



Sault Ste. Marie Stormwater Investigative Study
Master Plan
Innovative Approaches to Stormwater Management
Thunder Bay, Ontario
February 24, 2011



Sault Ste. Marie

- Since the 1990's quantity control has been addressed at new developments through implementation of dry ponds or other devices
- Recently approval agencies noted that dry ponds are insufficient for quality control and a wet pond system would be required.
- City met with DFO and the Sault Ste. Marie Region Conservation Authority (SSMRCA) and it was agreed that an investigative study to address stormwater quality and quantity by drainage area be undertaken
- City received funding and proceeded to the request for proposal stage
- City noted a preference for several large scale SWM facilities to minimize maintenance and liabilities and a preference for not having standing water (mosquitoes)
- City also noted the requirement for updated stormwater design standards to coincide with the Master Plan
- Also recognized bacteriological sampling in 2007 and 2008 indicates stormwater outfalls are a source of bacteria (extraordinarily common)



2 History of Stormwater Management

Area of Concern: St. Marys River

- The River was listed as an Area of Concern in 1985. Changes in chemical, physical, or biological integrity of this water body has been sufficient to cause beneficial use impairments:
 - Restrictions on fish and wildlife consumption and unhealthy populations
 - Fish tumours and other deformities
 - Unhealthy populations of bottom-dwelling organisms
 - Restrictions on dredging
 - Undesirable algae due to excess nutrients in the water
 - Beach closures
 - Poor aesthetics
 - Loss of fish and wildlife habitat



3 Municipal Class Environmental Assessment

Municipal Class EA Process

- Master Plans
- Integrate infrastructure requirements for existing and future land use with environmental assessment planning principles
- Outline a framework for planning for subsequent projects and/or developments
- Address Phase 1 and Phase 2 of the Municipal Class EA Process
- This Master Plan follows Approach #1 of the Master Planning Process where it becomes the basis for future investigations for specific Schedule B and C projects
- Schedule B projects would require the filing of the Project File for public review
- Schedule C projects would require fulfillment of Phases 3 and 4 prior to filing an Environmental Study Report



5 Municipal Class Environmental Assessment

The Purpose of the Study is to:

- Provide a long-term sustainable plan tailored to Sault Ste. Marie's specific needs to assist the City with meeting and maintaining stormwater management goals outlined by the Ministry of Environment.
- Meet Area of Concern delisting targets related to stormwater as identified in the St. Marys River Remedial Action Plan administered by U.S. and Canadian environmental agencies by developing a comprehensive monitoring program.
- Identify stormwater capacity issues and recommend remedial works for the future.



6 Class Environmental Assessment

Stormwater Management Goals

1. Stormwater Quality

Level of Protection is based on receiving waters - Ministry of the Environment Guidelines

- Long-Term Suspended Solids Removal
 - Enhanced 80% (sensitive aquatic habitat will be impacted by end-of-pipe discharge)
 - Normal 70% (conditions do not exist for enhanced protection)
 - Basic 60% (aquatic habitat is unaffected by suspended solids)
- Level of Protection is selected to enhance or maintain the existing aquatic habitat

2. Stormwater Quantity

Control of post-development stormwater peak flows to less than pre-development levels for new development



Water Quality Monitoring Program

The goal of the monitoring program is to identify and track poor quality locations and confirm water quality improvements following remediation activities to meet Area of Concern delisting targets.

The monitoring program establishes a procedure for sampling site selection that optimizes information collected and minimizes cost.



8 Municipal Class Environmental Assessment

1. Project Initiation / Assemble Data / Desk Top Review
 - meet with relevant government and agency staff
 - gather and review data
2. Evaluate Stormwater Quantity
 - evaluate stormwater drainage through computer modeling
3. Evaluate Stormwater Quality
 - analyze sampling information regarding Total Suspended Solids, Total Phosphorus and other parameters as well as observed and reported conditions
4. Identify Alternative Solutions / Public Consultation
 - project specific solutions
 - receive Public Input



5. Develop Stormwater Management Strategy / Master Plan

Alternative solutions were evaluated with respect to social, natural and economic environments and technical merit.

Arrive at an Implementation Plan and a Corresponding Stormwater Management Policy Problem Statement.

“Develop a Stormwater Management Plan Strategy to address stormwater quality and quantity concerns within the City of Sault Ste. Marie for current and future developments”.



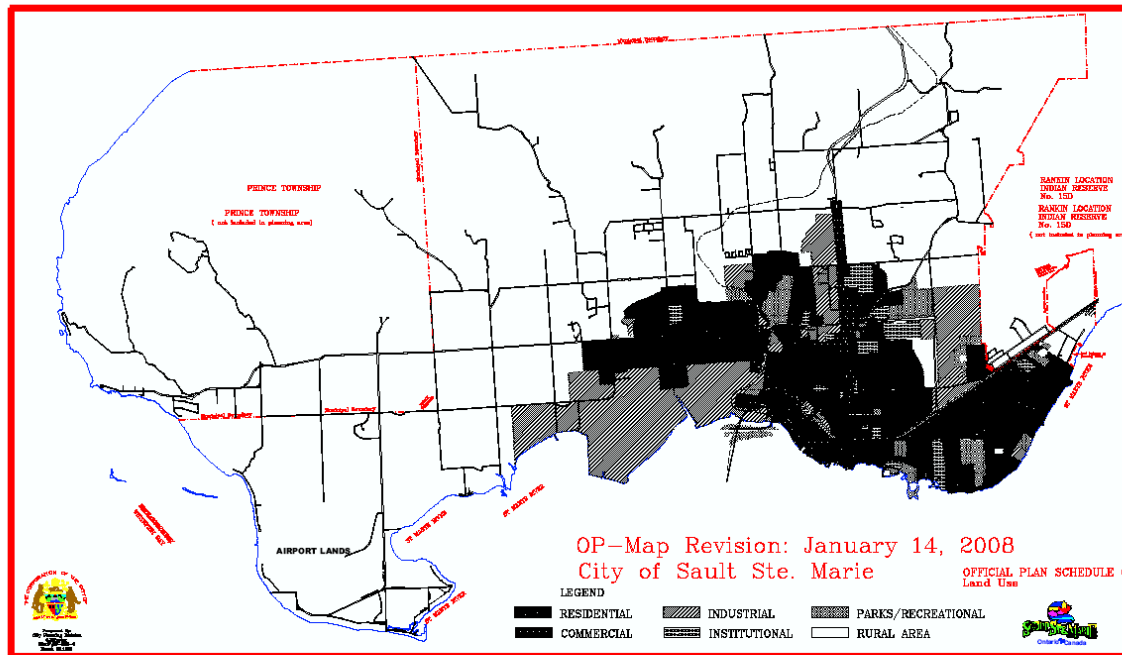
10 | Study Area

Sault Ste. Marie

- 75,000 people
- Urbanized water front
- Under developed lands to the north and west
- Development pressure to the northeast
- Numerous creeks and rivers flow south to the St. Marys River



Official Plan Land Use



Land use is related to the amount and quality of stormwater discharged to the storm sewers

Socio-Economics and Heritage

- Secondary Industry – cyclical economy
- Twenty-nine historic sites
- St. Marys River – National Heritage Waterway (2000)
- Friends of St. Marys River – Canada – U.S. representation, pledged to improve river conditions, preserve natural areas and create awareness of the state of the river.
- BPAC – BiNational Public Advisory Council:
 - Stakeholders group, informs agencies about public views and opinions regarding the cleanup of the St. Marys Area of Concern



14 Study Area

Topography and Physiography

- Great Lakes Basin
- Terraced lowlands
- Generally gently sloping
- Consists of fine textured soils of lacustrine and glacial origin
- North lies a pre-Cambrian escarpment overlain by forested and gravel deposits
- Key feature is the system of rivers and creeks
- Fort Creek dam, owned by Sault Ste. Marie Region Conservation Authority (1970) is in place to control west end flooding
- Creeks are subject to erosion



Precipitation and Stream Flow

- Located on the windward shore of Lake Superior
- Subject to lake-effect snow
- Yearly Precipitation
 - 630 mm of rain (2 feet)
 - 302.9 cm of snow (10 feet)
- Two previous years snow accumulation reached 4 metres

16 Study Area

Aquatic and Terrestrial

- Great Lakes – St. Lawrence Forest Region in the Boreal Forest Transition Zone
- Coniferous, deciduous trees – Sault Ste. Marie is 40% woodland

Species at Risk

- Bald Eagle, Lake Sturgeon, Eastern Cougar
- Invasive species in St. Marys River include spiny water flea, zebra mussels, sea lamprey, invasive plants include purple loosestrife, invasive insects include the emerald ash borer
- Waterways are cool or cold water fisheries
- Generally creeks and rivers feed the St. Marys River, only a handful of small lakes



17 Study Area

- St. Marys River fishery includes:
 - Rainbow, lake and brown trout
 - Chinook, pink and coho salmon
 - Walleye, northern pike, whitefish

City streams are spawning areas for many fish species. Concern is stream sediment and runoff from developed areas.



18 Study Area

Existing Water and Sanitary Sewer Infrastructure

- Water
 - Gros Cap intake on Lake Superior, plus 6 wells at 4 locations
 - Groundwater recharge area north of Third Line
 - Source Protection Area – All of Sault Ste. Marie
- Sanitary System
 - Sewage is pumped to two Wastewater Treatment Plants (East End (2/3) and West End (1/3))
 - The East End WWTP is the first large WWTP to use a Biological Nutrient Removal process that reduces nitrogen and phosphorus without additional chemicals.
 - Effluent is disinfected by U.V. Treatment
 - Resulted in significantly improved effluent quality



18 Study Area

- Sanitary System (continued)
 - Over the past 10 years – pumping station upgrades and monitoring of sanitary sewer emergency overflows
- Storm Sewers
 - Generally conveyed southerly and to the St. Marys River
 - Minor System – Piping – City jurisdiction
 - Major System – Streams and channels – SSMRCA jurisdiction
- Flooding Management
 - SSMRCA – Flood Control Channels totaling 12 km, and the Fort Creek Dam have helped protect the City from flooding



19 Stormwater Management

- Stormwater Management
 - Dealt with case – by – case
- Quantity
 - Typically Dry Ponds or oversized storm pipes for quantity control
- Quality
 - Addressed by the SSMRCA and DFO
 - Generally 70% T.S.S. removal, although this may vary
- Topsoil Stripping
 - Under Zoning By-Law – states removal of topsoil is prohibited in all zones. Subject to an approved agreement with the City according to Section 142 of the Municipal Act



20 | Stormwater Management

- Snow Disposal and De-icing
 - In accordance with the Salt Management Plan (2005)
 - City has access to approximately nine sites, and has used other sites in the past
 - The City has used berms and hay bales to help mitigate solids and pollutants
 - One site near the St. Marys River has been closed



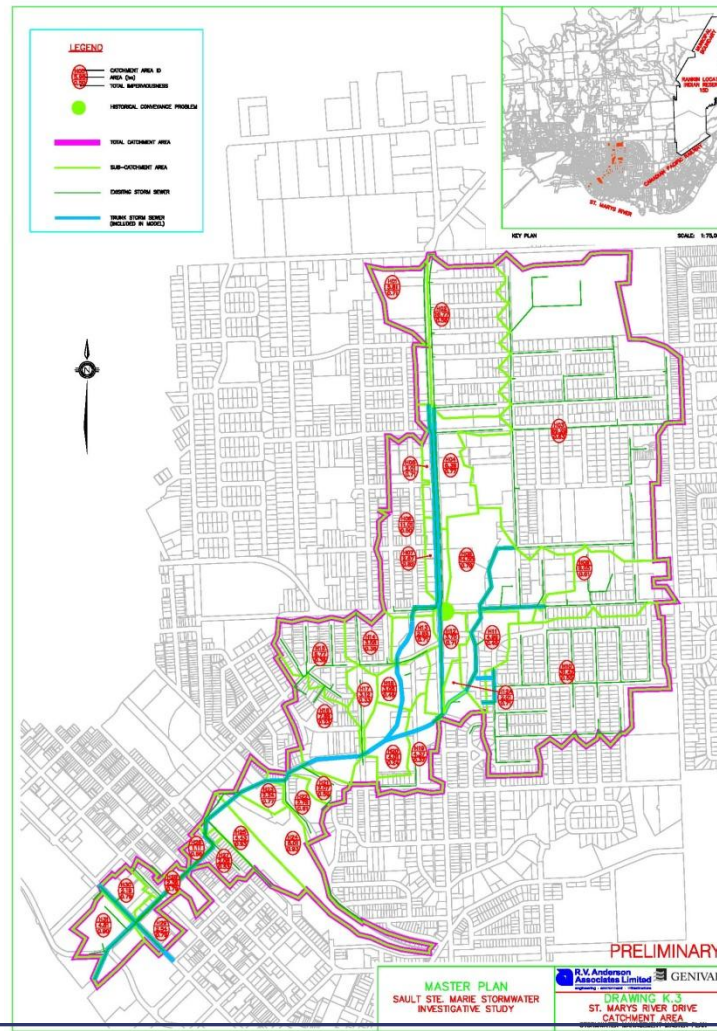
21 Stormwater Management

- Stormwater Conveyance
 - City is aware of issues regarding Stormwater Conveyance
 - Required a detailed computer model of specific areas
 - Modeled by PCSWMM for various design storms
 - Resulted in identification of problem areas and remedial actions



22 Stormwater Management

Stormwater Conveyance -Detailed Model



Stormwater Investigative Study Master Plan

23 Stormwater Management

- Water Quality

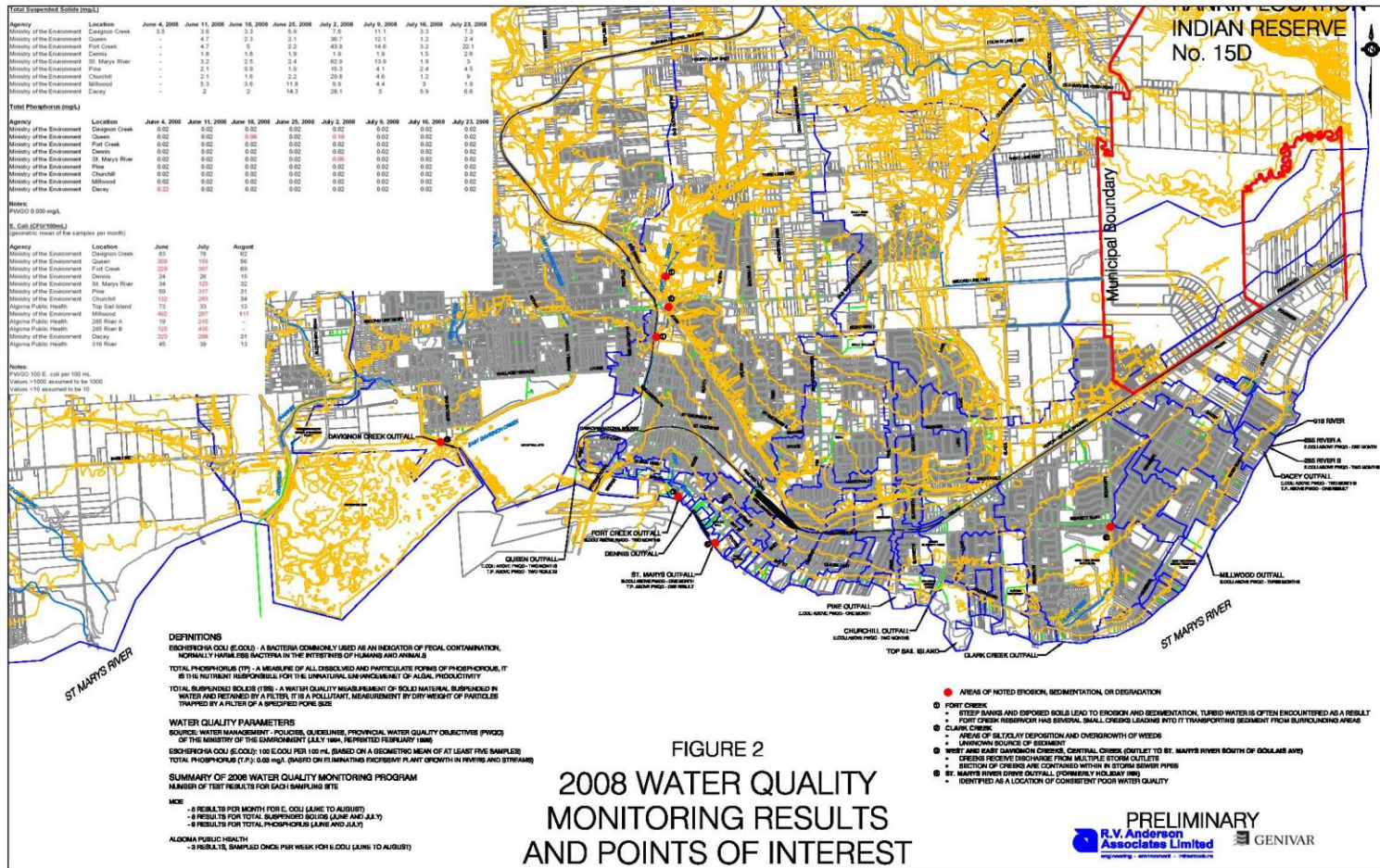
Reviewed recent and historic water testing results from various sources including:

- Ministry of the Environment
- Algoma Public Health
- Chippewa County Health
- Sault Tribe of Chippewa Indians
- Garden River First Nation
- Sault Ste. Marie Region Conservation Authority

Study concentrated on urban sampling in, 2007 and 2008



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Stormwater Investigative Study Master Plan

Alternative Solutions

1. Do Nothing
2. New Development
 - Large and small scale SWM facilities
3. Existing development SWM approach
4. City Wide SWM approach

Common Recommendations to All Alternatives

- Point source monitoring program
- Review of snow and salt management
- Remediation of erosion and sedimentation
- Operation and maintenance
- Community involvement and education



26 Stormwater Management Policy

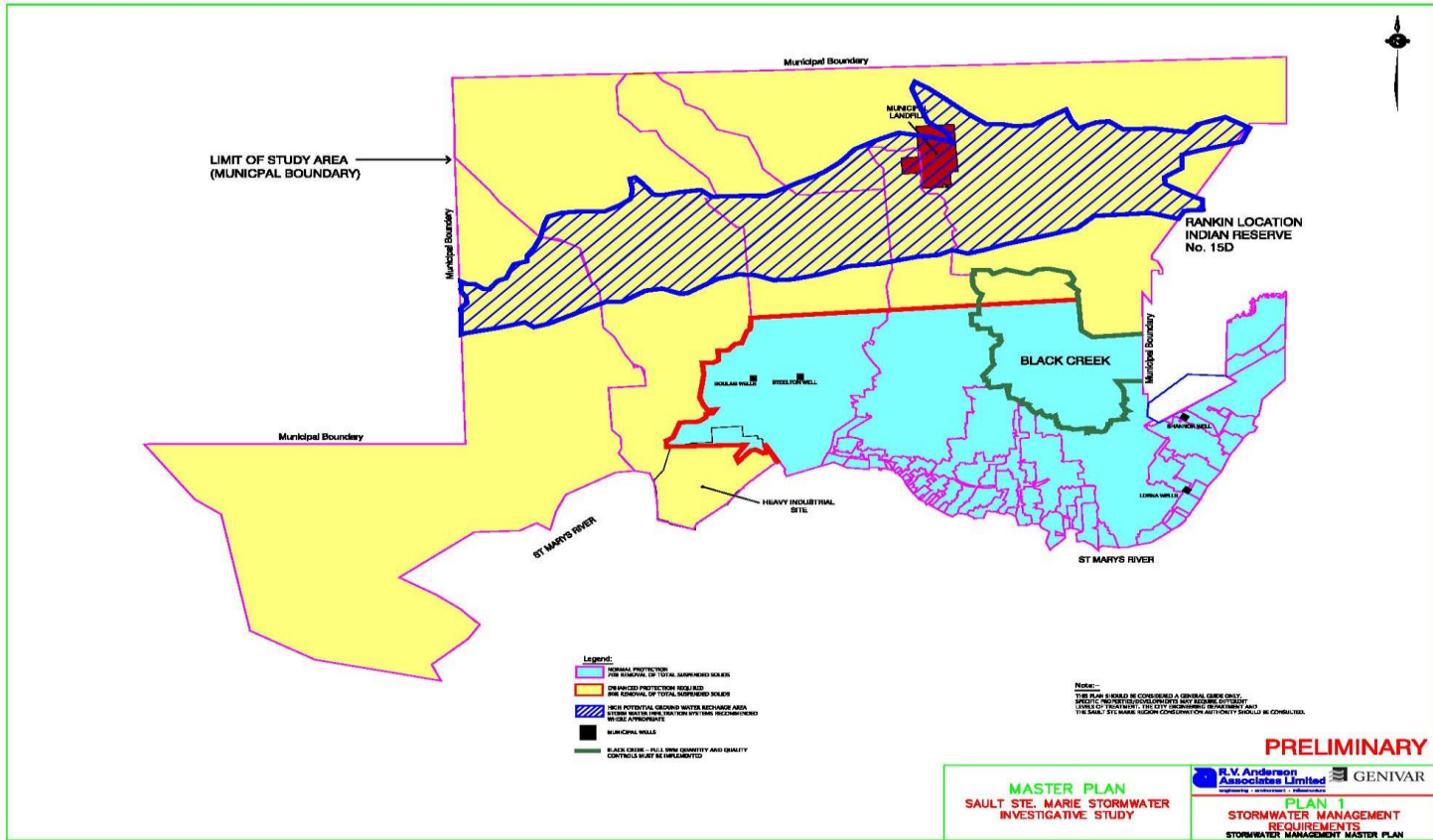
New SWM Policy Document

R.V. Anderson Associates Limited updated and consolidated the City's design standards into a comprehensive stormwater policy.

- Addresses minor system design – 10 year storm, 10 minute time of concentration
- Addresses major system design (overland flow and creeks). Design for 100 year storm + 20% to account for climate change
- SSMRCA and DFO determined that a normal level of protection (70% TSS Removal) is preferred in most areas. Enhanced levels required in the outlying areas
- City added that Black Creek area requires full SWM Management



27 Stormwater Management Policy



Stormwater Investigative Study Master Plan



29 Stormwater Management

New Development

- Implement SWM as per “MOE Stormwater Management Planning and Design Manual” (2003)
- Selection of SWM facility based on economics, effectiveness and sustainability
 - Lot level and conveyance controls
 - Infiltration and storage
 - End of pipe controls
 - Treat and/or alternate prior to discharge
 - Retrofit dry ponds

City-Wide Approach

- Incorporates existing and new development approaches



Public Consultation

- First Public Meeting held December 17, 2009
 - Agency and Government attendance
 - Good public reception and input
- Second Public Meeting
 - To be held shortly

31 Stormwater Management

Generally the preferred option is the City-Wide Approach which includes providing SWM for existing and new development projects subject to a final public meeting and a 30 day review period.

City concerns are funding of all SWM Projects.



32 Stormwater Management

City-Wide Approach Includes:

1. Implement Stormwater Management Policy
2. Improve Snow Disposal Sites
3. Education
4. Point Source Monitoring Plan
5. Establish Oil Grit Separators
6. Snow Disposal Site Review (Environmental Assessment)
7. Stormwater Management Pond Retrofits for Quality
8. Various Storm Pipe Improvements



