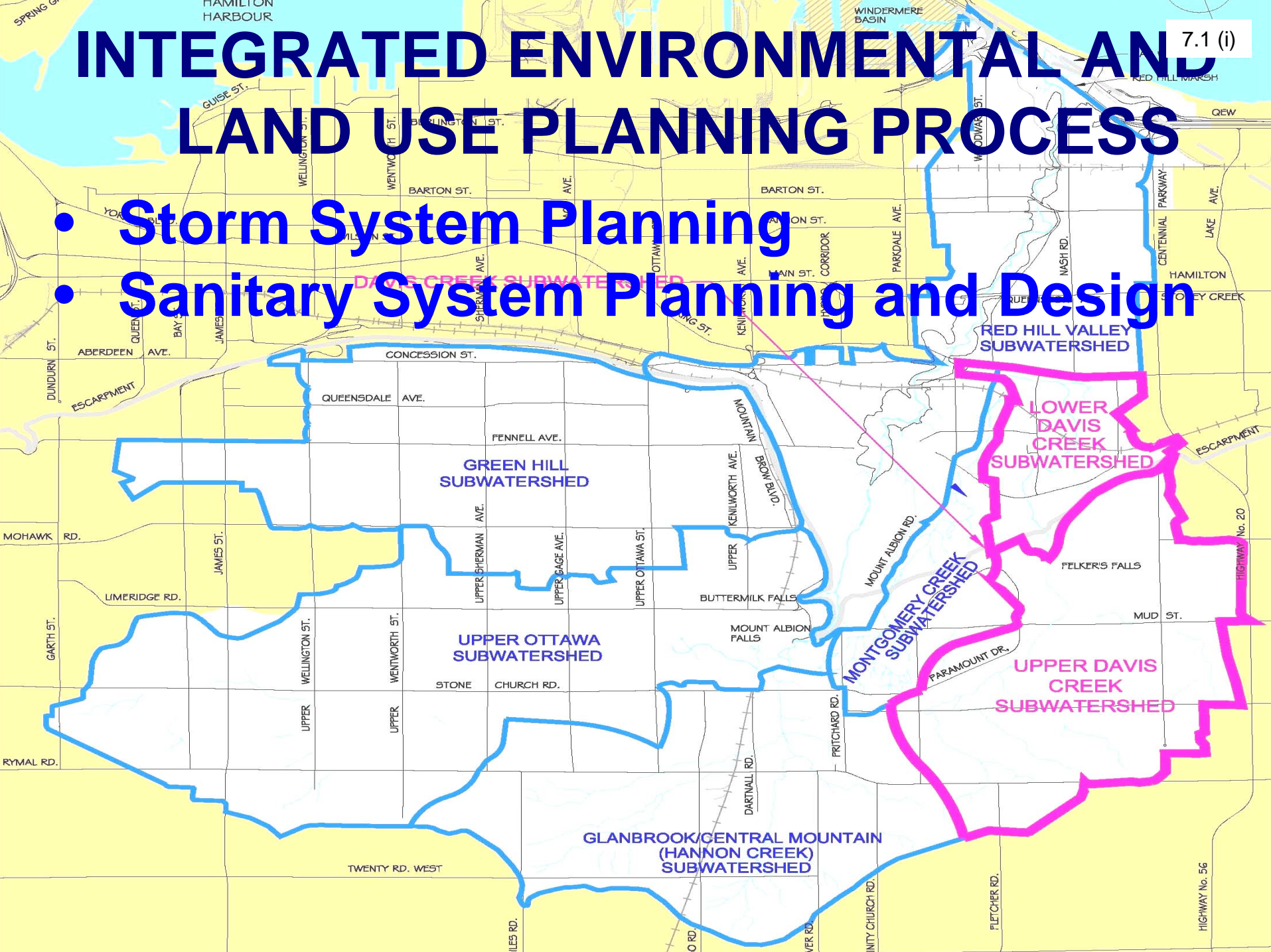


- 
- Storm System Planning
  - Sanitary System Planning and Design



# Integrated Environmental and Land Use Planning Process



1. Introduction
2. Stormwater System Planning
3. Sanitary System Planning
4. Summary/Conclusions

# 1. Introduction



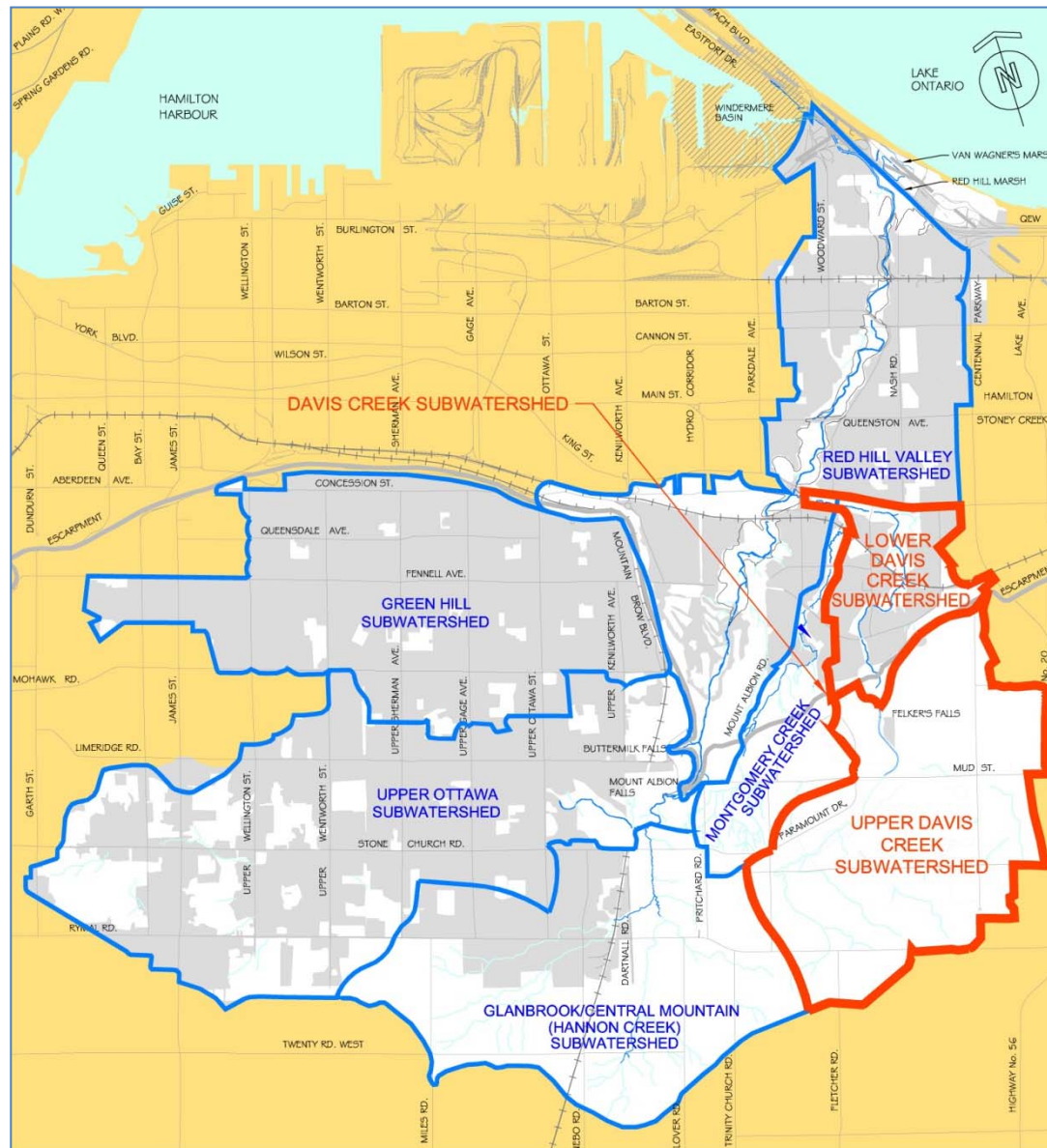
- Purpose:
  - To outline how City staff manage objectives related to:
    - Stormwater Systems
    - Sanitary Systems

## 2. Stormwater System Planning



- Premised on a hierarchical approach starting at the watershed scale, then to the subwatershed scale, followed by a neighbourhood scale and ultimately leading to the plan of subdivision

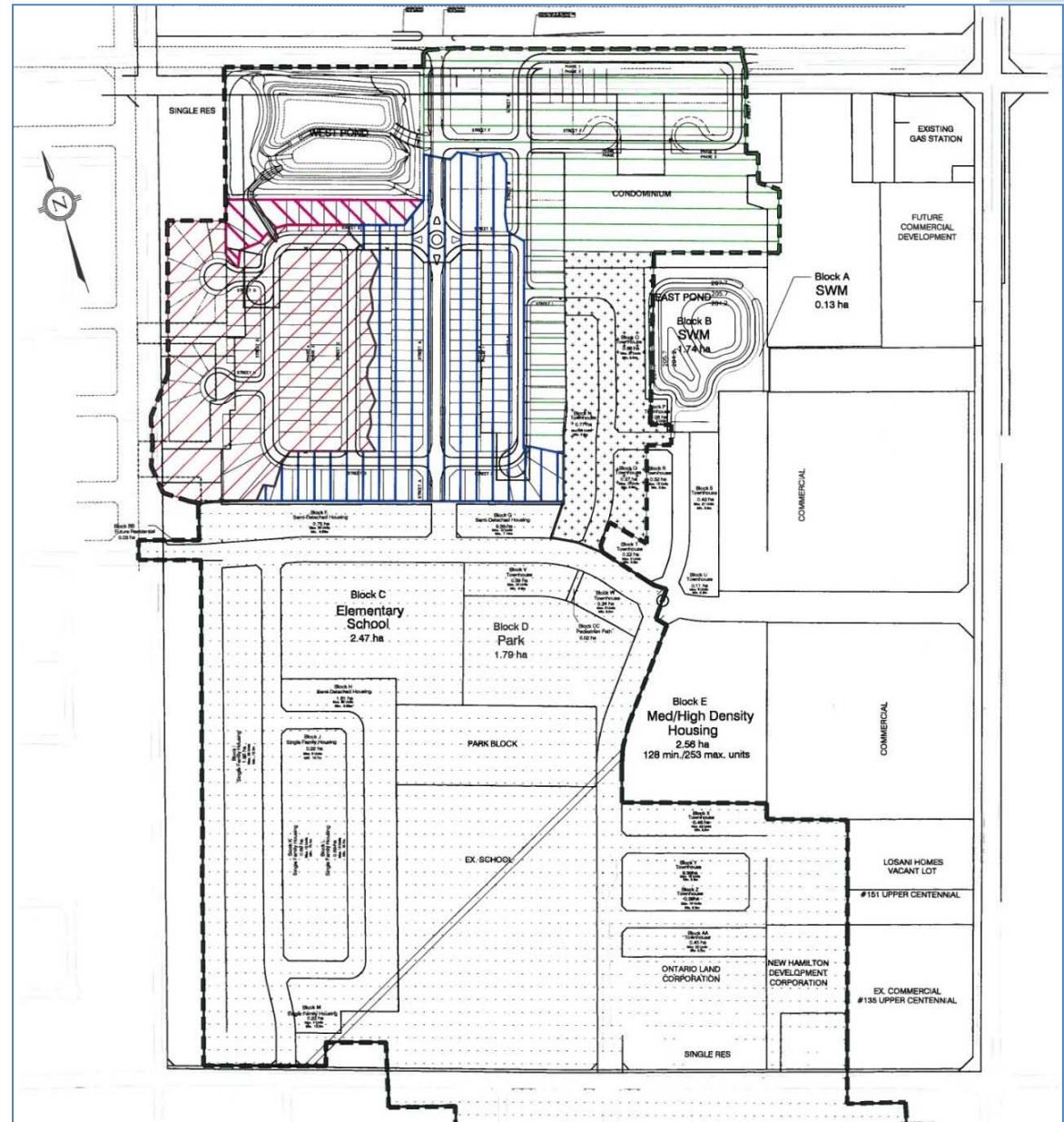
## 2. Stormwater System Planning



Red Hill Creek Watershed / Davis Creek Subwatershed Map



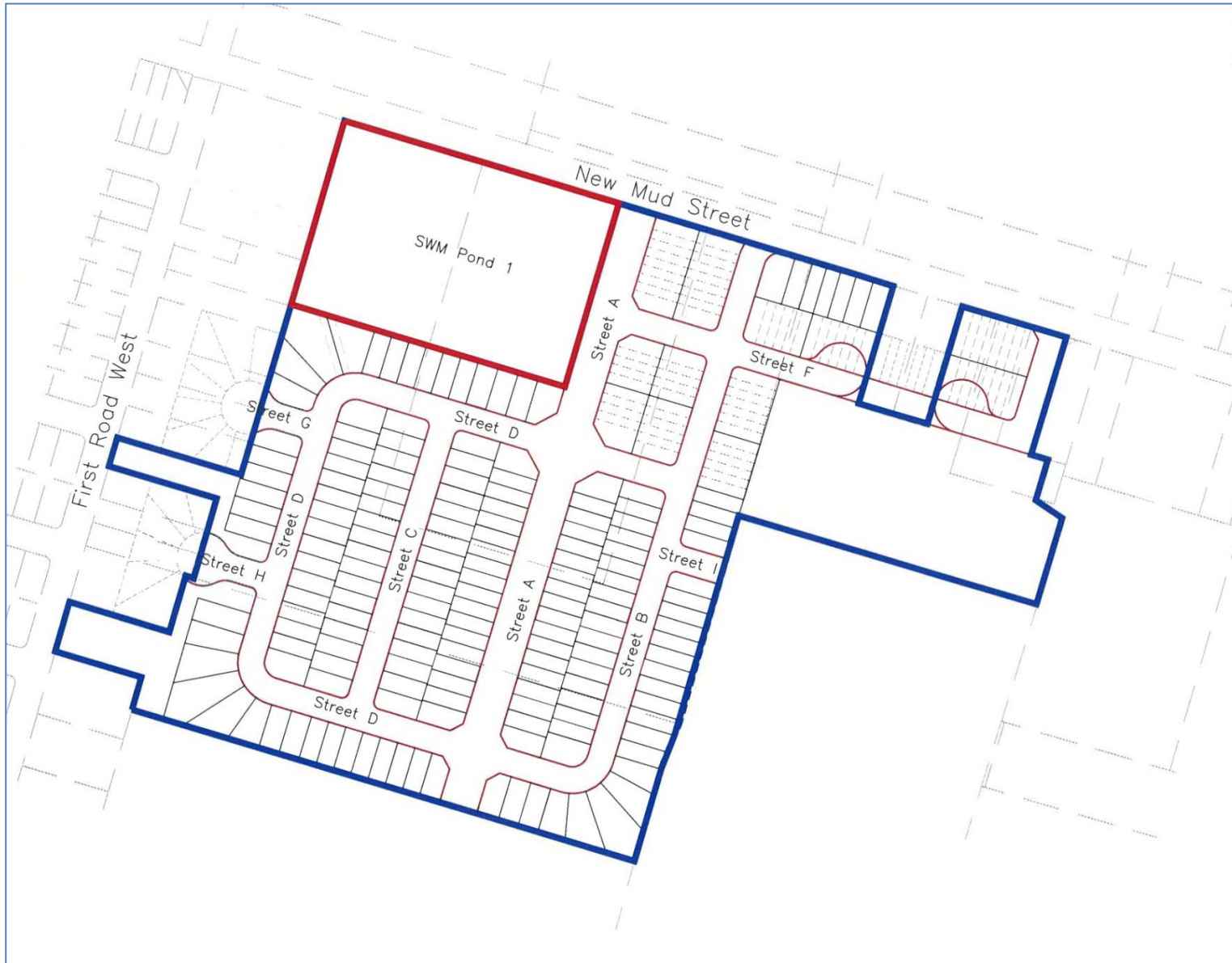
## 2. Stormwater System Planning



### Felker Neighbourhood Map

(ref. Stormwater Management and Design Brief,  
SWM Pond 1 – Felker Community,  
Stantec Consulting, April 2011)

## 2. Stormwater System Planning



**Plan of Penny Lane Estates Residential Subdivision**

(ref. Stormwater Management and Design Brief, SWM Pond 1 – Felker Community, Stantec Consulting, April 2011)

## 2. Stormwater System Planning



### Process

- Endorsed by Ministry of the Environment and Ministry of Natural Resources
- Aligned with City of Hamilton “Storm Drainage Policies”

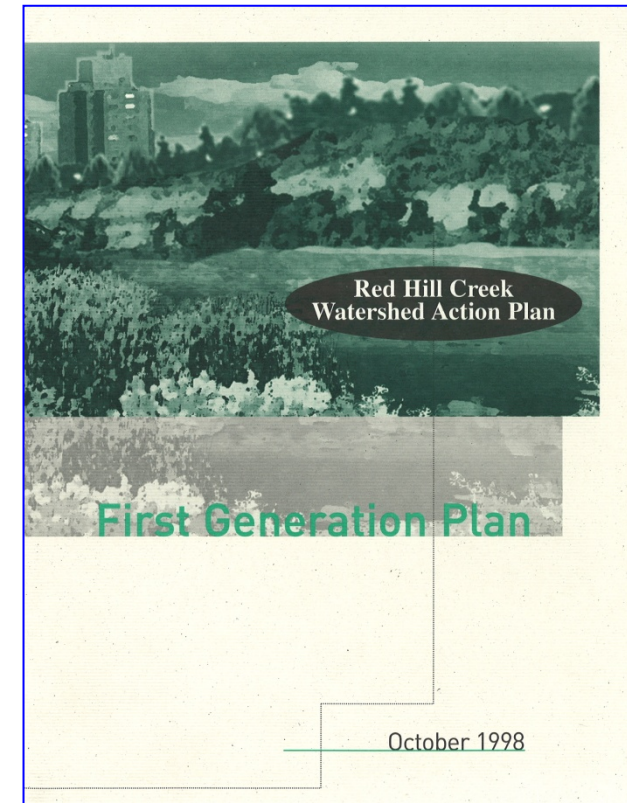


## 2. Stormwater System Planning



### .1 *Red Hill Creek Watershed Plan*

- Award-winning Red Hill Creek Watershed Action Plan, October 1998
  - Developed compendium of actions to address existing and future problems in Red Hill Creek Watershed
  - Upper/Lower Davis Creek cited as high priority areas

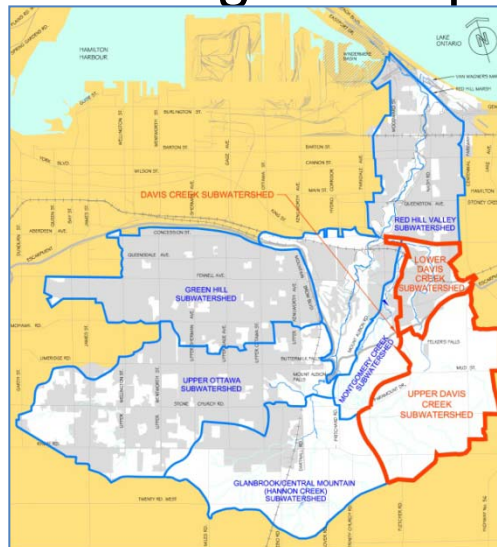


## 2. Stormwater System Planning



### .2 Davis Creek Subwatershed Plan

- Initiated in 2000 as recommended action from Red Hill Creek Watershed Plan
  - Companion to Red Hill Creek Expressway Impact Assessment Design Process
  - As Davis Creek is the largest tributary to Red Hill Creek, its contribution to flood risk within the Red Hill valley is significant and brings forward the need for a management plan (flooding/erosion)



## 2. Stormwater System Planning



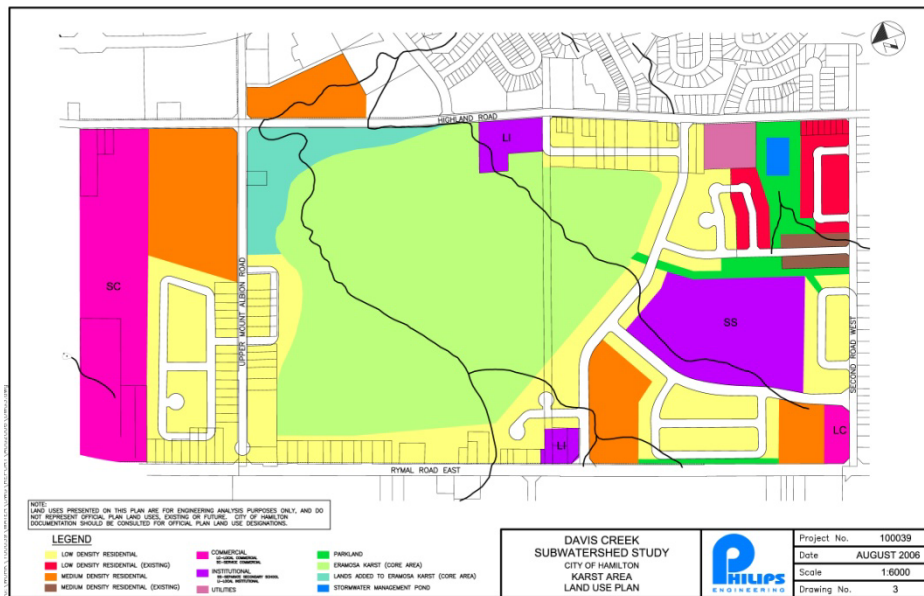
### *.2 Davis Creek Subwatershed Plan*

- Initiated in 2000 as recommended action from Red Hill Creek Watershed Plan
  - Subwatershed Plan Assessment applied observed rainfall and measured runoff to build an accurate and defensible tool for land use impact assessment and management.

## 2. Stormwater System Planning

### .2 Davis Creek Subwatershed Plan

- Study Process/Timing
  - Study delay in 2001 due to Municipal amalgamation
  - Discovery of Karst in headwater affects land use assumptions; lands designated as ANSI in 2003; study re-started in 2004
  - PIC held in 2005/6; study completed in 2006





## 2. Stormwater System Planning

### .2 Davis Creek Subwatershed Plan

- Key recommendations from Subwatershed Plan
  - Need for major flood control facility to protect valley/expressway
  - Need for follow-up investigations using Class Environmental Assessment process to address erosion in Lower Davis Creek
  - Specific management requirements for new development



Davis Creek Flood Control Facility



Lower Davis Creek Erosion



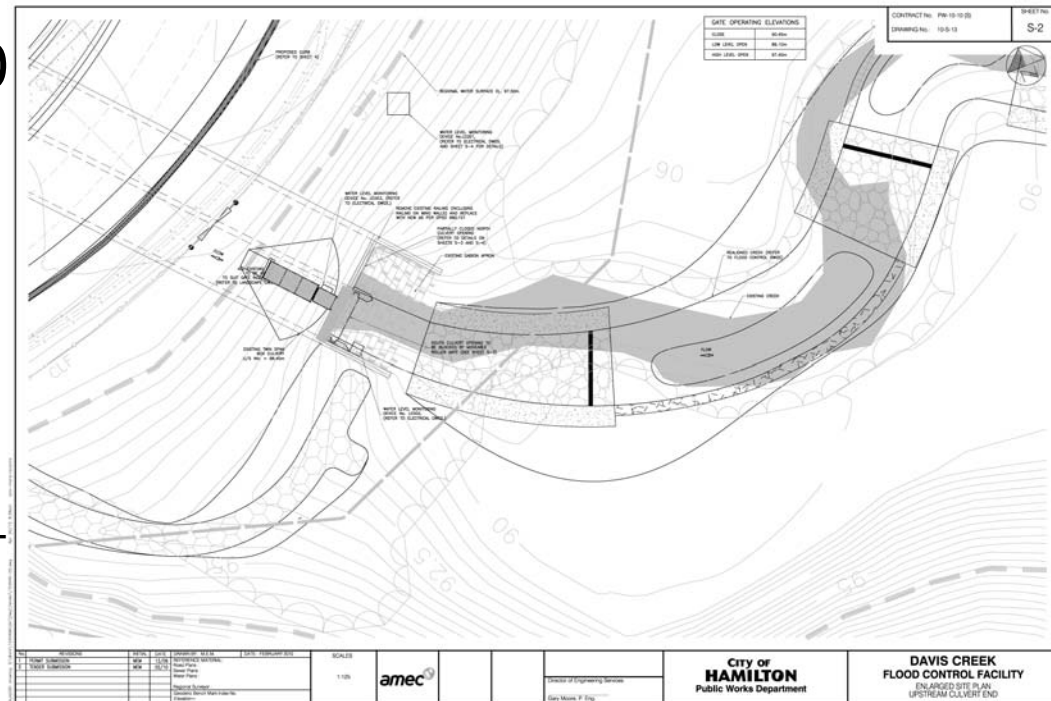
## 2. Stormwater System Planning



### .3 Davis Creek Flood Control System Design

- Initiated in 2003
- Placed on hold pending the results of Davis Creek Subwatershed Study
- Re-started design in 2009
- Submitted for permits in 2010
- Construction start-up mid-2010
- To be completed in 2011

Facility will reduce flood risk during major storms to Red Hill Valley Parkway by 15% +/-



## 2. Stormwater System Planning



### .4 *Lower Davis Creek Class Environmental Assessment*

- Initiated in early 2009 as recommendation of Davis Creek Subwatershed Plan
- Specific study focus on erosion downstream of escarpment to Greenhill +/-
- Fully integrated assessment of
  - *Environment* – trees/vegetation
    - wildlife
    - fish/aquatic systems
    - Species at Risk
  - *Physical System* – erosion
    - flooding

## 2. Stormwater System Planning



### *.4 Lower Davis Creek Class Environmental Assessment (Cont'd)*

- Social/Economics
  - private property
  - infrastructure
  - trails
  - maintenance
  - archaeology
- PIC's held in 2009/2010
- Project filed in May 2011
- Detailed Design to be initiated in June 2011,  
first phase of construction in 2012.

## 2. Stormwater System Planning



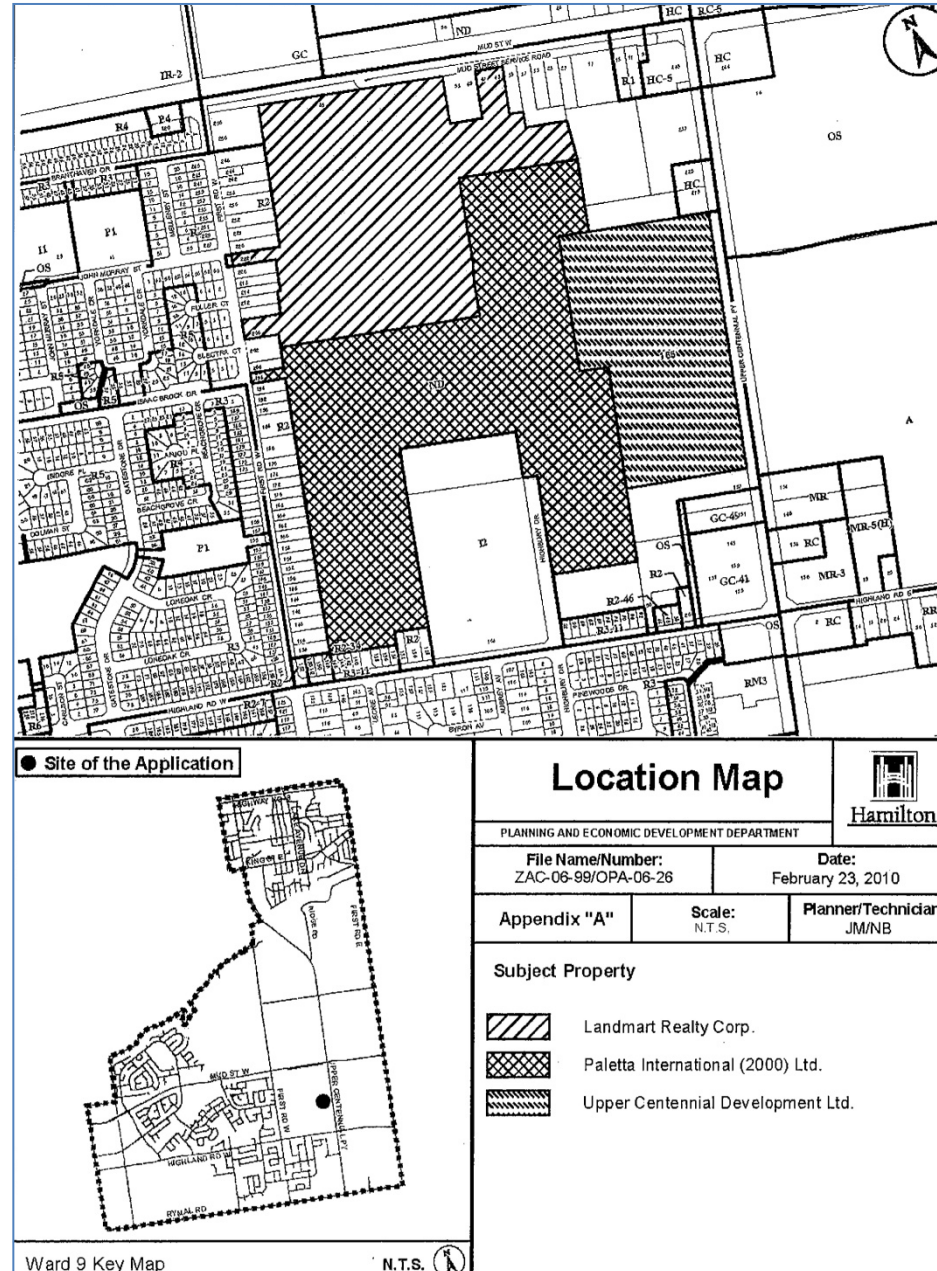
### .5 Secondary Plans

- City land use planning initiatives using Secondary Plans/Neighbourhood Plans to provide specific guidance including:
  - *Nash Neighbourhood*
  - *Felker Neighbourhood*
  - *Eramosa Karst (ROPA 9)*
  - *ORC lands*
- At Subwatershed level, these plans are assessed for impacts and management at a higher level, more coarsely → as details are advanced , assessment becomes more resolute leading to refinements in:
  - land use coverage
  - stormwater management facility size, number and location
  - drainage boundaries are adjusted

# 2. Stormwater System Planning

## .5 Secondary Plans

Felker Neighbourhood  
Special Policy Area





## 2. Stormwater System Planning



### .6 *Draft Plan Applications*

- Individual development applications within Secondary Plan Areas typically follow shortly on the heels of the Secondary Plans
- Each Plan follows a two-step process for Stormwater Planning as per City Policy:
  - *Functional Plan*
  - *Detailed Design*
- Need to follow City Policy for Storm Drainage plus Guidelines for Stormwater Infrastructure Design
- Provincial and Federal regulations also need to be addressed (MOE, HCA, DFO, MNR)
- Where more than one development is required to address a particular issue, the City will request a more comprehensive and integrated review/assessment

## 2. Stormwater System Planning

### .6 Draft Plan Applications

- e.g. Penny Lane
- Issue raised with respect to protection of a local environmental feature
- Necessitated a change and “rethink” on local drainage boundaries / approach to water balance and feature protection (required by HCA and MNR).



## 2. Stormwater System Planning



### .6 Draft Plan Applications

- City conducted an assessment of the impacts of this local constraint on the overall stormwater management system
- Employed original analytical tool developed as part of the Davis Creek Subwatershed Plan to ensure accuracy and consistency on a larger scale
- Specific and timely direction offered to proponents (Penny Lane) to allow for planning and design of:
  - *stormwater management*
  - *local grading*
  - *Storm sewer network*

## 2. Stormwater System Planning



### *.6 Draft Plan Applications*

- Local site design, as noted, receiving guidance from Municipal, Provincial, and Federal directives
- Minor System
  - sewer pipes, swales, ditches
  - usually designed to a 5 year capacity
  - flooding 2 to 3 times per decade on average
- Major System
  - roadways, channels, spill zones from ponds
  - usually designed to a 100 year standard

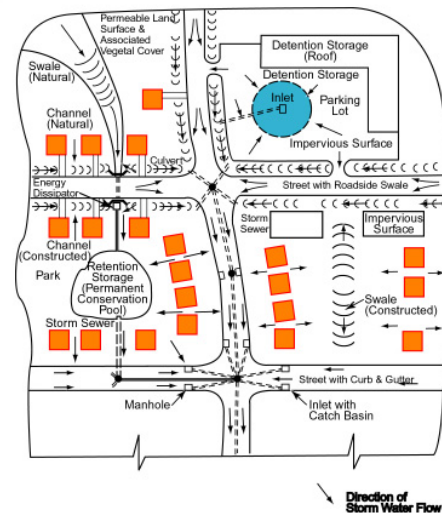
## 2. Stormwater System Planning

### .6 Draft Plan Applications

Major System



Minor System





## 2. Stormwater System Planning



### .6 *Draft Plan Applications*

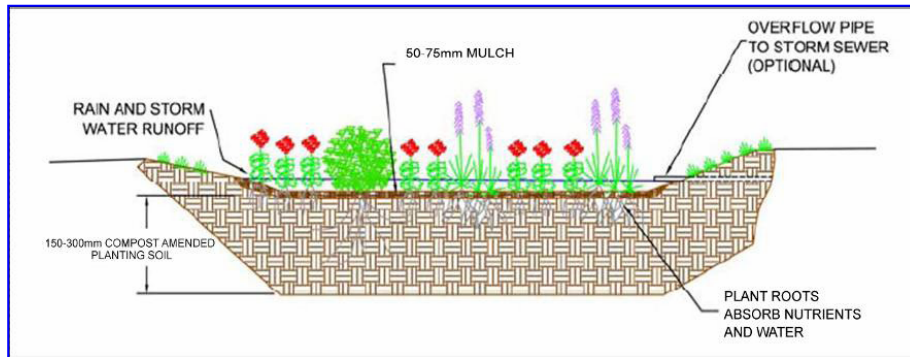
- Stormwater management practices provide protection for watercourses from flooding and erosion, and also improve water quality of urban runoff



## 2. Stormwater System Planning

### .6 Draft Plan Applications

- Low Impact Development Best Management Practices (LID BMP)
    - more source controls on private property
    - deals more with problem where it starts
- aligns with City Master Plan and 2010 LID BMP Guidelines, TRCA/CVC



*Rain Garden Cross Section*



*Front Yard Rain Garden*



*Bioswales*



## 2. Stormwater System Planning



### .7 *Implementation Considerations*

- Phasing of stormwater management with the amount and timing of development
- e.g. existing Lower Davis Creek is at risk from erosion
  - Prior to repairing the affected reach (construction targeted for 2012), development set to advance on the Escarpment within the tributary area
  - City required an assessment of the influence of



development (limited phase)  
what amount of development can  
to what degree does it  
controlled to effectively  
the City's risk in the Lower Davis

## 2. Stormwater System Planning

### .7 Implementation Considerations



- Phase 1 Development (Penny Lane Estates)

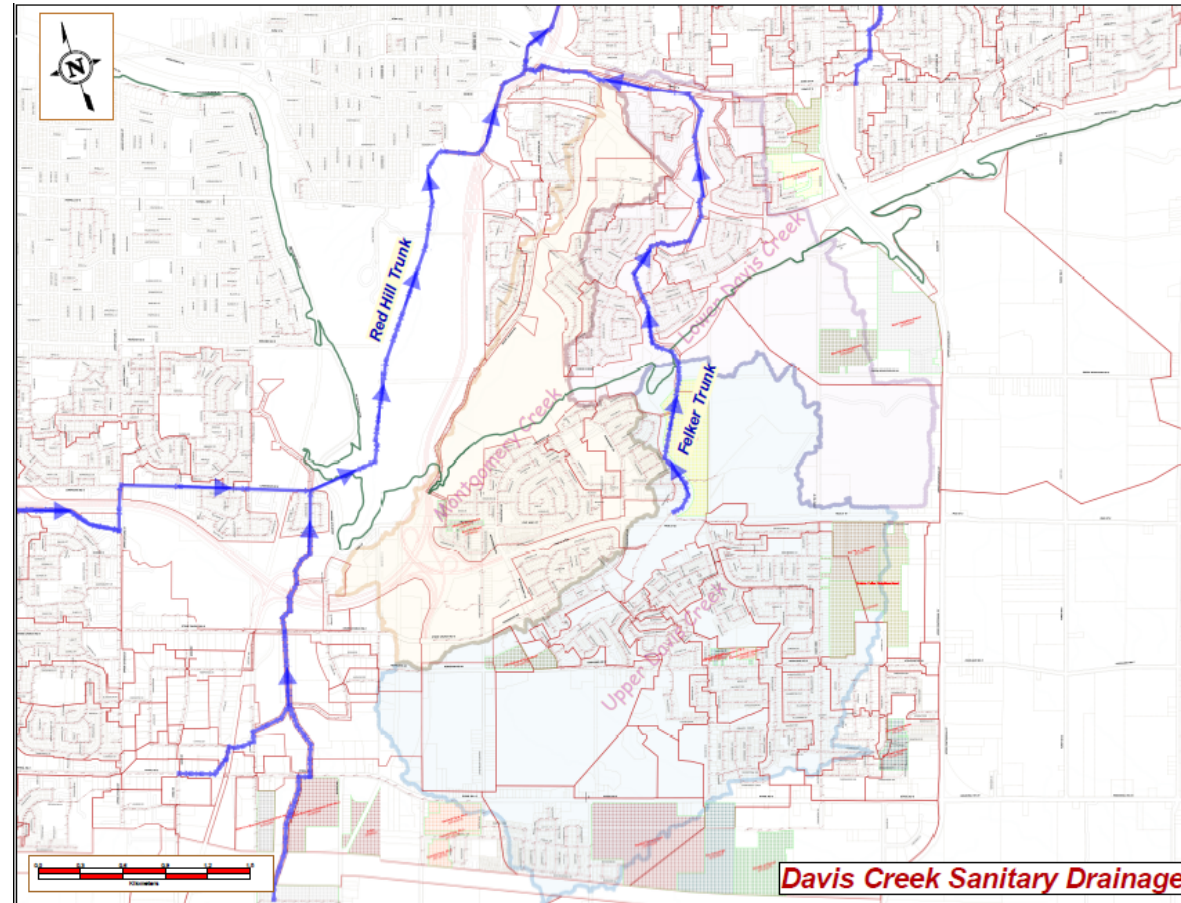
Ultimate Development in addition to Penny Lane Estates includes:

- Paletta International (2000) Ltd.
- Upper Centennial Development Limited



# 3. Sanitary System Planning & Design

## .1 Overview of Trunk Network



- Main outlet for Davis Creek subwatershed study area is Felker Creek trunk sewer which discharges into the Red Hill Creek sewer at King Street
- Sewage flows ultimately are conveyed to the Woodward Avenue Sewage Treatment Plant (WSTP)



# 3. Sanitary System Planning & Design

## .2 *What does this mean to design?*

- Design of sanitary sewer is based on peak sewage flows from the tributary area (catchment)
- Sewage flows are made up of waste discharge from residential, commercial, institutional and industrial uses including extraneous non waste sources
- Criteria in the City's Development Engineering Guidelines manual are:
  - **Sanitary Drainage**
    - ❑ Average residential flows – 360 litres/person/day
    - ❑ Peaking Factor (M) –  $5/P^{0.2}$  (where P is population in thousands, and  $2 < M < 5$ )
    - ❑ Infiltration Factor – 0.2-0.4 L/sec/h
  - **Equivalent Population Densities**
    - ❑ Single Detached – 60ppha
    - ❑ Semi-Detached – 75ppha
    - ❑ Townhouses – 110 ppha
    - ❑ Parks – 12-25 ppha
    - ❑ Schools and Institutional - 75-125ppha
    - ❑ Commercial – 125-750 ppha
    - ❑ Industrial and Central Business District – 125-750 ppha

# 3. Sanitary System Planning & Design



## *.2 What does this mean to design?*

- WSTP is capable of providing treatment for 409 MLD of mixed domestic, commercial, and industrial sewage.
- Sewage from proposed developments in the Upper Stoney Creek area will generate less than 1% of the WSTP capacity.
- Sewage design calculations are submitted to support proposed developments to substantiate there is available capacity in the downstream sewer.

## 4. Summary



- Planning Municipal Services (storm drainage and sanitary systems) needs to work from a Master Plan framework to a local scale to be effective
- Master planning allows input to development industry to be co-ordinated and orderly, not piecemeal
- Master Plans though have a “shelf-life” and need to be periodically updated:
  - development phasing/rate is market driven
  - regulatory policies tend to become more stringent over time
  - technology practices improve