Executive Summary

Background and Study Objective

On August 19, 2005, a storm exceeding the 1 in 100-year event and classified as a tornado remnant occurred in north Toronto, resulting in extensive creek erosion along Wilket Creek. City of Toronto infrastructure, including bridges, pathways, maintenance holes, and sanitary sewers in and adjacent to the creek were exposed, representing a risk to public safety. Following temporary repair efforts, additional damages occurred during subsequent storm events. Urban stream channels such as Wilket Creek have been identified as unstable and adjusting to a changed pattern of stream flow, primarily due to increased runoff from impervious surfaces associated with urban development and an absence of stormwater management controls. Such changes have increased bed and bank erosion, particularly acute during large storm events, resulting in altered stream morphology, damage, or increased risk of damage to infrastructure, and decreased habitat quality.

The primary study objective was to evaluate the existing geomorphic and ecological conditions of the Wilket Creek subwatershed and develop a Master Plan to rehabilitate the channel and mitigate further sustained erosion and risk to infrastructure.

Master Plan

This study reviews the historical and existing creek and watershed conditions, provides potential rehabilitation alternatives, and proposes a preferred alternative for specific reaches of Wilket Creek. The Master Plan was carried out following the planning and design process prescribed in the Municipal Class Environmental Assessment (MEA, 2000, amended 2007 and 2011). Approach Number 2 was followed that involves the preparation of a Master Plan at the conclusion of Phases 1 and 2 of the Municipal Class EA process, where the level of investigation, consultation, and documentation are sufficient to fulfill the requirements of Schedule B projects. The final Notice of Completion for the Master Plan is also the Notice of Completion for the Schedule B projects recommended in the Master Plan.

The Master Plan allows for an integrated planning approach for the Wilket Creek subwatershed, and a methodology for implementing the necessary rehabilitation efforts for Wilket Creek. In evaluating options, a broad-based process is used including functional performance, environmental, social, and economic considerations. The Master Plan uses the MNR (2002) guide, “The Adaptive Management of Stream Corridors in Ontario” as the foundation for defining the appropriate content for EA purposes at different study stages. An assessment that integrates information including hydraulic and hydrologic modeling, existing infrastructure, terrestrial, vegetative, and aquatic habitat, land use changes within the watershed, historical adjustments to channel planform, geomorphic conditions, and geologic data allows for preferred alternatives to be presented.

Emergency Works

Prior to the commencement of the study process, a select number of high risk sites were identified whereby the municipal infrastructure is prone to potential damage or complete failure if left in the current conditions for a significant amount of time. Given the imminent risk to the public in the form of an exposed sanitary sewer and the anticipated length of time required to complete the Master Plan study phase, Toronto Water declared the requirement for Emergency Works at these sites. As such, the development and selection process of the rehabilitation schemes for these priority sites were “fast-tracked” to more immediately protect the infrastructure. As they were completed prior to the completion of the Geomorphic Systems Master Plan, the alternative solutions were considered using the best available information at the time and were designed in context of the in-progress study in order to remain aligned with the overall strategy for Wilket Creek.

Study Conclusions Concerning Geomorphology and Ecological State of the Creek

Wilket Creek is a second order tributary to the west branch of the Don River. The Wilket Creek subwatershed has a drainage area of 15.5 km^2 and is an open channel system south of York Mills Road to its confluence with the Don River. North of York Mills Road the channel has been piped through a series of storm sewers. Several parks are located within the Wilket Creek corridor, including Wilket Creek Park, Edwards Gardens, Windfields Park, and Irving Paisley Park. Wilket Creek between York Mills Road and its confluence with the Don River was divided into separate reaches based on physical characteristics such as channel form, sinuosity, gradient, local geology, degree of valley confinement, and vegetative control. Nine reaches (WC-R1 to WC-R9) were delineated for the study area and extensively studied. The individual reaches were observed to be in various stages of adjustment and degradation in the study area. The urbanized flow regime has altered the dynamics of the Wilket Creek system resulting in channel instability, exposed infrastructure, and risk for future damage.

Adaptive Management Study Process and Findings

With the issues having been identified along Wilket Creek, various alternatives to address the issues were considered, including the "Do Nothing" alternative, "Local Improvements," and "Channel Realignment." Descriptions for each are provided below:

- **Do Nothing** – allows the creek to function in its current condition with no further efforts to repair, stabilize, or protect the creek, adjacent property, and infrastructure, or provide ecological improvements.

- **Local Improvements (Protection, Remediation, and Rehabilitation)** – includes repairing failing components of each site which may include establishment of grade control features, bank stabilization, repair or replacement of pedestrian paths and crossings, gabion repairs, stormwater outfall repairs, spot reconfiguration of the channel, and introduction of other hard and soft measures to protect at-risk infrastructure.

- **Channel Realignment (Rehabilitation, Enhancement, and Restoration)** – includes a complete realignment of the creek such that a self-sustaining, natural planform is developed with functional channel dimensions, stable pool-riffle sequence, and channel bank and floodplain restoration using natural channel design principles.

Consultation and Engagement

A number of Public Information Centers (PIC) and consultation meetings were held at different project stages. The information centers and meetings generally involved display boards depicting the study purpose, process, opportunities and constraints, with graphic illustrations of the existing conditions, as well as the possible opportunities. Parish Aquatic Services (PARISH), Toronto and Region Conservation Authority (TRCA), and City of Toronto staff was on hand to answer questions and assist with gaining an understanding of the study. Consultation was held on the following dates:

- June 2011 – Notice of Study Commencement and Public Information Center (PIC) #1 – Presentation of the objectives of the Master Plan study and the proposed designs for the Emergency Works at the first two priority sites in Wilket Creek Park (Sites 6&7 and Site 3)
- December 2013 – PIC #2: Presentation of alternatives
- February 2014 – Consultation meeting #1 with Friends of Wilket Creek (FOWC) community group
- April 2014 – Consultation meeting #2 with FOWC community group
- June 2014 – PIC #3: Presentation of preferred alternatives

Within the Wilket Creek Park segment, the primary concerns of participants was interruption to access of the multi-use trail that runs along the creek and any potential disturbance to existing vegetation due to construction or planform realignment.

Two sections of the creek for which there was significant public interest were along reaches WC-R5 and WC-R7. Resident comments were initially both in favour and opposed to intervention in these reaches. Reach WC-R5 is located along a private residential corridor and residents expressed concern that construction activities would negatively impact their property. A major concern from some residents was that, if work was to occur, construction access roadways would be made permanent, either into a roadway or a public trail, thereby increasing traffic and decreasing the privacy of the section. Assurance was sought by these residents that trespassing on private property would not result. WC-R7 is the least altered section of Wilket Creek. A community group expressed concern about the potential removal or damage to existing forest vegetation during construction activities or to allow space for planform realignment. In terms of planform realignment options, residents expressed a preference for retaining the natural sinuosity of the creek as opposed to any straightening. Due to the highly active nature of the creek in WC-R7 and the in-stream debris jams that results, a number of residents were adamant about addressing debris jams in a timely manner such that there is reduced impact to morphology and downstream properties.

Following discussion of the approach and perceived advantages and disadvantages regarding the various intervention strategies, the majority of participants were satisfied with the recommended preferred alternatives.

TRCA began the process of engagement with Aboriginal communities on July 26, 2011. A Notice of Commencement was circulated with a request that communities indicate any interest in the project. Two responses were received indicating no concerns with the project. A second notification was sent on March 6, 2012, to provide a project status update and as an opportunity for communities to provide input. The Notice of Filing will be sent to the identified First Nations and Métis communities.

Preferred Alternatives

After having evaluated each reach alternative against the criteria and consulting all interested parties, preferred alternatives were selected as follows:

- **Wilket Creek Park (WC-R1 to WC-R3) -** The preferred alternative for Wilket Creek Park is Channel Realignment. The overall vision for the park is a creek with a functional planform and profile that addresses risks while providing optimal geomorphic and ecologic benefit within the constraints that exist.

- **Edwards Gardens (WC-R4) -** The preferred alternative for Edwards Gardens is Do Nothing.

- **WC-R5 -** The preferred alternative for reach WC-R5 is a combination of Local Improvements and Channel Realignment.

- **WC-R6 -** The preferred alternative for reach WC-R6 is Local Improvements.

- **WC-R7 -** The preferred alternative for reach WC-R7 is a combination of Local Improvements and Channel Realignment.

- **WC-R8 and WC-R9 -** The preferred alternative for reaches WC-R8 and WC-R9 is Local Improvements.

Implementation

The implementation of the Wilket Creek recommended preferred alternatives is based on a 25-year timeline and would commence after the EA posting and the review process of the Master Plan is complete. A phased approach is to occur over the following time frames: Immediate, 0-5 years, 5-10 years, and 10-25 years.

The sequence of implementation would ensure that rehabilitation at the most critical sites are considered priority and are carried out first. Table 1 outlines the implementation plan and the EA Schedule associated with the rehabilitation works at each site. Past management in urban streams has generally been reactive, and often on an emergency basis, including at Wilket Creek. The implementation process will utilize the adaptive environmental management (AEM) approach to inform decision making and monitoring of rehabilitation work (MNR, 2002). The approach recognizes that the system as designed and constructed is not permanent, but rather is expected to change and adjust over time as it continues to adjust to land use impacts and the effects of climate change. To account for this future uncertainty, the AEM approach emphasizes three additional steps following implementation: Monitor, Evaluate, and Adjust. By employing this approach, the likelihood of error and risk is minimized as the design is adjusted as necessary to ensure success based on the results of the monitoring.

Table 1: Wilket Creek Geomorphic Systems Master Plan Implementation

Time Period (Relative Priority)	Reach (Site)	MEA (2011) Schedule
Immediate (Highest Priority)	WC-R1 (Site 3 Phase II) WC-R2 (Site 4) WC-R5 (Reach-based)	B B B
0-5 Years (High Priority)	WC-R1 (Site 1 and Site 2) WC-R2 (Site 5/9 and Site 6 Phase II) WC-R3 (Site 8/10) WC-R7 (Reach-based)	B B B A
5-10 Years (Moderate Priority)	WC-R6 (Reach-based) WC-R8 (Reach-based) WC-R9 (Reach-based)	A A A
10-25 Years (Low Priority)	WC-R4 (Reach-based)	A