Stormwater Billing – Impervious Area
Connecting GIS and Finance

Presented by:
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Outline

• Corporate History
• Background on Stormwater Billing
• Impervious Area Project
• The Delineation Process
• Impervious Area Analysis
• The Challenges ahead
Corporate History

City of Halifax assumes private water supply system

Commission purchases water utility assets from the City - Utility to be run in a business-like manner

Metro Amalgamation – Merger of Halifax, Dartmouth and Halifax County Water Utilities (HRWC)


Public Service Commission (PSC) is formed to address critical state of water utility

PSC renamed to Halifax Water Commission

Transfer of HRM's wastewater and stormwater service to Halifax Water
Geographic Scope

- CENTRAL (Bedford/Sackville)
- WEST (Halifax)
- EAST (Dartmouth)

Halifax Water Service Regions
West Region Pipe Installation
Background on Stormwater Billing

• Operations of water and wastewater functions financed by water consumption.

• Revenue for stormwater was based on wastewater revenue.

• 2009 Nova Scotia Utility and Review Board (NSUARB) report concluded that this rate structure is not fair and needs to be revised.

• Consultants hired by Halifax Water recommended to split the charge based on the class.
Background on Stormwater Billing

- The two classes are:
  - Residential customers
  - Commercial / Industrial / Institutional – ICI Customers

- Residential Customers to be charged based on average impervious area of all lots in that class.

- ICI customers to be charged based on impervious area of their lot.

- Identify process steps to delineate and use impervious areas and identify the study area.
Impervious Area Project

• In-house data gap analysis
  • Data consistency across the study area

• Collecting data
  • In house survey
  • Outsourcing the survey
    > High accuracy
    > High Cost – resource, time, money

• Impervious area delineation using imagery and software
Impervious Area Project

• Aerial Photo Vs. Satellite imagery – 780 sq. km.
  • Detail Vs. Accuracy Vs. Cost

• Software – ENVI; e-Cognition, ERDAS-Imagine

• Pilot project was defined and used to outline some of our requirements.

• ITT – Exelis was identified as the successful consultant

• Pilot project was used to identify strengths and weakness of the software and accuracy of the resultant product
Impervious Area Project

- ITT provided a demo of the software and the results in ESRI shapefile format.
- In-house survey team surveyed the properties and the results were then compared to the one provided by ITT.
- We found a 96% accuracy in the pilot study area.
- Based on the pilot project, and RFP was put out and ITT was once again successful proponent.
- In consultation with ITT, appropriate imagery was selected.
Impervious Area Project

• ITT completed the delineation process within 4 months
• A 2 month QC process was done at Halifax Water
  • Random check of the data for inaccurate delineation
  • Inaccurate classification
• Readjust some of the classification and adjust delineation
• Project Sign-off
The Delineation Process

• Imagery selected – Digital Globe WV2 Level 2A dataset
  • Separate panchromatic and multispectral
• Orthorectification of Imagery using GCPs
• Rater classification produced
• Based on spectral signatures only
  • Hybrid object-spectral approach was cost prohibitive
  • Supervised and unsupervised classification
  • Cloud and water masks incorporated
  • Vegetation index delineate vegetation
  • Anomaly detection – sun glint, specular reflection
The Delineation Process

• All classifications were done using raster data
• Raster data was then converted to vector data
• Class attribute was populated – impervious or pervious
Stormwater Billing

- Provincial Parcel Fabric
- Pervious and impervious areas
- Service and No Service areas
- Serviceable Impervious Area Analysis
The Finance Connection

GIS

Metering & Finance

SAP

Halifax Water
Challenges

• Data gaps
  • Pre-project lack of data – Possible different path
  • Post project lack of data
    > Identifying parcel lots as Residential, Commercial, Industrial and Institutional

• Program sustainability
  • How often do we update the delineation due to development?
  • Snapshot in time – how often do we rerun the analysis?
  • QC of result produced each time the analysis is run.
Challenges Continued...

• Change Management
  • Communicating to customers
  • Communicating to non-customers
  • Public meetings
  • Dealing with appeals
  • Maintaining a high level of customer satisfaction
  • Data accuracy

• Resource management
  • Allocation of staff to each appeal
  • Timely replies
Questions or Comments?