
TO: GENERAL COMMITTEE

SUBJECT: HOTCHKISS CREEK CULVERT FAILURE AND REPLACEMENT-
INNISFIL STREET

WARD: 2

PREPARED BY AND KEY CONTACT: K. OAKLEY, P. Eng.
MANAGER OF PLANNING & ASSET MANAGEMENT

SUBMITTED BY: R. SUTTON, P. Eng.
DIRECTOR OF ENGINEERING

GENERAL MANAGER APPROVAL: D. FRIARY
GENERAL MANAGER OF INFRASTRUCTURE & GROWTH
MANAGEMENT (ACTING)

CHIEF ADMINISTRATIVE OFFICER APPROVAL: M. PROWSE, CHIEF ADMINISTRATIVE OFFICER

RECOMMENDED MOTION

1. That the 2018 Capital Plan be amended by advancing the design for project Z477 (Hotchkiss Creek Culvert Expansion – Innisfil, 125 metres north of Tiffin Street) and approving new funding for utility relocation and property acquisition with these components of the project, totalling \$940,000 to be funded as follows:
 - a) \$687,200 – Tax Capital Reserve;
 - b) \$8,000 – Water Rate Reserve;
 - c) \$73,000 – Wastewater Rate Reserve; and
 - d) \$171,800 – Development Charges – Tax.
2. That the Director of Legal Services be authorized to commence negotiations and/or expropriation proceedings to acquire a property interest in land municipally known as 215 Innisfil Street as indicated on Appendix “A” to Staff Report ENG014-18 (the subject property) to facilitate the reconstruction of the culvert conveying Hotchkiss Creek across Innisfil Street.
3. That The Corporation of the City of Barrie make an application to City Council, as approving authority, for approval to expropriate the subject property and the City Clerk be authorized to execute the necessary forms of application.
4. That the “Notice of Application for Approval to Expropriate” be served and published and that any requests for inquiries received, pursuant to the “Notice of Application for Approval to Expropriate” be forwarded to the Chief Inquiry Officer and the Chief Inquiry Officer be requested to report to Council with respect to any such request.
5. That the Director of Legal Services be delegated authority to settle the expropriation or any negotiated agreement relating to the subject property, and the City Clerk be authorized to execute all associated and required documents in a form approved by the Director of Legal Services.

PURPOSE & BACKGROUND

6. On May 14, 2018 Operations staff were made aware of a sink hole forming within the Right-Of-Way (ROW) on Innisfil Street at the culvert conveying Hotchkiss Creek. Innisfil Street was closed to conduct emergency repair work on the sinkhole and a field investigation was conducted, including a Closed Circuit Television (CCTV) inspection of the culvert. The culvert was noted as being in very poor condition with holes and breaks within its structure as well as a sag throughout its length. Due to constraints posed by flowing water from the creek, a full documentation of the structural defects of the culvert and extent of the sinkhole were not documented. Staff were forced to backfill the sinkhole in the interim with non-shrink fill to remediate the damage in the short term.
7. The existing 1.5 m diameter corrugated steel pipe culvert was installed in 1966 and was designed to provide capacity of equal to or less than a five (5) year storm event. The current structure has deteriorated to the point of failure and aged past its useful life by twenty-two (22) years. The Draft Master Drainage Plan which is currently underway, recommends the installation of a 37.0 m long 3.962 m x 2.134 m open bottom concrete box culvert (Appendix "A") to meet capacity requirements.
8. A 750 mm trunk sanitary sewer was installed between 1966 and 1970; runs adjacent to Hotchkiss Creek and crosses beneath the existing culvert inlet. This trunk sanitary is operating at a high capacity (60% to 70%) that is expected to increase by approximately 15% as upstream development intensification occurs.
9. A 200 mm cast iron watermain, installed in 1946, is running parallel to Innisfil Street beneath the east limit of the ROW. It has a condition rating of poor.
10. Local sanitary sewers are constructed of asbestos cement and were installed in 1966 and 1970. A 200 mm sewer is located north of the trunk main, and a 300 mm sewer is located south of the trunk main. Both sections are condition rated as good.
11. A 1050 mm concrete storm sewer, installed in 1964, is located north of Tiffin Street, along Innisfil Street, and outlets into Hotchkiss Creek. Our records indicate this sewer is in good condition.
12. The culvert replacement is currently included in the 2018-2027 Capital Plan, with the design forecast in 2022 and construction in 2024, under the project title Hotchkiss Creek Culvert Expansion - Innisfil, 125 m north of Tiffin Street. The purpose of this Staff Report is to secure capital funding to begin the design, utility relocation and property acquisition as required, to replace the existing culvert which has failed.

ANALYSIS

13. The corrugated steel pipe culvert conveying Hotchkiss Creek beneath Innisfil Street has deteriorated to the point of failure. As noted above, deficiencies in the pipe structure have recently resulted in a sinkhole forming that required emergency repair and maintenance work by City staff and contractors. If the culvert is not repaired, future occurrences are highly probable and may increase both in damages and frequency. Innisfil Street is defined as a minor collector and is therefore well travelled by motorists within the City. Should the culvert completely fail the roadway will collapse creating a large void at the surface which poses a threat to public safety. This will also collapse the supporting aggregate structure around the watermain which poses the potential for breaks along the main. It is recommended that the existing, failed corrugated steel pipe be replaced with a concrete box culvert, in accordance with the recommendations of the ongoing Drainage Master Plan update.

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14. Deterioration of water quality, increased channel instability, and flooding to neighbouring properties during major storm events are likely due to the physical state and capacity restrictions of the existing structure.
 15. Staff in the Roads, Parks and Fleet Department are currently monitoring the road surface for the formation of deformations and sinkholes during daily and nightly road patrols, with additional patrols occurring overnight. Staff are also currently in discussions with the Lake Simcoe Regional Conservation Authority (LSRCA) and Department of Fisheries and Oceans (DFO) to begin the permitting process to pump the creek through a bypass, so that a comprehensive structural inspection can be performed on the culvert, and interim repairs options can be developed. As a result of the investigation and temporary repairs, the Roads, Stormwater and Rails Operations operating budget may be significantly pressured. Cost estimates are not yet available and are pending environmental approvals to conduct the investigation in order to qualify and quantify repairs.
 16. Staff are exploring the feasibility of lining the bottom of the culvert with High-Density Polyethylene (HDPE) interlocking segments to provide structural integrity to the culvert as an interim solution, however it is not expected that this will provide a long term solution, and replacement of the culvert is still required.
 17. It is recommended that adjacent sections of sanitary trunk sewer, and local watermain, storm and sanitary sewers be replaced at the same time. The extent to which these pipes require replacement will be considered during the design phase, with every effort made to minimize the amount of time before the culvert replacement can begin, while also mitigating the need for future work in the immediate vicinity of the culvert. The following paragraphs describe the current estimate of potential scope of such work.
 18. Should erosion and sinkholes continue to occur the structural integrity of the adjacent trunk sanitary pipe will be compromised. It is proposed that the 165 m of trunk sanitary adjacent to Hotchkiss Creek be replaced during the culvert replacement. The sanitary pipe should be sized to meet future capacity requirements, such that removal and reconstruction of assets in the area are not required following the proposed culvert construction.
 19. Although the watermain in the ROW has a low break history it has approximately eight (8) more years of expected useful life at which point an increase in age related deterioration is expected. Therefore it is recommended that the watermain be replaced within the limits of the culvert construction (approximately 60 m total) with a main that meets current City standards.
 20. It is also recommended that local sanitary and storm sewers be replaced within the limits of construction. This is to avoid the future removals and possible damage to assets installed during the proposed culvert construction.
 21. The culvert outlet may be located on private property which may require purchase. Property acquisition requirements will be confirmed during the design phase.
 22. Staff are requesting approval to proceed with the acquisition of the subject property at this time, so that as soon as the requirements can be confirmed during the design, the acquisition process can begin in order to facilitate construction timelines.
 23. Negotiated Agreements of Purchase and Sale are the preferred method of property acquisition. In certain circumstances, that is not always possible and as such expropriation proceedings may become necessary to acquire the subject property.

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24. Should expropriation become necessary, staff will continue in their efforts to negotiate Agreements of Purchase and Sale concurrently with expropriation proceedings until such time as the expropriation has been completed and it is no longer feasible to do so.
 25. Resourcing for this design is not currently within the 2018 work plan for the Engineering Department. The addition of this project may cause some delays in the design work for less critical projects. The project will be outsourced to a consultant.
 26. Without detailed design information, and an understanding of the full scope of the project, it is difficult to estimate the construction cost with a high degree of accuracy. As the design progresses, staff will refine the cost estimate and the construction funding will be requested through the 2019 Capital Plan.

ENVIRONMENTAL MATTERS

27. The following environmental matters have been considered in the development of the recommendation:
 - a) Should the culvert fail, the integrity of the trunk sanitary sewer in the vicinity will be compromised; should the trunk sewer fail and break, wastewater and raw sewage will be distributed into the watercourse.
 - b) Continued slope erosion and deterioration will continue until channel and culvert improvements are made. The LSRCA will be consulted during the design phase, and appropriate permits will be obtained.

ALTERNATIVES

28. The following alternative is available for consideration by General Committee:

Alternative #1

General committee could decide to only replace the existing culvert, without upgrading any other infrastructure in the project area.

While this alternative is available, it is not recommended for a variety of reasons. The existing trunk sanitary sewer is operating near capacity and flows are expected to increase in the near future. The trunk sanitary is located below the culvert, and therefore in order to replace it in the future the replacement culvert would be disturbed. In addition, replacing the culvert with the same sized corrugated steel pipe would fail to address the capacity requirements identified in the Draft Master Drainage Plan. As much of the downstream work on Hotchkiss Creek will be completed soon, upsizing this culvert is one of the next logical drainage improvements required on Hotchkiss Creek, and is important to proceed in advance of the upstream improvements. The watermain is in poor condition and approaching the end of its expected useful life. It would be undesirable to disturb the area again if the watermain is not being replaced during the project.

FINANCIAL

29. The total estimated funds required to complete the pre-construction phases (design, property and utilities) are summarized in the table below. Staff are not aware of any external funding opportunities that this project would be eligible for. The budget is based on a best estimate of project scope at the time of writing of this report, due to the urgent nature of the work, as the project proceeds, the scope will be refined and may result in cost changes.

Funding Source	Proposed addition to 2018 capital plan
DC Reserves - Tax	\$171,800
Tax Capital Reserve	\$687,200
Wastewater Capital Reserve	\$73,000
Water Capital Reserve	\$8,000
Total	\$940,000

30. As noted previously, the construction funding will be requested through the 2019 capital plan. The current cost estimate for construction is \$3.35 million.

LINKAGE TO 2014-2018 STRATEGIC PLAN

31. This report is not directly related to any of Council's Strategic Priorities.

APPENDIX "A"

