



SUBJECT: Flood hazard impacts and mitigation assessment

TO: **Committee of the Whole**

FROM: **Engineering Services Department**

Report Number: ES-04-24

Wards Affected: 1, 2

Date to Committee: December 2, 2024

Date to Council: December 10, 2024

Recommendation:

Receive for information engineering services department report ES-04-24 regarding the flood hazard impacts and mitigation assessment.

PURPOSE:

This report is intended to provide committee with a summary of the findings of the Flood Hazard Impacts and Mitigation Assessment and the resulting recommended action items. The findings outline the recommended infrastructure improvements required to reduce the risks of flood hazards in the Burlington GO MTSA, Downtown and along the Hager-Rambo Diversion Channel. Reducing the risk of flooding in these areas would help mitigate flood hazard risks, build climate change resiliency, and support growth and development in the Burlington GO MTSA and Downtown.

Vision to Focus Alignment:

- Increase economic prosperity and community responsive city growth
 - Support sustainable infrastructure and a resilient environment
 - Building more citizen engagement, community health and culture
-

Executive Summary:

The objective of the Flood Hazard Impacts and Mitigation Assessment was to complete a high-level evaluation of the stormwater systems in and around the Burlington GO MTSA, Downtown and the Hager-Rambo Diversion Channel to identify potential infrastructure improvement alternatives which could help to mitigate flood plain and spill flood hazard risks. Additionally, the report provides preliminary capital cost estimates and recommendations for proposed prioritization and sequencing of future works and/or studies.

The following are the important determinations that have been made:

1. The stormwater systems in and around the Burlington GO MTSA, Downtown and the Hager-Rambo Diversion Channel were designed and constructed to the standards at the time and are functioning within those parameters. Major infrastructure improvements would be required to upgrade these systems to have capacity to convey the Regional Storm standards in place today.
2. Preliminary cost estimates for recommended infrastructure improvements (City infrastructure only) amount to approximately \$24M.
3. There are 3 railway crossings which may require upsizing (Metrolinx/CNR).
4. The QEW crossing at the downstream end of the Hager-Rambo Diversion Channel may also require improvements to increase conveyance capacity (MTO).
5. Further analysis of the Hager-Rambo Diversion Channel may also be required to confirm what improvements may be feasible and to provide a preliminary cost estimate (CH).

Infrastructure improvements would need to be sequenced so that downstream properties are not adversely affected.

It may be possible to make infrastructure improvements on an individual basis subject to not adversely affecting downstream properties. One such example may be infrastructure improvements to the Lower Rambo Creek channel, immediately upstream of Caroline Street. This work (EA, detailed design, construction) could be initiated in 2024, subject to available funding and based on conservative modelling assumptions.

In addition to advancing select infrastructure improvements, recommended next steps also include initiating a city-wide Stormwater Master Plan which can include a more comprehensive study of the Hager and Rambo Creek watershed modelling and mapping (including public consultation). Development in flood hazards can also be managed via policy. In this regard, City staff continue to participate in Conservation Halton's ongoing Spill Flood Hazard Policy Review and Update.

Addressing the flood hazards will not be a quick fix. It will be a time consuming and expensive program. Undertaking the additional studies and infrastructure improvements in the Flood Hazard Impacts and Mitigation Assessment will require a continuation of the coordinated effort between various agencies and the provincial government. Reprioritizing Capital Funding, utilizing the Development Charges By-law, exploring cost-sharing opportunities and leveraging Provincial and Federal funding for flood mitigation projects will be key to the success of a program such as this.

Background and Discussion:

Terminology

A “Flood plain” is an area of land that is flooded by a nearby watercourse during large storm events. When the storm event passes, the flood waters generally recede from the flood plain and return to the watercourse.

A “Spill” occurs when floodwaters leave the watercourse, its valley and the flood plain and spill overland, typically in multiple directions by complex pathways, before rejoining the same watercourse at a distance downstream, flowing into an adjacent watershed or remaining within the spill area (if there is no outlet). Spills often mix with urban flooding on roadways and other urban surfaces. A spill can occur due to individual or a combination of factors, including ground elevations that slope away from a watercourse and its flood plain or because of barriers to the passage of flood flows such as undersized bridges or culverts.

Background

Hager and Rambo Creeks run through both the Burlington Major Transit Station Area (MTSA) and Downtown. The Hager-Rambo Diversion Channel (HRDC) was constructed in 1976 to divert water from residential areas and to convey stormwater around the Downtown to prevent flooding. The main diversion channel captures flow from the Upper Hager and Upper Rambo systems and is about 2.7 km long. Located east of the Queen Elizabeth Way (QEW) and south of the QEW/Highway 407 interchange, it outlets into Indian Creek which in turn empties into Hamilton Harbour/Burlington Bay. In the mid 1970s the HRDC was designed with the capacity to convey a 50-year frequency storm (i.e., according to historical data, the largest storm that would statistically occur in a 50 year timeframe).

In addition to the HRDC, nine other flood control projects were added during the years between the mid 1980's and the early 2000's as part of the construction of Highway 403 (407) through Burlington. The 407 diverted a large portion of flows from the upper tributaries of Rambo and Hager Creeks to the Freeman Detention Facility. These projects were constructed as part of a multi-proponent initiative involving the Halton Region Conservation Authority (Conservation Halton), the Ministries of Transportation and Natural Resources and the City of Burlington. They were designed and constructed in conjunction with the Highway 407 works and various QEW improvements and involved various channel and stormwater ponds. Since construction, the system has generally performed well, however the system was designed based on the standards at that time and not to the Regional Storm (Hurricane Hazel) Design Standard of today.

Below is a list that comprises the Hager-Rambo Flood Control System (see map in Appendix A):

- 1) East Rambo Creek Channelization (Queensway Drive to CNR-Oakville)
- 2) Lower East Rambo Creek Channelization (CNR- Oakville to Fairview Street)
- 3) East Hager Creek Channelization (CNR to Fairview Street)
- 4) East Hager Creek (CNR Crossing)
- 5) East Hager Creek Channelization (CNR to Freeman Pond)
- 6) Freeman Detention Facility
- 7) East Hager Creek Realignment and Pond System (Q.E.W. to North Service Road)
- 8) East Hager Creek Reconstruction (North Service Road to Future 407 (West))
- 9) West Hager Detention Facility

In 2020, a Phase 1 Flood Hazard and Scoped Stormwater Management Assessment was completed for Downtown Burlington and the Burlington GO Major Transit Station Area (MTSA) by the City's consultant WSP. Prior to the Phase 1 Study, the creeks south of the diversion channel in the Lower Rambo Creek watershed were considered part of the municipal storm drainage system; however, the Phase 1 study revealed that the drainage area of the Lower Rambo watershed and extent of the flood hazard was greater than previously understood and the Lower Rambo Creek and associated natural hazards regulatory responsibilities were transferred from the City to Conservation Halton (CH).

WSP was retained to undertake a Phase 2 study to update the Phase 1 flood hazard modelling and mapping for tributaries within the Rambo and Hager Creek watersheds, located within Downtown Burlington and the Burlington GO MTSA. Burlington Council received the final MTSA Phase 2 Flood Hazard Assessment, Burlington GO and Downtown, on July 11, 2023. The mapping and modelling developed as part of the Phase 2 Study is considered the best available information for understanding the magnitude and extent of the flood hazards (floodplain and spills), assessing potential risk to life and property, and for land use and regulatory decision making. The CH Board adopted the updated flood hazard mapping for incorporation into CH's Approximate Regulation Limit mapping in October 2023.

Based on the results of the Phase 2 Study that used current modelling tools and technologies (e.g., two-dimensional modelling, LiDAR data), a number of private properties and potential redevelopment sites in Downtown Burlington and the Burlington GO MTSA are within flood hazards (flood plain and spill). While Provincial policy directs municipalities to plan for development in Strategic Growth Areas to accommodate significant population and employment growth, it also generally directs development away from hazardous lands. This highlights competing Provincial objectives and policies related to growth, development and natural hazards. While CH has regulatory policies that allow for some development in flood hazards (subject to criteria), there is a need to identify long-term solutions that can mitigate potential risk to public safety or property damage, increase opportunities for growth and development, and build climate change resiliency. As a result, the City in coordination with CH has undertaken this Flood Hazard Impacts and Mitigation Assessment to establish options that may be available

to mitigate risks associated with flood hazards. At the same time, CH is currently updating spill flood hazard policies.

Strategy/process/risk

The objective of this Flood Hazard Impacts and Mitigation Assessment is to complete a high-level evaluation of the stormwater systems to identify potential infrastructure improvement alternatives which could help to mitigate floodplain and spill flood hazard risks. Included in this assessment are preliminary capital cost estimates, proposed prioritization and sequencing of future works and/or studies.

The modeling process included inputting the Regulatory storm, which for these areas is generally the Regional Storm (Hurricane Hazel) and assessing performance of the existing stormwater system (major overland flow routes/ditches, roads and railway culverts, creek enclosures, channels and creeks). This work was undertaken with staff from CH and the City's consultant WSP. The assessment was separated into 4 phases as described below (see attached key plan in Appendix B):

Phase 1a (City/WSP):

Review and assessment of flood mitigation opportunities for the spill identified at East Rambo Creek and the QEW railway underpass, adjacent East Rambo Stormwater Management (SWM) Pond, as well as the associated spills identified downstream to Fairview Street.

Phase 1b (CH):

Review and assess performance and hydraulic capacity of the Hager-Rambo Diversion Channel (HRDC) (East Rambo) between the CNR/GO culvert and Fairview Street and undertake a high-level review of potential flood mitigation opportunities for the spill flood hazard identified between the CNR/GO culvert and Fairview Street.

Phase 2 (City/WSP):

Review and assessment of the hydraulic capacity of Lower Rambo Creek and Lower East Rambo Creek between Fairview Street and Lake Ontario.

Phase 3 (CH):

Review and assess the performance and hydraulic capacity of the HRDC from downstream of Brant Street and Fairview Street to its downstream confluence with Indian Creek and undertake a high-level review of potential flood hazard mitigation opportunities along this reach.

Independent Peer Review

In addition to the Flood Hazard Impacts and Mitigation Assessment, the City retained Matrix Solutions Inc. to undertake a peer review related to the modeling methodology of the Phase 2 MTSA Flood Study. The report identified some minor concerns that were addressed in the assessment work, but nothing of a major concern. The conclusion from Matrix Solutions Inc. was that the Phase 2 modelling was completed with good engineering judgement and according to industry best standards.

Preliminary Analyses and Outcomes

The modelling scenarios and assessment of existing infrastructure have been completed for all phases. The City, its consultant WSP and CH worked to analyze the flooding concerns for their respective phases. The preliminary findings indicate the following:

City of Burlington (WSP) Analyses

Phase 1a (City/WSP) – Rambo Creek upstream of Fairview St.

This assessment addressed the spill that occurs from the East Rambo SWM Pond, north of the QEW. It passes through the CNR tunnel under the QEW and flows west along Plains Rd where it intersects with West Rambo Creek. This spill continues west along Plains Rd, then south along Brant Street to the railway underpass. The spill continues to flow south along Brant Street and eventually impacts the Downtown.

Mitigation Alternative #1 - Modelling has shown that with significant infrastructure improvements (6 major culverts along West Rambo Creek, between Plains Road and Fairview Street) the spill could potentially be contained and prevented from travelling down Brant Street, south of Fairview Street. However, direction of additional flows to the HRDC poses its own set of challenges, which are described in subsequent sections.

The preliminary cost estimate for these infrastructure improvements is \$9.7M plus Environmental Assessment (EA) and Detailed Design.

Mitigation Alternative #2 – As an alternative to the upsizing of 6 major culverts along West Rambo Creek, a second option would be to capture the spill further downstream. This would require construction of an interceptor system (trench/grate/sewer) across Brant Street, north of Fairview Street. This would eliminate the spill from travelling southward on Brant Street however, spill would continue to effect Plains Road. Direction of additional flows to the HRDC via an interceptor system would also pose its own set of challenges, which are described in subsequent sections.

The preliminary cost estimate is \$6M plus EA and Detailed Design.

Phase 2 (City/WSP) – Downtown (south of Fairview St.)

The preliminary analysis of Lower Rambo Creek and Lower East Rambo Creek, south of Fairview Street, has been completed. Two scenarios were analysed:

Scenario #1 – Brant St./Fairview St. spill captured

Assuming that the spill at Brant St./Fairview St. could be captured by infrastructure improvements identified in the Phase 1a recommendations and that the HRDC could accommodate these added flows. The following is the projected outcome:

- i. Upstream of the confluence of Lower Rambo Creek and Lower East Rambo Creek (located 60m north of Blairholm Ave):
 - a) This will significantly reduce the flood hazard impacts for these lands.
- ii. Downstream of the confluence of Lower Rambo Creek and Lower East Rambo Creek:
 - a) There are select stormwater assets that still would not have adequate capacity to convey Regional Storm flows. Infrastructure improvements would still be required to reduce the risk of flooding, however recommended infrastructure improvements would be less than if the Brant St./Fairview St spill was not captured.

Recommended Mitigation Options for further analysis:

1. Upsize the Courtland Place culvert
2. Upsize the creek enclosure culvert south of Blairholm Ave.
3. Upsize culvert at Victoria Ave.
4. Increase capacity of open channel north of Caroline St. and/or upsize creek enclosure culvert south of Caroline St.
5. Upsize the Martha St. bridge/culvert
6. Upsize the Waterfront Trail culvert

The preliminary cost estimate for these infrastructure improvements is \$7M plus Environmental Assessment (EA) and Detailed Design (City Assets)

Scenario #2 – Brant St./Fairview St. spill not captured.

Assuming that the spill at Brant St./Fairview St. is not captured, the spill would travel southward on Brant St. The following is the projected outcome:

- i. Upstream of the confluence of Lower West Rambo Creek and Lower East Rambo Creek:
 - a) The Rambo Creek flood plain and spill flood hazards would remain
- ii. Downstream of the confluence of Lower Rambo Creek and Lower East Rambo Creek:
 - a) There are several stormwater assets that would not have adequate capacity to convey the Regional Storm flows. The recommended Infrastructure improvements would need to be larger than the recommendations in Scenario #1.

Recommended Mitigation Options for further analysis:

1. Upsize the Courtland Place culvert
2. Upsize the creek enclosure culvert south of Blairholm Ave.
3. Upsize culvert at Victoria Ave.
4. Increase capacity of open channel north of Caroline St. and/or upsize creek enclosure culvert south of Caroline St.
5. Upsize the Martha St. bridge/culvert
6. Upsize the Waterfront Trail culvert

The preliminary cost estimate for these infrastructure improvements is approximately \$10M (City Assets)

Conservation Halton Analyses

Phase 1b (CH) – East Rambo Creek

East Rambo Creek Spill Flood Hazard

Between the CNR/Metrolinx rail culvert and Fairview Street, on the East Rambo portion of the HRDC, potential for spill eastward to the existing properties and Fairview Street has been identified. CH's preliminary analysis suggests that this spill may actually be smaller than was suggested by modelling from the City's Phase 2 Study. Use of grading to contain the spill within East Rambo Creek may be one potential strategy to prevent/mitigate this potential spill.

Preliminary cost estimate yet to be established (CH assets).

Argon Court

It is understood that the storm sewer (1200 mm diameter RCP at 0.20 percent slope) which drains the low point on Fairview Street, near Argon Court, may not have enough capacity to

convey the magnitude of flow/spill conveyed toward this area under a regulatory flood and that flows in excess of its capacity would generally accumulate within the low point and eventually spill toward the Downtown area via Argon Court and/or other spill pathways. CH's preliminary analysis suggests that this spill may be smaller than was suggested by modelling from the City's Phase 2 Study, generally due to the upstream spill from the channel being smaller (East Rambo Spill Flood Hazard). If full elimination of the Argon Court Spill is ultimately sought, twinning or installation of a relief storm sewer is a potential approach which could be used to eliminate this spill and/or to reduce potential ponding within the sag on Fairview Street. Use of a flap gate/backflow valve may also need to be considered as part of any future upgrade. Sizing of the relief sewer would depend upon if the upstream spill (East Rambo Spill Flood Hazard) is mitigated or not, as it is a direct contributor to the Argon Court spill.

Preliminary cost estimate = approx. \$1M (City Asset)

Phase 3 (CH) – Hager-Rambo Diversion Channel (HRDC)

A preliminary analysis of the HRDC's current performance and hydraulic capacity was advanced to assess whether it could accommodate additional flood flows and be used to mitigate some of the flood risks identified within the Burlington GO MTSA and Downtown area. Preliminary results from the analysis indicates that during the Regional storm (i.e., Hurricane Hazel) the HRDC would be operating beyond its hydraulic capacity, and that extensive upgrades would be required before it could safely convey additional flood flows from upstream.

Increasing the hydraulic capacity of the HRDC would require extensive upgrades and would need to be implemented through a sequenced and systematic approach to ensure that the improvements would be effective and safe for existing populated and developed areas (i.e., would need to ensure that mitigating flood hazards in the Burlington GO MTSA and Downtown area would not result in new areas of increased risk). Any potential improvements would need to be examined through a Master Plan / Class EA and feasibility assessment process and would have to be supported by updated flood hazard modelling before being considered by CH.

The potential improvements considered by CH staff's preliminary analysis are listed from downstream towards upstream; and it is recommended that improvements generally proceed in that order, though the final preferred alternatives and order should be established through a future comprehensive study.

1. QEW Enclosure

The HRDC is conveyed beneath the QEW via three nine (9) foot diameter concrete tunnels. The preliminary analysis suggests that these tunnels may be unable to fully convey all

existing flood flows. To avoid downstream impacts, conveyance of flows beneath the QEW would need to be increased and/or inflows would need to be attenuated via increased flood storage within upstream areas. The preliminary analysis has not formally assessed potential improvements, however, the conceptual addition of a fourth tunnel beneath the QEW or provision of approximately 40,000 additional cubic metres of flood storage volume could potentially allow impacts to be avoided. There may be an opportunity to use upstream parklands to provide additional flood storage; however, the feasibility of this approach requires further analysis and review.

Preliminary cost estimate yet to be established (MTO Asset).

2. *Maple Avenue*

The HRDC is conveyed beneath Maple Avenue via two box culverts (6 m width by 2.7 m high). The preliminary analysis suggests that the structure can generally convey most existing flood flows (some minor overtopping), however, the direction of additional flood flows would likely result in increasing flood risk on Maple Avenue and within the adjacent developed areas. The preliminary analysis has not formally assessed potential improvements, however, the conceptual replacement of the existing structure with an eighteen (18) metre span bridge, similar to the upstream Thorpe Avenue crossing structure, would likely reduce impacts.

Preliminary cost estimate = approx. \$2.5M (City asset)

3. *CNR Rail Crossing*

Downstream of Brant Street, the HRDC is conveyed beneath a railway spur via two culverts (14 foot diameter, asphalt lined structural plate). The preliminary analysis suggests that the structure can generally convey most existing flood flows (potential for some minor spill), however, the direction of additional flood flows would increase the spill and similar flood risks would continue (via an alternate pathway) to affect the Burlington GO MTSA and Downtown area. Replacement of the existing crossing structure with a 10 metre wide by 3.5 metre high box, or installation of a third barrel, could reduce impacts.

Preliminary cost estimate yet to be established (CNR Asset).

Potential Sequencing of Infrastructure Improvements

Sequencing of infrastructure improvements would need to be implemented through a systematic approach to ensure that the improvements would be effective and safe for existing populated and developed areas (i.e., would need to ensure that mitigating flood hazards in the Burlington GO MTSA and Downtown area would not result in new areas of increased risk).

The following outlines the preliminary recommended sequencing requirements for infrastructure improvements:

1. Infrastructure improvements in the Downtown is currently possible. The benefit in proceeding now is that flood hazards in the Downtown may be reduced and flood risks may be mitigated.
2. Infrastructure improvements along the HRDC, downstream of the Brant Street crossing (subject to a Master Plan / Class EA and feasibility assessment process supported by updated flood hazard modelling).
3. Infrastructure improvements to capture the spill at Brant St. and Fairview Street.
4. East Rambo Creek channel improvements to minimize spill impacts (upstream of Fairview St.)
5. Further infrastructure improvements in the Downtown.
6. Argon Court infrastructure improvements.

Considering the urgent nature of this issue, Engineering Services has initiated a Downtown Flood Hazard Mitigation Environmental Assessment to support proceeding with select Downtown infrastructure improvements.

Engineering Services is also prepared to initiate a Stormwater Master Plan to support a comprehensive review of the stormwater conveyance system discussed in this report which can include a more comprehensive study of the Hager and Rambo Creek watershed modelling and mapping (including public consultation).

Options Considered

Next Steps

In June 2024, Council was provided with a Flood Hazard Impacts and Mitigation Assessment – Update Memo (dated June 6, 2024). In that memo, seven next steps were identified related to the work CH and City staff have undertaken. The City and CH recommended advancing a broad range of actions. The following provides a status update.

1. Continue to update flood hazard and flood risk existing condition modelling based on any new information as recommended by the City's Phase 2 Study and CH to inform/support decision making for potential infrastructure improvements and potential revision to CH Flood Hazard Mapping.
 - CH and City staff anticipate that existing condition modelling updates can be undertaken in portions of the Burlington GO MTSA and Downtown areas as

- part of scope of work of the forthcoming Downtown Flood Hazards Mitigation EA.
- City staff have recommended initiating a city-wide Stormwater Master Plan which can include a more comprehensive study of the Hager and Rambo Creek watershed modelling and mapping (including public consultation).
2. Build on the above-referenced assessment work and existing condition modelling updates by coordinating resources, data, and analysis of proposed conditions and mitigation opportunities/alternatives.
 - City and CH staff to continue building off preliminary assessment work (see Appendix C & D) by coordinating resources, data, and analysis of proposed conditions and mitigation opportunities/alternatives
 3. Continue to engage with the development community and their consultants, collaborating on the development of possible alternatives to minimize the risk and impact of floodplains and spills.
 - City staff is continuing to engage with the development community through the Housing and Development Liaison Committee (HDLC) as well as with development applicants and their consultants regarding site-specific matters.
 - Through its Spill Flood Hazard Policy Review and Update, CH staff is engaging with City staff, stakeholders and the public, as well as engaging with City staff, the development community and their consultants on site-specific applications.
 4. Advance the City's site-specific flood risk and flood hazard mitigation opportunities.
 - City staff are advancing the Downtown Rambo Creek Flood Hazard Mitigation EA in coordination with CH staff.
 5. Participate in CH's Spill Flood Hazard Policy review and update.
 - The CH Draft Spill Flood Hazard Policies and Draft Technical Companion Document posted for 6-week public review and feedback (September 20-November 1)
 - City Planning and Engineering staff continue to participate in the review/feedback process, including attending multiple engagement sessions
 6. Request that the Province work with City and CH staff to discuss competing Provincial objectives and policies related to growth and development and natural hazards in Strategic Growth Areas, explore policy options, and advance Provincial technical guideline updates.

- CH and City Planning staff worked together in May 2024 to provide comments to the Ministry of Municipal Affairs regarding the new Provincial Planning Statement (PPS) specifically requesting updates to technical guidance to support PPS implementation and further direction for situations when Provincial natural hazard policies apply in Strategic Growth Areas. Further opportunities to coordinate commenting and any outreach will be considered.
7. Report back to the Committee of the Whole in Q4-2024 with a staff report and presentation including an update on a recommended strategy that could help mitigate flood hazard risks, build climate change resiliency, and support growth and development in the Burlington GO MTSA and Downtown.
- Staff report being presented to Committee of the Whole in December 2024.

Financial Matters:

Total Financial Impact

The following are preliminary cost estimates are for City infrastructure improvements only:

2024-2025 (to be funded from previously approved Capital Budget projects)

- | | | |
|---|------|---------|
| 1. Downtown Stormwater Environmental Assessment | = \$ | 125,000 |
|---|------|---------|

2025-2027 (to be funded from previously approved Capital Budget project)

- | | | |
|---------------------------|------|---------|
| 2. Stormwater Master Plan | = \$ | 750,000 |
|---------------------------|------|---------|

2026-2028 (future Capital Budget or alternative funding source referred to below)

- | | | |
|---|------|-----------|
| 3. Downtown Stormwater Detailed Design | = \$ | 175,000 |
| 4. Downtown Stormwater infrastructure improvements – Construction | = \$ | 2,500,000 |

2028-2034 (future Capital Budget or alternative funding source referred to below)

- | | | |
|--|------|-----------|
| 5. HRDC and Rambo Creek EA (upstream of Fairview St.) | = \$ | 200,000 |
| 6. HRDC Infrastructure Detailed Design (Maple Ave) | = \$ | 100,000 |
| 7. HRDC Infrastructure Construction (Maple Ave) | = \$ | 2,500,000 |
| 8. Rambo Creek infrastructure Detailed Design (upstream of Fairview St.) | = \$ | 300,000 |
| 9. Construction for infrastructure improvements (upstream of Fairview St.) | = \$ | 9,700,000 |

10. Rambo Creek infrastructure Detailed Design (additional Downtown sites)	= \$ 300,000
11. Construction for infrastructure improvements (additional Downtown sites)	= \$ 7,000,000
12. Argon Court infrastructure Detailed Design	= \$ 100,000
13. Argon Court Infrastructure Construction	= \$ <u>1,000,000</u>

Total Preliminary Cost Estimate = \$ 24.75 M

Source of Funding

There are several potential sources of funding:

1. Capital Budget

Engineering Services, in coordination with Finance, have utilized existing Capital funding to fund the Downtown Flood Hazards Mitigation EA. This is funding remaining in an existing project account as a result of the construction tender price being less than budgeted.

Further studies, EA's, Detailed Designs and construction for multiple infrastructure improvements could be considered for inclusion in the Engineering Services 2026-35 Capital Budget and Forecast.

2. Developer and Agency cost sharing

Opportunities for cost sharing with developers and agencies will continue to be reviewed and considered.

3. Development Charges

Infrastructure improvement costs that qualify for inclusion in the Development Charges By-law will be included through the appropriate processes. The timing of this has not been confirmed as yet.

4. Federal and/or Provincial grant programs

Currently there are grant programs available or already approved for the City of Burlington that could provide funding for the recommended infrastructure improvements.

- In April 2024, Engineering Services applied for funding from the Housing-Enabling Water Systems Fund. This application included the above estimated costs for the Downtown Stormwater System's EA, Detailed Design and construction costs for the proposed infrastructure improvements in the Downtown (\$2.7M). We were recently notified by the province that we were unsuccessful with our application.

- In January 2024, Infrastructure Canada and CMHC announced the City was approved to receive \$21,156,248.60 in funding from the Housing Accelerator Fund (HAF). Of the seven initiatives identified to support enabling the construction of housing, #7 was to support “Municipal Infrastructure Needs”. This could be a potential funding source.

Recent announcements by the provincial and federal governments indicate that more grant programs will be available to municipalities in support of enabling new housing construction. Applying for funding from these grant programs will continue to be a high priority.

Other Resource Impacts

Not applicable

Climate Implications:

The proposed infrastructure improvements are intended to reduce the risk of flood hazards in the Burlington GO MTSA, Downtown and along the Hager-Rambo Diversion Channel. The improvements would generally increase the capacity of these stormwater systems to convey Regional Storm flows, thus providing added protection and resiliency to these important neighbourhoods.

Engagement Matters:

Engineering Services staff have been in regular contact with representatives of the development community. Updates on the Flood Hazards Impacts and Mitigation Assessment have been provided in the Halton Development Liaison Committee as well as separate off-line meetings with developers and their engineering consultants.

More detailed discussions will take place with developers and their engineering consultants, for properties that are directly impacted by the currently approved Flood Hazards mapping. Working together with CH and the development community is key to developing a strategy and implementing solutions to allow these important developments to proceed.

Conclusion:

Addressing the flood hazards will not be a quick fix. It will be a time consuming and expensive program. The cost to undertake the infrastructure improvements in Phases 1a, 1b, 2 and 3 will be significant. Reprioritizing Capital Funding, utilizing the Development Charges By-law, exploring cost-sharing opportunities, and leveraging Provincial and Federal funding for flood mitigation projects, as well as interjurisdictional communications will be key to the success of a program such as this.

Staff recommend the City Clerk receive and file the report ES-04-24.

We look forward to continuing to work with CH staff, the development community, stakeholders, agencies, residents and the province to help advance solutions to mitigate flood risks throughout the city and help to promote development in support the City's housing targets.

Respectfully submitted,

Cary Clark, P.Eng

Manager of Development and Stormwater Engineering

905-335-7600 x 7672

Appendices:

- A. Hager-Rambo Flood Control Works - Key Plan
- B. Flood Hazard Assessment Phases - Key Plan
- C. WSP Technical Memo
- D. CH Technical Memo

Notifications:

Scott Hamilton, Engineering Services

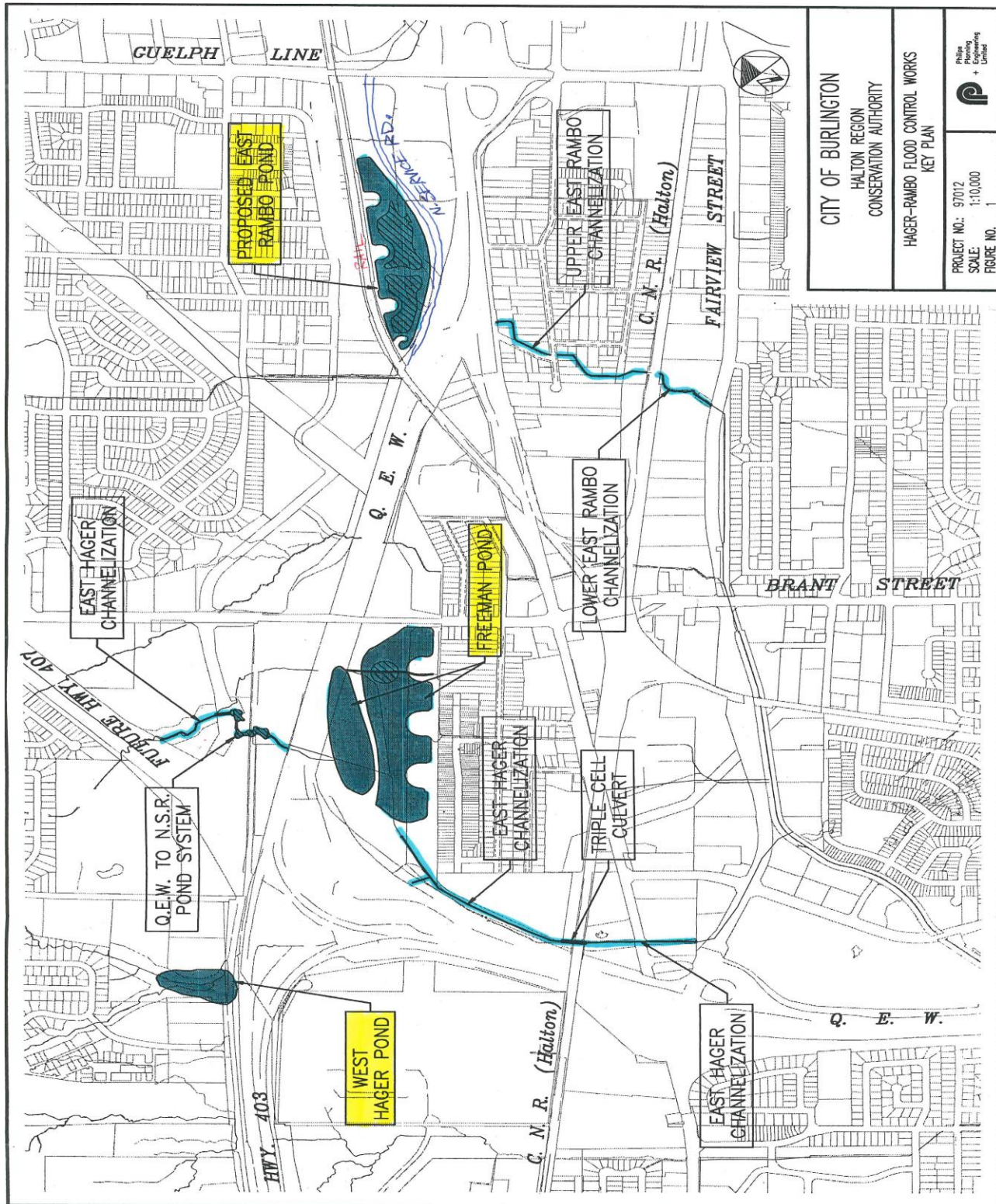
Matt Howatt, Conservation Halton

Kellie McCormack, Conservation Halton

Report Approval:

All reports are reviewed and/or approved by Department Director, the Chief Financial Officer and the Executive Director of Legal Services & Corporation Counsel.

Hager-Rambo Flood Control Works - Key Plan



APPENDIX B

Flood Hazard Assessment Phases - Key Plan

