

Junction Creek Subwatershed Study and Stormwater Master Plan

**Subwatershed Management Strategies
Recommended Preferred Solution**

**Public Meeting No. 4
March 21 and 22, 2018**

Introduction and Meeting Goals

- The goals of this 4th Public Meeting are to:
 - Present an overview of the evaluation process and background information for Stormwater Master Plan alternatives, options, and policies
 - Identify alternative management strategies developed for critical areas of the subwatershed
 - Provide an opportunity for the public to offer feedback on the Study and these preliminary Stormwater Master Plan strategies, and to discuss key concerns with staff in order to address these comments in the final report, the findings of which will be presented at the 5th Public Meeting.

What is a watershed?

An area of land that collects water from rain and snow and drains through surface waterways (wetlands, streams, rivers, and lakes) or seeps beneath the surface to groundwater. The area of land is defined by the shape and height (elevation) of the ground surface.



Subwatershed Study and Stormwater Master Plan

Purpose and Objectives

Subwatershed Study and Stormwater Master Plan

Purpose:

- Develop a long-term plan that will provide policy and management actions to protect, maintain and enhance the surface water, groundwater and natural resources of Junction Creek and its tributaries

Objectives:

Water Quality

- Improve sediment, surface water and groundwater quality
- Minimize pollutant loadings to groundwater and surface water
- Improve aesthetics of Junction Creek and its tributaries

Water Quantity

- Preserve and re-establish to the extent possible the natural hydrologic process to protect, restore, and replenish surface water and groundwater resources
- Reduce the impacts of erosion on aquatic and terrestrial habitats and property
- Minimize the threats to life and property from flooding

Natural Environment

- Protect, enhance and restore to the extent possible the natural features and functions such as wetlands, riparian and ecological corridors
- Improve warmwater and coldwater fisheries as appropriate

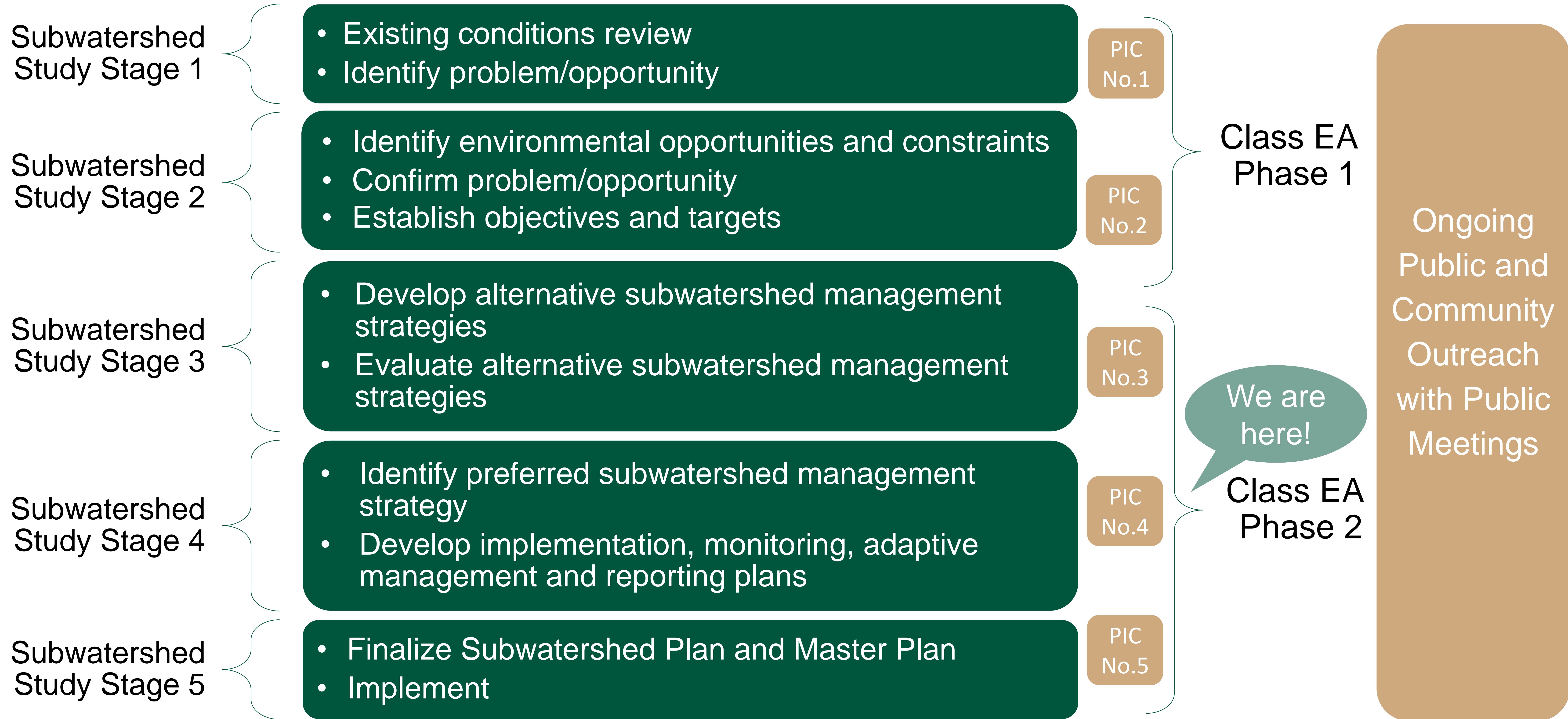
Municipal Class Environmental Assessment Process

- Municipal projects that are similar in nature, routinely carried out and have predictable effects that can be effectively managed are examined according to the Municipal Engineers Association "Municipal Class Environmental Assessment," (October 2007, 2011 and 2015)
- Characteristic features of Master Plans are:
 - Broad in scope, but require more detailed investigations at the project-specific level
 - Focused on the analysis of a system for the purpose of outlining a framework for the provision of future developments
 - Focused on providing recommendations for specific projects that are part of a larger management system
- The Stormwater Management Master Plan will follow the Class EA process for Master Plans and will satisfy Phases 1 and 2 of the process
- Recommended projects as part of the Master Plan will be required to undergo additional planning and design, including public and agency consultation in accordance with the Class EA process

The Class EA defines a Master Plan as:

"A Long Range Plan which integrates infrastructure requirements for existing and future land use with environmental planning principles. These Plans examine the whole infrastructure system or group of related projects, in order to outline a framework for planning subsequent projects and/or developments."

Study Process and Schedule



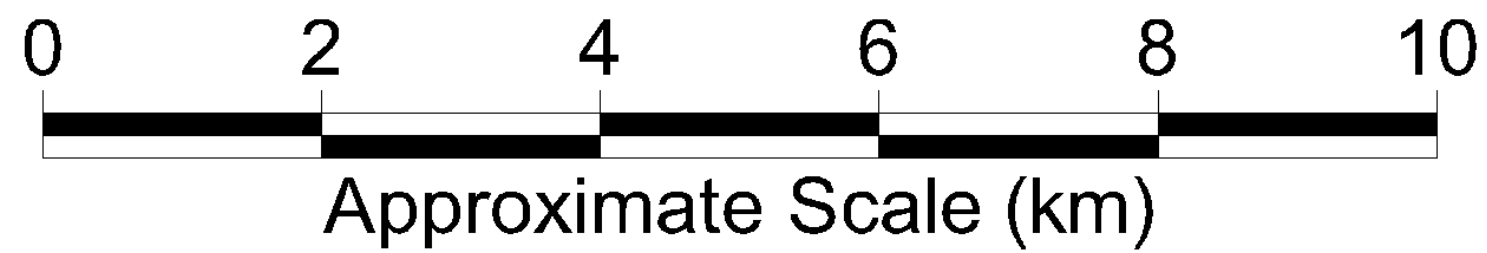
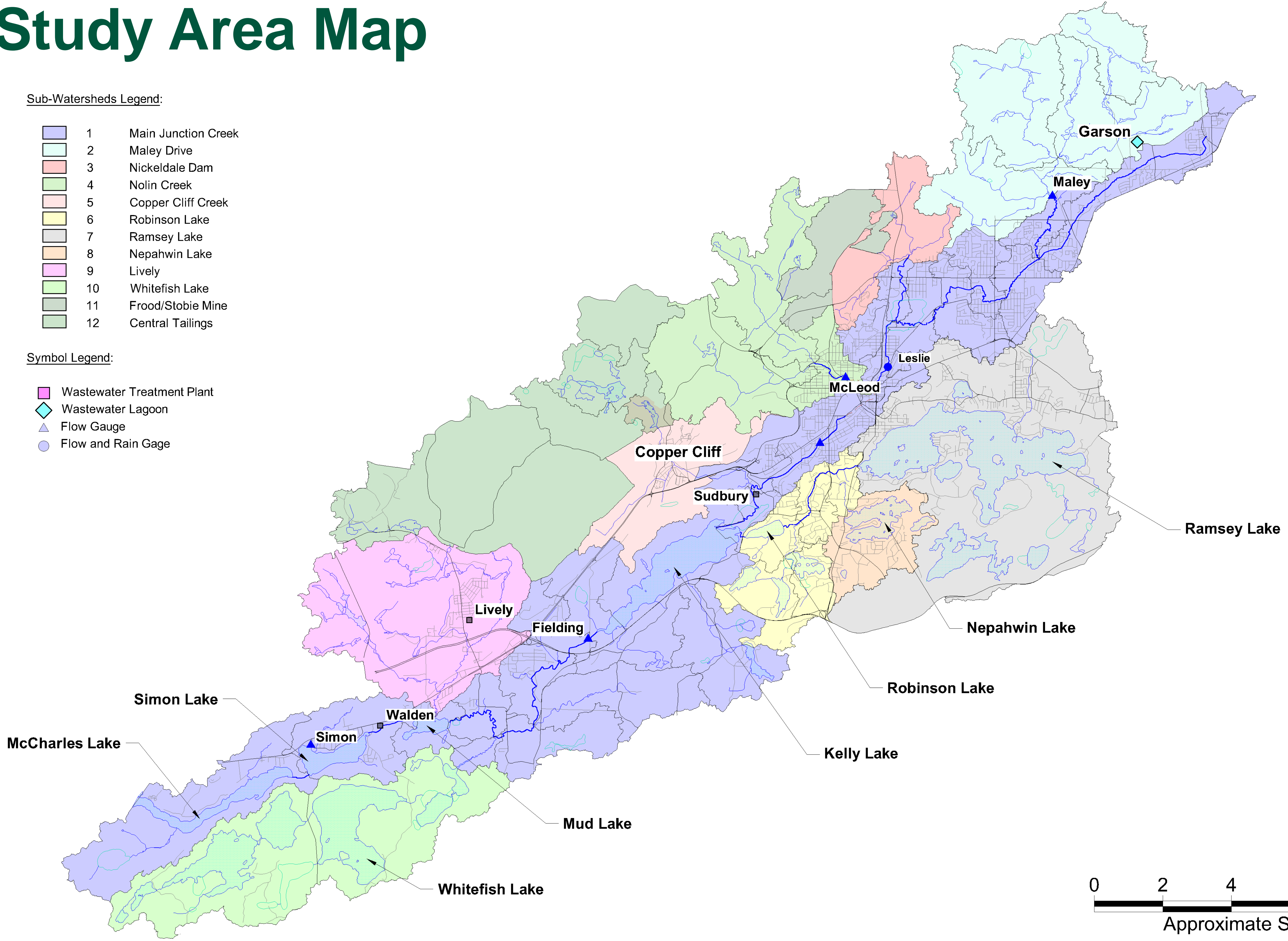
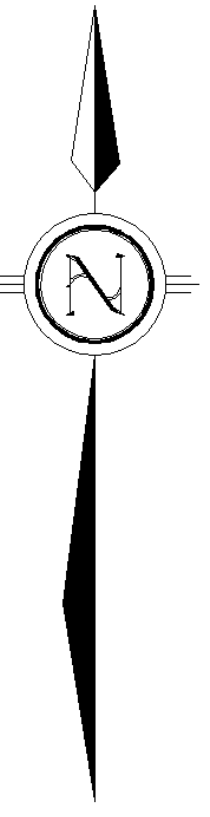
Study Area Map

Sub-Watersheds Legend:

- 1 Main Junction Creek
- 2 Maley Drive
- 3 Nickeldale Dam
- 4 Nolin Creek
- 5 Copper Cliff Creek
- 6 Robinson Lake
- 7 Ramsey Lake
- 8 Nepahwin Lake
- 9 Lively
- 10 Whitefish Lake
- 11 Frood/Stobie Mine
- 12 Central Tailings

Symbol Legend:

- Wastewater Treatment Plant
- Wastewater Lagoon
- Flow Gauge
- Flow and Rain Gage

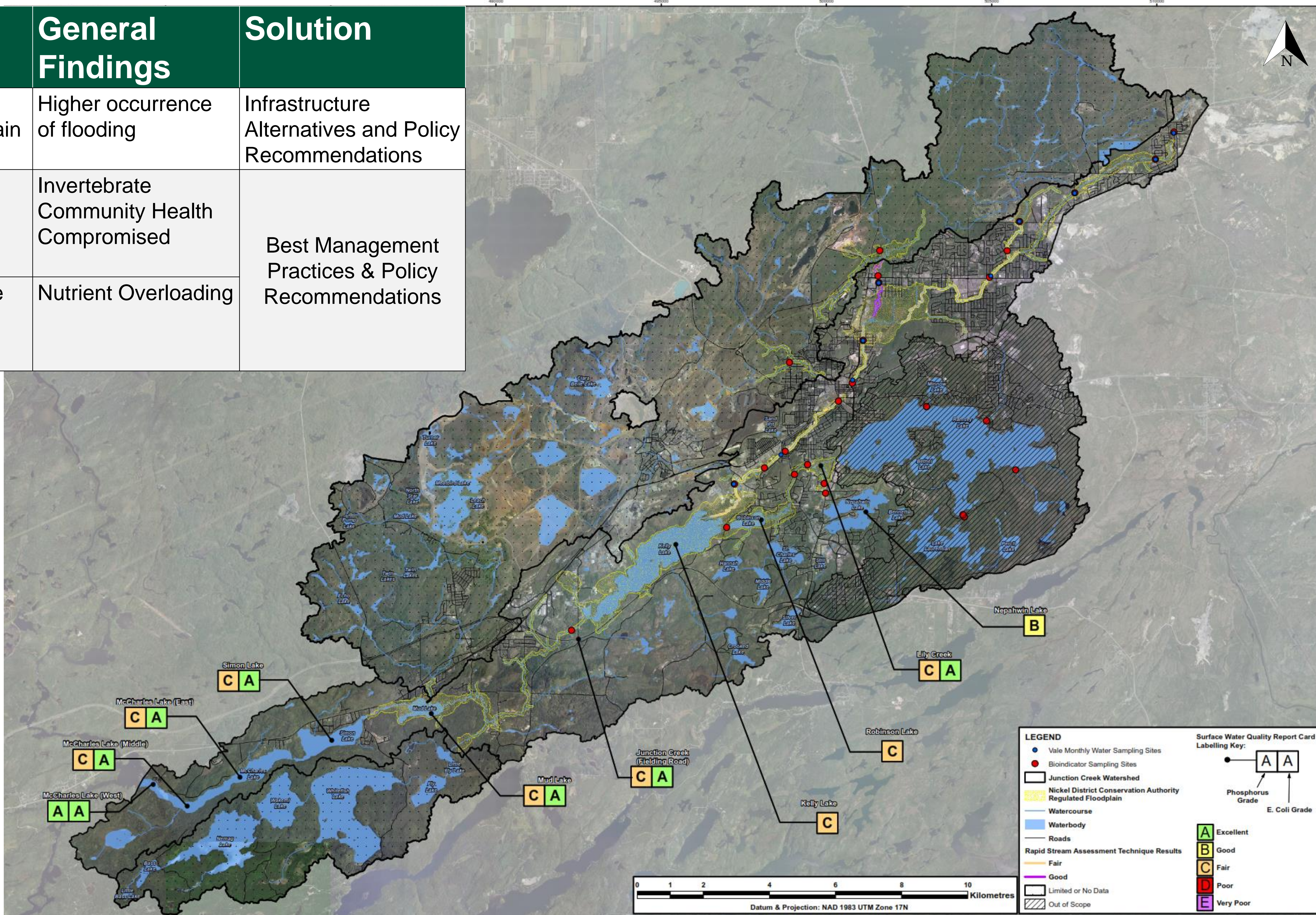


Studies Completed to Date

- In addition to the Stormwater Master Plan Alternatives and Policies described in this presentation, significant background studies have been completed to characterize the entirety of the Junction Creek Subwatershed, which will be detailed in the Final Report, the results of which will be presented at the next Public Meeting:
 - Natural Heritage Characterization
 - Hydrogeology (Groundwater) and Water Quality Characterization
 - Geomorphologic Assessment
 - Urban Infrastructure Assessment (Storm Sewers and Roadways)
 - Hydrologic / Hydraulic Modelling
 - Riverine Floodplain Assessment
 - Climate Change Impacts Assessment

Water Quantity & Quality Issues within the Subwatershed

Issue	Location	General Findings	Solution
Water Quantity	Primarily within the Regulated Floodplain	Higher occurrence of flooding	Infrastructure Alternatives and Policy Recommendations
Water Quality	North of Kelly Lake	Invertebrate Community Health Compromised	Best Management Practices & Policy Recommendations
	South of Kelly Lake	Nutrient Overloading	



- Water quantity and water quality issues have been identified throughout the subwatershed.
- These issues are visible in different ways and locations.

Assessment of Trunk Storm Sewer Networks within the Junction Creek Watershed (Minor System)

- **Methodology:** Develop models to examine the storm sewer system and test against standard 5-year design storm events.
- **Findings:** Areas with high (>10%) percentages of simulated surcharging and flooding during the 5-year event are located primarily in older areas in the City.

Surcharging?

A sewer is surcharged when it receives more flow than it can handle by gravity. The head, or water level at the upstream end of the sewer, will rise until the extra pressure forces enough water through the sewer. Typically, this is not seen as water levels usually stay below ground level, inside the maintenance holes.

Integrated Assessment of Trunk Storm Sewer and Road Networks (Major System)

- **Methodology:** Develop models to examine performance of storm sewer system and road network (Dual Drainage System Model) and test against standard 100-year design storm events.
- **Findings:** All networks analyzed are inherently prone to some surface “flooding” during the 100-year storm event, which is generally consistent with current practice for drainage system designs (i.e., roads are intended to carry water). However, roadway water depths above 0.15 m tend to exceed the capacity of the curb and gutter system, potentially adversely flooding public and private property.

Long List of Alternatives

A long list of alternatives was developed based on the results of the performance assessment of the existing storm sewer system developed networks.

- **Alternative 1.** Do Nothing.
- **Alternative 2.** Increase size of deficient storm sewers, or twinning (i.e., adding a second sewer pipe).
- **Alternative 3.** Implement larger pipes, or super-pipes, to provide stormwater quantity control.
- **Alternative 4.** Implement on-site stormwater management for individual private properties.
- **Alternative 5.** Implement storage areas within available public spaces.
- **Alternative 6.** Retrofit existing stormwater management facilities to provide additional quantity control.
- **Alternative 7.** Redirect excess flow to other nearby systems (localized diversions).
- **Alternative 8.** Optimize the outlet configuration and storage of the Maley and Nickeldale Dams.
- **Alternative 9.** Improve the conveyance capacity of Junction Creek (open watershed).
- **Alternative 10.** Low Impact Development (LID) Best Management Practices (BMP) (other than Alternative 8).
- **Alternative 11.** Combinations.

Screened Alternatives

The long list of alternatives was reviewed considering the cost, feasibility and ability to address study objectives. The following alternatives were screened from further consideration.

- **Alternative 1. Do Nothing**
Does not address the issues associated with deficient infrastructure capacity and associated flooding risk.
- **Alternative 3. Super-Pipes**
Generally not a cost-effective option and provides minimal flood control benefit. Also dependent on having a sufficient grade difference (to avoid backwater effects) and sufficient space within City-owned land.
- **Alternative 4. On-site stormwater management**
Requires voluntary participation from private landowners and would not give the City control over the system (Can be separately pursued as a 'no regrets' component of a public plan).
- **Alternative 6. Retrofit existing stormwater management facilities**
Generally not considered to be a viable option, as the majority of existing stormwater management facilities are generally maximized in terms of flood control.

Short Listed Alternatives

From the review of the long list of alternatives, the following alternatives were determined to be feasible and positively impact water quality, water quantity and/or the natural environment.

- **Alternative 2. Increase size of deficient storm sewers, or twinning:** This is typically the most effective alternative. Cost, existing utility locations, and depth of installation must be considered during implementation planning.
- **Alternative 5. Implement storage areas within available public spaces:** This alternative can be an effective option in appropriate locations; however, available space and a possible reduction in public use must be considered. Underground storage is a possibility to resolve space constraints but at an added cost.
- **Alternative 7. Redirect excess flow to nearby systems:** This is an effective alternative but requires a system with sufficient capacity to accept additional flow and adequate existing grades.
- **Alternative 8. Optimize Maley and Nickeldale Dams:** The existing dam structures on Junction Creek will be reviewed to ensure that the storage capacity and outlets are being utilized for maximum flood reduction efficiency.
- **Alternative 9. Improve the Conveyance Capacity of Junction Creek:** Junction Creek is very flat through the City, particularly in areas that have experienced routine historical flooding due to backwater effects. There may be potential to reduce flooding by improving the transportation capacity of the creek through channelization or dredging of critical reaches.
- **Alternative 10. Low Impact Development (LID) Best Management Practices (BMP):** Opportunities for LID BMPs may be limited given the types of soil in the area, but remain a potential solution where suitable soils exist.
- **Alternative 11. Combinations:** Where no single alternative would adequately address the issues, a combination of alternatives is likely an appropriate solution.

Flood Risk Management vs. Floodplain Regulation

- The proposed stormwater master plan alternatives and policies target a reduction in flood risk within the Junction Creek Subwatershed.
- This means that properties will be flooded less frequently, but many will still remain within the Regulatory Floodplain, an area managed by the Conservation Authority.
- The public needs to be aware of the land use alteration restrictions associated with regulated lands to ensure no impacts to other properties.

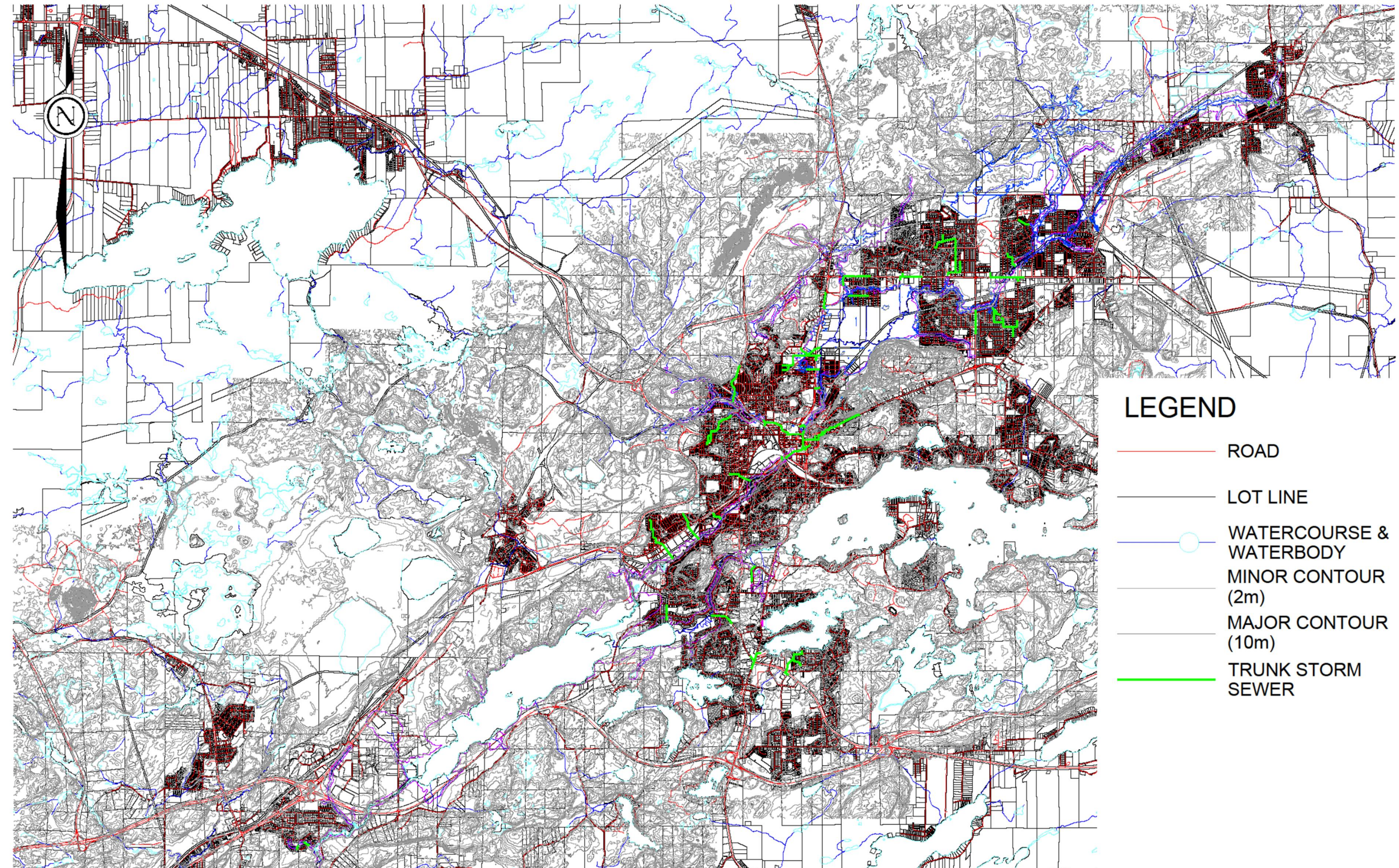
An area may receive a *Flood Risk Reduction*, yet still be within the *Regulatory Floodplain*.

- *Flood Risk Reduction* infers a lower occurrence and magnitude of flooding, i.e. property experiences flooding on average once in 5 years compared to once in 2 years.

- The *Regulatory Floodplain* is the area which floods during the Regulatory Event (i.e. Timmins Storm), and is subject to development restrictions managed by the Conservation Authority.

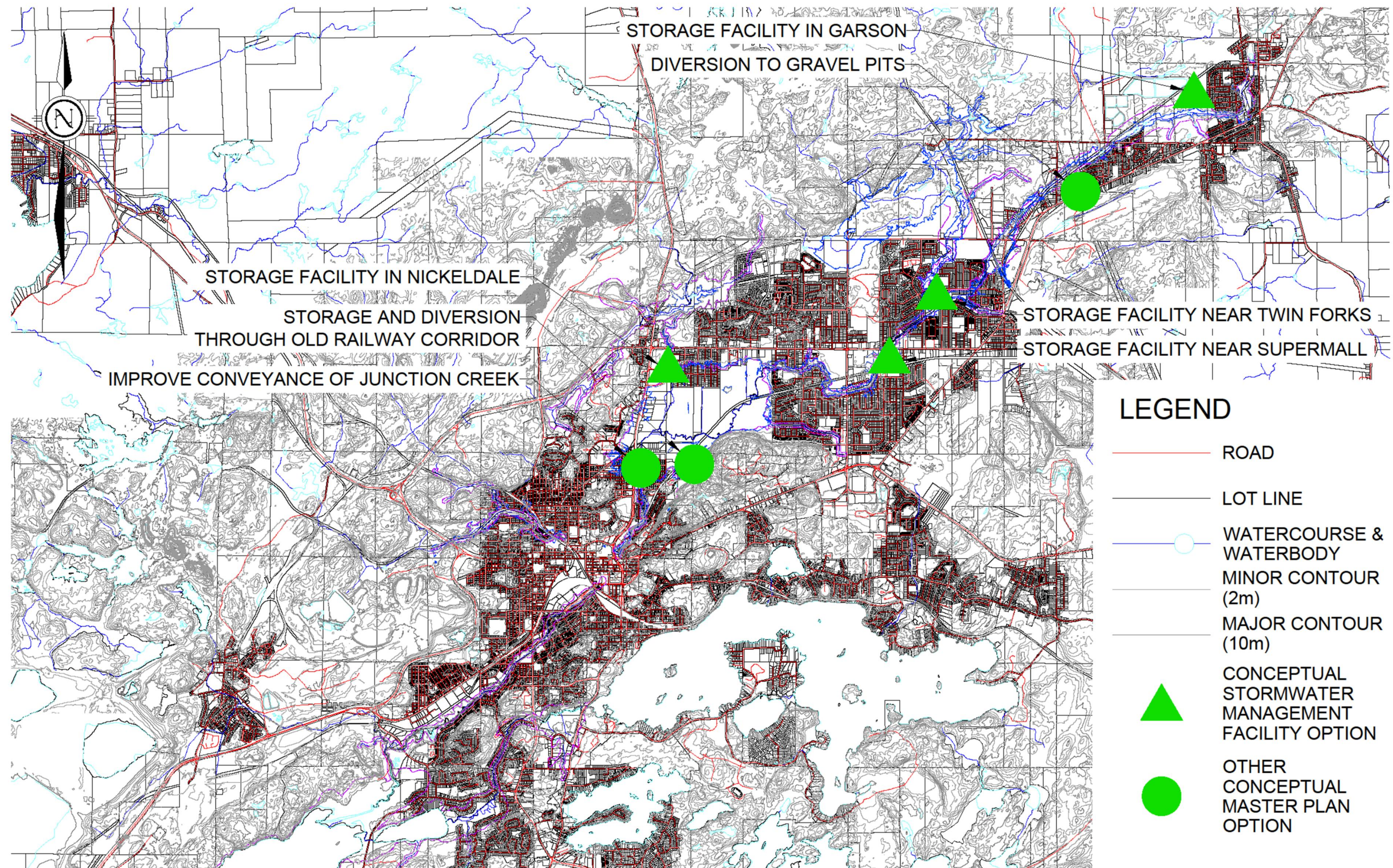
Alternative 2: Increase Size of Deficient Sewers

- Upgraded sewer network models have been created for all trunk (>900mm) sewer elements, and prioritized.
- These upgrades target a 5-year storm event uncharged capacity standard level of service.
- Prioritization of Drainage System Upgrades is based on several factors:
 - Instances and severity of historic flooding
 - Magnitude of the required upgrades
 - Effects on City's Emergency Evacuation Routes
 - Effects on other priority upgrades



Alternative 5: Implement Storage Areas within Public Spaces

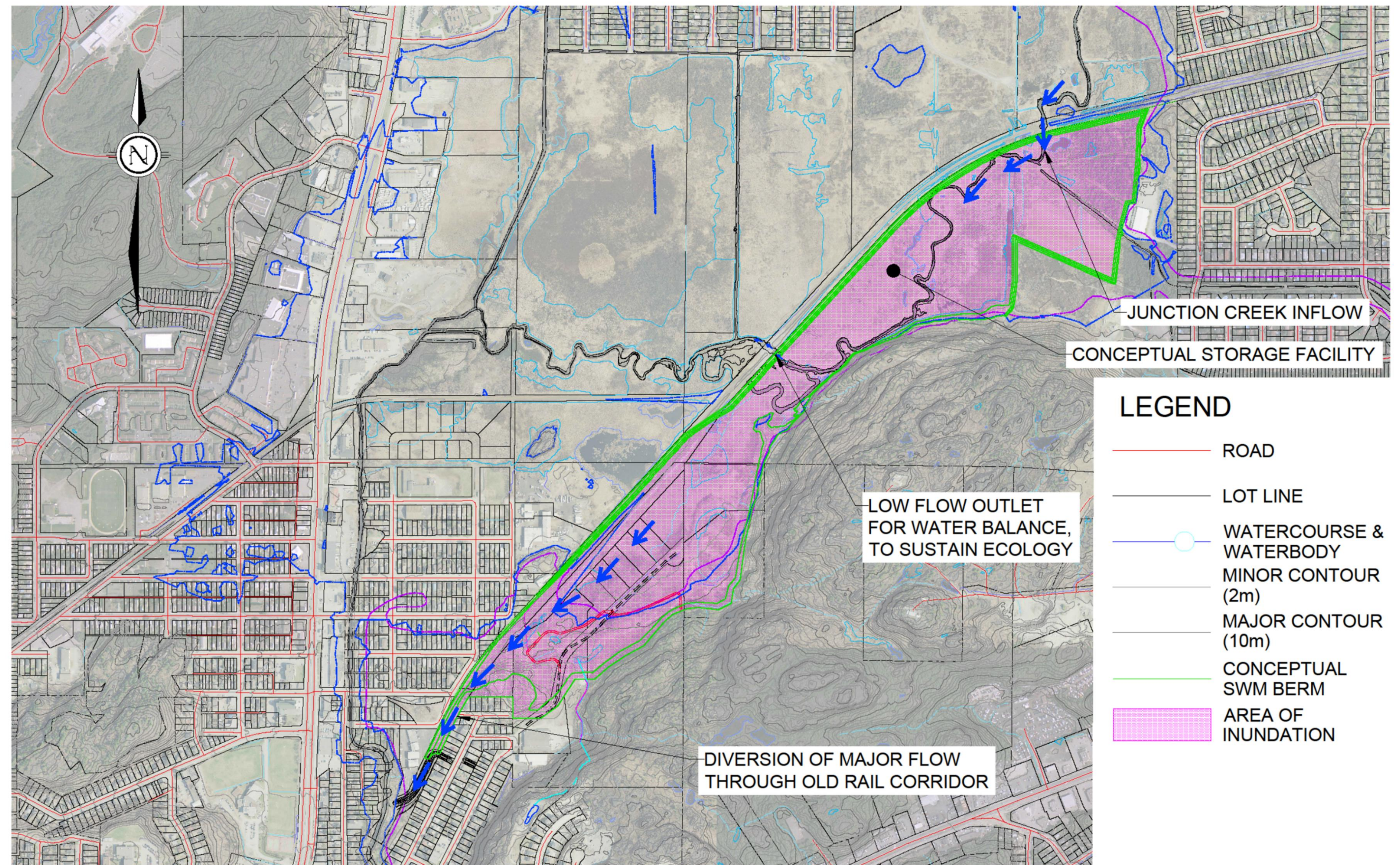
- Potential locations for stormwater management storage facilities (Alternative 5) were determined based on accessible public land:
 - Storage Facility near the Supermall
 - Storage Facility near Twin Forks
 - Storage Facility in Garson
 - Storage Facility in Nickeldale



Alternative 7: Redirect Excess Flows to Nearby Systems

Diversion Facility Upstream of Ponderosa

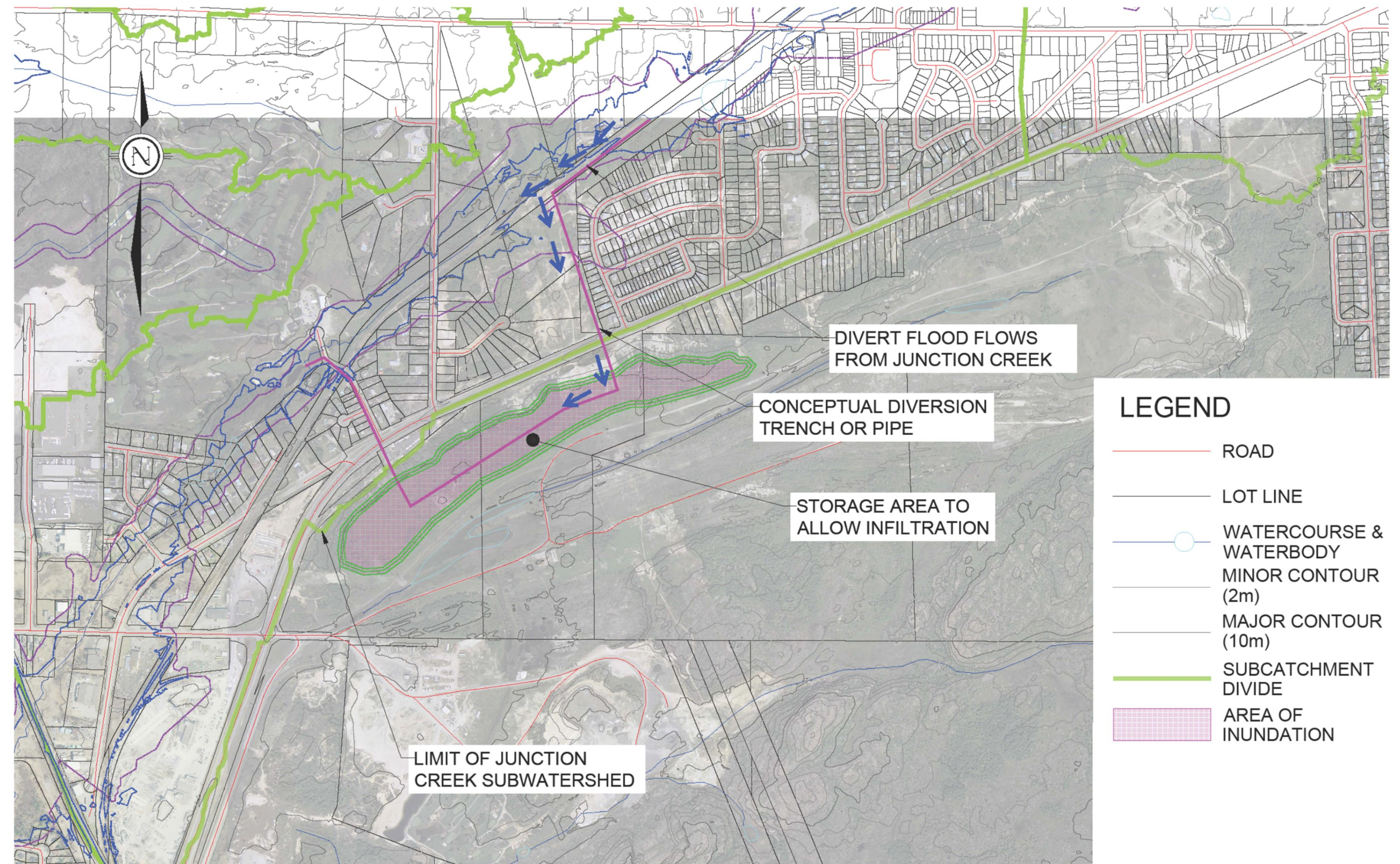
- Facility would create a natural storage area behind the existing railway corridor and divert flows down a new channel through the old rail corridor.
- Design could be integrated with the existing trail network and recreational areas.
- Preliminary storage capacity: 600,000 m³



Alternative 7: Redirect Excess Flows to Nearby Systems

Diversion to Gravel Pits east of Falconbridge Drive

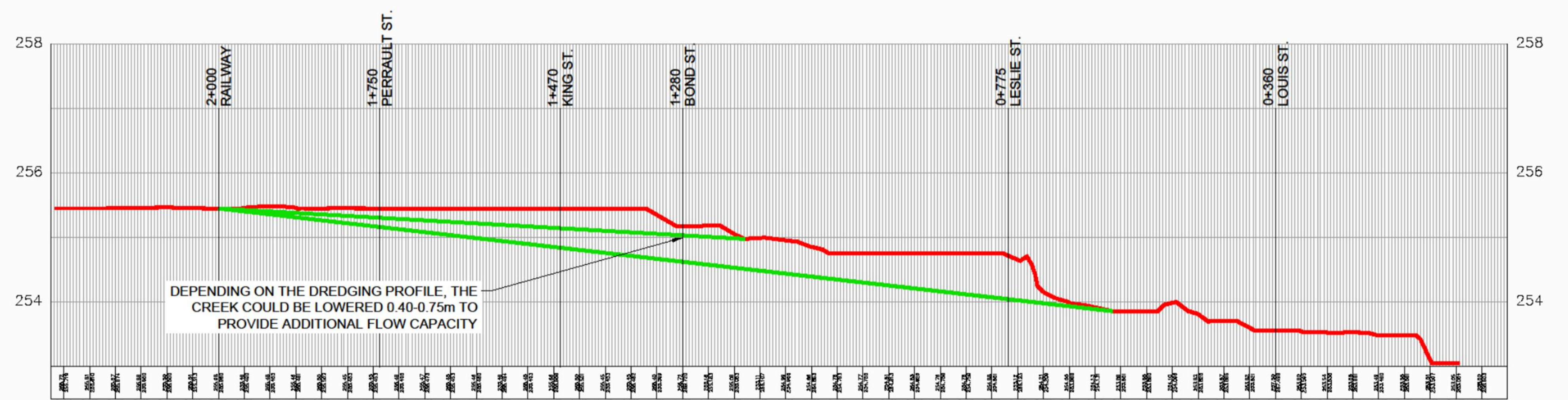
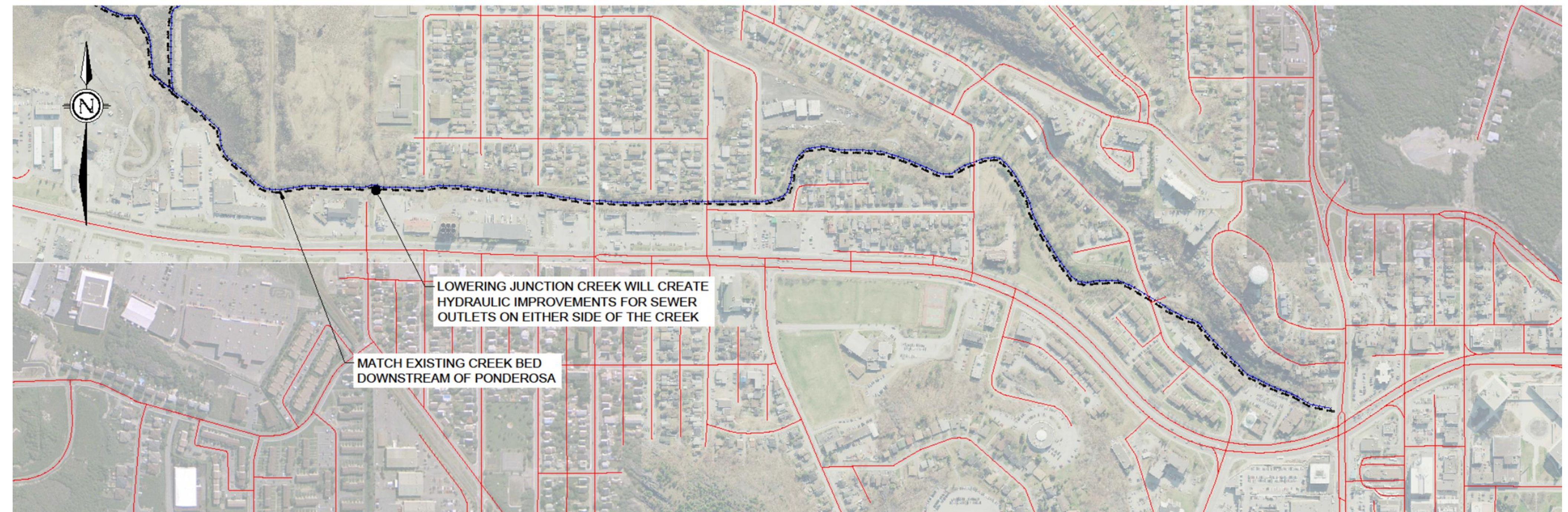
- A diversion berm would divert major flood flows away from Junction Creek and towards existing gravel pits.
- Though further analysis is required, this could allow the flood flows to infiltrate through the gravel pits into the groundwater, and re-emerge within the creek baseflow.



Alternative 9: Improve the Conveyance Capacity of Junction Creek

Dredge Junction Creek Downstream of the Ponderosa

- Junction Creek is relatively flat through downtown Sudbury after the Ponderosa.
- Many sewer outlets in this area are submerged or partially submerged, such as Perreault St.
- Increasing the grade of Junction Creek to the Box Culvert could improve the performance of storm sewers and reduce the occurrence of flooding on local streets, or other options will be proposed.
- Deposited, likely contaminated sediment could be removed, and the area could be rehabilitated with natural habitat improvements.

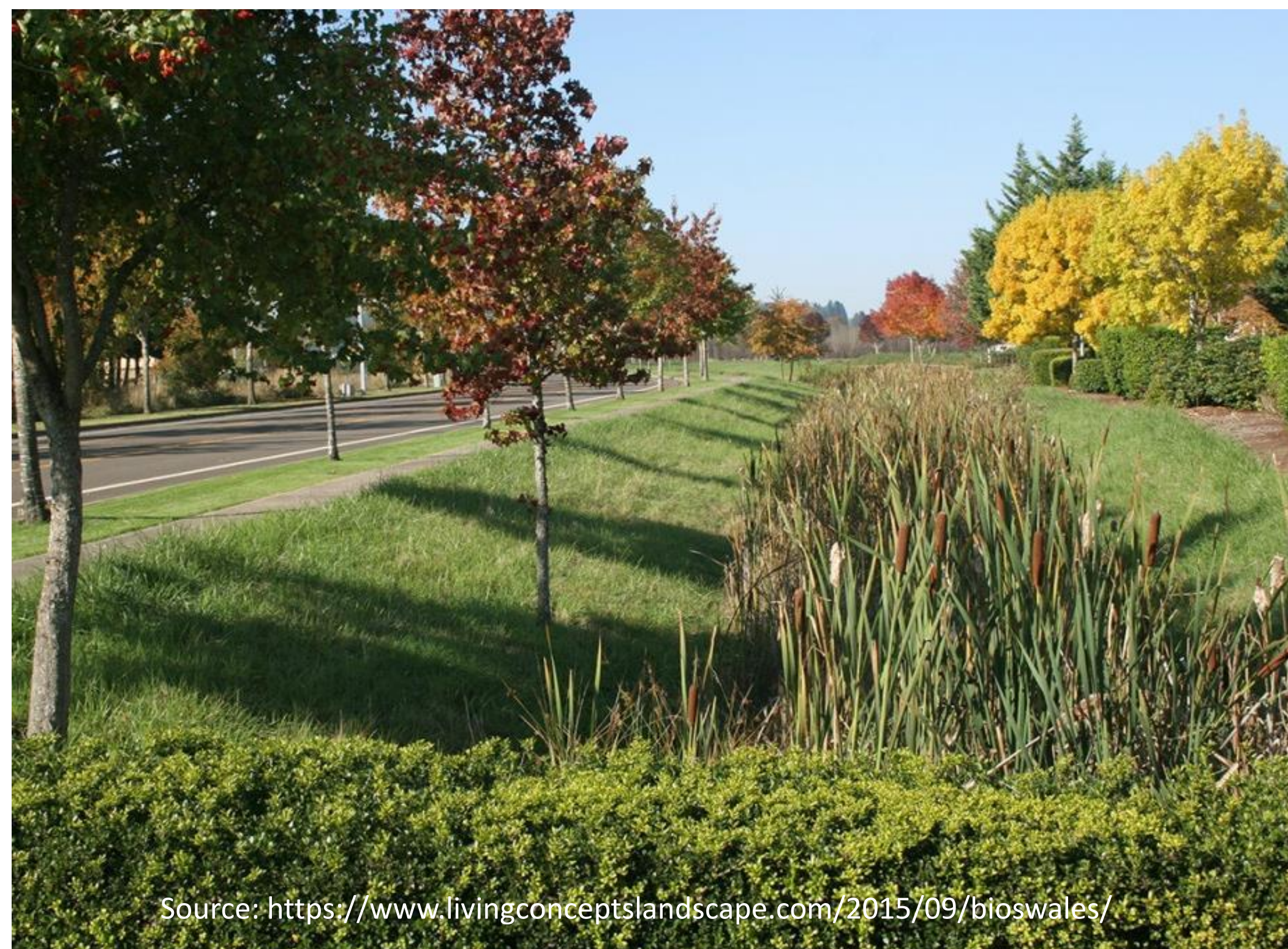


LEGEND

- EXISTING JUNCTION CREEK PROFILE
- CONCEPTUAL DREDGED PROFILE OPTIONS

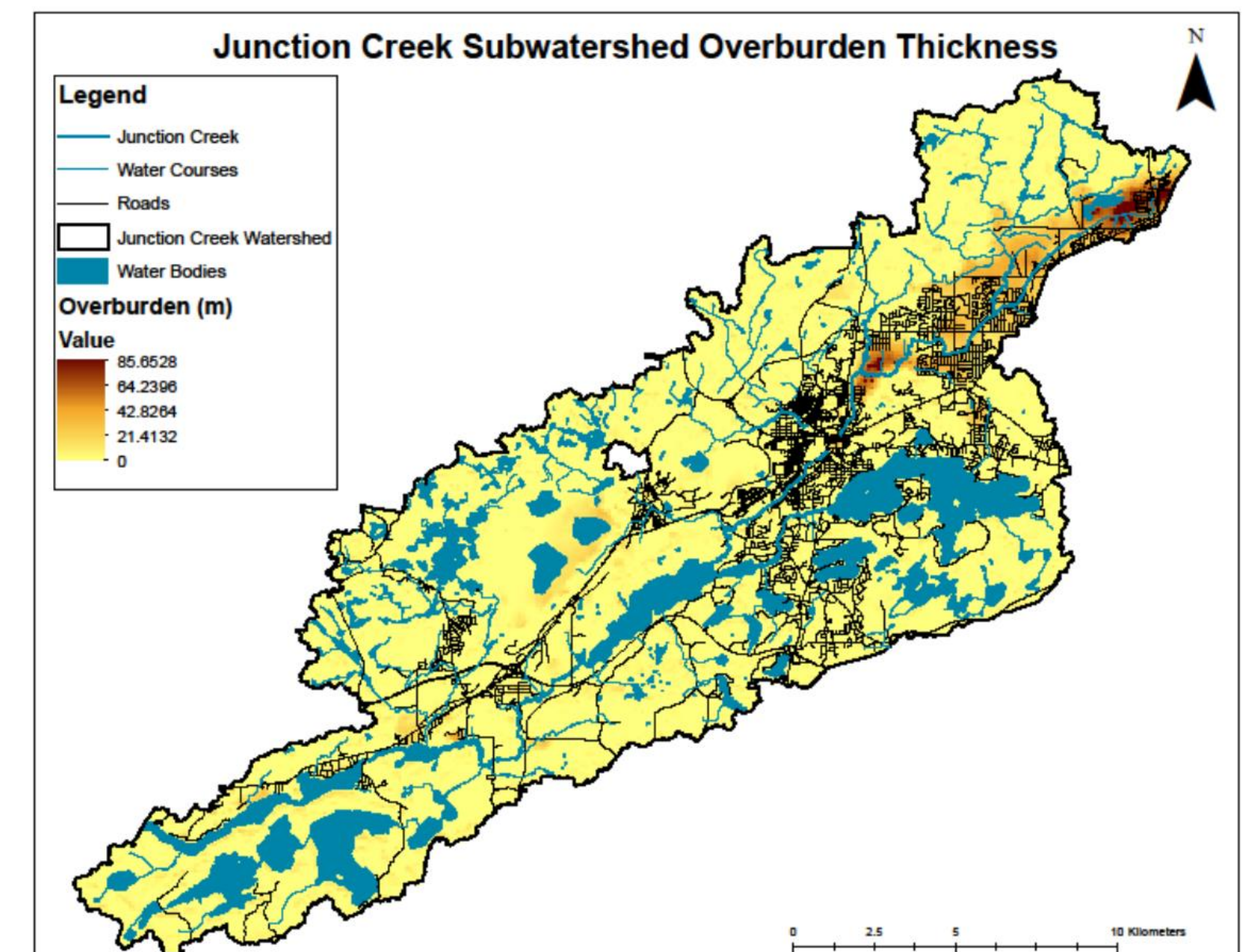
Alternative 10: Low Impact Development (LID) Best Management Practices (BMP)

- Property level / source controls encourage the infiltration of water into the ground and reduce stormwater runoff at source. LID BMPs can include green roofs, bio-retention, rain cisterns, permeable pavement and downspout disconnections.
- End-of-pipe treatments such as jellyfish filters and oil & grit separators are relatively easily installed and can offer water quality improvements as part of existing infrastructure retrofits, where space for other techniques is limited.
- Opportunities for LID BMPs may be limited by site-specific constraints such as types of soils in the area, depth to bedrock, proximity to open water, available space, grading constraints and/or utilities.
- Storage capacity and cost estimates vary depending on the type and scale of the LID BMP.



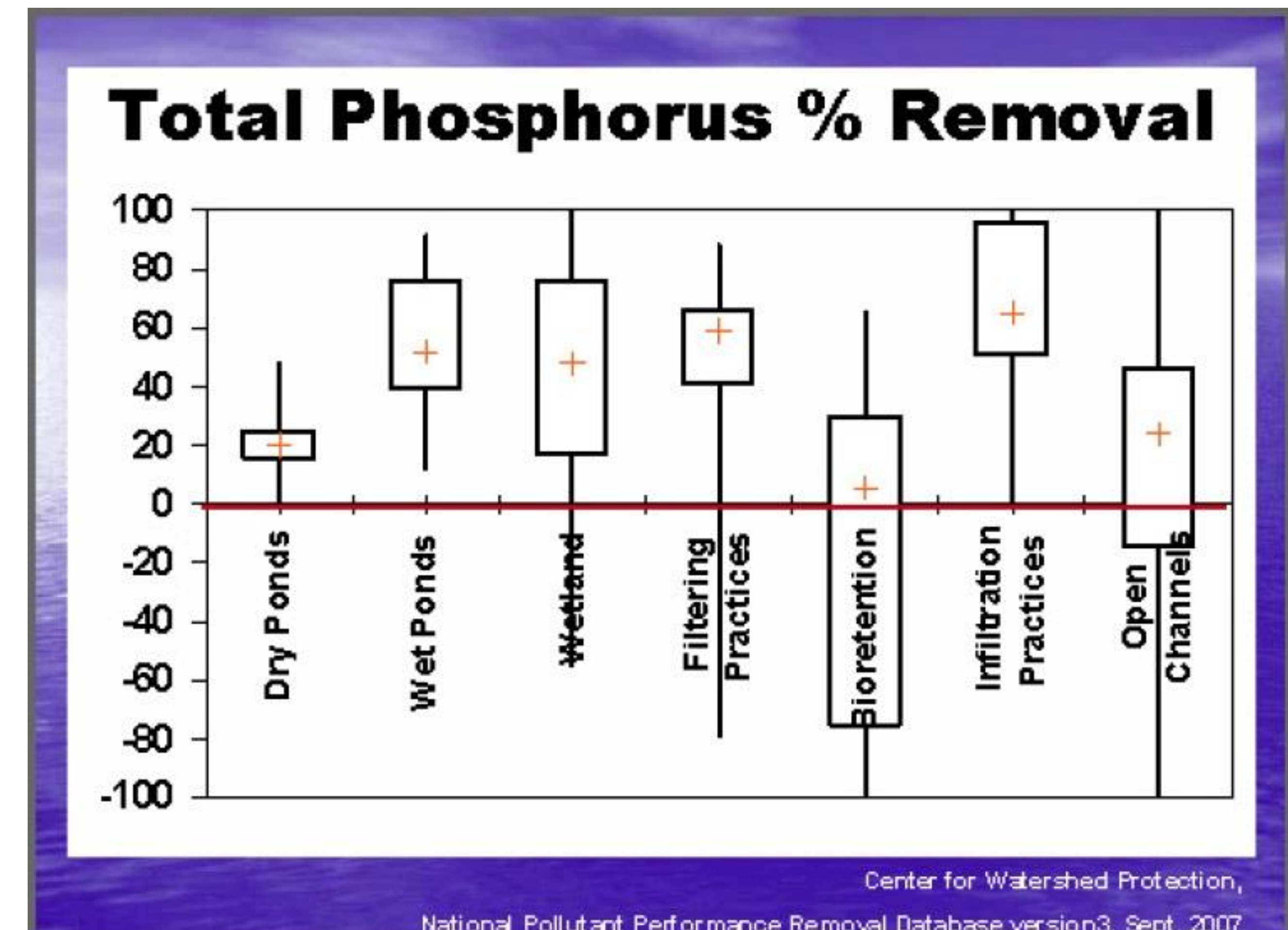
Management Policy Recommendations

- In addition to the identified specific master plan alternatives, various management policy recommendations are under development to address the identified flood, water quality, and erosion issues, as well as meet overall watershed ecology objectives.
- Stormwater management recommendations will be established in three parts:
 - Extended detention of stormwater at its source will improve water quality by allowing suspended sediment to settle out of runoff, will reduce erosion by limiting the frequency of high runoff flows to the creek, and will have minor flood control benefit.
 - Stormwater quantity control requirements will provide peak flow control to mitigate flooding caused by runoff from developed areas.
 - Recommended storage allowances (i.e. designate land set aside) for future increased rainfall intensities due to Climate Change.
- Opportunities for infiltration-based technologies are being identified based on local hydrogeological constraints.
- These policies may be implemented as a requirement of new development, and as part of neighbourhood retrofit projects.



Management Policy Recommendations Continued

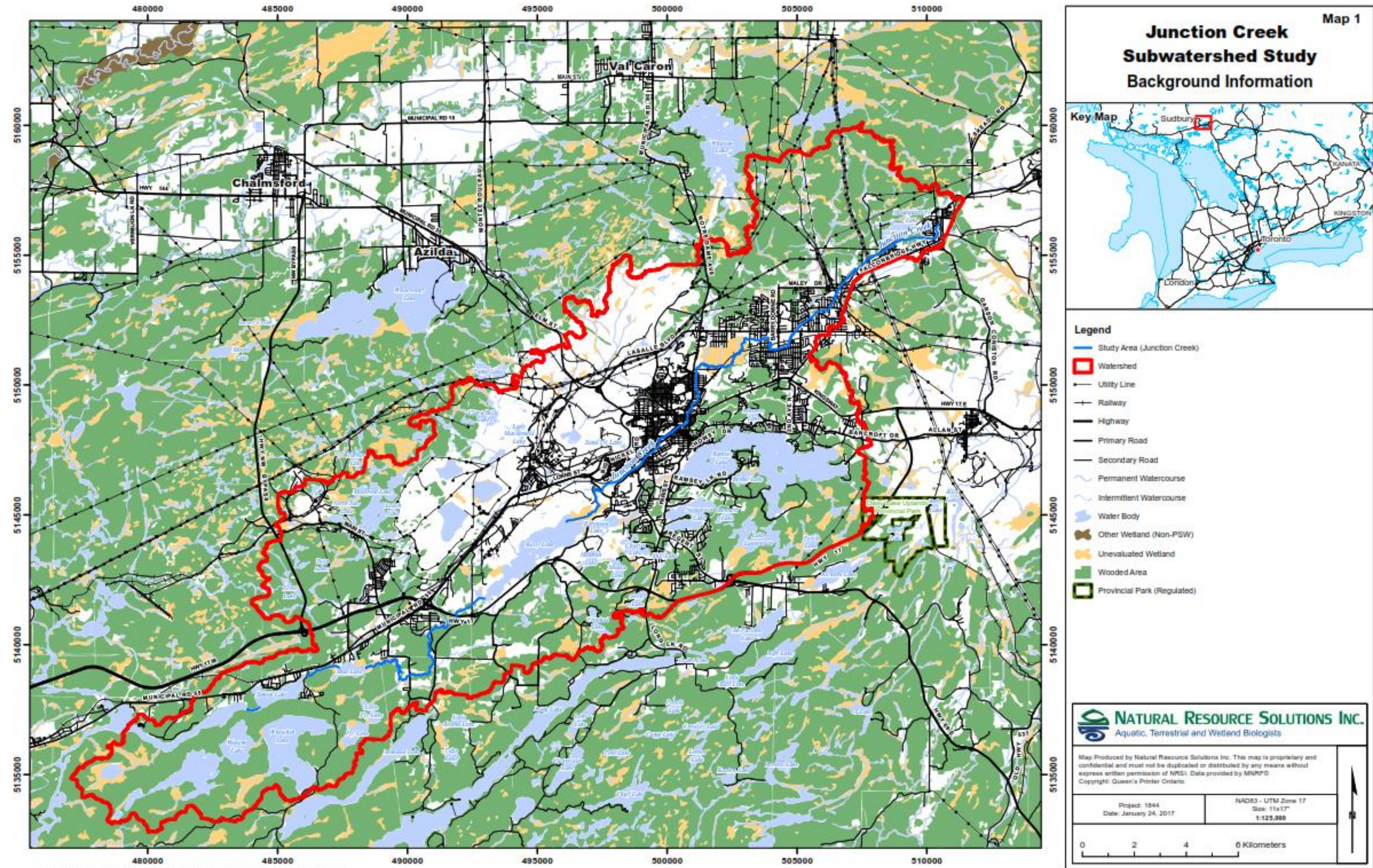
- Additional policy recommendations targeting the improvement of specific water quality issues and ecology opportunities are being advanced.
- Nutrient management policies for the lower subwatershed lakes are being put forth to help reduce the potential for algal blooms, which include:
 - Monitoring of nutrient point-sources to identify the source of nutrient contributions.
 - Phosphorus budgeting for new development or redevelopment targeting, at minimum, no net increase in phosphorus runoff contributions (to be refined through further study).
 - Public education and outreach on fertilizer and nutrient application timing policies.
 - Regular septic maintenance inspections and tracking of septic system clean-outs.



Source: <https://www.ontario.ca/page/lake-simcoe-phosphorus-reduction-strategy#section-9>

Natural Environment

- As part of the Natural Heritage Assessment, recommendations to create and enhance potential brook trout habitat are being considered
- Recommendations:
 - Decreasing water temperature by increasing creek bank and land vegetation.
 - Protecting and enhancing sensitive environmental features, such as riparian buffers and setbacks.



Next Steps

- Incorporate feedback received at Public Meeting No. 4 to determine preferred Stormwater Master Plan solutions
- Finalize Subwatershed Study and Stormwater Master Plan
- Present Findings at Public Meeting No. 5
- The final Background Characterization and Subwatershed Study & Stormwater Master Plan Reports will be posted for public comment through the EA process



How Can You Get Involved?

- Join our Project Mailing List for timely, relevant updates by adding your name to the sign-in sheet
- Review information shared at this Stage 4 Public Meeting
- Attend upcoming Public Meeting No. 5, which will incorporate the results of the final studies :
 - Stage 5: Subwatershed Study Completion
- Provide input on your observations regarding:
 - Preferred Alternatives
 - Priorities and interests
 - Opportunities to enhance the health of the ecosystem
 - Constraints that may be sensitive to disruption

WAYS TO PROVIDE YOUR INPUT

- City's website:
greatersudbury.ca/watershedstudy2016
- Comment form:
 - Paper copy
 - Online
- Speak with one of the Study Team members:
 - **Paul Javor**, M.A.Sc., P.Eng.
City of Greater Sudbury
Phone: 705-674-4455 ext. 3691
Fax: 705-560-6109
Email: Paul.Javor@greatersudbury.ca
 - **Brian Grant**, B.Sc., P.Geo.
Amec Foster Wheeler
Phone: 705-682-2632
Fax: 705-682-2260
E-mail: brian.grant@amecfw.com