

The Experiences from Implementing Decision Support Technology To Address Water Management Plans In An Operational Environment

Steven McArdle

President

4DM Inc.

Toronto Ontario

4850 Keele Street Toronto Ontario M3J 3K1

416-410-7569

smcardle@4dm-inc.com

Chris Tonkin

Operating Manager

Madawaska/Ottawa River Production Group

OSLPG-Ontario Power Generation

613-432-8878 ext 3315

tonkin.c@opg.com

CEATI Water Management Interest Group
Two-Day Workshop to be held
November 16-17, 2005 - Niagara Falls, New York

- The need for decision support information by OPG has shifted towards a more proactive approach as result of
 - Changes to electricity market in Ontario with regulated WMP
 - Requirements for auditing of water levels and flows
 - Pressures arising from residential and cottage encroachment along operating water ways
 - Expanding recreational/social use along the water ways
- OPG invested into implementing a Water Management Program that including Data Validation, Water Accounting and Adaptive Water Management
- The Adaptive Water Management System – **Water View** was implemented as decision support tool for addressing water management requirements

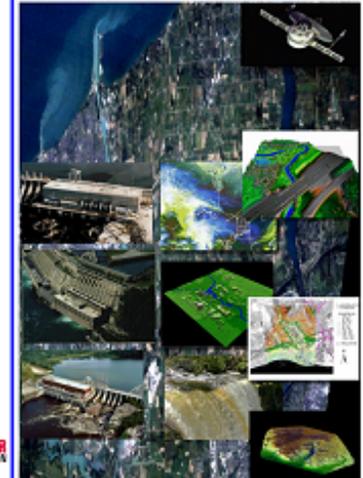
From Idea to Decision Support – The Path

- Prerequisite for enabling a decision support systems typically requires
 - Clear understanding of the users needs
 - A proof of concept to demonstrate the idea
 - A Champion within the organization

- Operational deployment of **Water View** consisted two periods
 - Visionary and Implementation Stages
 - Visionary Stage
 - HydrologiX
 - User Needs Requirements of WRD
 - Water.View Proof of Concept
 - Implementation Stage
 - Business Requirements & Project Execution Plan
 - Functional Specifications
 - System Design & Iterative Build, Test & Demo



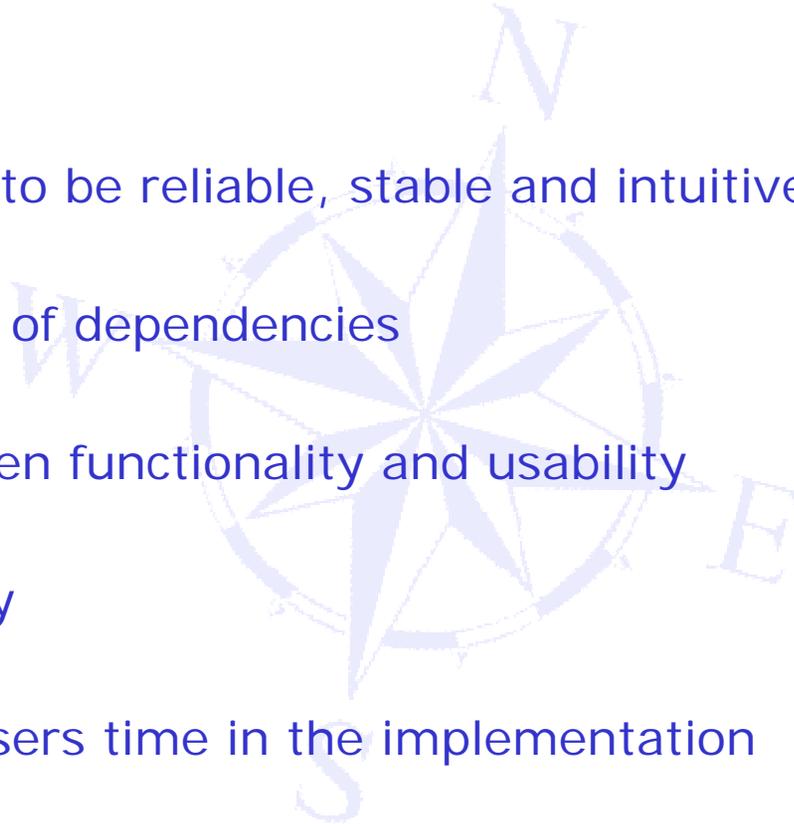
A Geospatial Information Technology Needs Assessment for Ontario Power Generation, Water Resources Division



Prepared for:
ONTARIO POWER GENERATION
 2003

Prepared by: **ADM**

- Partnerships
- Valid data
- System needs to be reliable, stable and intuitive
- Understanding of dependencies
- Balance between functionality and usability
- Interoperability
- Allocation of users time in the implementation



Water View was implemented in July 2005 in the Madawaska Watershed within OPG intranet environment

The primary focus is to provide decision support information to meet compliance and reporting requirements related to WMP

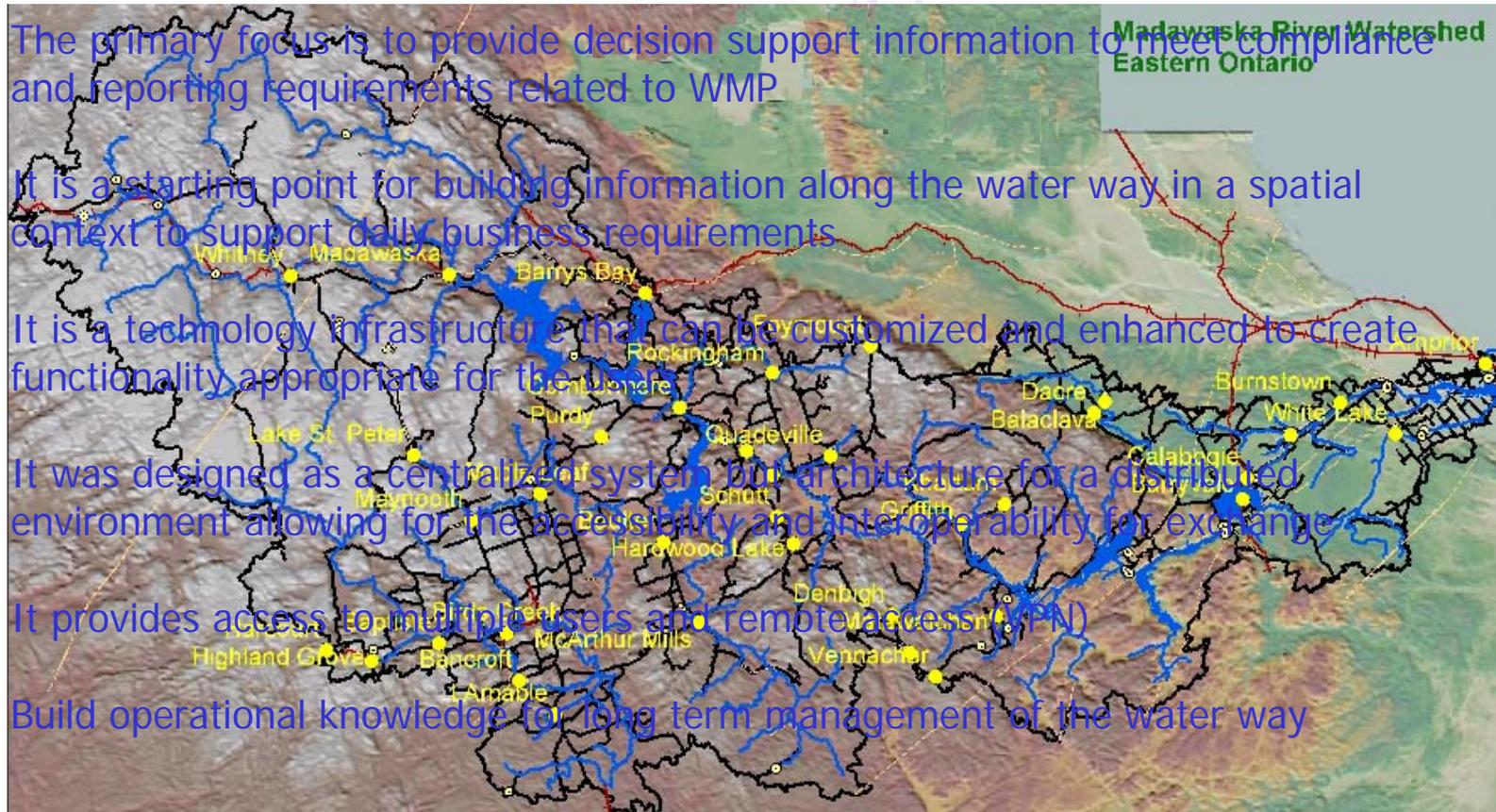
It is a starting point for building information along the water way in a spatial context to support daily business requirements

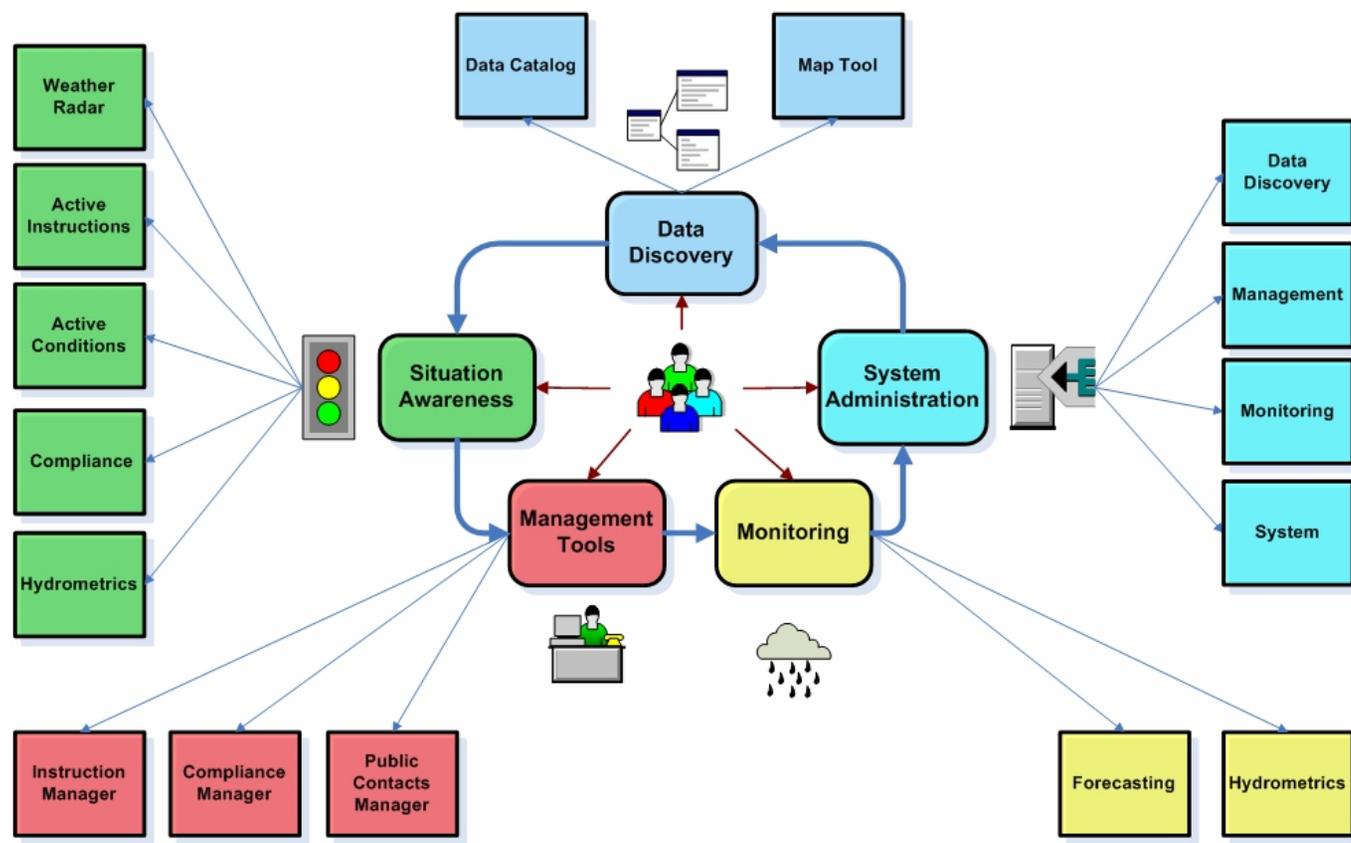
It is a technology infrastructure that can be customized and enhanced to create functionality appropriate for the user

It was designed as a centralized system and architecture for a distributed environment allowing for the accessibility and interoperability for exchange

It provides access to multiple users and remote access (VPN)

Build operational knowledge for long term management of the water way





- Data Discovery for accessing information
- Situation Awareness
- Operational instructions on flows and levels
- Compliance and performance checking and reporting
- Managing and tracking issue identification
- Hydrometrics – display of water levels and flows
- Climate – Weather Radar and Numerical Weather Prediction

1. Implementing Standing Instructions at water structures for evaluating WMP compliance requirements
2. Monitoring the movement of water within the watershed
3. Responding and addressing issues and concerns

1. Implementing Standing Instructions at water structures for evaluating WMP compliance requirements

WaterView OSLPG - Madawaska River System COMPLIANCE MANAGER

HOME | DATA DISCOVERY | SITUATION AWARENESS | MANAGEMENT TOOLS | MONITORING | SY

Compliance Manager Generating Report...

- Current Compliance
- Query Compliance
- View Query Results
- Tabular
- Report Query Results
- Summary Report
- Detailed Report

Compliance Color Key

- Compliant
- Warning
- Violation
- Error
- No Data

©2005 40M Inc.

DETAILED COMPLIANCE REPORT

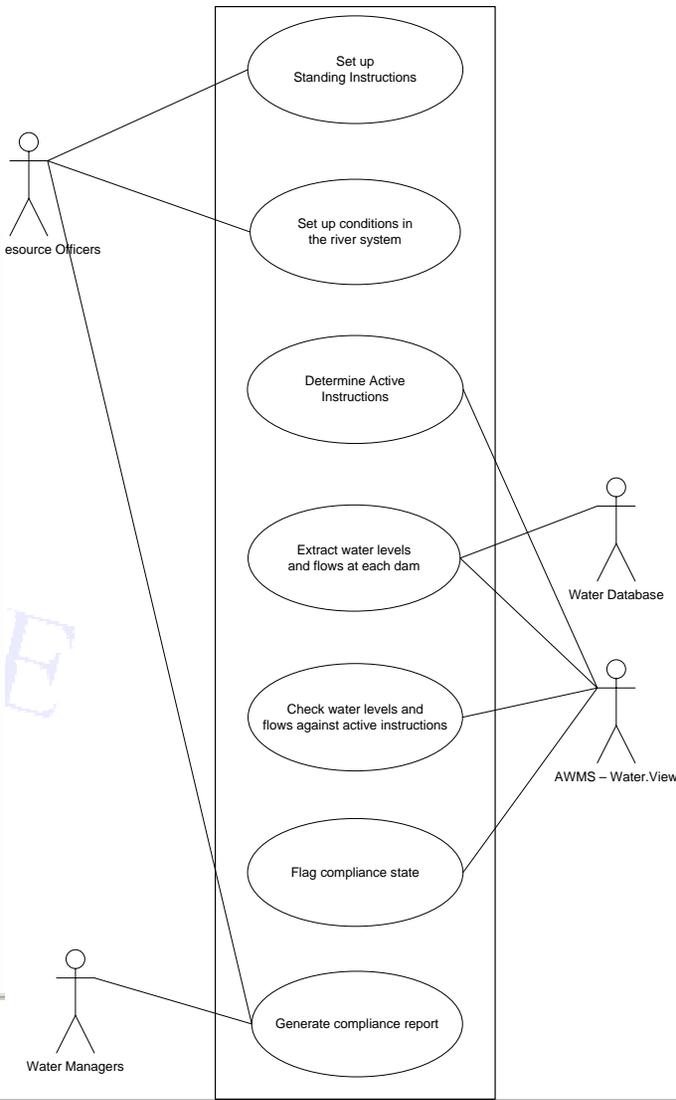
Madawaska River System

For Period: 2005/07/03 to: 2005/07/15

Facility: Mountain Chute GS

Instruction: (140) Normal Operating Range
Source Names: WMP, OPG Constraint

2005-07-05 00:01:24.671	Result: Compliant
Limit Type: maximum Limit Value:248.4 Queried Value:248.15	
2005-07-05 00:01:25.265	Result: Compliant
Limit Type: minimum Limit Value:243.8 Queried Value:248.15	
2005-07-06 00:01:19.89	Result: Compliant
Limit Type: maximum Limit Value:248.4 Queried Value:248.16	
2005-07-06 00:01:20.484	Result: Compliant
Limit Type: minimum Limit Value:243.8 Queried Value:248.16	
2005-07-07 00:01:20.546	Result: Compliant
Limit Type: maximum Limit Value:248.4 Queried Value:248.17	
2005-07-07 00:01:21.125	Result: Compliant
Limit Type: minimum Limit Value:243.8 Queried Value:248.17	
2005-07-08 00:01:19.765	Result: Compliant
Limit Type: maximum Limit Value:248.4 Queried Value:248.19	
2005-07-08 00:01:20.359	Result: Compliant
Limit Type: minimum Limit Value:243.8 Queried Value:248.19	
2005-07-09 00:01:19.906	Result: Compliant
Limit Type: maximum Limit Value:248.4 Queried Value:248.22	
2005-07-09 00:01:20.515	Result: Compliant
Limit Type: minimum Limit Value:243.8 Queried Value:248.22	
2005-07-10 00:01:20.484	Result: Compliant
Limit Type: maximum Limit Value:248.4 Queried Value:248.27	
2005-07-10 00:01:21.093	Result: Compliant
Limit Type: minimum Limit Value:243.8 Queried Value:248.27	
2005-07-11 00:01:19.718	Result: Compliant
Limit Type: maximum Limit Value:248.4 Queried Value:248.33	
2005-07-11 00:01:20.312	Result: Compliant
Limit Type: minimum Limit Value:243.8 Queried Value:248.33	
2005-07-12 00:01:19.859	Result: Warning
Limit Type: maximum Limit Value:248.4 Queried Value:248.33	
2005-07-12 00:01:20.453	Result: Compliant



2. Monitoring the movement of water within the watershed

INSTRUCTION MANAGER

Instruction: Daily Level Constraint

Category: level
 Comments: comments
 Instruction Sources: OPG Constraint

Instruction Item: Default Instruction

Constraint:

Gauge: CHENAUX.WRAMETER.ARNHDLVL
 Operating Note: Headwater level
 Tolerance: 0.5

Evaluation

Time Based Method

- Type: average
- Start Time: 00:00:00
- End Time: 23:59:59

Evaluation

- Type: maximum
- Limit: 98.95

Constraint:

Gauge: CHENAUX.WRAMETER.ARNHDLVL
 Operating Note: Headwater level
 Tolerance: 0.5

Evaluation

Time Based Method

- Type: average
- Start Time: 00:00:00
- End Time: 23:59:59

Evaluation

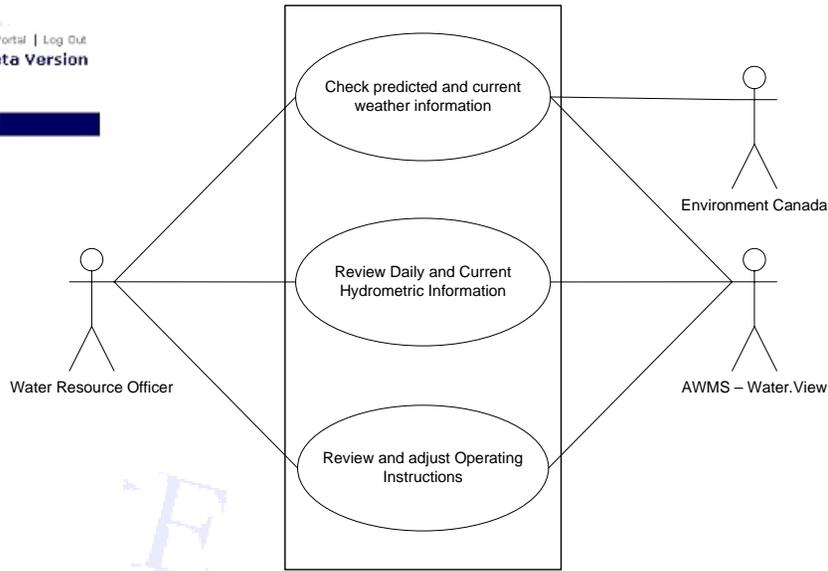
- Type: minimum
- Limit: 98.80

©2005 4DM Inc.

07/07/2005 17:35:00

Step 3. Select Interval:
 Query graph

©2005 4DM Inc.



3. Address and respond to issues and concerns

Public Contacts Manager Table:

ID	Date	Contact
6	Mar 09 2005	Patrick Rody
7	Jun 20 1996	Steven Roy
8	Jul 04 1996	Steve McArdle
10	Mar 09 2005	Steve McArdle
11	Mar 09 2005	Patrick Rody
12	Mar 10 2005	Patrick Rody
13	Mar 23 2005	Steve McArdle
14	Mar 10 2005	Steve McArdle
15	Mar 24 2005	Steven Roy
16	Mar 01 2005	Steven Roy

Detailed Report - ID#13:

OPG PUBLIC CONTACT INFORMATION SHEET - ID#13

ISSUE RECIPIENT
 Report Date: Oct 28 2005 OPG Contact Person: Donald Ferio
 Entry Date: Mar 23 2005 Plant Group: OSPLG River System: Madawaska

PUBLIC CONTACT INFORMATION
 First Name: Steve Last Name: McArdle ID: 13 Legal Entity:
 Address: 2277 Mink Lake Road
 City/Town: Markdale Province/State: ON Country: none Postal/Zip Code: L8B2K1
 Phone: 403 708 3774 Fax: Email:

DETAILS OF PUBLIC CONTACT
Spatial Location
 Reach: 3 Waterbody: Madawaska River (Cal North - Stew)
 Lot: MCNAB LOT 16 CON 9
 Land Rights: Owner
 Location Notes: n/a

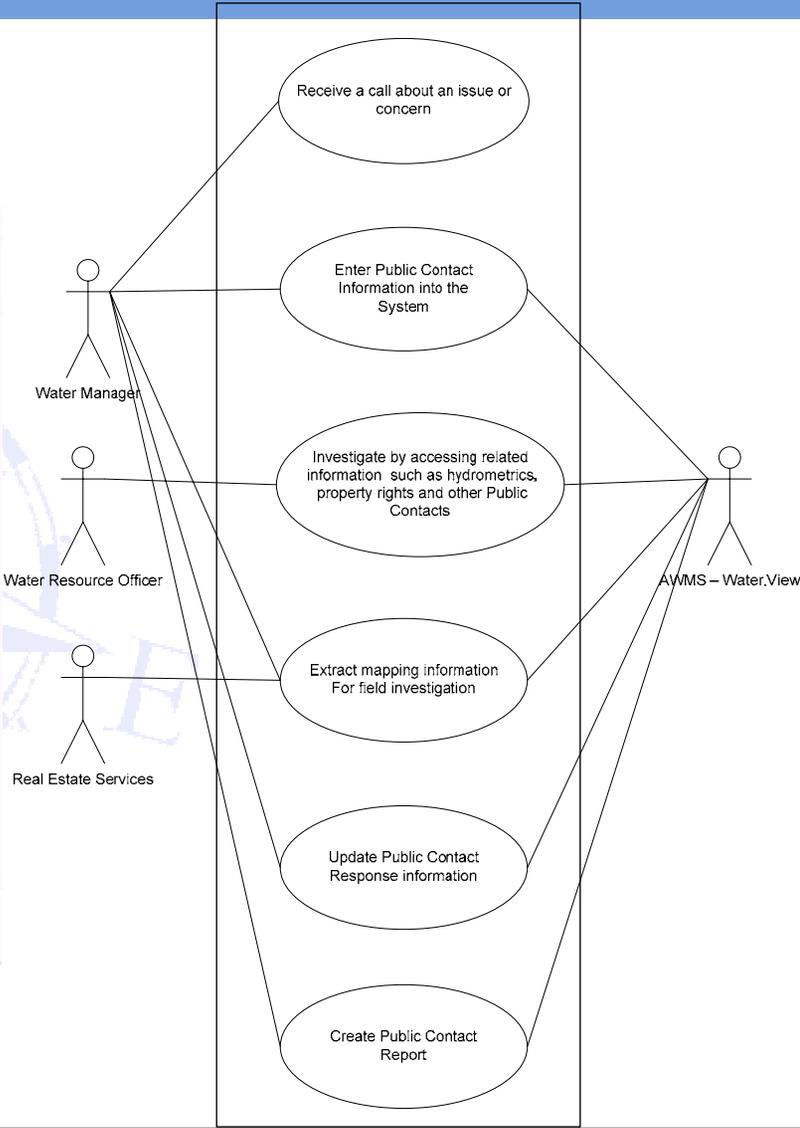
Description of Incident/Issue/Concern
 Erosion near Stewartville

Response
 Status: Further Action Required
 Discussion with owner to follow

CATEGORY
 Public Issue Category:
 • Citizenship
 • Environment
 • Erosion/ Erosion
 • Water Management



GPS



- Challenges
 - Dependency on other applications
 - Complexity of the requirements
 - Uncertainty in the definition of regulatory requirements
- Benefits
 - Simplifying managing Standing and Daily Instructions
 - The increase awareness of compliance and performance requirements
 - Capturing and building watershed knowledge for improved long-term operations
 - Increase accessibility to decision support information through web based technology

- Expansion into other watersheds
- Enhancements to existing functionality
 - General enhancements
 - Advanced climate analysis
 - Compliance and performance prediction
- New functionality
 - Scenario planning and forecasting/optimization on water levels and flows within constraints
 - Real-time dam safety monitoring

Steven McArdle

President

4DM Inc.

Toronto Ontario

4850 Keele Street

Toronto Ontario M3J 3K1

416-410-7569

smcardle@4dm-inc.com

Chris Tonkin

Operating Manager

Madawaska/Ottawa River Production

Group

OSLPG-Ontario Power Generation

613-432-8878 ext 3315

tonkin.c@opg.com