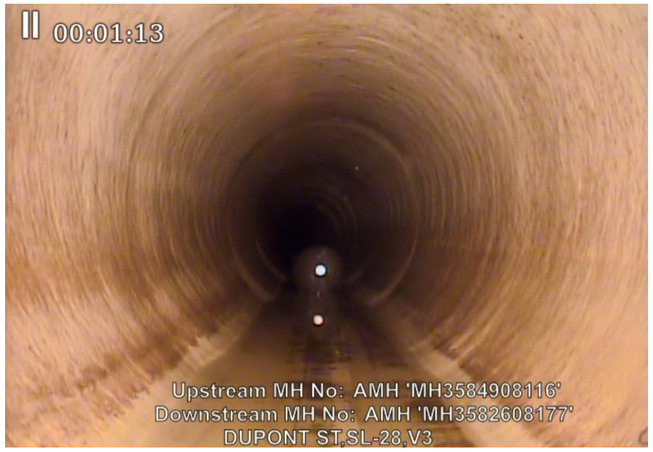


Wastewater Designs

Assessment and Evaluation

During Phase 2 of the MCEA process, alternative solutions including the “Do Nothing” alternative were assessed. The preferred alternative was a combination of:

- Managing Wastewater Demand (such as limiting growth to optimize the allocation of existing wastewater capacity and improving the existing system to minimize inflow and infiltration)
- New Wastewater Infrastructure (such as installing new sewers, larger replacement sewers, new online storage, twin pipes, improving slopes) to handle the anticipated volume.

The Do Nothing alternative was considered and problems remain even with no development. As Do Nothing is not a reasonable solution, it will not be included in the alternative designs assessment and evaluation.

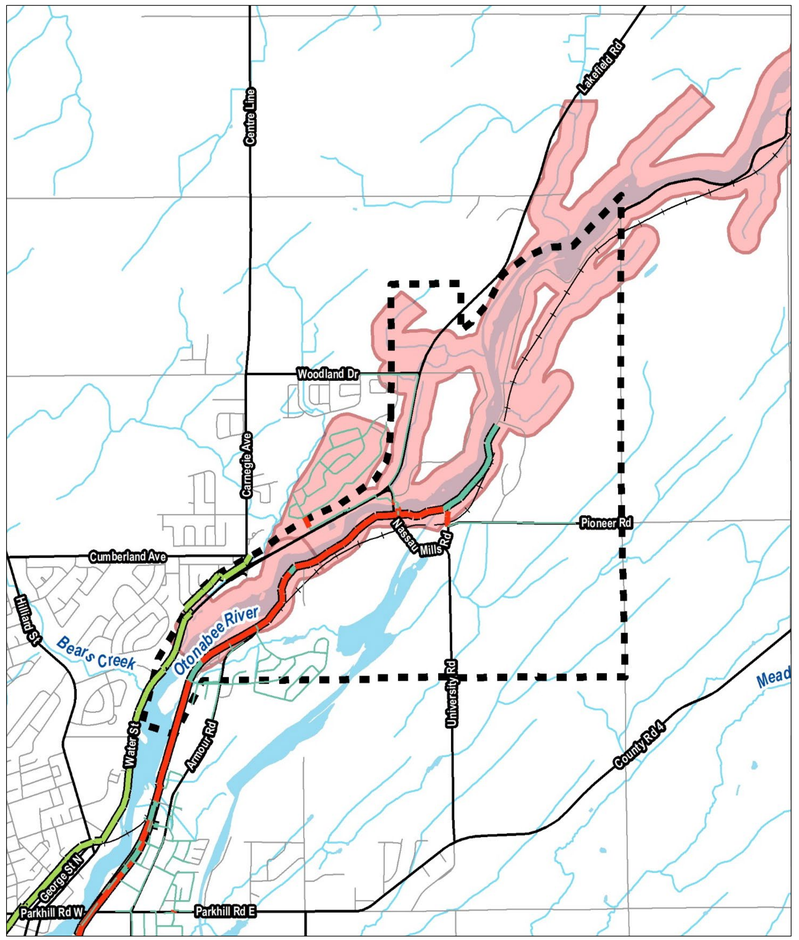
City of Peterborough

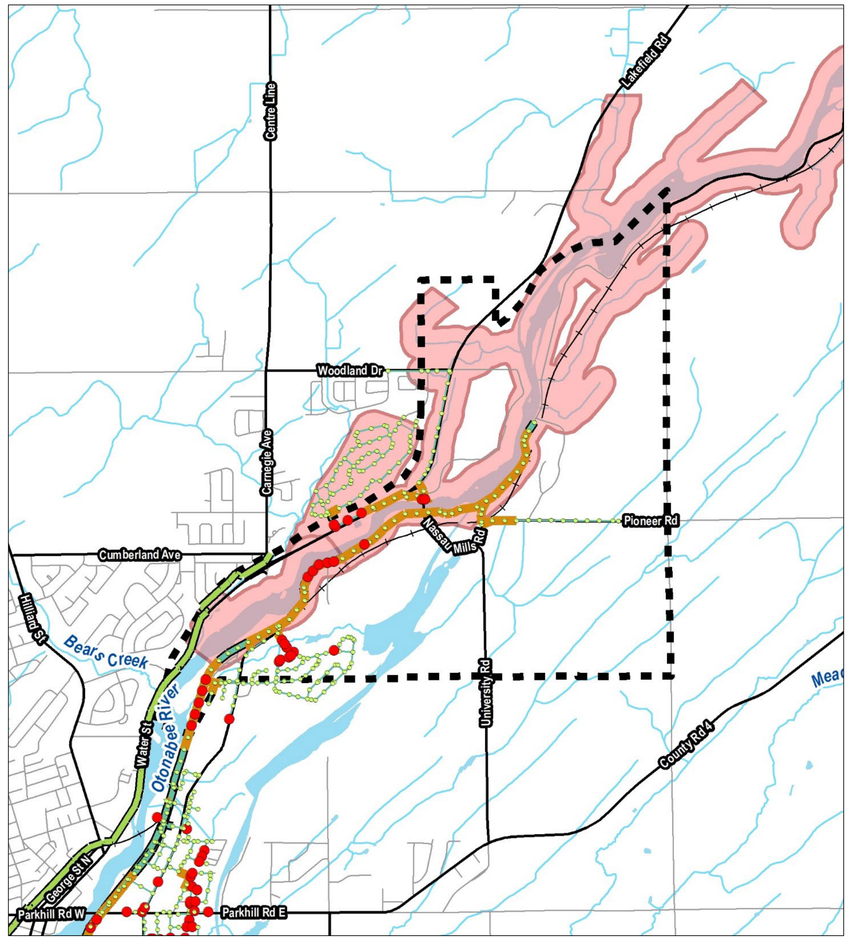
Wastewater Future Modeling Results

- Design criteria for the wastewater system include:
  - Maintain a design flow of less than 80% of the sewer capacity
  - Have no risk of basement flooding for the 100-year design storm, (i.e. no pipe surcharge within 1.8m of the ground surface)
- The Ministry of the Environment, Conservation and Parks and the City of Peterborough specify the parameters for wastewater modelling:
  - 450 L/person/day
  - Inflow and infiltration of 0.28 L/s/ha (Ministry criteria)
  - Inflow and infiltration of 0.6 L/s/ha (City adjusted value)

- With the design criteria for modelling established, the two options investigated to address problems were:
  - Pipe twinning and upgrades
  - Inline storage

Modelling Results:
The design flow was greater than 80% of the sewer pipe capacity at 6 locations identified below (3 in the study area) when an inflow/infiltration rate of 0.28 L/s/ha was used. Most of the length of the East Trunk will be over 80% capacity if the City's accepted inflow rate of 0.6 L/s/ha is used (left map).
The risk of basement flooding for the 100-year design storm is indicated by the red and orange dots below (right map):





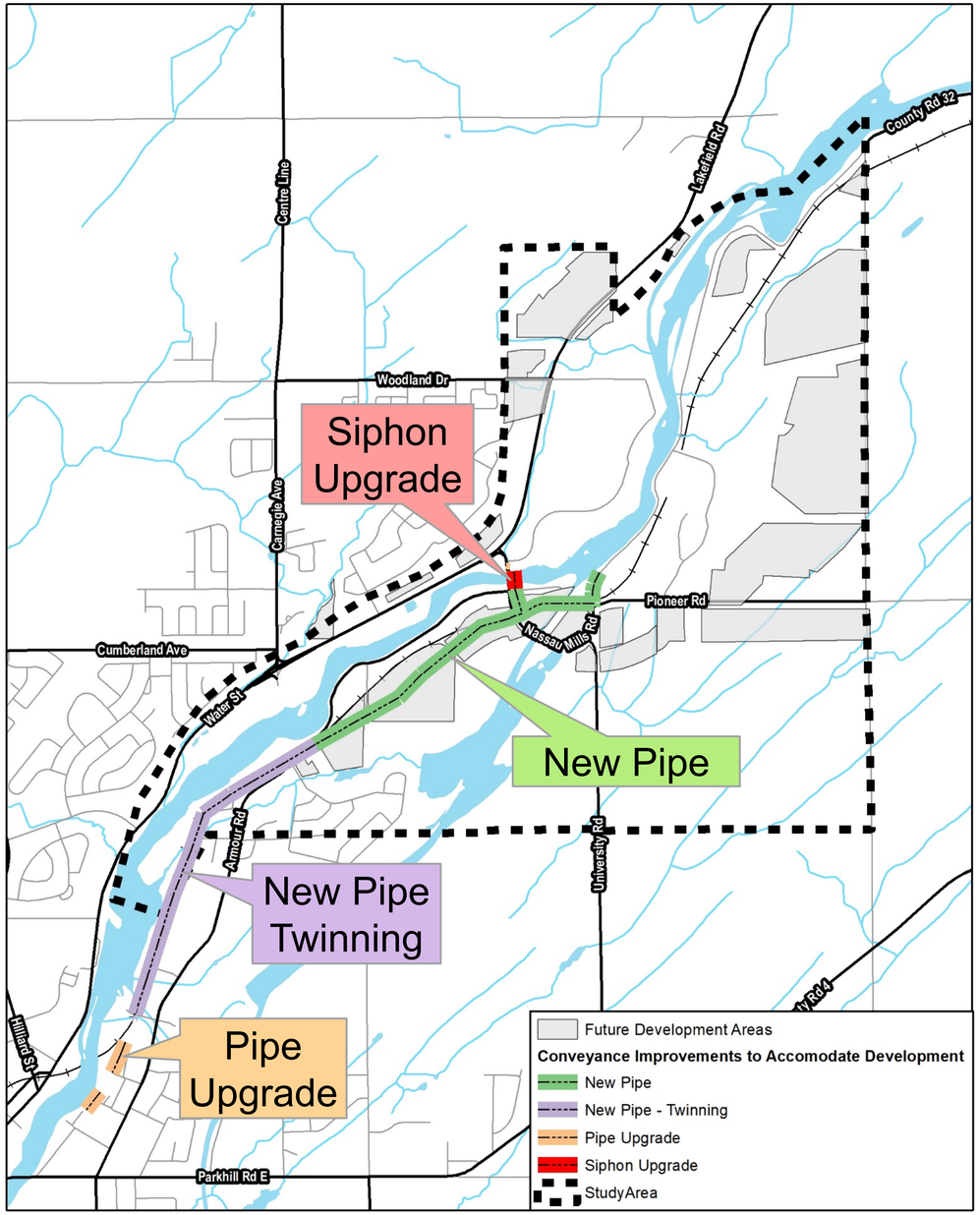
Wastewater Evaluation Criteria

Alternatives were evaluated based on their ability to address the identified problems, stakeholder input, and their potential effects. Evaluation criteria are described below:

Criteria Group	Indicator	Description
Natural Environment	**Terrestrial** (vegetation, wildlife, wetlands)	○ Potential to impact terrestrial habitats or systems, including terrestrial features / functions (ANSIs, ESAs), unique vegetation species, mature trees, existing park / open spaces linkages or wildlife
	Aquatic (fish, aquatic life and vegetation)	○ Potential to impact aquatic habitats or systems, including possible impacts on aquatic life, features / functions through construction of a new outfall.
	Soil, Ground Water and Surface Water	○ Potential to impact soils, groundwater and surface water due to the construction. Alternatives requiring more than 0.3 m of excavation will likely require dewatering during construction.
Socio-Cultural Environment	**Community Impact**	○ Potential to impact the community in terms of visibility, road access, construction of mitigation measures in valley lands / parks and playgrounds / City property / school property, possible noise / odour / light, potential risk in terms of proximity to open water, which may provide breeding grounds for mosquitoes with West Nile Virus, short-term construction impacts.
	Land Use Compatibility (parks, ravines, open spaces)	○ The extent to which the alternative blends in with the existing land uses in terms of minimizing impacts related to visibility, noise, odour, air emissions, and regulatory requirements.
	Archaeology/Built Heritage	○ The potential of the alternative to impact archaeological or built heritage sites.
Technical Considerations	**Water Quality Effectiveness of Control Measure**	○ Effectiveness of the alternative in the reduction of the potential for basement flooding from the sanitary sewer system.
	Constructability of Control Measure	○ The extent that various hard constraints (major infrastructure and utility conflicts, access) are likely to exist that make the alternative difficult to construct.
	Feasibility of Control Measure	○ The extent to which the alternative is difficult or costly to construct in terms of availability of space, accessibility, utility conflicts, easement requirements, and construction techniques.
Economic Consideration	**Capital Cost**	○ The capital cost associated with the construction of the alternative including labour, material and equipment and possibly property acquisition.
	Operations & Maintenance (O&M) Cost	○ Post-construction operation and maintenance activities associated with various mitigation measures including regulation inspection, grass cutting / weed control, performance monitoring, sediment / trash removal and energy requirements from pumping, lights, flushing and other operational requirements.

Wastewater Design Concepts

Option 1 – Pipe Twinning and Upgrades (see map)



Pros:

- Provides conveyance capacity necessary to address capacity concerns
- Requires little additional footprint for installation
- Maintains self-cleaning capabilities, due to higher pipe velocities
- Does not have the maintenance and odour issues associated with inline and offline storage
- Supports Official Plan growth

Cons:

- Cost and area of disturbance

Overall:

- Addresses identified problems
- Avoids potential odour issues
- Supports future development

Wastewater Design Concepts

Option 2 – Inline Storage (for part of East Trunk Sewer) plus upgrades as shown

Pros:

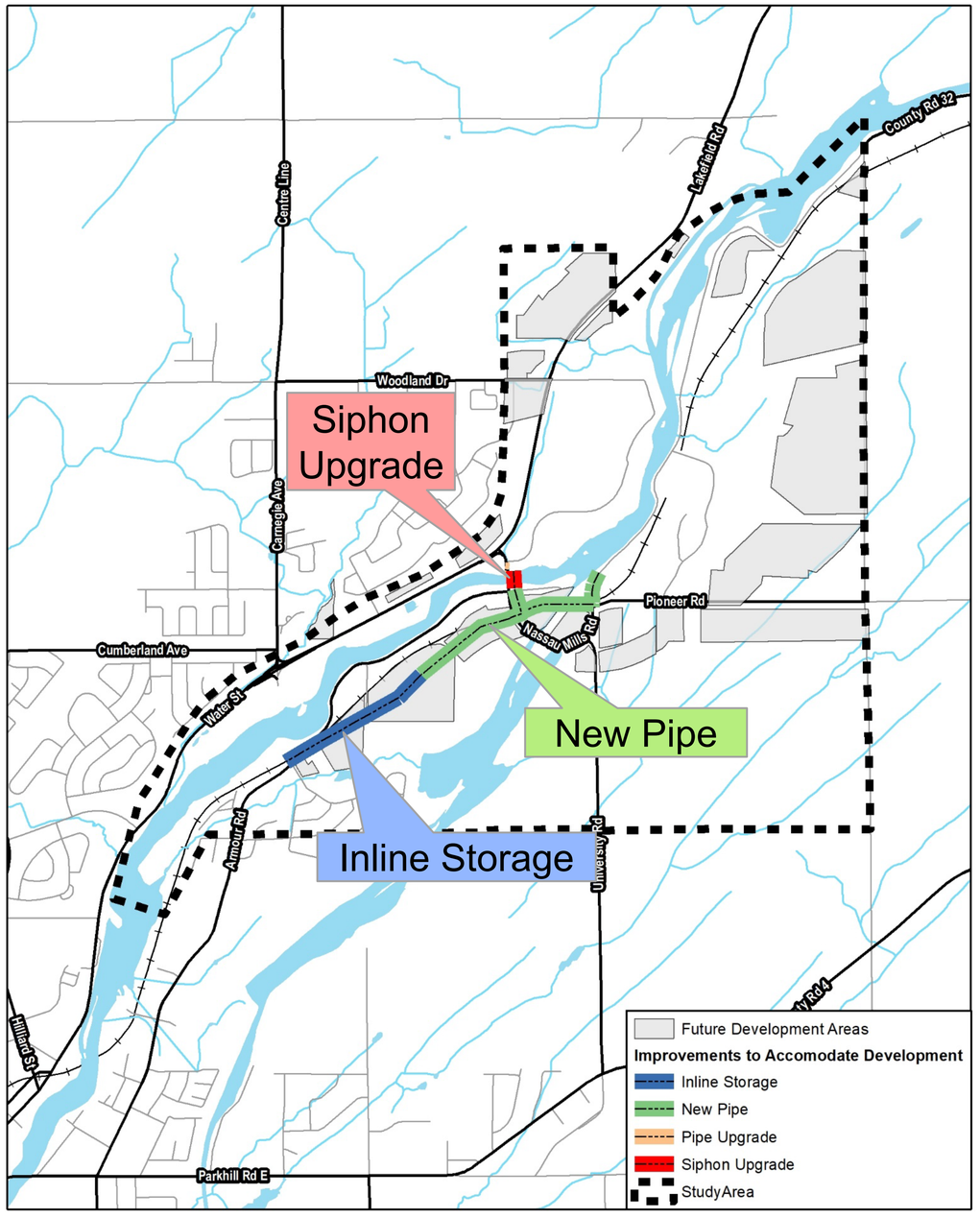
- Provides buffering (peak flow attenuation) capacity necessary to address basement flooding risk
- Installation requires a similar footprint of excavation when compared to the installation of (smaller) conveyance pipes
- Does not require additional land to be dedicated to providing storage beyond what would normally be required to install conveyance pipes
- Supports Official Plan growth
- Cost may be less due to shorter length of disturbance and dewatering requirements (pipe cost similar between options)

Cons:

- Large diameter pipes lead to low pipe flow velocities. This can lead to the settlement of waste material in the pipe, which will require more frequent maintenance (cleaning)
- Settlement of waste material in the pipes may also create odour issues along the pipe's path

Overall:

- Addresses identified problems
- Supports future development



Wastewater Design Concepts

Most Preferred ● ◔ ◑ ◕ Least Preferred

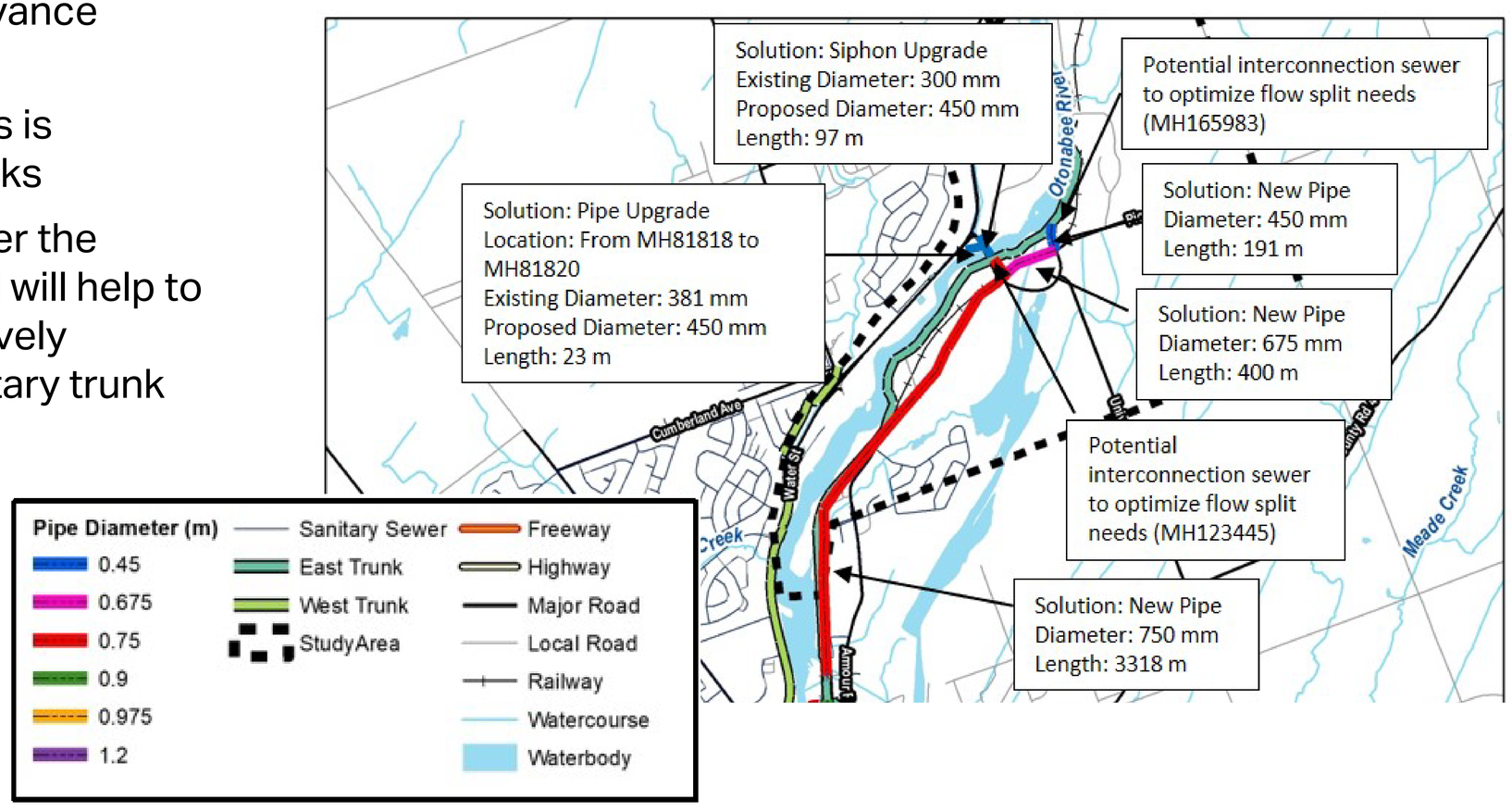
	Natural Environment Criteria			Social Environment Criteria			Technical Considerations			Cost Considerations	
	Terrestrial System	Aquatic System	Soil, Ground Water, Surface Water	Community Impact	Land Use Compatibility	Cultural Heritage	Effectiveness – Quality Control	Constructability	Feasibility	Capital Cost	O&M Cost
Option 1 – Pipe Twinning and Upgrades	●	●	●	●	◑	●	●	◑	◑	◕	◑
Option 2 – Inline Storage	●	●	◑	◑	◕	●	●	◑	◑	◑	◕

Option 1 is preferred:

- Less potential for odours along the route of the pipe
- Less maintenance/cleaning
- Similar low potential for effects on the environment

Summary of Proposed Upgrades

- The proposed wastewater system improvements will address existing sewage backup and drinking water source protection risks while accommodating future growth in the City's North End
- The map illustrates the location of the proposed upgrades and the size and length of pipes
  - In areas with shallower sewers, pipe twinning is preferred to alleviate sewage conveyance capacity issues
  - In other areas, upgrades to pipe sizes is proposed to alleviate surcharging risks
  - Upgrades to the existing siphon under the Otonabee River at Nassau Mills Road will help to ensure that sewage flows are effectively conveyed to the upgraded East sanitary trunk



Next Steps - Wastewater

- The project team will consider all comments received from this consultation and from a Public Information Centre to be held in the future. The PIC will present refined alternatives, preliminary evaluation and preliminary design alternatives.
- After receiving comments, the project team will confirm or update the Preliminary Preferred Options.
- Preliminary Designs will involve:
  - Confirm pipe sizing, type and lengths
  - Identify any property requirements for twin pipes and pipe upgrades as well as siphon upgrade
  - Provide cost estimates
  - Develop implementation plan considering urgency of work to address existing problem areas, future development needs and availability of funding
- The project team will then hold another round of consultation before preparing the Environmental Study Report for public review

Comments

How can you provide comments?

- Visit the Project website. Go to http://www.peterborough.ca/ and click on:
  "Doing Business", "Studies and Projects" and look under "Projects" for "North End – Trent University Area Transportation and Wastewater Management Class Environmental Assessment"
- Send comments by email to: **NorthEndEA@Peterborough.ca**

Questions?

If you have any additional questions:

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