The Ottawa River: A Report to the Community

Stickney Avenue Depositional Zone (SADZ) Investigation

May 22, 2007

Presented by:

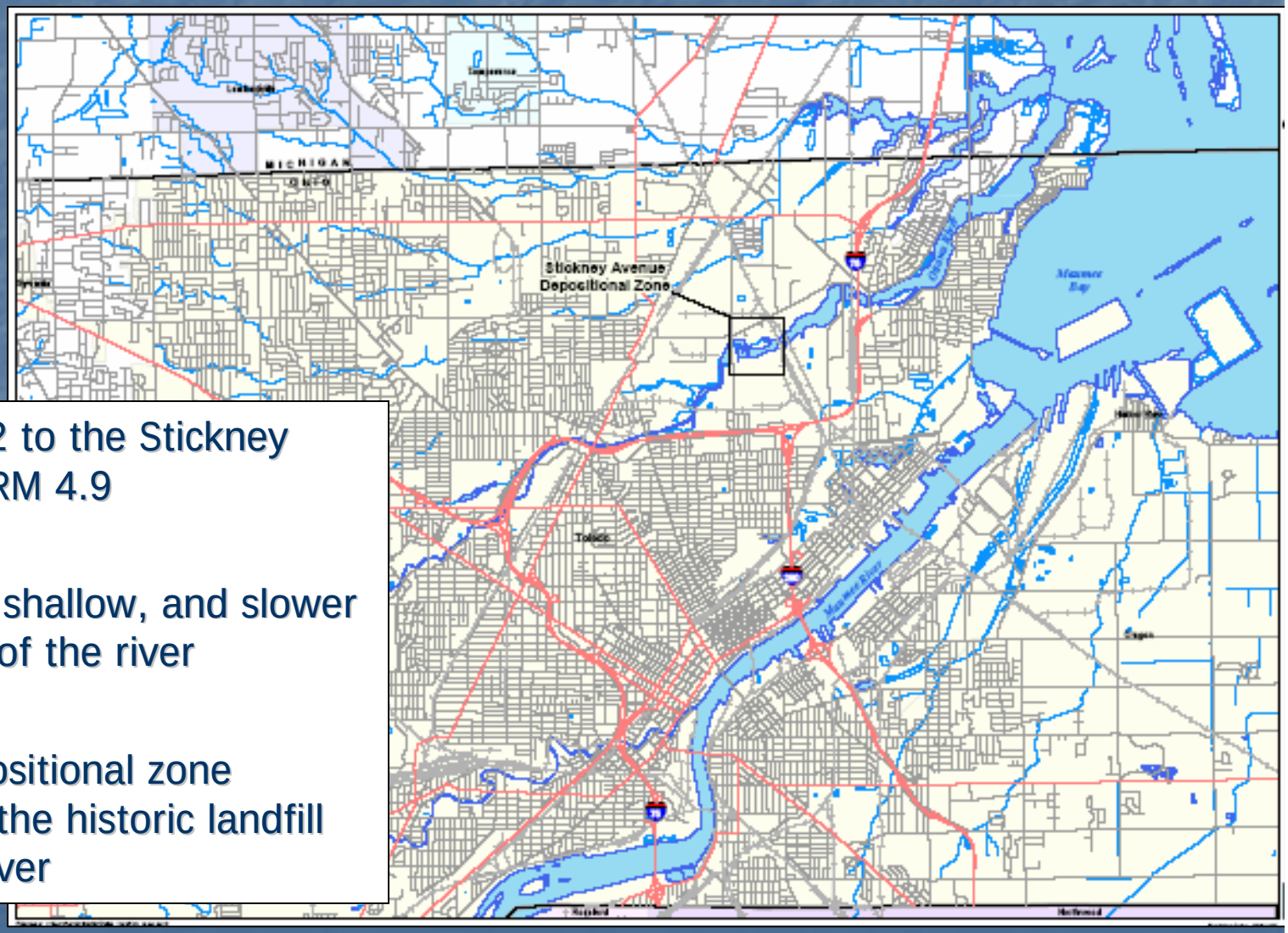
Scott Bell, P.E., BCEE (LimnoTech)
Kelly Bensman (Hull & Associates)

TMACOG

LimnoTech
Water | Environment | Scientists | Engineers

Hull & associates, inc.

SADZ Location & Characteristics



- Between RM 4.2 to the Stickney Avenue bridge RM 4.9
- Wide, relatively shallow, and slower moving section of the river
- First major depositional zone downstream of the historic landfill section of the river

SADZ Previous Studies*

- Physical & hydraulic conditions in river favor sedimentation
- Relatively thick sediment layer with buried PCB impacts
- Conditions indicate that it may be feasible to manage contaminated sediments in place through capping and/or monitored natural recovery

*(LimnoTech, 2001; Hull & Associates, 2004)

SADZ Physical Description

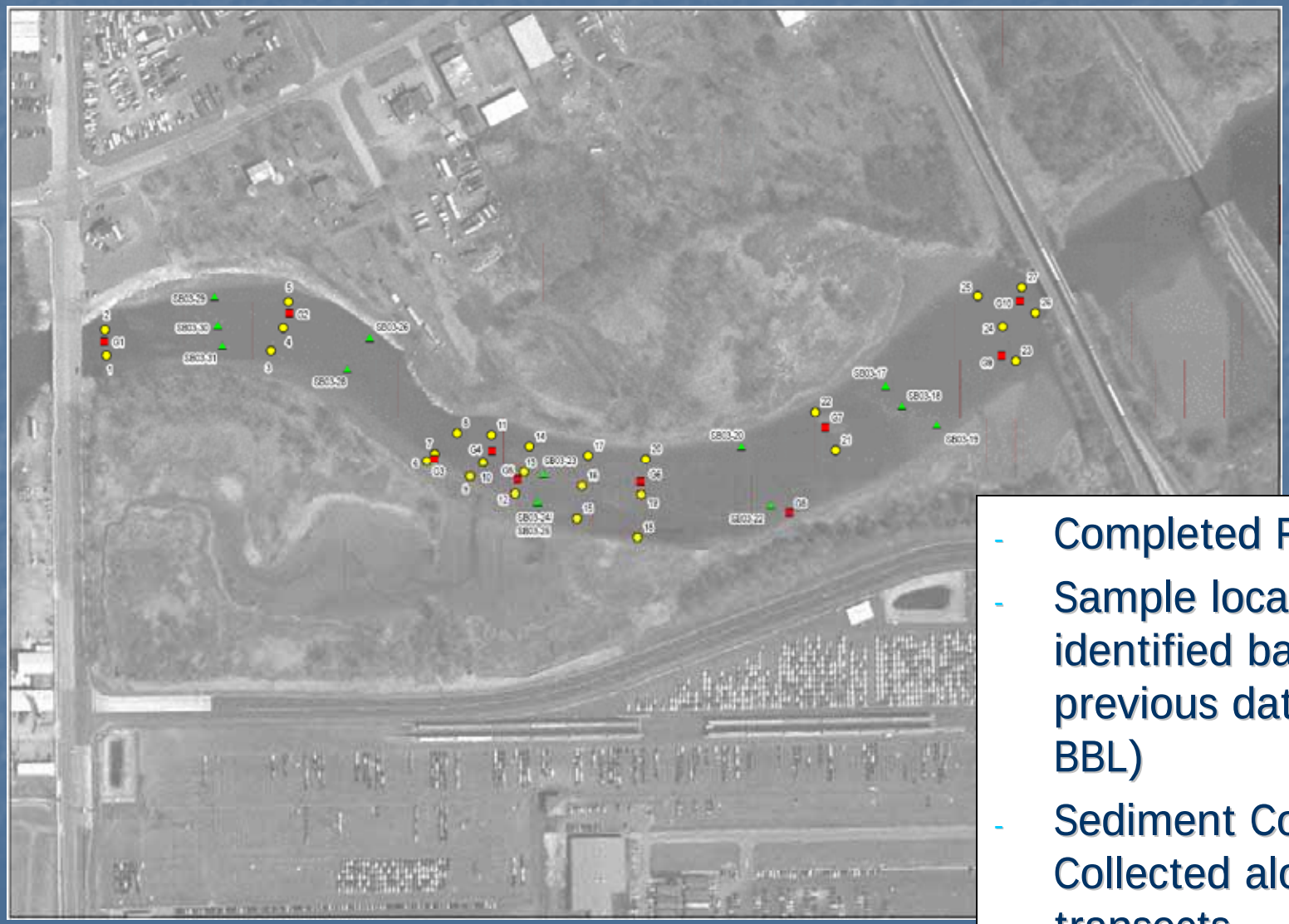
SADZ Backwater Area

- Periodically inundated
- Receives storm water runoff from nearby industrial and urban areas
- Physical and chemical characteristics unknown

SADZ Project Scope

- Investigate sediment and hydrological characteristics
- Collect supplemental physical, chemical data to support remedial design
- Collect toxicity data to assist U.S. EPA in sediment toxicity evaluation
- Target investigation to fulfill the requirements of Great Lakes Legacy Act to position project for possible funding for remediation

SADZ Sediment Sampling



- Completed Fall 2006
- Sample locations identified based on previous data (Hull, BBL)
- Sediment Cores Collected along 7 transects

Sample Collection

Sediment Cores

- Supplemental physical and chemical data to assist in remedial design
- 27 sediment cores collected
- Located along 7 transects
- 1-12 ft. core lengths

Surficial Sediment

- Data to assist U.S. EPA in sediment toxicity evaluation
- 10 samples collected
- located along length of SADZ (RM 4.2 – RM 4.9)

Sediment Core Sample Collection

- Cores processed on-shore
- Visual Characterization
  - Color
  - Sediment texture
  - Relative organic content
  - Presence of non-soil materials

Sediment Core Sample Collection

- 57 composite samples collected
- Chemical Analysis
  - PCBS, PAHs, Lead, TOC
- Physical Analysis (10 samples)
  - Grainsize Distribution
  - Atterberg Limits
  - Natural Moisture Content
  - Specific Gravity

Sediment Grab Sample Collection

- 10 grab samples collected
- Chemical Analysis

  -AVS/SEM (acid volatile sulfides/simultaneously extracted metals): As, Cd, Cr, Cu, Pb, Hg, Ni, Zn

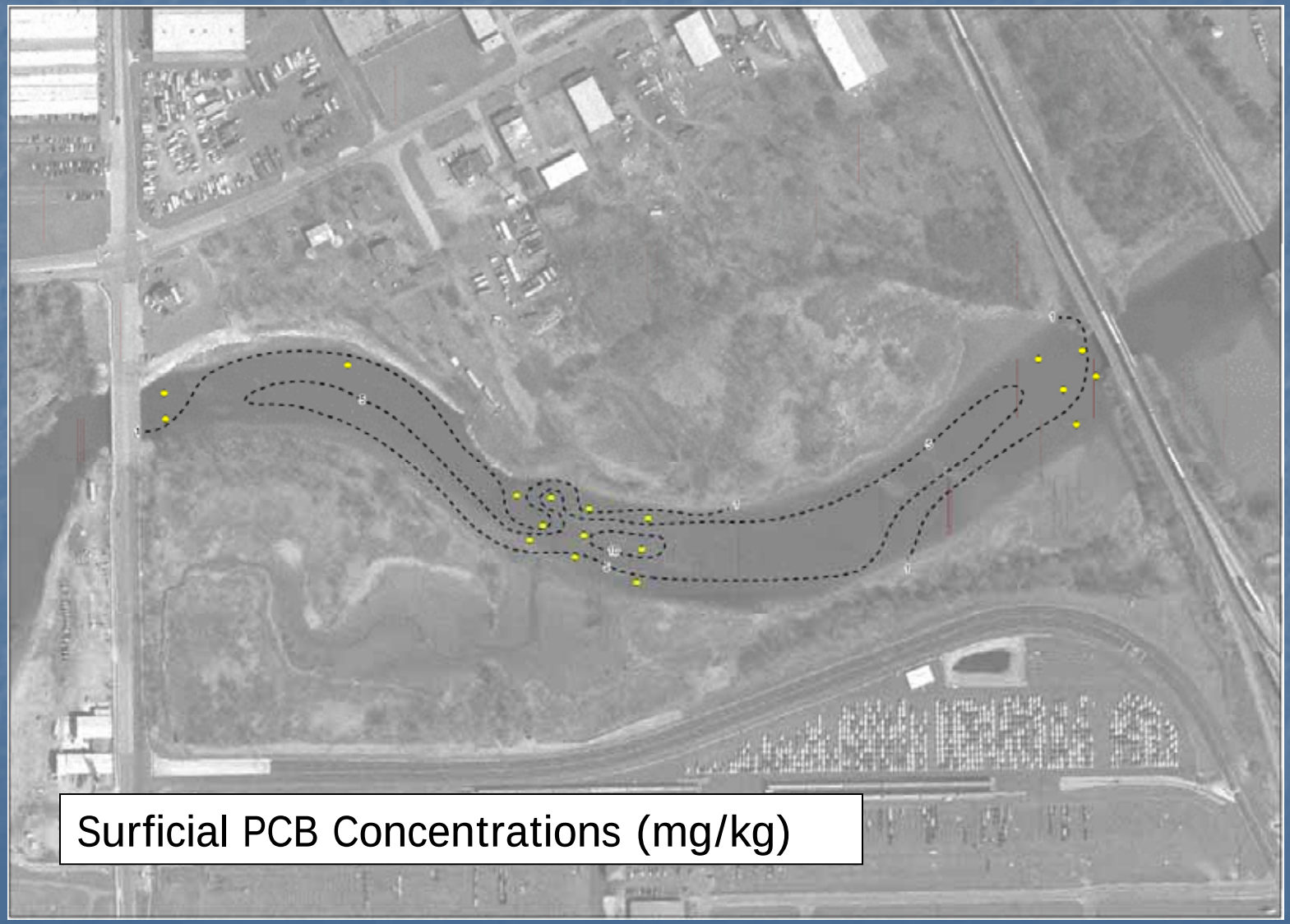
  -PAHs

  -TOC

Sediment Analytical Results

- PCBs
  - Only 2 of the 7 arochlors analyzed were detected
  - Arochlor 1242 detected in 61% of samples
  - Arochlor 1254 detected in 63% of samples
  - Total PCB concentrations ranged from 0.08 – 26 ppm
  - Results similar to historic sampling
  - Highest concentrations clustered near backwater area
  - PCBs>1 ppm (general accepted standard for remediation) located throughout the main channel

Sediment Analytical Results



Sediment Analytical Results

- PAHs
  - 17 of the 18 PAHs analyzed detected in at least one sample
  - PAHs detected in 74% of samples
  - Total PAH concentrations ranged from 0.11 – 6.4 ppm
  - Highest concentrations clustered near the upstream portion of the SADZ, near the Stickney Bridge
  - Results similar to historic sampling

Sediment Analytical Results

- Lead
  - Naturally occurring element in soil
  - Detected in 100% of samples
  - Lead concentrations range from 4.16 – 495 ppm
  - Highest concentrations clustered near backwater area
  - Results similar to historic sampling

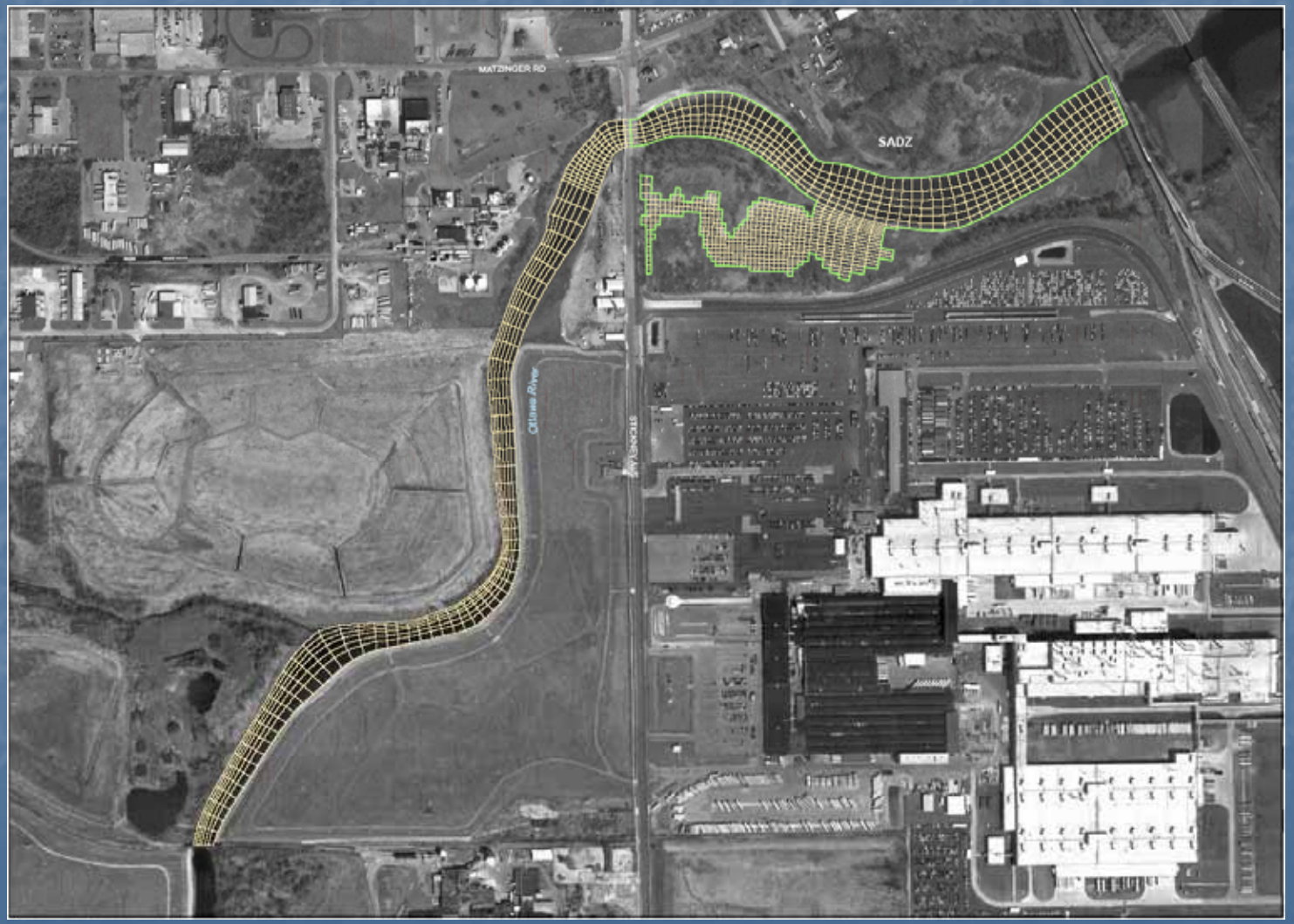
Sediment Analytical Results

- Geotechnical
  - Physical properties are variable
  - Sediments vary from clays to sands
  - Most sediments appear relatively fine-grained and contain some (clay/silt content)
  - SADZ contains cohesive and non-cohesive sediments as characterized by predominance of clay/silt
  - No apparent relationship exists between sediment type and contaminant occurrence

Hydrodynamic Modeling

- Purpose: simulate extreme conditions to evaluate sediment stability
- Multiple computer models used:
  - SADZ backwater area hydrology – Used USEPA SWMM to simulate storm water flows
  - Ottawa River Hydrodynamics – Used large-scale model to simulate river conditions under a range of flows and Lake Erie seiche effects
  - SADZ Hydrodynamics – Used fine-scale model of SADZ to evaluate local conditions in SADZ

Hydrodynamic Modeling

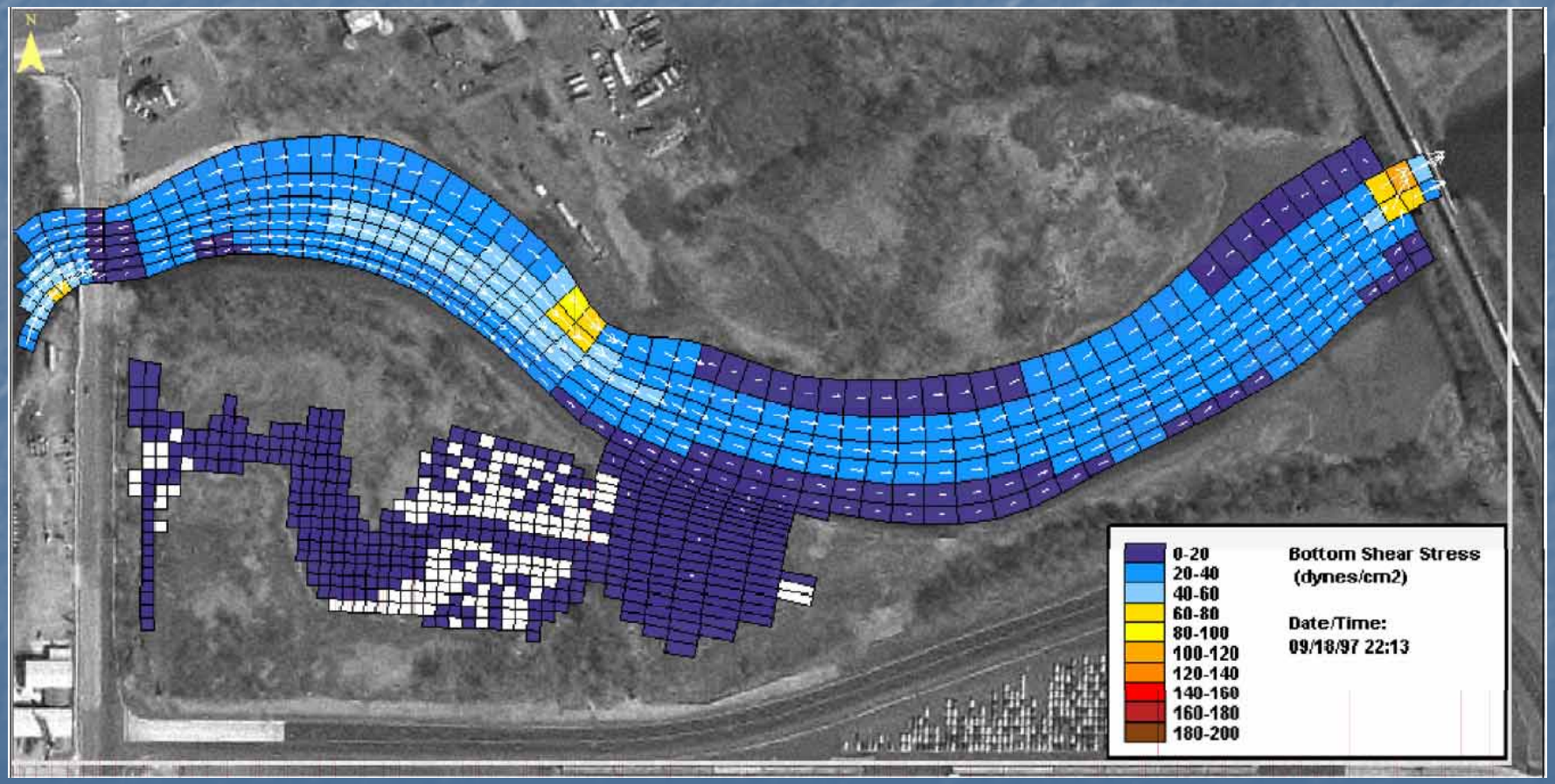


Hydrodynamic Modeling

Goals:

- To simulate river conditions under extreme conditions
- Interested in velocities and shear stresses, because they indicate the energy available to move sediment

Hydrodynamic Modeling



Hydrodynamic Modeling

Findings:

- Peak shear stresses during extreme hydrologic events may exceed threshold shear stresses of the sediments, which could result in downstream transport of contaminants.

- However, these peaks are infrequent, isolated, and of short duration.

Conclusions

- The effectiveness of monitored natural attenuation as the sole remediation alternative for the SADZ uncertain.
- The distribution of PCB impacts above 1 ppm throughout the SADZ indicates that dredging alone would likely involve sediment removal from almost the entire SADZ.

Conclusions

- An engineered cap may be feasible, if it is constructed of material that will withstand the peak shear stresses that can potentially develop in the SADZ
- A potentially feasible remedial alternative would include capping in potentially erosive areas, with monitored natural attenuation in the rest of the SADZ.