over dredging because:
  - Appropriate response based on no measurable risk
  - Avoids risks/challenges associated with dredging, such as resuspension of buried contamination, wastewater treatment, and staging, dewatering and transportation of dredged sediment



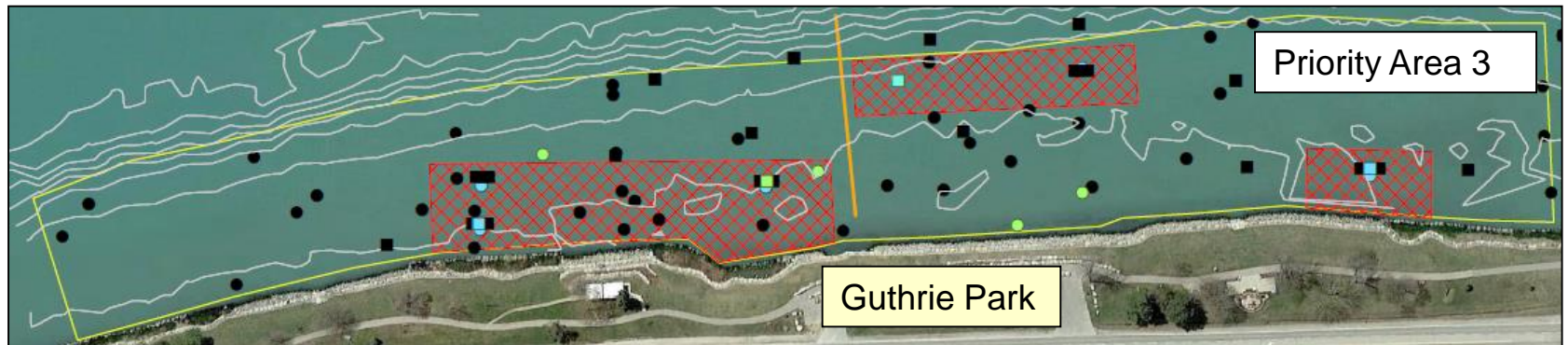
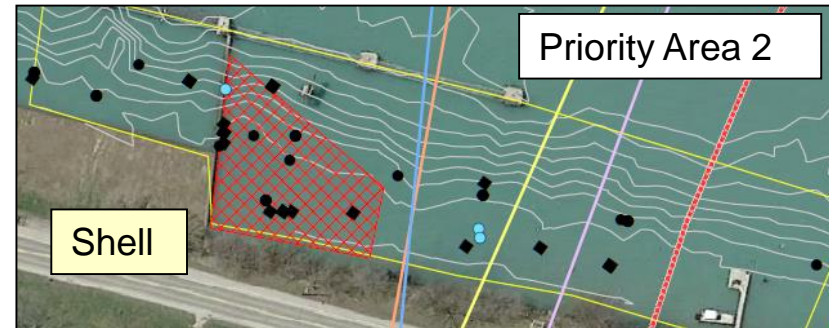
Typical Cover  
Placement

# Erosion Resistant Cover



- **Cover areas were developed considering:**

- Historical and PDI surface sample locations with mercury concentrations >10 mg/kg.
- Construction challenges presented by buried utilities, loading docks and walkways.



# Erosion Resistant Cover

- Cover results in predicted reduction in SWACs in all Priority Areas

Priority Area	Cover Area (Acres)	Current SWAC (Data thru 2020) (mg/kg)	Post Cover SWAC (mg/kg)
PA-1	0.6	2.6	2.2
PA-2	0.3	2.4	2.2
PA-3	1.8	2.3	1.8

# Conceptual Monitoring Plan

- Water Quality During Placement of the Erosion Resistant Cover
  - Real time monitoring of turbidity downstream of construction activities to ensure compliance with turbidity and total suspended solids water quality goals
  - Operations will be modified and/or suspended as appropriate based on monitoring results to ensure compliance
  - Goals and monitoring details to be developed during design
- Erosion-Resistant Cover
  - Immediately following placement to verify construction was consistent with design
  - The need for long-term monitoring to be determined during design

# Protecting the Erosion Resistant Cover and Preventing Disturbance of Buried Sediment

- There is always the potential for another party to need to do work at some point in the future, along the St. Clair River shoreline, where mercury remains at depth and/or where the Erosion Resistant Cover has been applied. Work could be related to such activities as the addition, repair or replacement of infrastructure (e.g. pipelines, docks or walkways).
- It may be beneficial to have some form of legal or administrative measures in place to restrict future activities, and/or require they be done in a manner that is protective of the cover and minimizes the potential for resuspension and transport of mercury-impacted sediment.
- Discussions are underway with agencies and adjacent water lot owners to determine the best approach to achieve this goal.

# Summary

- No measurable risks to fish presented by mercury in sediment.
- Risk-based SWAC goal of 3 mg/kg mercury in surface sediment has been met in all Priority Areas and Buried Deposit Areas.
- Significant decreases in mercury concentrations in surface sediment compared to historical results due to natural recovery.
- Re-exposure of subsurface buried mercury is unlikely.
- No action recommended for the Buried Deposits.
- An Erosion Resistant Cover is recommended in focused areas within Priority Areas 1, 2 and 3 to enhance erosion protection and decrease mercury concentrations at the surface.
- The planned remedial actions will achieve the sediment management goals and remedial action objectives.

## Next Steps

Activity	Timing
Information Sessions - Aamjiwnaang First Nation, Walpole Island First Nation, Agencies, Industries, Municipalities, and Community	June 2021
Posting of Virtual Community Information Session to Conservation Authority Website	July 2021
Submission of Draft Engineering and Design Report to Conservation Authority	August 2021
Submission of Final Engineering and Design Report to Conservation Authority	November 2021
Acceptance of Final Engineering and Design Report	December 2021
Implementation of Engineering and Design Plan	To Be Determined



**Thank you!**