



Corporate Report

Clerk's Files

Originator's
Files

MG.23.REP

DATE: August 27, 2009

TO: Chair and Members of General Committee
Meeting Date: September 9, 2009

FROM: Martin Powell, P. Eng.
Commissioner of Transportation and Works

SUBJECT: **August 2009 Storm Events Update**

- RECOMMENDATION:**
1. That a staff report be brought to General Committee once an assessment of the damages and remediation requirements with respect to public property and infrastructure as a result of the August 2009 storm events is complete.
 2. That the need for advancing planned flood remediation and erosion rehabilitation works on the Cooksville Creek be assessed.
 3. That additional opportunities to reduce the risk of flood damages and safety concerns on public and private properties beyond those already planned be considered in consultation and cooperation with the Region of Peel and the local Conservation Authorities, such as a roof leader disconnection program.
 4. That a copy of the report, dated August 27, 2009, from the Commissioner of Transportation and Works entitled *August 2009 Storm Events Update* be forwarded to the Region of Peel, Credit Valley Conservation, Toronto and Region Conservation and Conservation Halton.

BACKGROUND:

While not approaching the rainfall of last year where Toronto Pearson International Airport recorded the wettest June, July and August on record with a three-month total of 396 mm (15.6 inches), wet weather continues to be a trend over the summer of 2009. About 85 mm (3.3 inches) of rainfall was recorded at Toronto Pearson International Airport in July and 122 mm (4.8 inches) has been recorded so far in August.

Of the rain events in July and August, the August 4, 2009 and August 9, 2009 events were the most significant.

The August 4th event, in particular, generated a large number of complaints to the City, the majority of which were from within the Cooksville Creek watershed. This is due to the fact that the intense rainfall event was centred on or close to the Mississauga Valley Community Centre where the one hour storm exceeded the 1 in 100 year event. The storm caused flooding related incidents and associated damages to private properties, municipal infrastructure (watercourse erosion, trail damage and flooding at the Lakeview Golf Course) and infrastructure under other jurisdictions such as the Region of Peel and CN Rail.

Flooding related complaints were reported to the City immediately following the August 4th storm event. They included complaints from residents living on Meadows Boulevard, Woodington Drive, Rhonda Valley, Paisley Boulevard East, Camilla Road, Myron Drive, Lochlin Trail, Carmen Drive and Hampton Crescent. Reports of flows from Cooksville Creek overtopping King Street East during the peak of the flooding event were also received.

In light of the above, this report, written in cooperation with all City departments, is intended to provide a synopsis of the rain events in August but with a focus on the August 4th storm, including discussions regarding complaints, immediate remedial actions, costs of repairs to date, current preventative and maintenance practices related to City operations and future capital improvements planned by the City. This report will also highlight the action plan that the Region of Peel will be undertaking related to water entering basements through floor drains as a result of the August 4th storm event, as well as the responsibilities of local Conservation Authorities with respect to flood

warning and development approval practices.

COMMENTS:**Rainfall Events of August 4, 2009 & August 9, 2009**

Rainfall this summer has been unusually heavy at times. The August 4th and August 9th storms, particularly the intense event on August 4th, have caused flooding related damages to properties and infrastructure.

The City maintains a network of rain gauges which record the amount of rainfall at different locations throughout the City. These are shown in Appendix 1.

The storm of Tuesday, August 4th, which lasted for just over one hour, appears to have been centred over the Cooksville Creek watershed.

The rainfall recorded by Station #10, located in the north end of the watershed indicated that 42 mm (1.7 inches) of rain fell within one hour. This amount of rainfall exceeds the **1 in 25 year** event.

Station #6, located in the middle of the watershed at the Mississauga Valley Community Centre, recorded 68 mm (2.7 inches) of rainfall within one hour, which exceeds the **1 in 100 year** event.

Station #5, located on Fire Station #106 at 3450 Dixie Road, just east of the Cooksville Creek watershed boundary, recorded that 43 mm (1.7 inches) of rain fell within a one hour period. Similar to the event recorded at Station #10, this storm also exceeded a **1 in 25 year** event.

In comparison, Station # 3 to the west of the Cooksville Creek watershed on Wolfedale Road, only recorded 9 mm (0.35 inches) of rainfall within one hour, which is less than the 1 in 1 year event while Station # 1, located near the mouth of Cooksville Creek on the Lakeview Water Treatment Plant, also recorded just 19 mm (0.75 inches) of rainfall within one hour which is slightly greater than the 1 in 2 year event.

The table below summarizes the above.

Rain Gauge	#1	#3	#5	#6	#10
Rainfall Amount (1 hr)	19 mm (0.75")	9 mm (0.35")	43 mm (1.7")	68 mm (2.7")	42 mm (1.7")
Storm Event	> 1:2 yr.	< 1:1 yr.	> 1:25 yr.	> 1:100 yr.	> 1:25 yr.

In summary, the August 4th rainfall event was a localized, brief but highly intense storm, centred on or close to the Mississauga Valley Community Centre where it exceeded the **1 in 100 year** event for a one hour duration.

In contrast to the August 4th event, the storm of August 9th appears to have occurred fairly uniformly across the City. There were two distinct rainfall events on August 9th separated by just over nine hours. At all stations where data is available, the magnitude of the event was either equal to or less than the 1 in 5 year event.

Complaints and Inquiries

This section will focus primarily on the Cooksville Creek watershed and adjacent watersheds to its east due to the large number of complaints from the area. However, it should not be construed that complaints received in other areas of the City are of less importance. A map showing the locations of the service requests/calls is provided as Appendix 2.

Transportation and Works Department

So far in August, a total of 82 service requests City-wide have been received by the Transportation and Works Department, the majority of which are related to issues within the Cooksville Creek watershed south of Eglinton Avenue, with several others scattered throughout the City. For instance, two service requests were received from homeowners in the Malton area for flooding on their yards as a result of the August 9th storm. These complaints were localized and not related to any issues associated with Mimico Creek.

While it is difficult to associate a service request to a particular storm

event, as a call may come in several days after an occurrence, it is assumed that the 44 service requests received between August 4th and August 7th were as a result of the August 4th event. The remaining 38 calls were likely a combination of complaints caused by the August 4th and August 9th storms but may not be limited to these two dates.

It is estimated that approximately half of the service requests are related to surface flooding, one-third related to water entering basements through floor drains, and the remainder are inquiries or concerns.

Community Services Department

As the Transportation and Works Department generally receives calls related to flooding issues, Parks and Forestry only received four complaints from the August 4th event: one call with respect to cleanup at Cooksville Park and three e-mails related to flooding of homes adjacent to Dellwood Park within the Cawthra Creek watershed. A service request was also received after the storm event passed, with the report of a dead tree adjacent to the Cooksville Creek at Kirwin Avenue.

Inspection and Maintenance - August 4th Rainfall

Transportation and Works Department

On August 5th and August 6th, the storm sewer systems in the affected areas were inspected by City staff and found to be clear of debris and operational. Also the Cooksville Creek was inspected and cleared of debris and fences were repaired where necessary. The City also offered assistance to private property owners with debris removal and fence repair. It is estimated that the cost of cleanup incurred by the Transportation and Works Department on the Cooksville Creek is approximately \$40,000. The breakdown is as follows:

- \$20,000 contracted to repair fencing
- \$10,000 for cleanup under Engineering and Works' operating budget
- \$10,000 for Engineering and Works staff time

It should be noted that the regular monthly preventative maintenance of all inlets and outlets within the Cooksville Creek watershed was performed the week prior to the August 4th storm.

During the response to inspect and clean up debris along the Cooksville Creek after the storm event, City staff observed and reported several areas of excessive channel erosion and deposition in the vicinity of Mississauga Valley Park and Camilla Park. This included dislodged bank armouring materials, fallen trees and fences, bank scour and accumulations of broken shale on the bed of the channel. Staff has conducted preliminary assessments of these areas and is working with the CVC to assess their priority and determine the appropriate course of remedial action.

Following the August 4th event, staff from the Transportation and Works Department and the Region of Peel worked together expeditiously and, by August 7th, put into place a plan to detail roles and responsibilities between the two jurisdictions on investigations and studies. Subsequently, a meeting was held between City and Region of Peel staff on August 20th to confirm roles and discuss next steps. A memorandum prepared by the Region of Peel outlining an Action Plan for the August 4th flooding in Wards 1, 3, 4, 5, 6 and 7 is attached as Appendix 3.

Community Services Department

The majority of issues related to flooding on parkland were determined to be a result of the August 4th storm event. This event caused trail damage and debris deposition on parkland. The major trail damage was on the Cooksville Trail at Richard Jones Park. The Community Services Department has determined that the total cost of repair is \$80,000 as summarized below:

- \$8,000 for minor repair work which has been completed or currently being carried out under the Parks operations budget
- \$50,000 for paving at Richard Jones Park which is already a planned 2009 capital project
- \$12,000 for asphalt repaving at Stonebrook Park which is an ISF funded project
- \$10,000 of required pathway repairs which remains unfunded

Therefore, as part of the trail system was damaged at locations where projects have already been planned, \$18,000 is the anticipated additional cost required to repair pathways as a result of the August 4th storm.

Debris cleanup was carried out primarily at Cooksville Park, Camilla Park and Dellwood Park by Parks and Forestry staff. Aside from Cooksville Park, debris cleanup in the watercourses was undertaken by Transportation and Works Department staff. The estimated cost of Parks and Forestry staff's time for cleanup and interim pathway repairs is roughly \$2,000.

It is noted that some of the cleanup was delayed, especially at Dellwood Park, as saturated ground conditions limited equipment accessibility to areas adjacent to the creek. Further delay was encountered as Forestry staff with large capacity chipping units was already fully engaged with the removal of damaged street trees and working with Enersource on priority clearing. Parks staff was therefore limited to the use of three small capacity chipping units. Acquisition of larger capacity chippers for each the three Parks Districts should be reviewed with an approximate purchase cost of \$60,000 to \$75,000 each to expedite future efforts.

Furthermore, there was also flooding at the Lakeview Golf Course from Applewood Creek. An assessment of the impact to the golf course is currently being undertaken by staff.

Claims

To date, Risk Management has received 98 claims related to the August 4th storm event.

The table below identifies the location of the claims that have occurred in the City and received to date. Based on this information, the highest frequency of claims are from Wards 4 and 7.

Ward	1	2	3	4	5	6	7	8	9	11	Total
# of Claims	6	3	5	31	10	3	32	4	1	3	98

Investigations are presently being conducted and claims are being

assessed. Any claims related to the sanitary system have been referred to the Region of Peel. All claimants have received an acknowledgement of their claim.

In corresponding with the Region of Peel, 44 claims have been received to date. The Region is currently investigating these claims and thus far, none of the claims have been denied.

Inspection and Maintenance Programs

Transportation and Works Department

The Transportation and Works Department has programs in place, including the Sewer, Bridge and Watercourse Program and the Cleaning and Litter Pickup Program, which involve regular inspections, cleaning, maintenance and repairs of catch basins, storm sewers, culverts, bridges and storm drainage inlets and outlets. The objectives of these programs are: to ensure that the City's drainage infrastructure functions as designed, to ensure proper drainage and safe passage of traffic within the public right-of-way, to keep watercourses sufficiently clear to meet design flood protection criteria, to reduce the risk of flooding, to ensure public safety, to prevent damages to public and private property and pollution to the environment, and to preserve the integrity of the storm drainage system itself.

Watercourse maintenance activities include the removal of fallen trees, garbage, woody and urban debris including tires, shopping carts, bicycles and sediment accumulation, responding to spills and illegal dumping, maintaining engineered bed and bank materials and controlling erosion. Certain watercourse maintenance activities are subject to approval by the local Conservation Authority.

Storm drainage inlets and outlets are inspected once a month between April 1st and October 31st and are cleaned on a demand basis or as required, weather permitting, between November 1st and March 31st. If required, garbage, debris and tree branches are removed. Also, inlets and outlets known to be prone to flooding are inspected and cleaned prior to a storm weather alert and after a storm has occurred.

Storm sewers and culverts are cleaned or flushed on a demand basis, while roadside catch basins are cleaned once every three years.

Community Services Department

Community Parks are visited at least weekly and any debris is cleaned up. Greenbelts and Woodlands are cleaned up twice annually (spring and fall). Material or structures in the watercourse that are noted by Parks and Forestry staff are referred to the Transportation and Works Department, although Parks and Forestry staff may assist with tree removal.

Hazard trees in publicly travelled areas are removed as needed. In natural/wooded areas, the practice is to leave cut material on the ground to enhance habitat.

During the summer, Parks and Forestry staff is fully engaged with turf maintenance, horticulture and garbage pickup.

Complaints are referred to the relevant Parks Supervisor and any necessary cleanup required is dealt with within 48 hours on a priority basis.

Role of Conservation Authority – Flood Warning

There are three Conservation Authorities within the municipal boundaries, namely Credit Valley Conservation, Toronto and Region Conservation and Conservation Halton.

The local Conservation Authorities (CAs) work in cooperation with the Ontario Ministry of Natural Resources (MNR) to provide flood forecasting and warning services for municipalities and residents within their watersheds so that they can respond to potential flooding and flood emergencies. MNR routinely notifies CAs and other water management partners when significant precipitation is forecasted to occur across all or portions of the Province. Information provided through the Provincial Flood Advisory includes the anticipated path, areal extent and timing of the storm event together with estimates of expected rainfall accumulations. Mathematical modeling is used to identify areas that may be hardest hit. Such modeling is regional in

nature and does not account for localized differences in rainfall intensity or duration at the scale of individual subwatersheds.

For flooding and flood emergencies, the CAs have the following areas of responsibility:

- Monitor watershed and weather conditions and operate a flood forecasting system in order to provide warning of anticipated or actual flood conditions
- Issue Flood Advisory and Flood Warning bulletins to municipalities and other appropriate agencies to advise of potential flooding
- Operate CA dams and flood control structures to reduce the risks of flooding
- Provide advice to municipalities in preventing or reducing the effects of flooding
- Maintain communications with municipalities and the Surface Water Monitoring Centre of the MNR during a flood

The CVC has indicated that the lower portions of Cooksville Creek are known to experience peak flow conditions within 15-20 minutes of the onset of heavy rain. As a result of this, conventional flood warning systems are ineffectual for this watershed in providing City staff and residents with sufficient time to respond, other than on an emergency basis.

Capital Improvement

Since the 1970s, the City of Mississauga has completed many studies regarding the management of its creeks and rivers from the perspectives of flooding and erosion. Generally, the purpose of these studies was to develop long term plans for the construction of infrastructure improvements and other actions to provide adequate drainage facilities, minimize potential flood damage, reduce the extent of the Regulatory Flood Plain and rehabilitate and stabilize associated creeks and rivers. Site specific measures include peak flow control facilities, drainage improvements and erosion stabilization works. Where practical, these works have been programmed into the City's Storm Drainage and Watercourse Improvements Capital Budget and Forecast and many have been completed.

In the last 25 years, the City has invested over \$30 million in capital improvement works along its creeks, rivers and storm drainage channels. The City has an on-going watercourse monitoring program focused on flooding and erosion problems and maintenance activities have been completed where required.

Further capital improvements to mitigate flooding and erosion problems continue and additional projects are planned to be completed over the coming years. As detailed in the *2009 Development Charge Background Study: Storm Drainage Component, May 12, 2009*, the City expects to spend \$130 million through 2031 on flooding and erosion control works. Of this amount, \$11 million has been allotted to improve the capacity of several culvert crossings and channel sections to reduce flooding and \$8.7 million to address erosion concerns along Cooksville Creek.

Despite these best efforts, flooding and erosion will continue to occur in some areas. Limitations to technical feasibility, available space and funds, along with the natural variability of the creeks themselves, hinder the City's ability to address all of the flooding and erosion concerns that may arise.

Development within Flood Plain

Mississauga Plan, the City's Official Plan, has specific policies related to development in the flood plain. Flood plain lands are generally captured within the Greenbelt designation which does not permit new development, except those uses which, by their nature, must be located in the Greenbelt such as flood or erosion control works, piped services, etc. Development is defined as the creation of a new lot, a change in land use, or the construction of buildings and structures requiring approval under the Planning Act.

However, it is recognized that there are existing buildings and structures within the flood plain. As such, for existing lots of record, development is not permitted on any natural hazard lands, including flood plains, if there are lands suitable for development on the property beyond the hazard lands. Reconstruction, minor additions and maintenance of legal non-conforming facilities, buildings and

structures may be permitted. With respect to reconstruction, development should be relocated to an area that is least susceptible to natural hazards. Any building or structure that is permitted in or adjacent to the flood plain is to be protected to the elevation of the Regulatory flood; for Cooksville Creek, the flood produced by the Hurricane Hazel storm. In addition, access for development adjacent to or within the flood plain is subject to the local Conservation Authority's flood-proofing standards and other policies, such as that off site hazards are not increased. CVC policy prohibits the creation of lots, major redevelopment and intensification within the Regulatory flood plain.

As discussed, there are numerous properties in the flood plain throughout the City due to historic development, which occurred at a time when no policies or regulations governing flood plain management were in place. Since those developments occurred, computer models to plot flood plains were developed and flood plain mapping was produced. In the 1980s, the Province developed a Policy Statement for Flood Plain Planning along with Implementation Guidelines. The Provincial Policy Statement (PPS) was issued in 1997 and revised in 2005. The PPS contains policy statements pertaining to natural hazards including flood plains.

Public Education

In July, 2007, City staff distributed a brochure called, *Cooksville Creek: What Residents Can Do In Case of a Flood*, to residents living within or near the Regulatory flood plain of the Cooksville Creek. This practical guide, prepared by Transportation and Works Department staff in consultation with CVC, provided useful information about the characteristics of the creek, the risks during flood conditions and actions residents can take to protect their home and family before, during and after a flood event. A City-wide version of this brochure was made available to the public during the City's Emergency Preparedness Week in May, 2009.

STRATEGIC PLAN:

The management and maintenance of the naturalized watercourse corridors in the City of Mississauga falls under the Living Green Strategic Pillar and its strategic goal to conserve, enhance and connect

natural environments.

FINANCIAL IMPACT: Costs have been incurred to date as a result of the August 4, 2009 storm event. These costs have not yet been fully quantified, as efforts to assess damage, remediation works and responses to inquiries and claims are still on-going.

CONCLUSION:

1. On August 4, 2009, a localized, brief but highly intense storm centred in the proximity of the Mississauga Valley Community Centre produced rainfall that exceeded the 1 in 100 year event for a one hour duration.
2. The storm of August 4, 2009 generated a large number of inquiries, service requests and claims to the City as a result of flooding related issues and associated damages to private and public properties.
3. The City's regular maintenance and inspection programs ensured that the City's drainage infrastructure functioned as designed during the August 4, 2009 storm event.
4. City staff has been working cooperatively with Region of Peel and CVC staff in responding to the inquiries and service requests received.
5. City staff and contractors conducted clean up operations immediately after the storm event and assisted private property owners with debris removal and fencing repairs.
6. The City is presently assessing damage and remediation requirements of City property as a result of the August 4, 2009 storm event. Currently, it is estimated that \$60,000 of unplanned funds has been and will be spent but this figure will rise once a full assessment is complete.
7. The City is presently assessing whether planned flood remediation and erosion rehabilitation works on the Cooksville Creek should be advanced.

8. The City in consultation with the Region of Peel and local Conservation Authorities will be reviewing additional opportunities to reduce the risk of flood damages and safety concerns on public and private properties beyond those already planned, such as a roof leader disconnection program.

ATTACHMENTS:

- Appendix 1: Rain Gauge Locations
- Appendix 2: Map - Service Requests Received by the City (August 4 – August 19, 2009)
- Appendix 3: Memorandum prepared by the Region of Peel outlining an Action Plan for the August 4th flooding in Wards 1, 3, 4, 5, 6 and 7

Original Signed By

Martin Powell, P.Eng.
Commissioner of Transportation and Works

*Prepared By: Lincoln Kan, P.Eng.
Manager, Environmental Services*