Restoring a Natural Heritage System in an Urban Context - Lessons Learned and the Value of Collaboration

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Jason Elliott – Conservation Halton
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Presentation Outline

1. Introduction
   - Mount Pleasant Planning Area – Brampton
   - Who Was Involved
   - Environmental Planning Process

2. Background Studies
   - Northwest Brampton Landscape Scale Analysis
   - Huttonville /Fletchers Creeks Subwatershed Study
   - Conceptual NHS Planning

3. Detailed NHS Planning and Design
   - Comprehensive Fish Compensation Plan
   - Environmental Implementation Report
   - Detailed Design and Permitting

4. Implementation
   - Shovels in the Ground
   - Lessons Learned
Mount Pleasant Sub-Area 51-1
Brampton, Ontario
Promotional Video
Key Stakeholders and Agencies

Credit Valley Conservation
- Plan input and review – stormwater, floodplain hazards, wetlands, fisheries
- Administration of the Conservation Authorities Act

Ministry of Natural Resources and Forestry
- Plan input and review – wetlands, wildlife, fisheries and species at risk
- Administration of the Endangered Species Act

City of Brampton
- Plan input and review – stormwater, infrastructure, recreation, community design
- Administration of the Municipal Act and Planning Act

Department of Fisheries and Oceans
- Plan input and review - fisheries
- Administration of the Fisheries Act

Ministry of Environment and Climate Change
- Administration of the Ontario Water Resources Act

Mount Pleasant Landowners Group
- Land subdivision, delivery of civil engineering and the NHS

TransCanada Pipelines
- Construction of new 42” pipeline across the block

CN Rail
- Rail line crossing the block

Consultants
- Studies and submissions

Contractors
- Construction of the NHS
Diverse Consulting and Contracting Teams

**Dougan and Associates**
- Coordination and delivery of NW Brampton Landscape Scale Analysis Study

**AMEC International**
- Coordination and delivery of subwatershed study on behalf of City of Brampton

**Stoneybrook Consulting**
- Coordination of Environmental Implementation Report & Functional Servicing Report

**Urbantech and Rand Engineering**
- Engineering – grading, stormwater management, road infrastructure, erosion and sediment control, construction administration

**Savanta**
- Natural areas inventory, assessment, detailed design support for NHS, construction supervision, monitoring

**Geoprocess Research Associates**
- Geomorphic assessments, channel design, construction supervision and monitoring

**NAK Design**
- Landscape design, construction supervision and monitoring

**G. Gordon Enterprises, Niran and ConDrain**
- Grading, road, and stormwater construction

**Geoscape and Bruce Wilson Landscaping**
- Channel and wetland construction, vegetative landscaping

**GHD**
- Erosion and sediment control monitoring

**R.J. Burnside & Associates Limited**
- Hydrogeology

**Delta Urban**
- Land use planning coordination between the City of Brampton and the landowner group

**r-pe**
- Land Surveyors

**Kuntz Forestry Consulting Inc.**
- Tree Preservation Plan
The Brampton Planning Process

• Comprehensive process involving multiple stages tying together subwatershed studies and land use planning
  • Subwatershed Study
  • Environmental Implementation Report
  • Master Environmental Servicing Plan
  • Functional Servicing Report
  • Plans of Subdivision with Supporting Details

• Opportunities exist to improve collaboration and outcomes while removing redundancy
Implementation Report (EIR/ME SP)

EIS - Functional Assessment of Headwater Drainage Features - Vegetation, Wildlife & Fish Studies - Terrestrial Features
SWM - Hydrology, Hydraulics, Grading, Sewers
Hydrogeology - Groundwater Characterization - Water Balance
Geotechnical - Slope Stability and Erosion Hazards
Geomorphology - Erosion Thresholds - Meander Belt Hazards - Drainage Density
Natural Channel Design

Recommendation of EIR/ME SP

Natural Feature Mitigation - Wetland Creation - Natural Channel Design - Corridor & Buffer Planting & Restoration
Monitoring - Long-term Groundwater and Surface Water (EMS) - Site Specific - Natural Channel Designs
Functional Servicing Report - Terms of Reference (City of Brampton) - Background Information - Proposed Development - SWM Facilities - Major & Minor Drainage Systems - Grading Plans, etc.

Engineering Submission of Subdivision

Noise Study
Stormwater Management Implementation
Detailed Grading and Other Servicing
Environmental Design - Restoration & Planting Plans - Natural Channel Design - Open Space/Parks Plans
Geotechnical Study - Soil Report

Block Plans
Phase 1 Approval - Block Plan Concept
Phase 2 Approval - Community Design
Draft Plan Submission
Conditions of Draft Plan Approval
Plan of Subdivision Approval, Registration
Subdivision Agreement
Development, Construction, Grading and Servicing
Building

Notes:
- Broad scale study goes beyond subwatershed boundaries to examine connection between landscape features e.g., Credit River valley, corridor, Niagara Escarpment, Oak Ridges Moraine, based on desktop scale analysis.
- EIR Implements Subwatershed Study - Identify & analyse significance & sensitivity of natural features & functions - Stormwater management methods to protect/enhance hydrologic, hydraulic, hydrogeologic, water quality, geomorph.
Linking Land Use Planning and Subwatershed Studies

• Valuable to understand the sequencing of key technical studies and how they integrate with land use planning

  – Northwest Brampton Landscape Scale Analysis
  – Huttonville/Fletchers Creeks Subwatershed Study
  – Natural Heritage System Design and Implementation
Northwest Brampton Landscape Scale Analysis

- Modelled the inter-relationship of ecosystem features and functions at a landscape scale using GIS
- Interrelated the landscape ecology of Northwest Brampton within the larger watershed (Credit River and Etobicoke Creek watersheds)
- Provided context to the subwatershed study and municipal land use planning
- Informed cross-watershed and cross-jurisdictional decisions about landscape linkages
Corridors and Linkages
Existing Fish Communities
The Subwatershed Study is a proactive document created cooperatively with government agencies to:

• manage the water, land/water interactions, aquatic life and aquatic resources within subwatershed systems to protect the health of the ecosystem, as land uses change
• offer strategies that provide direction on how best to manage potential impacts on water resources and natural heritage systems, in the context of land use planning
• recommend strategies for implementing subwatershed initiatives and specify which party is responsible for such things as long term monitoring and invasive species management.
Headwater Drainage Features Assessment

Channel Characteristics - Central Swale Site

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Order 2</th>
<th>Order 1, North Trib.</th>
<th>Order 1, East Trib.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drainage Area (km²)</td>
<td>0.022</td>
<td>0.013</td>
<td>0.0062</td>
</tr>
<tr>
<td>Surrounding Land Use</td>
<td>Agriculture - Wheat</td>
<td>Agriculture - Wheat, Residential</td>
<td>Agriculture - Wheat</td>
</tr>
<tr>
<td>Channel Gradient (%)</td>
<td>0.55%</td>
<td>0.35%</td>
<td>1.63%</td>
</tr>
<tr>
<td>Average Top-of-Bank Width (m)</td>
<td>2.75</td>
<td>2.45</td>
<td>1.35</td>
</tr>
<tr>
<td>Average Channel Depth (m)</td>
<td>0.17</td>
<td>0.19</td>
<td>0.12</td>
</tr>
<tr>
<td>Channel Substrate (mm):</td>
<td>D16: 0.01</td>
<td>D50: 0.82</td>
<td>D84: 3.97</td>
</tr>
</tbody>
</table>

Order 2 - Looking downstream
Order 1, North Trib. - Looking upstream
Order 1, East Trib. - Looking upstream
Headwater Drainage Features Assessment
Watercourse Management

Figure SM13: Channels Resulting from Application of Watercourse Management Strategies
NHS Development Process

Step 1: Inventory of known features and associated functions

Step 2: Identify key natural heritage features & functions (including biodiversity) and areas of existing connectivity

Step 3: Work collaboratively with municipal planners and infrastructure team members to test viability of conservation and enhancement

Step 4: Identify areas to maintain diversity & connectivity and features and area for restoration & enhancement (including improved connectivity)

Step 5: Identify Recommended NHS
Digital Elevation Model
Determining The Existing Features and Functions
Factors Considered in NHS Development

- Conservation of existing features
- Protection of Functions
- Enhancement, Restoration
- Integration with Urban Uses
- Linkages
- Resiliency, Sustainability
Development of the NHS Pathways Converge

Landowner representatives, the municipality, and agencies work together to develop a conceptual NHS based upon best science

- Facilitated by the agencies through workshop process

• DFO, MNRF, and CVC developed a NHS and presented to a subwatershed steering committee

• Private sector developed conceptual NHS vignettes as part of urban development plans

• City produced a land use plan for impact analysis

• November 2009 – A negotiated convergence of all interests into an agreed upon NHS with Implementation Principles

  - This formed the basis of the Block 51-1 Secondary Plan
Natural Heritage System Conceptual Design Vignettes
Land Use Plan
Secondary Plan NHS and Implementation Principles
Comprehensive Fish Compensation Plan

COMPREHENSIVE FISHERIES COMPENSATION PLAN (CFCP)

SUB-AREAS 51-1 & 51-2
WEST FLETCHER'S CREEK & EAST HUTTONVILLE CREEK
MOUNT PLEASANT, NORTH WEST BRAMPTON

Prepared by
MOUNT PLEASANT CONSULTING TEAM
Sevanta Inc., Stonybrook Consulting, R. J. Burnside & Associates,
Urbantech Consulting, Cam Pont and Associates, J.T.B. Environmental Systems

NOVEMBER 2011
(REVISED MARCH 2012)

VERSION 1
Comprehensive Fish Compensation Plan

Redside Dace Habitat
Environmental Implementation Report

- Bridge between Secondary Plan and Detailed Design
- One study rather than individual EISs to provide consistency and efficiency
- Additional, more refined study than SWS
- Understanding hydrological and hydrogeological aspects was key
- Numerous consultant team meetings and agency workshops
Environmental Implementation Report

Key Elements:
• Stormwater Management
• Finalized Corridor Widths
• Feature Based Water Balance
• Preliminary NHS Restoration and Design

Novel Solutions:
• Online Regional Flood Storage
• Reverse Graded Floodplain
• Wildlife Fencing
• Trail Locations
Preliminary NHS Restoration and Design Principles:

- Setting of viable future conditions - design informed by future urban conditions and natural features and functions that could be reasonably maintained, enhanced, or restored
- Utilization of trajectories instead of endpoints
- Use of historical reference systems for guidance on building system function not as goals
- Roles of novel ecosystems
- Consideration of maintenance requirements
Detailed Design and Permitting- Putting the Vision on Paper
Detailed Design and Permitting—Putting the Vision on Paper
Implementation
Shovels in the Ground

Stakeholder relationships founded on flexibility, communication, collaboration, and coordination is crucial because things do not always go as planned!

Continual Adjustments are Necessary!
Challenges

- Timing of regulatory approvals
- Coordination with TCPL
- Weather
- Diversion Channels
- Flooding Risk
- Stabilization
- Vegetation
- Unexpected Events
- Impacts from Adjacent Development
TCPL Delays
TCPL Delays
Lessons Learned

• Start discussions with federal agencies early in process

• Encourage them to work within your timelines
Diversion Channels
Diversion Channels
Lessons Learned

• Rock is the best option for quick stabilization

• Planning with realistic timelines is important

• Keeping fish out is hard
Flooding Risk
Something is Wrong!
Incorrect Floodplain Elevation

Upstream of Veteran’s Drive

Flooding caused by incorrect floodplain elevation

Pumping out the channel to aid in dry out
Lessons Learned

• Before activating the ultimate channel make sure that the elevations match the design drawings
  – Have the geomorphologist approve the reach
Stabilization Challenges
Stabilization Challenges
Lessons Learned

- It takes 6-8 weeks for vegetation to effectively stabilize
- Coir blanket is a good product to use for stabilization late in the season
Vegetation Challenges

• Large quantities needed
• Contractor oversight
  – incorrect willow species used
  – Incorrect nurse crop used
• Canada Geese
Difficulty in Acquiring Native Plant Material in Large Quantities
Contractor Oversight

Incorrect willow species used
Contractor Oversight

Incorrect Nurse Crop Used
Goose Exclusion Netting
Lessons Learned

• Speak with nurseries early and ensure product is available
• Have botanist check plant material before it goes in the ground
• Exclusion netting is effective in establishing seed when waterfowl are a threat
Unexpected Events

- Sanitary Crossing Below Huttonville Creek
- CN Crossing Errors
- Groundwater Seepage on Slope
Sanitary Sewer Construction under Huttonville Creek
Sanitary Sewer Construction under Huttonville Creek
Sanitary Sewer Construction under Huttonville Creek
Sanitary Sewer Construction under Huttonville Creek
Sanitary Sewer Construction under Huttonville Creek
Lessons Learned

• Ensure that you have good soils information along the alignment of the pipe
CN Crossing Errors
CN Crossing Errors
CN Crossing Errors
CN Crossing Errors
Lessons Learned

• There is a larger margin of error when using the pipe ramming methodology
• When dealing with complex issues you have to look for creative solutions and be willing to work outside of the box
Groundwater Seepage On Slope
Lessons Learned

• Be prepared to resolve pressing issues quickly through effective communication
Impact from Adjacent Development

Sediment spill into Stage 2 Channel
Lessons Learned

• Confirm that pool depths are in accordance with design drawings before activating channel
Extensive Coordination on Design

- The ‘Tooth’ and level of culvert
- Restoration of Wetlands 4 and 7
- Wildlife Fencing
Extensive Coordination on Site

- Sandalwood culvert
- Flow switches
- Trail alignments
Lessons Learned

• Large, complex projects require a lot of coordination amongst all stakeholders

• Life of the project extends past the approvals stage
Silt Smart

Erosion and Sediment Control Effectiveness Monitoring and Rapid Response Protocol for Large Urban Development Sites

Version 1.2
March 2012
Lessons Learned

- Silt Smart is a valuable tool for communicating ESC effectiveness to contractors, inspectors, project managers, and agencies.
Next Steps: Monitoring

- Preparation of Monitoring Plan took considerable time and effort
- Numerous consultant and agency workshops and discussions
Conclusions

- Collaboration early in the process and continuing throughout construction is key.
- Innovative approaches to issue resolution is important; this sometimes requires all parties to be willing to test traditional or standard methods and approaches.
- Open communication amongst stakeholders allows for quick clear and rapid decision making.
- Commitment from all parties to address issues as they arise and be flexible with pre-determined schedules.
- Flexibility and a degree of reason amongst all parties allowed for much improved outcomes.
Acknowledgements
Key Stakeholders
Acknowledgements
Consultants and Contractors