



CITY OF HAMILTON
PUBLIC WORKS DEPARTMENT
Hamilton Water Division

TO:	Chair and Members Public Works Committee
COMMITTEE DATE:	November 14, 2016
SUBJECT/REPORT NO:	Pilot Study Assessment of Increase in Lot Coverage in Rurally Serviced Roadway Neighbourhoods, Community of Ancaster (PW16100) (Ward 12)
WARD(S) AFFECTED:	Ward 12
PREPARED BY:	Udo Ehrenberg Manager of Infrastructure Planning and Systems Design 905-546-2424, Extension 2499 Nahed Ghbn Project Manager, Infrastructure Planning and Systems Design 905-546-2424, Extension 6413
SUBMITTED BY:	Stuart Leitch Acting Director, Water & Wastewater Planning & Capital 905-546-2424, Extension 7808
SIGNATURE:	

RECOMMENDATION

- (a) That Staff Report PW16100 and Appendix A, Pilot Study Assessment of Increase in Lot Coverage in Rurally Serviced Roadway Neighbourhoods, Community of Ancaster (Phase 1 report) be received;
- (b) That Staff be directed to undertake a Detailed Drainage Assessment Study (Phase 2) of all of the Existing Residential (ER) Neighbourhoods in Ancaster with rural drainage serving to determine the threshold capacity and break-point of the existing drainage networks;
- (c) Due to the high level theoretical nature of the Phase 1 Pilot Study Assessment combined with limited geographic scope of the the study area, approval of lot severances in all rural cross section drainage neighbourhoods in Ancaster should continue to be deferred until a Detailed Drainage Assessment Study (Phase 2) is completed.
- (d) That the General Manager of the Public Works Department be authorized and directed to retain AMEC Foster Wheeler as a Procurement Policy #11 – Single Source Provider, to undertake the follow up Detailed Drainage Assessment Study (Phase 2) including the procurement of associated consulting services to an amount anticipated not to exceed \$250,000 for a future Project ID

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#5181755420 funding source subject to approval as part of the 2017 Rate Budget;

EXECUTIVE SUMMARY

On a motion, dated September 16, 2013, Council directed staff to determine if future requests for lot severances, in the developed communities of old Ancaster, that do not have storm sewers, should not be permitted, due to potential downstream flooding, and report back to the Public Works Committee. On a second motion, dated September 3, 2014, Council directed staff that approval of lot severances in all rural cross section neighbourhoods in Ancaster, be deferred until this assessment is complete.

As directed by Council, the Hamilton Water Division has launched this Pilot Study Assessment in order to investigate, at a high level, the potential impacts of impervious coverage increase in representative neighborhoods in Ancaster, and to quantify the effect of increasing impervious areas in rural cross section neighborhoods, based on supportable science, which defined the potential level of impact and associated opportunities for mitigation. An investigation of this type could also be used as a guiding document to inform the City of the related impacts, not only for neighbourhoods in Ancaster, but also for other parts of the City of Hamilton including Waterdown and the older parts of Stoney Creek.

AMEC Consulting was retained to assist with this Pilot Study. As part of this assessment, a suitable location in the Community of Ancaster, currently serviced with a rural roadway drainage standard, has been identified to conduct this Pilot Study. Through technical analyses (modelling), the impact potential (specific to surface water runoff) due to varying levels of increased impervious coverage, resulting from lot severances and other forms of lot coverage increase was determined. The evaluation has quantitatively assessed the change in runoff rate and volume indicating the impacts to performance. The study has also considered opportunities for mitigation at a high level. A Site Reconnaissance was conducted to identify development and servicing trends across Ancaster to support the selection of candidate sites for study. Eight (8) neighbourhoods were reviewed based on the City's Property Assessment data and also servicing approach/configuration. To support the numerical impact assessment, analytical modelling of the Pilot Study area in the Community of Ancaster was conducted; this included model selection, parameterization, and associated assumptions and performance assessment.

Hydrologic modelling using software was completed in the study to develop a numerical model representative of the conditions present within the Pilot Study area. Three (3) scenarios have been considered in the assessment, which reflect increased impervious coverage due to the infill development of larger homes on existing lots or the creation and development of new lots by severance application. The existing amount of impervious area has been increased by 10%, 20%, and 30% for this modelling exercise. In addition, a fourth scenario was modelled to reflect the Maximum Lot Coverage of

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35% permitted in the Existing Residential (ER) Zone. In this scenario the assumption was that all lots had a Lot Coverage of 35% reflecting buildings and structures, plus the existing level of driveways, walkways and patios. The drainage system performance has been evaluated based on four (4) progressively more intense design storm events: the 25 mm 4-hour Chicago storm, as well as the 2 year (53 mm in 24 hours), 5 year (72 mm in 24 hours), and 100 year (123 mm in 24 hours) Soil Conservation Service (SCS) 24-hour storm events.

It was determined that increased impervious surfaces through severances or redevelopment has the potential to increase peak flows, runoff volumes, and contaminant loads, leading to reduced roadside ditch performance and degraded storm water quality. Options to mitigate the increased runoff problems can be achieved through on-lot Best Management Practices (BMPs) including forms of Low Impact Development (LID) technologies. These technologies can be an effective means of mitigating the increased runoff (peaks and volumes) however, long-term oversight and sustainability in a residential setting requires municipal resources and policy that are not currently in place.

In order to provide a perspective on the issue of land use intensification, a number of local municipalities were contacted to determine if they are experiencing similar trends, and if so, what are they doing to manage the similar concerns/impacts. No formal process is yet in place to address the impact within Mississauga, Oakville and Burlington however there is an awareness of the situation and staff are working towards opportunities to reduce impacts.

The intent of this Staff Report is to provide Council a foundation for staff recommendation to undertake a Detailed Drainage Assessment Study (Phase 2) for all Existing Residential (ER) neighbourhoods in Ancaster with rural drainage servicing. The scope of work, including: computer modelling, field investigations, alternatives review, risk assessment and benchmarking; will guide our future decision around the appropriateness of lot severancing and increased impervious coverage in rural drainage servicing areas.

The report of the Pilot Study investigation is provided in Appendix A.

Alternatives for Consideration – See Page 7

FINANCIAL – STAFFING – LEGAL IMPLICATIONS

Financial: Funding for the Phase 2 Study will be recommended in the 2017 Rate Budget deliberations with Committee and Council.

Staffing: There are no staffing impacts related to the recommendations of this report.

Legal: There are no legal impacts related to the recommendations of this report.

HISTORICAL BACKGROUND

The City of Hamilton, similar to many other Cities, has been observing development trends related to severances and redevelopment of lots in high-value “desirable” neighbourhoods, such as those found in the older sections of the Community of Ancaster. The larger lots are in certain circumstances being severed creating multiple properties resulting in higher overall impervious coverage and additional driveway entrances needed to cross local drainage ditches servicing the neighbourhood. The issue is particularly prevalent in those neighbourhoods which are rurally-serviced (i.e. ditches and driveway culverts versus curb/gutter and storm sewers). In those circumstances, where the amount of severances and related lot coverage increases are significant, local catchment impervious coverage can increase resulting in higher peak flows and corresponding runoff volumes, and also potential to deliver additional contaminant load to environmentally sensitive receivers/systems, causing an increased risk for flooding, erosion, and environmental degradation. The trend in many older communities is to redevelop over time and intensify, which is consistent with Municipal Places to Grow and contemporary Urban Planning Policy which promotes 40% of new development / growth within the existing urban boundary. Concurrently, the City’s Public Works Department remains concerned about ensuring that any potential impacts of this form of redevelopment is effectively managed. In this regard, the City has initiated this assessment, based on supportable science, to quantify the effect of increasing impervious areas in rural cross section neighborhoods, which will define the potential level of impact and associated opportunities for mitigation. This initiative has engaged multiple City departments including Planning and Economic Development, and various Divisions of Public Works.

POLICY IMPLICATIONS AND LEGISLATED REQUIREMENTS

All proposed developments/redevelopments must be in conformity with Places to Grow legislation, the policies of the Urban Hamilton Official Plan (UHOP), Planning Act, and applicable City Standards and Guidelines.

RELEVANT CONSULTATION

The appropriate City Divisions and Departments including Planning and Economic Development Road Operations Division have been consulted as they are Project Stakeholders. Staff met with the Ward Councillor on August 13, 2014, and on October 3, 2016. The Ward Councillor expressed his concerns regarding the approval of additional lot severance applications in Ancaster as it pertains to increased stormwater runoff.

ANALYSIS AND RATIONALE FOR RECOMMENDATION

The City has initiated this Pilot Study Assessment in order to investigate, at a high level, the potential impacts of lot coverage increase in representative neighbourhoods in Ancaster, and to quantify the effect of increasing impervious areas in rural cross section

neighborhoods. As part of this Pilot Study, a set of area characteristics including topography, historical intensification, and ditch condition was used to select a Pilot Study Area as the representative site for the assessment. Numerical analyses of four (4) impervious coverage scenarios (10%, 20%, 30% increased imperviousness plus zoning based scenario) has demonstrated that peak flows and runoff volumes could increase substantially with the relative amount depending on location, coverage, and size of event. The assessment of impacts has intentionally focused on more frequent storm events which would be expected to cause nuisance-type of flooding and / or standing water in the roadside ditches serving the neighbourhoods.

Based on the results of the Pilot Study, the existing ditch and driveway culvert system in the Pilot area performs reasonably well for the 25 mm, and the 2 year storm (53 mm in 24 hours) with only isolated locations exhibiting spill onto lawns during a 2 year storm event, largely attributable to driveway culvert grades and maintenance condition. The 5 year storm (72 mm in 24 hours) performance is not as good with some areas spilling onto the roadway. The 100 year storm event (123 mm in 24 hours) exhibits widespread overtopping of roads, as expected, to effectively drain the study area, with intensification exacting the greatest impacts to the urbanized road sections.

Observations and Conclusions of the Pilot Study Assessment (Phase 1):

Based on the Pilot Study conducted for the rurally-serviced pilot area in the Community of Ancaster, it has been concluded and suggested that:

- The Community of Ancaster has a number of areas which are serviced by rural and semi-rural drainage standards (i.e. ditches and driveway culverts); many of these locations are in older parts of the community with comparatively large lots versus current practices.
- The majority of these areas in the Community of Ancaster are zoned Existing Residential (ER) Zone in the Ancaster Zoning By-law 87-57. All development must meet the requirements of this zoning designation, specifically the Maximum Lot Coverage of 35% which refers to the portion of land occupied by buildings and structures (i.e. houses and accessory structures) and does not include impervious areas such as driveways, walkways and patios.
- Several of these areas are being redeveloped through severances of larger lots and/or tearing down smaller homes and replacing with ones of substantially larger footprints thus creating more impervious surfaces (patios, wider driveways, etc.).
- Based on the City's data, over the period of 2001 to 2016, there have been 38 Severances in Ancaster Existing Residential (ER) communities and 8 in the Pilot Area. Over the same period of 2001 to 2016, there have been 162 Demolitions and 175 Replacements in all Ancaster ER communities and 20 Demolitions and 22 Replacements in the Pilot Area.

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- Redevelopment through one of the foregoing mechanisms has the potential to increase peak flows, runoff volumes, and contaminant loads, leading to reduced roadside ditch performance and degraded storm water quality.
- Based on a set of area characteristics including topography, historical redevelopment, and ditch condition, the study area was selected as the preferred representative site for the pilot assessment.
- A review of development areas from the 1950's to present suggests a trend towards smaller lots with urban drainage systems (curb, gutter, sewers) and more comprehensive stormwater management including Low Impact Development (LID) technologies and Best Management Practices (BMPs) (at source control by keeping water where it lands).
- Of the three (3) contacted area municipalities, Oakville and Mississauga responded that the problem is evident, however, no formal process is in-place as of yet to address the impact. It appears with the awareness of the situation, Oakville and Mississauga municipal staff is working towards opportunities to reduce impacts by way of informal treatment, involvement of Building Departments, and neighbourhood focused Class EAs.
- Numerical analyses considered four (4) improvement coverage scenarios, including: 10%, 20%, 30%, which increased imperviousness and a fourth scenario that analysed the impact of a Maximum Lot Coverage of 35% as permitted by the ER Zone. All scenarios demonstrated that peak flows and runoff volumes increase substantially with the relative amount of increase being dependant on location, coverage, and size of event.
- The increase of impervious area reduces system performance, thus increasing the number and severity of drainage deficiencies. This assessment has been based on peak flows and does not inherently consider runoff volumes which, due to redevelopment, would extend the period of inundation.
- While not directly assessed by this pilot study, both creek/ditch erosion and storm water quality are anticipated to be similarly affected by the redevelopment, albeit storm water quality is likely to be the lesser of the two, given the limited amount of contaminant sources for expanded residential home coverage.

Recommendations of the Pilot Study Assessment (Phase 1):

A number of recommendations have been identified to address the trends related to severances and redevelopment of lots currently observed in the older neighbourhoods. These types of recommendations, that are relevant to the study areas and can be implemented to mitigate the increased runoff problems, include:

- i) On-lot Best Management Practices (BMPs) (including forms of Low Impact Development (LID)) can be an effective means of mitigating the increased runoff

(peaks and volumes) and should be considered for these circumstances; City staff should contemplate the sustainable design and implementation of these measures per the City's Drainage Policy and the City's Criteria and Guidelines for Stormwater Infrastructure Design as well as the following:

- Applicants must demonstrate that an adequate outlet is available with no negative impact to any downstream properties.
 - Should lot level controls (and suitable forms of LID) for Storm Water Management be proposed to mitigate increased runoff, the proposed infrastructure must be included in the appropriate Consent Agreement with securities and registered on title. This would include operation and maintenance responsibility.
 - Overbuilding (Stormwater Best Management Practices) BMPs including providing redundant storage and an amount of control to account for potential loss of effectiveness over time.
 - Use of less complex BMPs (i.e. increased topsoil depth).
 - Requiring focussed site specific geotechnical investigations for each single lot development to establish groundwater levels and infiltration capability of native / local soils.
 - Avoid lowering rebuilt homes basement elevation due to potential to intercept more groundwater and promote more frequent discharge foundation water into ditches.
- ii) Where potential for redevelopment is significant the City should consider a detailed study in order to establish criteria and breaking points for municipal infrastructure upgrades including drainage assessment to confirm a suitable storm outlet and downstream impacts.
- iii) Driveway culverts should be inspected as part of the City's inspection activities for condition and build-up of sediment, and maintained accordingly; problem areas should be assessed more frequently as required subject to available resources.
- iv) Rebuilt rurally serviced roadways should consider sub-drains for ditch systems.

Based on the high level theoretical nature and limited geographical scope of the Pilot Study Area (Phase 1), Council may consider this as a foundation for staff recommendation to undertake a detailed drainage Assessment Study (Phase 2) for all Existing Residential (ER) neighbourhoods in Old Ancaster with rural drainage servicing.

ALTERNATIVES FOR CONSIDERATION

The report is not received by Council. Staff do not recommend this alternative because the impact of increased imperviousness would remain unmitigated thus increasing the

risk of higher peak flows, increase in runoff volumes and contaminant loads, leading to reduced roadside ditch performance and degraded storm water quality.

ALIGNMENT TO THE 2016 – 2025 STRATEGIC PLAN

Economic Prosperity and Growth

Hamilton has a prosperous and diverse local economy where people have opportunities to grow and develop.

Healthy and Safe Communities

Hamilton is a safe and supportive city where people are active, healthy, and have a high quality of life.

Clean and Green

Hamilton is environmentally sustainable with a healthy balance of natural and urban spaces.

Built Environment and Infrastructure

Hamilton is supported by state of the art infrastructure, transportation options, buildings and public spaces that create a dynamic City.

Our People and Performance

Hamiltonians have a high level of trust and confidence in their City government.

APPENDICES AND SCHEDULES ATTACHED

Appendix A	Pilot Study Assessment of Increase in Lot Coverage in Rurally Serviced Roadway Neighbourhoods (Community of Ancaster)
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