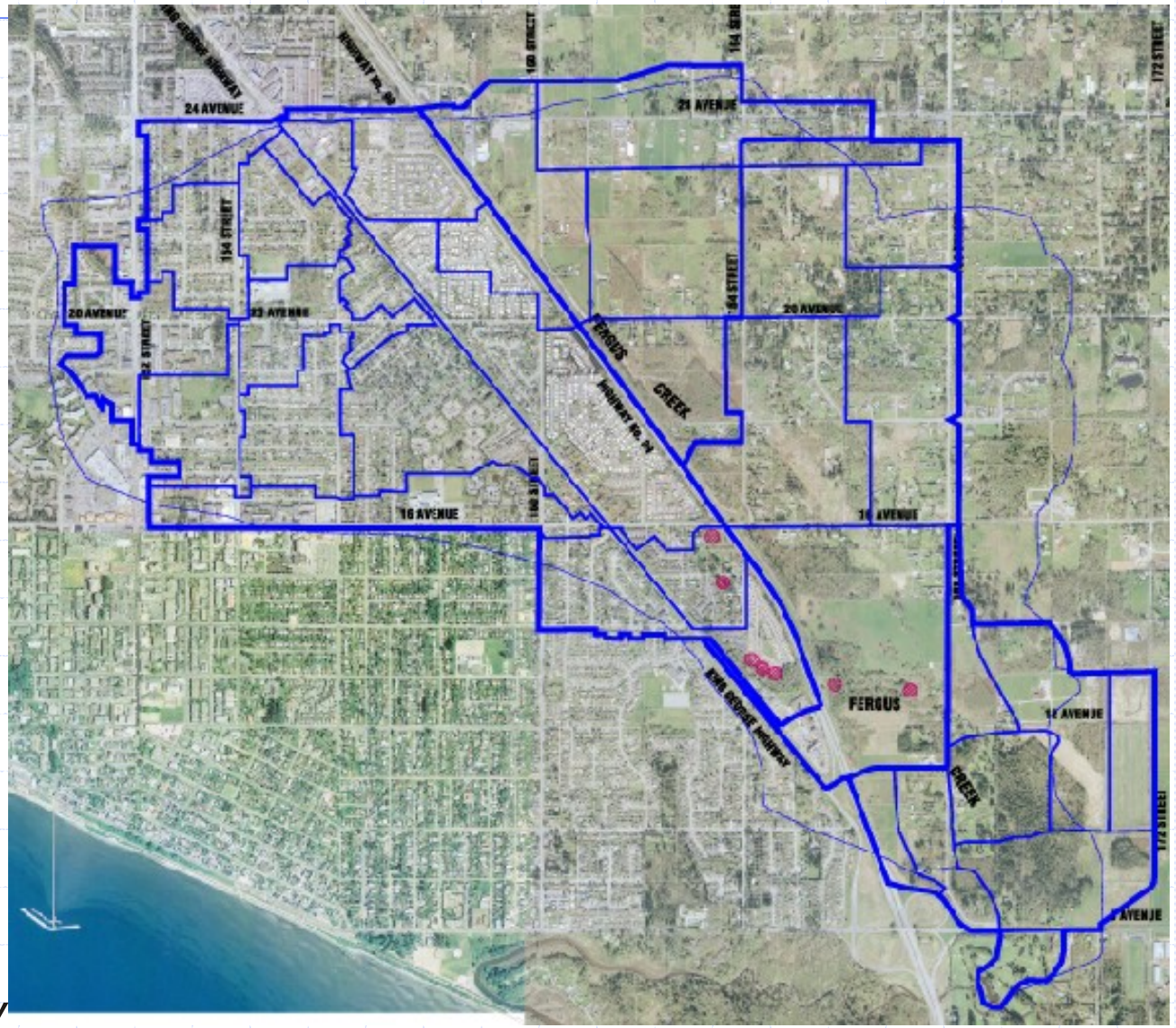
Fergus Creek Test Case

Engineering Results

November 15, 2007

McElhanney

Fergus Creek Watershed



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Modelling BMP's

- Not all the same
- Only two types in operation
  - Capture rainfall before runoff – Surface Change BMP
  - Capture and route runoff – Volume Reduction BMP
- Use different techniques for analysis

Surface Change BMP

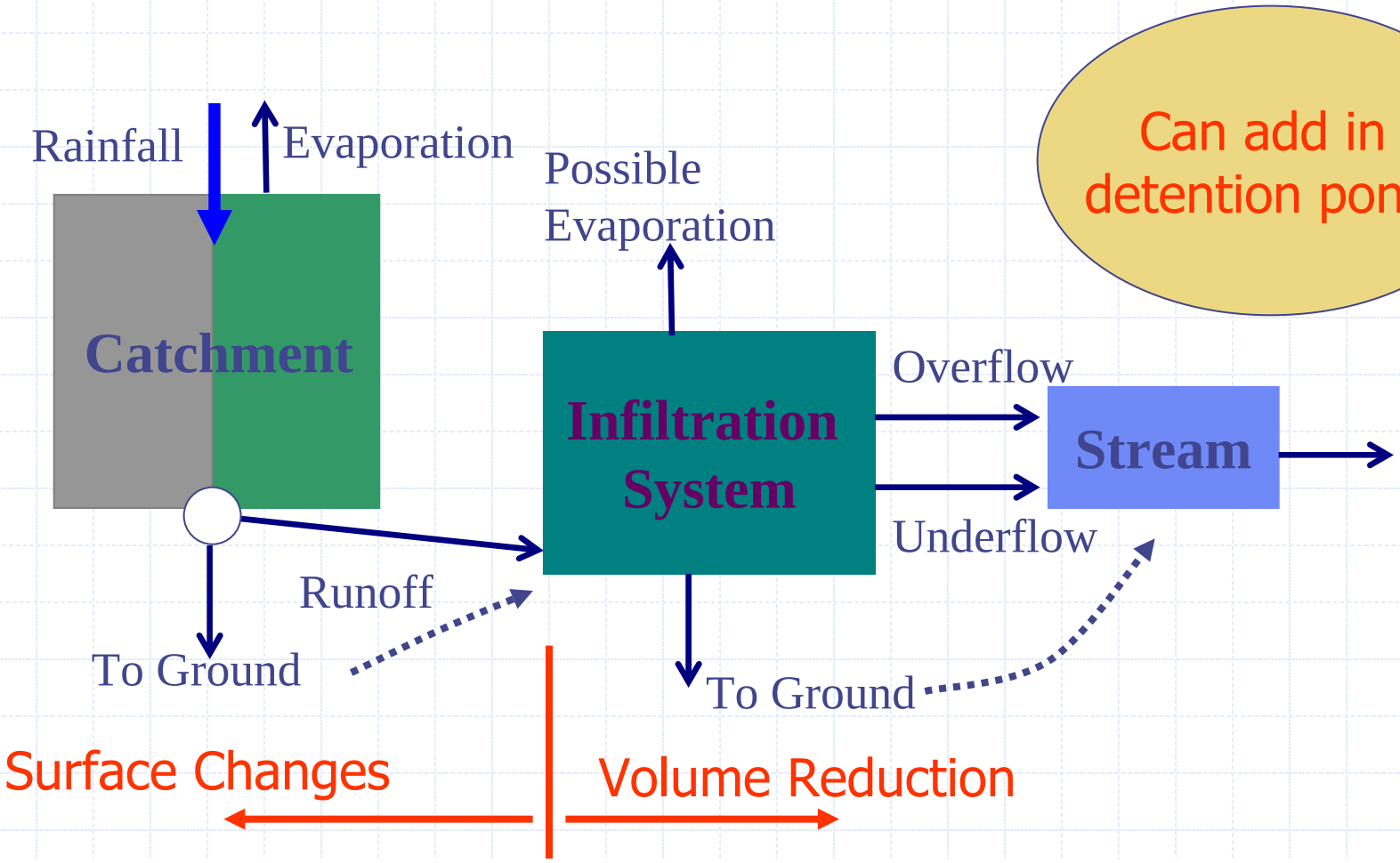
- Absorbent Landscapes
  - Tree cover density
  - Increased top soil depth
  - Porous pavement
  - Green Roof – Typical
  - Some infiltration swales – without storage
- Altered surface parameters
  - Imperviousness
  - Surface roughness
  - Infiltration rates
  - Soil moisture reservoir

Volume Reduction BMP

- Capture surface runoff and STORE it
- Infiltration for volume reduction
  - Rain gardens
  - Infiltration swales with storage
    - Surface or subsurface storage
  - Infiltration ponds
  - Underground galleries

Modelling BMP Systems

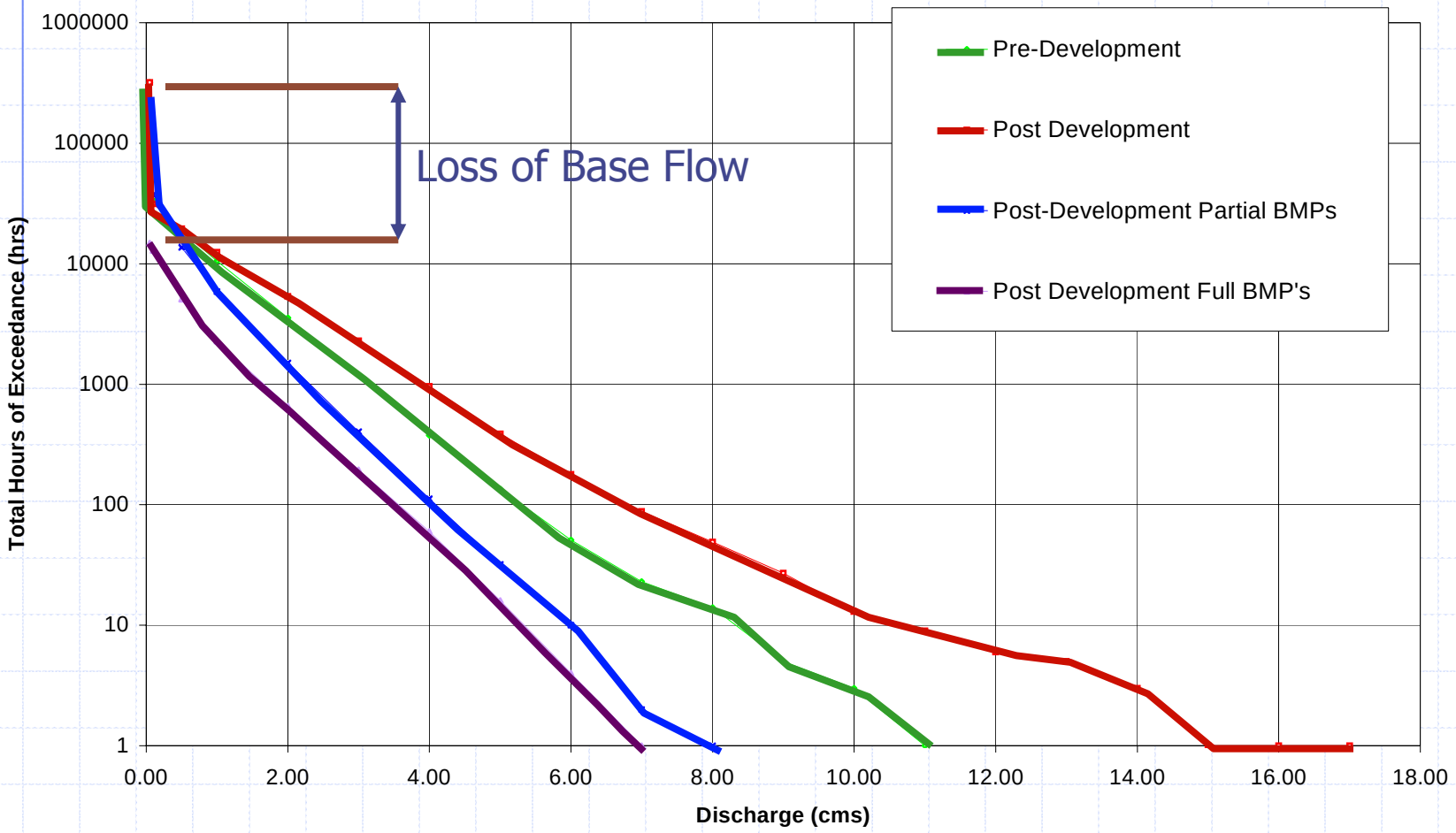
- The new Water Balance Model



Analysis Results

- **Beyond the Guidebook**
  - Flow Exceedance / Duration
  - Potential Stream Erosion
  - Stream Water Quality

Exceedance - Fergus Creek



Tractive Force Equation

$\tau = \sigma Rs$, where

σ = unit weight of water

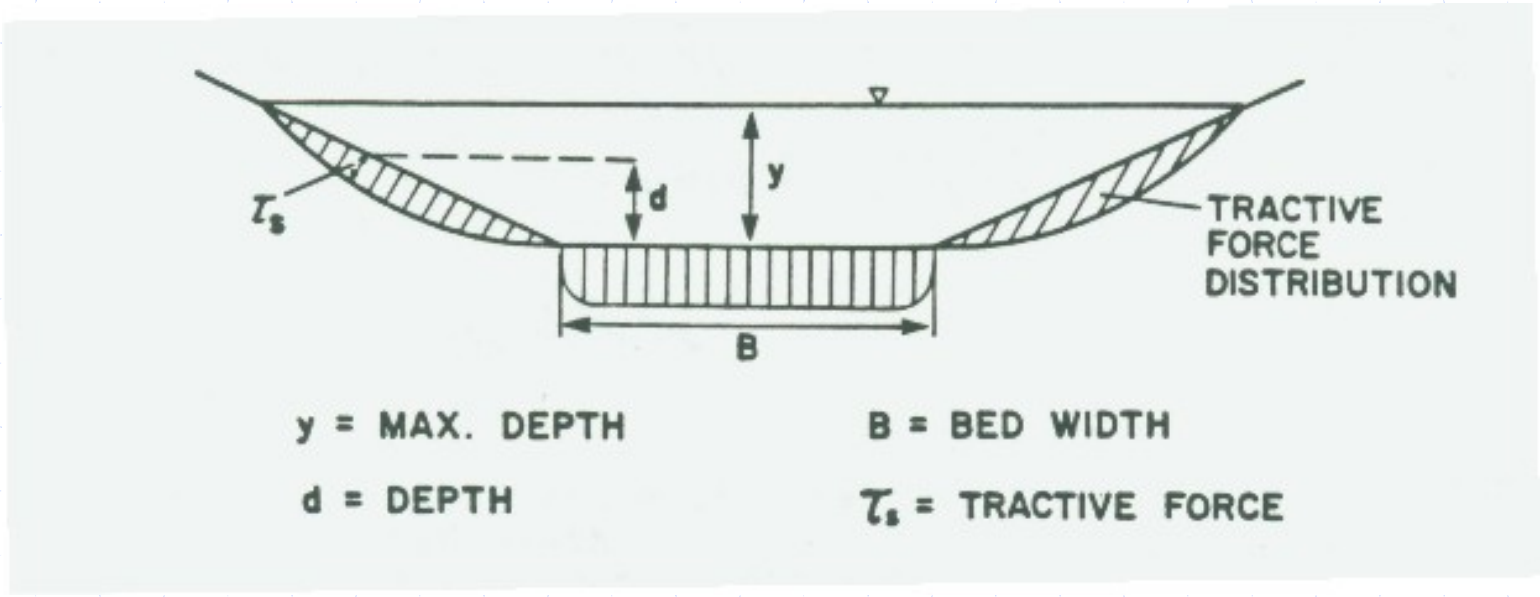
R = hydraulic radius of flow, and

s = slope of channel

- Simple equation
  - Applicable for a wide, open channel
- Include banks for narrow channels

Tractive Force

Based upon Tractive Force calculations



Impulse Equation

$I = \sum(\tau PT)$, where

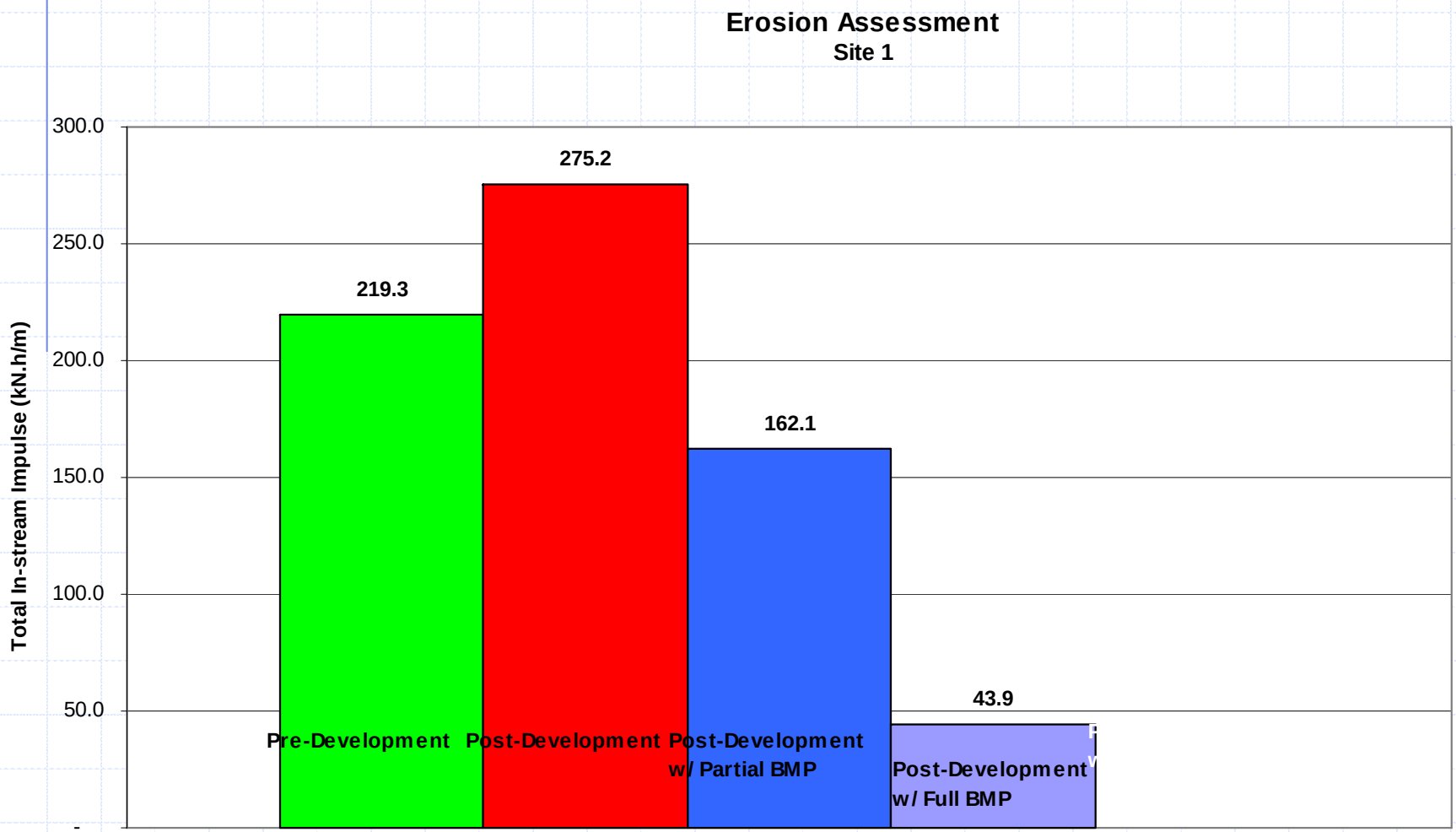
τ = Tractive Force

P = wetted perimeter

T = time

- A measure of energy applied to the stream cross section in the form of friction
- Use duration of flow to estimate total Impulse for a range of flow depths

Potential Stream Erosion

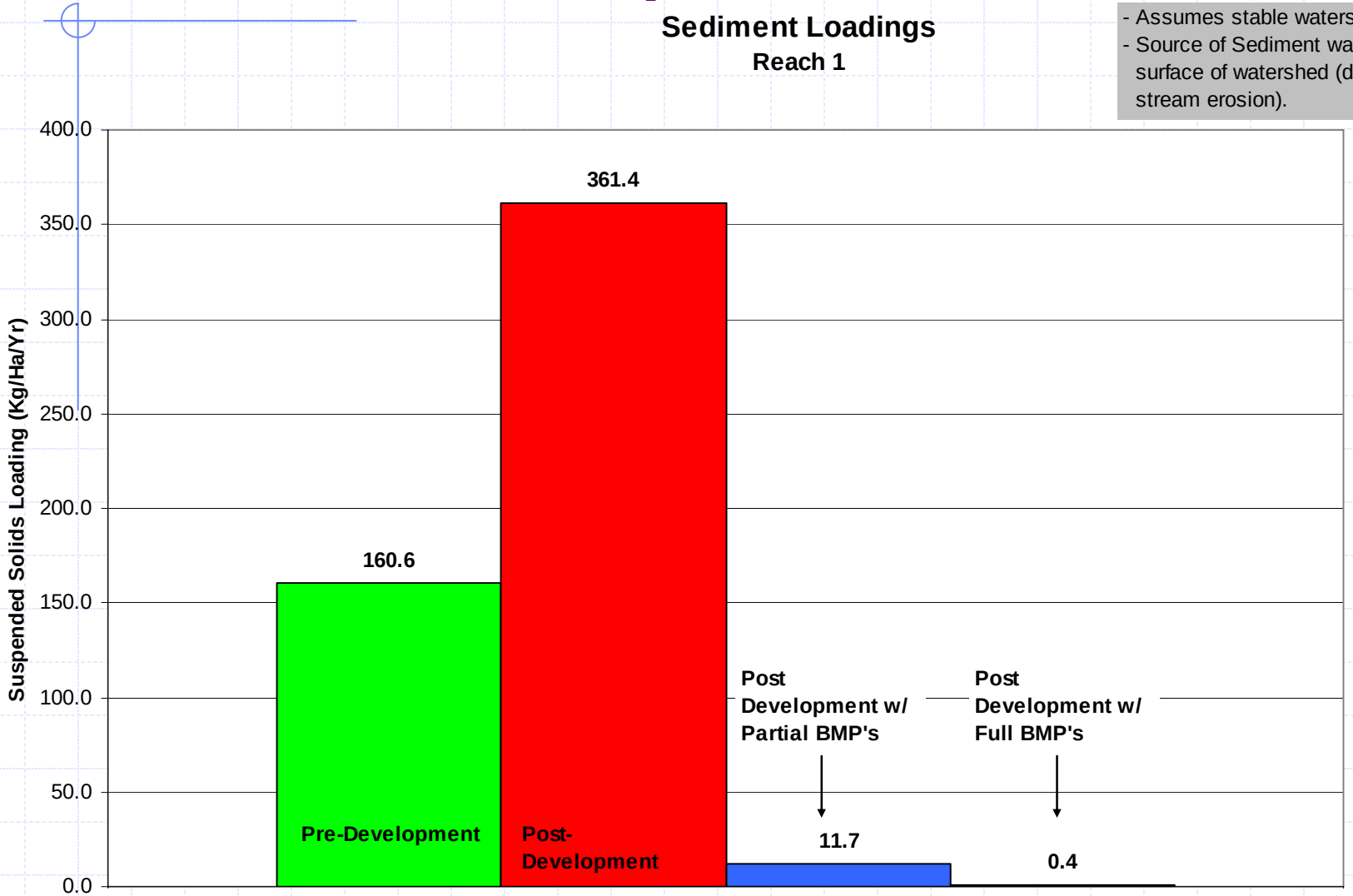


Sediment Supply

Sediment Supply

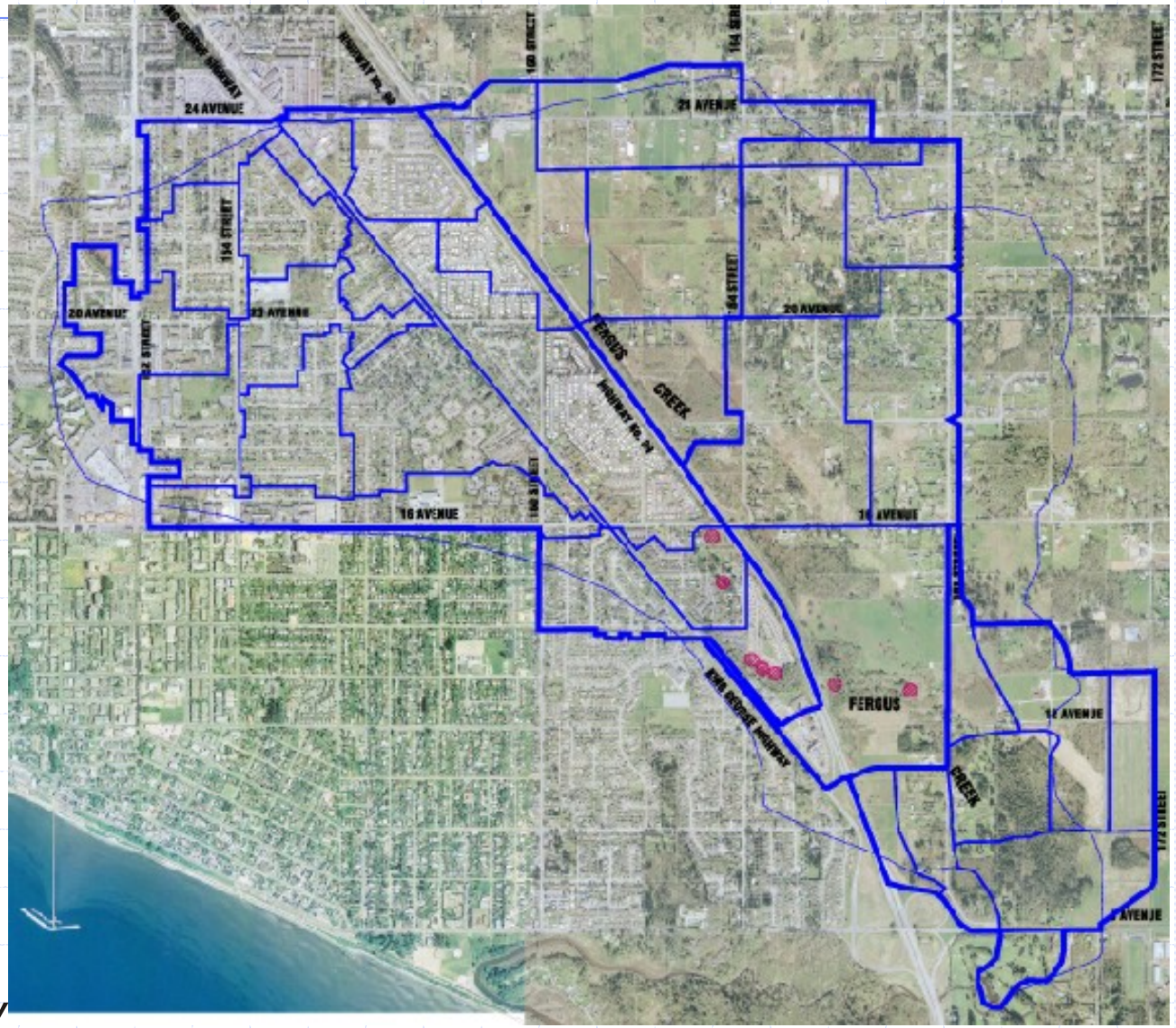
Type of Land Use	Sediment Yield (tonnes/ha/yr)
Natural Forest	0.66
Agricultural	0.11 to 2.2
Urban Construction	1.8 - 73.5
Stable Watershed	0.039 to 0.367
Urban Areas	0.10 to 0.61

Water Quality



- Assumes stable watershed
- Source of Sediment washoff from surface of watershed (does not include stream erosion).

Fergus Creek Watershed



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