



19 July 2018

City of Hamilton
77 James Street North, Suite 400
Hamilton, Ontario
L8R 2K3

**Attention: Mr. Bhajan Sarker, P.Eng.
Project Manager, Water & Wastewater Systems Planning**

Reference: Glen Road Inspection and Monitoring Program

Dear Bhajan:

Further to our proposal of 02 July 2018 a walk through inspection of the storm sewer pipe which conveys Chedoke Creek underneath Main Street, King Street and Tope Crescent. The inspection included the following components:

- Walk-through inspection of both sides of the twin box;
- Collection of samples the upstream, mid-point and downstream ends of both culverts;
- For each connection observed along the way:
 - Record approximate station/distance and note to point of reference (station 0+00)
 - Take a sample if any flowing water from the connection and deliver to lab for analysis
 - Photos of all connections
 - Note any evidence of any sanitary waste content in discharge; or ~~clear~~; or dry. If evidence of sanitary connection, report same day for City action.
 - Record any abnormalities related to water quality impact
- Deliver a report of findings including images/videos, lab data.

The inspection work was completed on 18 July 2018 commencing at 9:40am. The inspection was completed by entering from the North end of the west pipe, exiting at the south end, and entering the south end of the east pipe. Flow rates and pipe sizes noted during the inspection are visual estimates only. The following pipes identified during the inspection:

West Pipe Inspection (North to South)

1. East Pipe . North End

Flow: Flow appeared to be coming from the downstream and was variable based on the strength of the winds. Prevailing winds were from the North.

Sample: Yes . Bottle Set 1

2. West Pipe . North End

Flow: Flow appeared to be coming from the downstream and was variable based on the strength of the winds. Prevailing winds were from the North.

Sample: Yes . Bottle Set 2

3. Manhole (HE09B118) - Glen Road Overflow: 31.4m from the North End

Flow: No flow

Sample: No Sample Taken

The overflow occurs at a manhole located on the west side of the pipe. The inlet pipe is approximately 4 meters above the invert of the Creek. There is significant sewer debris on the manhole steps and safety grate. Some of the manhole steps are missing and the safety grates look to be severely corroded and may not open. Maintenance work is recommended.



4. Storm Sewer: 97.3m from the North End
Flow: 0.2 lps . Clear Water
Sample: Yes . Bottle Set 3
The pipe is a 300mm diameter storm sewer entering the sewer at the pipe obvert.



5. Chedoke Creek: 194m from the North End
Flow: 100 lps . Clear Water
Sample: Yes . Bottle Set 4
The location is at a doorway between the 2 pipes.



6. Chedoke Creek: Inlet (South End) 364m from the North End
Flow: 100 lps . Clear Water
Sample: Yes . Bottle Set 5
Sample collected from the invert of a plastic lined diversion channel constructed by the contractor which is undertaking work on the channel.



East Pipe Inspection (South to North)

No flow was entering the east pipe at the upstream end. All flow was diverted to the west pipe by the contractor. The floor of the pipe was dry until approximately 100m when backwater effects from the downstream confluence with the west pipe and the Main King diversion channel.

7. Storm Sewer: 134m from the South End
Flow: No Flow
Sample: No Sample Taken
The pipe is a 300mm diameter storm sewer entering at the pipe obvert on the East side of the pipe.



8. Manhole (HE09B057) . 170m From the South End
Flow: N/A
Sample: N/A
Located on the East Side of the pipe. This manhole could not be located from the surface.

9. Main King Diversion: 245m from the South End
Flow: 30 lps
Sample: Yes . Bottle Sets 6 and 9 (duplicate taken)
The pipe is a 1.8m X 1.8m box. The water is cloudy with a sewage smell. There is no visible paper product in the flow or on the pipe walls. The pipe is approximately 0.6 m above the invert of the east pipe.



10. Manhole (HE09T003 and HE09E048) . 248m From the South End
Flow: N/A
Sample: N/A
There is an overflow in this manhole from the sanitary sewer on Tope Crescent. There is some sanitary debris on the manhole steps.



11. Storm Sewer . 251m From the South End
Flow: <0.1lps
Sample: Yes . Bottle Set 11
The pipe is a 900mm CSP with some corrosion on the invert. The water is clear with no indication of sanitary influence.



13. Storm Sewer . 367m From the South End
Flow: <0.1
Sample: Yes . Bottle Set 10
The pipe is a 1500mm CSP with some corrosion on the invert. The water is clear with no indication of sanitary influence.



Chedoke Creek Flow Observations

1. There is no flow in the east pipe upstream of the confluence with the Main/King Diversion.
2. Chedoke Creek is entirely contained in the west pipe between the upstream end and the confluence with the Main/King. This is the result of construction diversion works upstream.
3. Both pipes (East and West) are joined together for a 15m section (no separating wall) at the confluence with the Main King and water from the West pipe (Chedoke Creek) mixes with flow in the East Pipe (Main King).
4. There are doorways between the east and west pipes. The doorways are elevated with a 0.45m wall keeping base flow separate in the 2 pipes.
5. Flow in both pipes downstream of the Main King confluence are mixed.

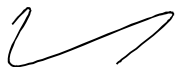
GIS Considerations

Manholes HE09B058 and HE09B059 do not exist. Manholes HE09T003 and HE09E048 are the same manhole.

The CSP pipes identified during the inspection are not shown on the GIS mapping.

If you have any questions or require clarification regarding any of the information contained herein please contact the undersigned at (905) 857-7600.

Yours Sincerely,
CALDER ENGINEERING LTD.



William A. Dainty, P.Eng.
Principal