City of Hamilton

CITY COUNCIL
AGENDA

21-010

Wednesday, June 9, 2021, 9:30 A.M.

Due to the COVID-19 and the Closure of City Hall (CC)

All electronic meetings can be viewed at:

City's Website: https://www.hamilton.ca/council-committee/council-committee-meetings/meetings-and-agendas

City's YouTube Channel: https://www.youtube.com/user/InsideCityofHamilton or Cable 14

Call to Order

1. APPROVAL OF AGENDA

   (Added Items, if applicable, will be noted with *)

2. DECLARATIONS OF INTEREST

3. APPROVAL OF MINUTES OF PREVIOUS MEETING

   3.1. May 26, 2021

4. COMMUNICATIONS

   4.1. Correspondence respecting 2021 Tax Policy - Fire Area Rated Tax Changes:

      4.1.a. Tammy Felts

      4.1.b. Sean Thomson

4.1.c. Tammy Felts

Recommendation: Be received and referred to the General Manager of Finance and Corporate Services for consideration during the 2022 budget deliberations.

4.2. Correspondence respecting EngageHamilton Grids 2:

4.2.a. Rose Janson and family

4.2.b. Denise Baker, Weir Foulds (Final Land Needs Assessment)

4.2.c. Denise Baker, Weir Foulds (Phasing Criteria)

4.2.d. Sue Markey

Recommendation: Be received and referred to the August 4, 2021 Special General Issues Committee meeting respecting GRIDS 2 and Municipal Comprehensive Review.

4.3. Correspondence from York Region requesting support for their resolution requesting that the Province consider entering into Step 1 of the "Provincial Roadmap to Reopen" as of 12:01 am May 31, 2021.

Recommendation: Be received.

4.4. Correspondence from the Honourable Chrystia Freeland, Deputy Prime Minister and Minister of Finance in response to the Mayor's letter respecting Hamilton City Council's COVID-19 Economic Recovery Suggestions.

Recommendation: Be received.

4.5. Correspondence from the Municipality of Calvin requesting support for their resolution to implement an additional level of licensing which would permit small organizations to hold fundraisers as a method of sustaining our community and organizations.

Recommendation: Be received.

4.6. Correspondence from the Town of The Archipelago requesting support for their resolution respecting Bill 279 - Environmental Protection Amendment Act (Microplastics Filters for Washing Machines), 2021.

Recommendation: Be received.

4.7. Correspondence from the Township of The Archipelago requesting support for their resolution respecting Bill 228 - Banning Unencapsulated Polystyrene Foam.

Recommendation: Be received.

4.8. Correspondence from Bianca Beraldo requesting that Council save the wetlands on Garner Road in Ancaster.

Recommendation: Be received.

4.9. Correspondence respecting Light Rail Transit (LRT) in the City of Hamilton:

4.9.a. Rose Beraldo

4.9.b. Joshua Weresch

Recommendation: Be received and referred to the consideration of Item (h)(i) of General Issues Committee Report 21-012.

4.10. Correspondence from the Town of Fort Erie requesting support for their resolution requesting that the Federal Government cease further consideration of eliminating capital gains tax exemptions on primary residences.

Recommendation: Be received.

4.11. Correspondence from Paul Dube, Ombudsman of Ontario requesting that the City pass a resolution stating how it intends to address the following recommendations within the Ombudsman's report when the Ombudsman has determined

that a meeting or part of a meeting was held contrary to the open meeting rules, in accordance with s. 239(12) of the *Municipal Act, 2001*

Recommendation: Be received and referred to the consideration of Item 6.2, Amendment to Item 4.6 of the April 28, 2021 Council Minutes, respecting the correspondence from the Paul Dube, Ombudsman of Ontario respecting an investigation into a complaint about a meeting held by the Lesbian, Gay, Bisexual, Transgender and Queer Advisory Committee for the City of Hamilton on October 20, 2020.

4.12. Correspondence from the Town of Halton Hills requesting support for their resolution respecting the Elimination of LPAT.

Recommendation: Be received.

4.13. Correspondence respecting the discovery of 215 remains of children on the grounds of the Kamloops Residential School:

4.13.a. Mary Love

4.13.b. Zoe Kazakos

Recommendation: Be received.

4.14. Correspondence from the Township of Havelock-Belmont-Methuen requesting support for their resolution in support of the use of Automatic Speed Enforcement (Photo Radar).

Recommendation: Be received.

4.15. Correspondence from the Township of Havelock-Belmont-Methuen requesting support for their resolution respecting drainage matters and the Canadian National Railway.

Recommendation: Be received.

4.16. Correspondence from the Township of Havelock-Belmont-Methuen requesting support for their resolution respecting the continuous increases to Municipal Insurance.

Recommendation: Be received.

4.17. Correspondence from the Honourable Jeff Yurek, Minister of the Environment, Conservation and Parks to the Hamilton Region Conservation Authority (HRCA) granting the HRCA an exception to subsections 17 (1.1) and (1.2) of the Conservation Authorities Act.

Recommendation: Be received.

5. COMMITTEE REPORTS

5.1. Public Works Committee Report 21-008 - May 31, 2021

5.2. Planning Committee Report 21-009 - June 1, 2021

5.3. General Issues Committee Report 21-012 - June 2, 2021

5.4. Audit, Finance and Administration Committee Report 21-009 - June 3, 2021

5.5. Emergency and Community Services Committee Report 21-006 - June 3, 2021

6. MOTIONS

6.1. Absence – Councillor Terry Whitehead

6.2. Amendment to Item 4.6 of the April 28, 2021 Council Minutes, respecting the correspondence from the Paul Dube, Ombudsman of Ontario respecting an investigation into a complaint about a meeting held by the

the Lesbian, Gay, Bisexual, Transgender and Queer Advisory Committee for the City of Hamilton on October 20, 2020

7. NOTICES OF MOTIONS

8. STATEMENT BY MEMBERS (non-debatable)

9. COUNCIL COMMUNICATION UPDATES

9.1. May 21, 2021 to June 3, 2021

10. PRIVATE AND CONFIDENTIAL

11. BY-LAWS AND CONFIRMING BY-LAW

11.1. 096

To Amend By-law No. 01-215, Being a By-law to Regulate Traffic

Schedule 5 (Stop Control)

Schedule 18 (Bicycle Lanes)

Ward: 6, 13

11.2. 097

To Amend By-law No. 01-218, as amended, being a By-law to Regulate On-Street Parking Respecting Free-Floating Carshare Vehicles

Ward: City Wide

11.3. 098

To Amend By-law No. 17-225, as amended, being a By-law to Establish a System of Administrative Penalties

Table 3 (By-law No. 01-218)

Ward: City Wide

11.4. 099

To Amend Zoning By-law No. 6593, as amended by By-law No. 16-041, respecting Lands Located at 149 ½ Sherman Avenue North, Hamilton

ZAH-21-005

Ward: 3

11.5. 100

To Adopt Official Plan Amendment No. 28 to the Rural Hamilton Official Plan, respecting 435 Carluke Road West (Ancaster)

Ward: 12

11.6. 101

To Amend Zoning By-law No. 05-200 with respect to Lands Located at 435 Carluke Road West, Ancaster

CI-20-C

Ward: 12

11.7. 102

Being a By-law to Amend By-law No. 19-142, “City of Hamilton Development Charges By-law, 2019”

Ward: City Wide

11.8. 103

To Amend Zoning By-law No. 05-200, respecting lands located at 967-977 Arvin Avenue, Stoney Creek

ZAH-20-023

Ward: 10

11.9. 104

Respecting Removal of Part Lot Control, Lands located at 20 Southridge Court, 533 and 555 Sanatorium Road, Hamilton, Part of Block 1, Registered Plan No. 62M-1191

PLC-20-012

Ward: 14

11.10. 105

To Confirm the Proceedings of City Council

12. ADJOURNMENT

CITY COUNCIL
MINUTES 21-009

9:30 a.m.
May 26, 2021
Council Chamber
Hamilton City Hall
71 Main Street West

Present: Mayor F. Eisenberger
Councillors M. Wilson, J. Farr, N. Nann, C. Collins, T. Jackson, J.P. Danko (Deputy Mayor), B. Clark, M. Pearson, L. Ferguson, B. Johnson, A. VanderBeek, E. Pauls, J. Partridge and S. Merulla.

Absent: Councillor T. Whitehead – Leave of Absence

Mayor Eisenberger called the meeting to order and recognized that Council is meeting on the traditional territories of the Erie, Neutral, HuronWendat, Haudenosaunee and Mississaugas. This land is covered by the Dish with One Spoon Wampum Belt Covenant, which was an agreement between the Haudenosaunee and Anishinaabek to share and care for the resources around the Great Lakes. It was further acknowledged that this land is covered by the Between the Lakes Purchase, 1792, between the Crown and the Mississaugas of the Credit First Nation. The City of Hamilton is home to many Indigenous people from across Turtle Island (North America) and it was recognized that we must do more to learn about the rich history of this land so that we can better understand our roles as residents, neighbours, partners and caretakers.

APPROVAL OF THE AGENDA

The Clerk advised of the following changes to the agenda:

4. COMMUNICATIONS

4.12. Correspondence respecting the 2021 Tax Policy - Fire Area Rated Tax Changes:

(k) Viv Saunders
(l) Liliana Arce
(m) Trena Ennis
(n) Lindsay Fennema
(o) Mike Fennema

Recommendation: Be received.

4.13 Correspondence from Viv Saunders respecting Hamilton Tax Increment Grants.

Recommendation: Be received and referred to the consideration of Item 2 of General Issues Committee Report 21-011

11. BY-LAWS AND CONFIRMING BY-LAW

094 Respecting Removal of Part Lot Control, 270 Melvin Avenue, Block "A", Registered Plan No. 62M-865
PLC-21-002
Ward: 4

(Pearson/VanderBeek)
That the agenda for the May 26, 2021 meeting of Council be approved, ***as amended***.

Result: Motion CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

DECLARATIONS OF INTEREST

There were no declarations of interest.

APPROVAL OF MINUTES OF PREVIOUS MEETING

3. May 12, 2021 (Item 3.1)

(Ferguson/Partridge)
That the Minutes of the May 12, 2021 meeting of Council be approved, as presented.

Result: Motion CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr

YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

COMMUNICATIONS

(Danko/Pauls)
That Council Communications 4.1 to 4.13 be approved, ***as amended***, as follows:

4.1 Correspondence from the Municipality of Chatham-Kent requesting support for their resolution requesting that the Ministry of Government and Consumer Services review the Municipal Freedom of Information and Protection of Privacy Act (MFIPPA).

Recommendation: Be received.

4.2 Correspondence from the City of Kingston requesting support for their resolution petitioning Queens Park to provide $400 million in emergency stabilization funds for post-secondary education institutions in Ontario and petitioning the federal and provincial governments to pass a Post-secondary Education Act that ensures 80 percent of all funding of post-secondary education be provided by public funds and that tuition fees be eliminated for students in the province.

Recommendation: Be received.

4.3 Correspondence respecting the Hamilton LRT Project:

(a) Rashne Baetz
(b) Sarah Van Berkel

Recommendation: Be received.

4.4 Correspondence from the Township of McKellar requesting support for their resolution urging the Federal Government to address the expectation for CERB recipients to repay as much as $3,000.00 to $4, 000.00 in tax and to consider giving disadvantaged CERB recipients a tax break for 2020, or a tax credit for 2021.

Recommendation: Be received.

4.5 Correspondence respecting the Urban Boundary Expansion:

(a) Gabriel Nicholson
(b) Linda Chenoweth

Recommendation: Be received and referred to the upcoming Special General Issues Committee meeting respecting GRIDS 2 and Municipal Comprehensive Review.

4.6 Correspondence from the Ministry of the Environment, Conservation and Parks in response to the Mayor's letter seeking the Minister's exception under the Conservation Authorities Act related to the recently proclaimed legislative amendments requiring 70 per cent of municipal appointments of authority members to be members of council.

Recommendation: Be received.

4.7 Correspondence from Alexander Alder in support of the local call to restructure Hamilton's Board of Health to include members of the public and health leaders from equity seeking groups.

Recommendation: Be received and referred to the Medical Officer of Health for appropriate action.

4.8 Correspondence from the Ministry of Transportation respecting the Province's willingness to meet with City Council in June to discuss the Province's funding commitment of $1.7 billion and the $1.7 billion commitment from the federal government to advance the Hamilton LRT project.

Recommendation: Be received.

4.9 Correspondence from the Township of Matachewan requesting support for their resolution requesting that the Province of Ontario reverse their decision on the closure of Youth Justice Facilities in Northeastern communities.

Recommendation: Be supported.

4.10 Correspondence from the Honourable Steve Clark, Minister of Municipal Affairs and Housing in response to the Mayor's letter respecting the impacts that Bill 204, the Helping Tenants and Small Businesses Act, 2020 will have on the community housing sector within the City of Hamilton.

Recommendation: Be received.

4.11. Correspondence from the Township of Brock requesting support for their resolution respecting Durham Dead-End Road Kids.

Recommendation: Be received.

4.12. Correspondence respecting the 2021 Tax Policy - Fire Area Rated Tax Changes:

(a) Viv Saunders
(b) Deborah Ecklund
(c) Ruth Southwell
(d) Tammy Felts
(e) Kelly Cooper
(f) Michael Cooper
(g) Nitu Jhuty
(h) Sengui Kaya
(i) Michelle LaButte
(j) Sarah Taylor
(k) Viv Saunders
(l) Liliana Arce
(m) Trena Ennis
(n) Lindsay Fennema
(o) Mike Fennema

Recommendation: Be received ***and referred to the General Manager of Finance and Corporate Services for consideration during the 2022 Budget deliberations.***

4.13 Correspondence from Viv Saunders respecting Hamilton Tax Increment Grants.

Recommendation: Be received and referred to the consideration of Item 2 of General Issues Committee Report 21-011.

Result: Motion on the Communication Items, *as Amended*, CARRIED by a vote of 14 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
NOT PRESENT - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

(Danko/Pauls)
That Council move into Committee of the Whole to consider the Committee Reports.

Result: Motion CARRIED by a vote of 14 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
NOT PRESENT - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

SELECTION COMMITTEE FOR AGENCIES BOARDS AND SUB-COMMITTEES REPORT 21-003

(Nann/Pearson)
That Selection Committee for Agencies, Boards and Sub-Committees Report 21-003, being the meeting held on Monday, May 10, 2021, be received.

Result: Motion on the Selection Committee for Agencies, Boards and Sub-Committees Report 21-003, CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

BOARD OF HEALTH REPORT 21-005

(Wilson/Nann)
That Board of Health Report 21-005, being the meeting held on Monday, May 17, 2021, be received.

Result: Motion on the Board of Health Report 21-005, CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

PUBLIC WORKS COMMITTEE REPORT 21-007

(VanderBeek/Nann)
That Public Works Committee Report 21-007, being the meeting held on Monday, May 17, 2021, be received and the recommendations contained therein be approved.

Result: Motion on the Public Works Committee Report 21-007, CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

PLANNING COMMITTEE REPORT 21-008

(Danko/Johnson)
That Planning Committee Report 21-008, being the meeting held on Tuesday, May 18, 2021, be received and the recommendations contained therein be approved.

(Danko/Merulla)
That Item 5 of the Planning Committee Report 21-008, respecting Report PED21104, Application for Approval of a Draft Plan of Condominium (Common Element) for Lands Located at 270 Melvin Avenue, Hamilton (Item 9.4), be ***amended***, to read as follows:

5. Application for Approval of a Draft Plan of Condominium (Common Element) for Lands Located at 270 Melvin Avenue, Hamilton (PED21104) (Ward 4) (Item 9.4)

(a) That Draft Plan of Condominium application 25CDM-2021007, by Wilson Street., Ancaster Inc., Owner to establish a Draft Plan of Condominium (Common Element) comprised of a private road, sidewalks, landscaped areas, and eight visitor parking spaces for 42 street townhouse dwellings on lands located at 270 Melvin Avenue (Hamilton), as shown on Appendix "A", attached to Report PED21104, be APPROVED subject to the following ***amended*** conditions:

(i) That the approval for Draft Plan of Condominium (Common Element) application 25CDM-2021007 applies to the plan prepared by A.T. McLaren Limited, certified by S.D. McLaren, O.L.S., and dated October 20, 2020, comprised of a private road, sidewalks, landscaped areas and eight visitor parking spaces for 42 street townhouse dwellings, attached as Appendix "B" to Report PED21104;

(ii) That the conditions of Draft Plan of Condominium Approval 25CDM-2021007, be ***amended***, by deleting and replacing special condition 15 of the Recommended Conditions of Draft Plan of Condominium Approval, to read as follows (attached as ***REVISED*** Appendix C to Report PED21104), be received and endorsed by City Council.

15. That the Owner / Developer create an easement in a form that has been pre-approved by the City upon registration of the Declaration and Description pursuant to Section 20 of the Condominium Act, 1998 and prior to any transfer of any POTL, Reserving unto the Condominium Corporation, its assigns, successors, servants, agents and employees, the right in the nature of an easement, to enter without charge in, over and along all of the POTLs, from time to time, for the purposes of entering, inspecting and undertaking, at any time, modifications to the surface drainage of the said POTLs in accordance with the Detailed Grading Plan and the overall Grading Plan approved by the City of Hamilton, to the satisfaction of the Senior Director of Growth Management.

(b) That there were no public submissions received regarding this matter.

Result: *Amendment* to Item 5 of the Planning Committee Report 21-008, CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

Result: Motion on the Planning Committee Report 21-008, as *Amended*, CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES – Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

GENERAL ISSUES COMMITTEE REPORT 21-011

(Danko/Pauls)
That General Issues Committee Report 21-011, being the meeting held on Wednesday, May 19, 2021, be received and the recommendations contained therein be approved.

At Council's request, Item 8 was voted on separately, as follows:

8. Update on Real Estate Matters Related to the Pandemic (PED21101 / PW21030 / LS21016) (City Wide) (Item 14.1)

(a) That the direction provided to staff in Closed Session, respecting Report PED21101/PW21030/LS21016, Update on Real Estate Matters Related to the Pandemic, be approved;

(b) That the extension of the support timeframe of the COVID-19 Occupant Support Framework be applicable for as long as occupation restrictions related to the pandemic continue to be applied by the Provincial Government; and,

(c) That Report PED21101/PW21030/LS21016, respecting the Update on Real Estate Matters Related to the Pandemic, remain confidential.

Result: Motion on Item 8 of the General Issues Committee Report 21-011, CARRIED by a vote of 12 to 3, as follows:

NO - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
NO - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
NO - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

Result: Motion on the balance of the General Issues Committee Report 21-011, CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead

YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

AUDIT, FINANCE AND ADMINISTRATION COMMITTEE REPORT 21-008

(Ferguson/Pearson)
That Audit, Finance and Administration Committee Report 21-008, being the meeting held on Thursday, May 20, 2021, be received and the recommendations contained therein be approved.

Result: Motion on the Audit, Finance and Administration Committee Report 21-008, CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

(Danko/Pauls)
That the Committee of the Whole Rise and Report.

Result: Motion CARRIED by a vote of 15 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
YES - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek

YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

STATEMENTS BY MEMBERS

Members of Council used this opportunity to discuss matters of general interest.

COUNCIL COMMUNICATION UPDATES

(Danko/Pauls)
That the listing of Council Communication Updates from May 7, 2021 to May 20, 2021, be received.

Result: Motion CARRIED by a vote of 14 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
NOT PRESENT - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES – Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

PRIVATE AND CONFIDENTIAL

Council determined that discussion of Item 10.1 was not required in Closed Session; therefore, the matter was addressed in Open Session, as follows:

10.1 Appointments to the Hamilton Public Library Board for the 2018-2022 Term

(Nann/Pearson)
That the appointment of the following citizens to the Hamilton Public Library Board for the remainder of the 2018-2022 Term of Council, be approved:

(a) Gagan Batra
(b) Lynne Serviss

Result: Motion CARRIED by a vote of 14 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr

YES - Ward 3 Councillor Nrinder Nann
NOT PRESENT - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES – Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

BY-LAWS AND CONFIRMING BY-LAW

(Danko/Pauls)
That Bills No. 21-088 to No. 21-095 be passed and that the Corporate Seal be affixed thereto, and that the By-laws, be numbered, be signed by the Mayor and the City Clerk to read as follows:

088 To Amend By-law No. 6593, respecting Lands Located at 974 and 980 Upper Paradise Road and Blocks 131, 132, 133 and 134 of Registered Plan 62M-1068
ZAC-19-21
Ward: 14

089 To Set Optional Property Classes Within the City of Hamilton for the Year 2021
Ward: City Wide

090 To Establish Tax Ratios and Tas Reductions for the Year 2021
Ward: City Wide

091 To Set and Levy the Rates of Taxation for the Year 2021
Ward: City Wide

092 To Repeal By-law No. 20-092 of the City of Hamilton, being a By-law to Adopt Municipal Options for Tax Capping
Ward: City Wide

093 To Levy a Special Charge Upon the Rateable Property in the Business Improvement Areas for the Year 2021
Ward: City Wide

094 Respecting Removal of Part Lot Control, 270 Melvin Avenue, Block “A”, Registered Plan No. 62M-865
PLC-21-002
Ward: 4

095 To Confirm the Proceedings of City Council

Result: Motion CARRIED by a vote of 14 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
NOT PRESENT - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

(Pearson/Ferguson)
That, there being no further business, City Council be adjourned at 10:55 a.m.

Result: Motion CARRIED by a vote of 14 to 0, as follows:

YES - Ward 1 Councillor Maureen Wilson
YES - Ward 2 Councillor Jason Farr
YES - Ward 3 Councillor Nrinder Nann
NOT PRESENT - Ward 4 Councillor Sam Merulla
YES - Ward 5 Councillor Chad Collins
YES – Ward 6 Councillor Tom Jackson
YES - Ward 7 Councillor Esther Pauls
YES - Deputy Mayor - Ward 8 Councillor John-Paul Danko
YES - Mayor Fred Eisenberger
YES - Ward 15 Councillor Judi Partridge
NOT PRESENT - Ward 14 Councillor Terry Whitehead
YES - Ward 13 Councillor Arlene VanderBeek
YES - Ward 12 Councillor Lloyd Ferguson
YES - Ward 11 Councillor Brenda Johnson
YES - Ward 10 Councillor Maria Pearson
YES - Ward 9 Councillor Brad Clark

Respectfully submitted,

Mayor F. Eisenberger

Andrea Holland
City Clerk

Pilon, Janet

Subject: Fire Insurance Increase

From: Tammy Felts
Sent: May 25, 2021 2:35 PM
To: Pearson, Maria <Maria.Pearson@hamilton.ca>
Cc: DL - Council Only <dlcouncilonly@hamilton.ca>; clerk@hamilton.ca
Subject: Fire Insurance Increase

Dear Councillor Pearson,

Thank you for replying to my email. The information you provided is information I was already aware of. What is at issue is the fact you have chosen not to deal with the unfair tax treatment of my fire services as compared to other properties located in Upper Stoney Creek, Ancaster, and Waterdown.

Hence, I have included all of Council and am hopeful Council as a whole will acknowledge this imbalance and address it, prior to sending me a 6.8% tax billing increase.

There is no possible scenario where you can convince me that I should be charged 2x more than other Hamiltonians who have had urban fire services for the last 20 years!... some of which are located basically across the street from a fire station with full-time firefighters.

What is being pushed through is grossly unfair. Either adjust the boundaries for everyone who has the same level of fire services, or leave it alone until Council has adequate time to properly and fairly discuss what should be done.

Respectfully;

Tammy Felts

4.1 (b)

Pilon, Janet

Subject: Fire Taxation Increase- Stoney Creek

From: Sean Thomson
Sent: May 26, 2021 4:39 PM
To: DL - Council Only <dlcouncilonly@hamilton.ca>; clerk@hamilton.ca
Subject: Fire Taxation Increase- Stoney Creek

Dear honorable Mayor and Counsilors,

Please fix the fire taxation boundary mapping first, before you raise taxes by 6.8%!

Hamilton is the 3rd least affordable city to live in North America (behind only Vancouver and Toronto in Canada and just ahead of San Jose and LA in the US).

The last thing our ward needs in an unfair tax hike.

Please take this into your consideration.

Sincerely,

Pilon, Janet

Subject: Fire Property Tax Increase

From: Tammy Felts
Sent: May 29, 2021 10:56 AM
To: Pearson, Maria <Maria.Pearson@hamilton.ca>
Cc: DL - Council Only <dlcouncilonly@hamilton.ca>; clerk@hamilton.ca
Subject: Fire Property Tax Increase

Dear Maria;

The incorrect (Autofilled) subject line of my last email must have confused you as your reply has left me dumbstruck!

The fire rating map significantly affects me, Ward 10, as well as every property within the urban boundary throughout the city of Hamilton.
We are all paying a higher rate to provide urban fire services to areas paying reduced rural rates in Upper Stoney Creek, Glanbrook, Ancaster, Dundas and Waterdown.
It's very simple, a reduced number of properties in the urban fire boundaries results in ME personally paying higher urban fire taxes for 2021.

Why do you believe, and are telling me, I'm not 'affected'?

Lastly, I already know what my rate increase will be. The rates were provided on last week's Council Meeting Agenda. My fire rates are increasing by 91% which, after all the other rate changes, my property taxes are increasing by ~ 6.8%.

Respectfully;

Tammy Felts

Pilon, Janet

Subject: EngageHamilton Grids2

From: Rose Janson
Sent: May 26, 2021 3:48 PM
To: Wilson, Maureen <Maureen.Wilson@hamilton.ca>; Farr, Jason <Jason.Farr@hamilton.ca>; Nann, Nrinder <Nrinder.Nann@hamilton.ca>; sam.medulla@hamilton.ca; Collins, Chad <Chad.Collins@hamilton.ca>; Jackson, Tom <Tom.Jackson@hamilton.ca>; Pauls, Esther <Esther.Pauls@hamilton.ca>; Ward 8 Office <ward8@hamilton.ca>; Clark, Brad <Brad.Clark@hamilton.ca>; Pearson, Maria <Maria.Pearson@hamilton.ca>; Johnson, Brenda <Brenda.Johnson@hamilton.ca>; Ferguson, Lloyd <Lloyd.Ferguson@hamilton.ca>; VanderBeek, Arlene <Arlene.VanderBeek@hamilton.ca>; Whitehead, Terry <Terry.Whitehead@hamilton.ca>; judy.partridge@hamilton.ca; Office of the Mayor <mayor@hamilton.ca>; clerk@hamilton.ca
Subject: EngageHamilton Grids2

Good afternoon, City Councilors

We were invited to give feedback to the web-site EngageHamilton Grids 2.
We found this puzzling, as the site assumes that there will be expansion of our Urban Boundary. Isn't this a question still to be asked in a survey of Hamilton's citizens?

My family used to have an orchard in Flamborough, but now we live in Ward One. We are firmly opposed to any expansion of Hamilton's Urban Boundary, because precious farmland, trees and green space must be protected, for our kids.

It is premature to ask citizens about where new growth and subdivisions should go, as people just don't want that kind of expansion.

So much unused and empty space exists in the city, that could become beautiful family housing, with green public spaces and good transit.
This is the way of progressive cities; Montreal is an excellent example.

Thank you for the work you do on behalf of Hamilton citizens.

Sincerely,
Rose Janson and Family

May 30, 2021

VIA EMAIL

Denise Baker
Partner
t. 416-947-5090
dbaker@weirfoulds.com

File 16056.00008

*Partner through a professional corporation

City of Hamilton
77 Main Street West
Hamilton, Ontario
L8P 4Y5

Attention: **Members of the City of Hamilton General Issues Committee**

Re: **Input on behalf of the Twenty Road East Landowners' Group GRIDS 2 and Municipal Comprehensive Review - Final Land Needs Assessment March 29, 2021 Special General Issues Committee Meeting**

Agenda Item 8.1 (PED17010(i))

Dear Madams and Sirs:

Together with my co-counsel, Davies Howe LLP, we are writing on behalf of our client, the Twenty Road East Landowners' Group (the "**TRE Group**") to provide comments on the GRIDS 2 and Municipal Comprehensive Review - Final Land Needs Assessment, (the "**Staff Report**"). The TRE Group has been actively involved in the Urban and Rural Hamilton Official Plan matters since GRIDS 1 and appreciates this opportunity to provide input to the City on the above-noted matter.

In my letter dated December 11, 2020 (copy attached), we provided preliminary comments on the Land Needs Assessment and Technical Background Reports as described in the December 2020 General Issues Committee Staff Report No. PED170010 on behalf of the TRE Group. Those comments continue to be valid and important to your consideration of this Staff Report.

THE TRE GROUP LANDS

The TRE Group consists of approximately 25 landowners collectively owning approximately 480 hectares within the City centred around the intersection of Twenty Road East and Miles Road (the

"**TRE Lands**"). They are non-prime agricultural area lands within the White Belt and have been colloquially described as a "hole-in-the-donut", being immediately adjacent to the southern urban boundary of the City and located between two employment areas.

It is without dispute that the TRE Lands can be easily integrated into the urban area through the extension of existing major arterial roads to provide a variety of housing opportunities on non-prime agricultural areas in close proximity to the City's core, to the City's future employment areas, to the Airport Employment Growth District and to the Redhill South Business Park, and will optimize the use of existing or planned infrastructure, including transportation infrastructure, in a cost-efficient manner.

The TRE Lands are available and suitable for urban development and it is appropriate to include these Lands within the next urban boundary expansion to accommodate the City's growth to 2051. Inclusion of TRE Lands in the urban boundary has been recognized as appropriate in the Staff Report. It is our understanding that the boundaries identified in the report are subject to modification based on more detailed information like on the ground identification of natural features, confirmation of NEF contours etc.

SELECTION OF A COMMUNITY AREA LAND NEED SCENARIO

The March 29, 2021 Staff Report on Land Needs Assessment addresses two very important questions which inform where and how the City of Hamilton (the "**City**") will grow to the year 2051: the intensification rate and the anticipated density for the urban boundary expansion area.

As noted in Table 2 on page 5 of the Staff Report, City Staff have presented four scenarios based upon varying intensification rates and density assumptions which also result in four different amounts of land needed for the City's next urban boundary expansion. It is important to understand the various assumptions which are made for each of the four scenarios, summarized as follows:

	Scenario	Intensification Rate	New DGA density	Resultant Land Need
1.	Current Trends	40%	53 pjh	3,440 ha
2.	Growth Plan Min.	50%	65 pjh	2,190 ha
3.	Increased Targets	55% avg	75 pjh	1,630 ha
4.	Ambitious Density	60% avg	77 pjh	1,340 ha

The selection of the intensification rate and the density for the new designated greenfield area (the "**New DGA**") will have significant implications on the height, density, built form and range of housing types for infill and on intensification within the current City boundary going forward. The selection will also have significant implications upon the nature and density of housing to be built in the pending urban expansion area.

City Staff's recommendation in the Staff Report is to adopt the Ambitious Density Scenario which would see the intensification target average 60% over the planning period to 2051 and see the New DGA area planned at a minimum of 77 people and jobs per hectare (the "**pjh**").

We believe that the intensification target average 60% and a density of 77 pjh which inform the Ambitious Density Scenario creates an unrealistic and unachievable demand for intensification within the current city boundary, and also creates new communities in the New DGA which are much denser than may be contemplated or desired.

These proposed thresholds are not in the City's best interests as:

1. Within the City's current built boundary, the intensification thresholds will require the addition of significant intensification within the existing communities such that existing residents will be forced to accept heights and densities in their own neighbourhoods which they have traditionally objected to, forcing Council to make decisions supporting density which may not be desired by the existing residents.

2. It will produce a majority of high density and medium density residential units, and very few low-density residential units given that infill and redevelopment sites do not normally yield low density housing forms; and

3. It will create communities in the New DGA which contain a significantly higher percentage of medium density housing and a relatively low percentage of low density given the very high density selected of 77 pjh for the New DGA.

These proposed thresholds discourage and may even prevent the construction of much needed single detached dwellings in the City for families, rendering existing supply more unaffordable and forcing existing residents to leave the City in search of housing which they can afford.

Similar concerns were also raised in the City of Hamilton Residential Intensification Market Demand Analysis prepared by Lorius and Associates for the City (the "**Lorius Market Analysis**"). According to the Lorius Market Analysis, there continues to be a strong demand for affordable ground-related starter homes as compared to mid-rise and high-rise housing, and that if the supply of family-sized homes and smaller units is not balanced, there are several risks including, but not limited to, the following:

1. Planning for a level of intensification beyond reasonable market expectations could lead to conflict between the demand for and supply of low-intensity development;

2. Planning for a higher target is unlikely to increase intensification without the market demand and approvals at a local level; and,

3. An overly aggressive target may encourage a more dispersed pattern of urban development by pushing growth further afield, contrary to the objectives of the Growth Plan.

For these reasons, Lorius stated that any scenario based on elevated intensification beyond the minimum Growth Plan requirement and a denser pattern of ground-related housing may be a challenge to achieve within the planning horizon. It is also for these reasons that the Lorius Market Analysis recommended an intensification target of 50% (i.e. the Growth Plan Minimum). We agree with Lorius' assessment in this regard.

Furthermore, the selection of an aggressive and likely unachievable intensification scenario will also result in an urban boundary expansion which will not be sufficient to accommodate forecasted growth contrary to the requirements of the Growth Plan. Paired with a relatively high

density of 77 pjh for the urban boundary expansion, even less low density and ground related housing products will be available for the City as a whole.

We note that the current Urban Hamilton Official Plan policy provides for a density of 70 pjh for new community lands being brought into the urban boundary, not 77 pjh. It is also our experience that many communities across the Greater Golden Horseshoe have shown that even achieving a target of 70 pjh in a NEW DGA is particularly challenging.

In our opinion, the reliance on an unrealistically high intensification target and a very dense 77 pjh density target is not a balanced or suitable approach on which to determine the extent needed for urban boundary expansion lands. Not only will it underestimate the real market demand but it will also result in a very limited opportunity to accommodate a full range of market-based housing, most particularly ground related housing for which the City's own consultants have identified a need.

It is our opinion that either the Growth Plan Minimum Scenario or the Increased Targets Scenario would be appropriate, achievable, and most importantly provide a balance between higher density infill growth and new community lands growth resulting in the delivery of a balance and range of market-based housing supply as required by Provincial policy.

Finally, we point out that housing affordability is not unilaterally driven by residential unit size – availability of all forms of housing is a key factor of affordability. As noted above, a limited supply of single detached residential units creates a significant and pronounced market shortfall and therefore will create an affordability issue, even with an abundant supply of medium and high density residential units. It has been proven that a large segment of the market will go elsewhere if the type of housing it desires is not provided, rather than purchase housing types that are not desired, and this risk has been noted in the documentation surrounding this current decision.

THE OFFICIAL PLAN AMENDMENT RESULTING FROM THE MCR

As noted in the Staff Report, Provincial policy requires municipalities to designate all land required to accommodate the Growth Plan forecasts to 2051. However, the Staff Report suggests that land needs beyond 2041 not be designated as urban at this time as not all of the land will be required immediately.

However, Provincial policy requires that all of the land resulting from this Land Needs Assessment work must be brought into the City's urban boundary through this Official Plan Amendment. Accordingly, we disagree that the City's proposed approach is appropriate for managing growth or is in conformity with Provincial policy. In addition, we do not agree that Provincial policy permits the City to bring the lands needed to accommodate growth to 2051 into the urban boundary in stages.

It is our experience that other municipalities in the Greater Golden Horseshoe have successfully implemented phasing policies which guide development of lands once they have been added to the urban boundary. Our comments on the Staff Report regarding the Draft Evaluation Framework and Phasing Criteria are found under separate cover.

It is our opinion that the City must bring all lands appropriately required to 2051 into the urban boundary at this time in this MCR Official Plan Amendment, with phasing policies applicable as appropriate once they are included in the urban boundary.

In conclusion, for the reasons noted above, we urge the City to be cautiously realistic in planning for growth in a manner which provides for a full market-based range of housing types and choice. We suggest that the City should not adopt a scenario which has the potential to create a unbalanced and untenable housing market in the City, leading to Council having to make decisions on density and height not desired by existing residents and forcing families to look outside the City for much needed ground related housing.

We thank the City for the opportunity to provide our comments on the Staff Report. Should you have any questions, please do not hesitate to contact the undersigned or Ms. Susan Rosenthal.

Yours truly,

WeirFoulds LLP

Denise Baker
Partner

DB
cc. Ms. Heather Travis, Senior Project Manager
Mr. Steve Robichaud, Director, Planning and Chief Planner

Denise Baker
Partner
t. 416-947-5090
dbaker@weirfoulds.com

December 11, 2020

File

Via Email to *stephanie.paparella@hamilton.ca*, *clerk@hamilton.ca* and *GRIDS2-MCR@hamilton.ca*

Ms. Stephanie Paparella
Legislative Coordinator
General Issues Committee
City of Hamilton
71 Main Street West, 1st Floor
Hamilton, ON l8P 4Y5

Dear Chair and General Issues Committee Members:

Re: GRIDS 2 and Municipal Comprehensive Review
Land Needs Assessment and Technical Background Reports
Report No. PED17010(H) (City Wide)

We, together with Ms. Susan Rosenthal of Davies Howe LLP, are counsel to the group of landowners known as the Twenty Road East Landowners' Group (the "**TRE Group**"). The TRE Group has been actively engaged on the Rural and Urban Hamilton Official Plan matters and welcomes this opportunity to comment on the City's current growth management exercise, GRIDS 2.

We would first like to recognize and thank staff for the work that they have done on the Land Needs Assessment ("**LNA**"). We recognize the LNA as a positive starting point for what we expect to be several on-going discussions, with the overall goal of including the TRE Group lands in the City of Hamilton urban boundary.

To that end, we are providing this submission outlining our initial areas of concern following our preliminary review of the LNA and associated staff report. In addition, we have included some clarifying information as part of this submission, all of which is intended to form the basis of a road map for further discussion between ourselves and staff. Further, it is noted that this submission is made in consideration of the inputs of our consulting team including land use planners, servicing engineers and a land economist.

Getting the Intensification Target Right

The selection of an Intensification Target for the existing built-up area has significant implications to how the City will grow. As the Intensification Target increases, so does the number of households required to live in smaller and more intensive units, while at the same time, the land needed to accommodate future growth is reduced.

The report provides important context informing the selection of the Intensification Target by setting out a scale to help ground the discussion. At the low end of the scale is the "current trends" rate of 40%. While we are advised that this is the rate of intensification that is more recently experienced by the City, we understand the rate over the last ten years to be closer to 35%.

The 50% minimum requirement of the Growth Plan, which the LNA identifies as being at the high end of the range of market demand is, in our submission, a suitable aspirational goal. The staff report further identifies "increased" and "ambitious" targets, which average out to 55% and 60% over the growth period, respectively, which in our opinion would result in a significant departure, not only from what the City has experienced over the last ten years, but is also a considerable departure from forecasted marked demand.

The staff report translates the Intensification Targets into more readily understandable terms by correlating them to land needed to accommodate new Community Area. The Growth Plan target of 50% results in the need for about 2,200 ha of land. The averages of 55% and 60% give rise to a need of approximately 1,640 ha and 1,340 ha, respectively. These numbers are understandably preliminary, but nevertheless start to form the picture. We note that we would like a better understanding of whether or not the aforementioned numbers are gross ha or net ha, and we would fur

Going forward, it is our submission that rather than restricting Intensification Target options under consideration to the "increased" or "ambitious" targets, the full range of Intensification Targets from the Growth Plan's 50% target to the higher averages should be given consideration to ensure that a sufficient amount of land is added to the urban boundary to accommodate the full range and mix of housing contemplated by the Growth Plan, and to ensure that objectives of the provision of affordable housing for young families can be met.

This approach would also be consistent with provincial policy direction to plan for growth on a market basis while not precluding other considerations. This approach also allows for a weighing of the consequences of too high of an Intensification Target, such as development "leap-frogging" Hamilton as a whole, leading to financial negative consequences for the City. Therefore getting the Intensification right is an important input into the LNA to ensure that the appropriate amount of lands is added to the urban boundary and should include full consideration including the minimum target as permitted by the Growth Plan.

Correctly Assessing Lands in the Whitebelt

Properly identifying the area of land available to accommodate new growth is critical to successful implementation of any growth management exercise. Making the right choices about what lands to avoid, for example, prime agricultural lands, is critical to long term prosperity. The whitebelt lands are the lands available to accommodate future growth subject to certain development constraints, though on a finer scale. In terms of constraints on Hamilton's whitebelt, the Staff Report notes that a large portion of the whitebelt is constrained by the airport Noise Exposure Forecast (NEF) contours and natural heritage features. In applying these constraints, along with the proposed intensification target, Staff have identified approximately 1,600 ha of land available for residential urban boundary expansion.

What was not evident in the Staff Report was the clear need to avoid prime agricultural lands, some of which are located within the whitebelt, when determining the most appropriate location for any proposed expansion. Discussion about the role of prime agricultural areas may have a significant impact on the amount and location of unconstrained whitebelt lands available to accommodate Community Area lands needs.

The Staff Report very helpfully provides a map of the potential whitebelt lands in Appendix "H". We understand that the assessment is preliminary in nature and that the City intends to complete further "ground-truthing" to better identify the lands; however, we note based on our review of all factors that the amount of land that is available in the Twenty Road East area is larger than the 275 net hectares as shown in Appendix "H", as they are designated rural and not constrained by way of a prime agricultural lands designation in the same way as some of the other lands in the whilebelt. We look forward to discussing that in greater detail with Staff.

Understanding the Numbers

The staff report states that "[T]he results of the scenarios, together with the City's constrained whitebelt land supply, identifies that an urban expansion area ranging in size from 1,340 ha to 1,640 ha will be required to accommodate residential (Community Area) growth to the year 2051.We would appreciate clarity in these numbers to understand whether these are gross hectares or net hectares, and what if any, "take outs" were considered in arriving at this number.

Timing and Ordering of Future Development

We understand that once the LNA is finalized, the City will explore phasing of development within the whitebelt. While we recognize that this topic will be covered in much greater detail, we wanted to correct any misunderstanding or uncertainty in the Staff Report regarding the execution of Minutes of Settlement as part of the AEGD Secondary Plan proceeding. The TRE Group was not a signatory to the Minutes of Settlement and as such, the priority of development, including the relative position of various whitebelt areas, remains an outstanding matter which is still before the LPAT.

Concluding Remarks

We encourage the ongoing consideration of three Intensification Targets, including the Growth Plan density target of 50%. We caution that more intense density scenarios may result in a land needs outcome which is not in the City's long-term best interest.

Further, we urge the City to ensure that it meets the provincial policy mandate to avoid prime agricultural areas in considering lands for urban expansion.

Finally, it is imperative that the City treats all potential whitebelt lands equally as this process unfolds, subject to the applicable prime agricultural constraints as noted above, to ensure the integrity of the Municipal Comprehensive Review process is not otherwise compromised by

favouring one area over any other. Appropriately considering all lands equally will ultimately lead to the best alignment between the market-based need for housing and its availability.

As always please do not hesitate to reach out to me should you have any questions or concerns. We remain available to meet with staff at their convenience to discuss the foregoing.

Yours truly,

WeirFoulds LLP

Per: Denise Baker
Partner

DB
cc. Mr. Steve Robichaud, Director of Planning and Chief Planner
Ms. Heather Travis, Senior Project Manager, Growth Management Strategy
Ms. Susan Rosenthal, Davies Howe LLP
Ms. Maria Gatzios, Gatzios Planning
Client

May 30, 2021

VIA EMAIL

Denise Baker
Partner
t. 416-947-5090
dbaker@weirfoulds.com

File 16056.00008

*Partner through a professional corporation

City of Hamilton
77 Main Street West
Hamilton, Ontario
L8P 4Y5

Attention: Members of the City of Hamilton General Issues Committee

Re: Input on behalf of the Twenty Road East Landowners' Group
GRIDS 2 and Municipal Comprehensive Review Planning for Growth to 2051: Draft Evaluation Framework and Phasing Criteria
March 29, 2021 Special General Issues Committee Meeting Agenda Item 8.2 (PED17010(j))

Dear Madams and Sirs:

Together with my co-counsel, Davies Howe LLP, we are writing on behalf of our client, the Twenty Road East Landowners' Group (the "**TRE Group**") to provide comments on the GRIDS 2 and Municipal Comprehensive Review Planning for Growth to 2051: Draft Evaluation Framework and Phasing Criteria, (the "**Staff Report**"). The TRE Group has been actively involved in the Urban and Rural Hamilton Official Plan matters since GRIDS 1 and appreciates this opportunity to provide input to the City on the above-noted matter.

THE TRE GROUP LANDS

The TRE Group consists of approximately 25 landowners collectively owning approximately 480 hectares within the City, centred around the intersection of Twenty Road East and Miles Road (the "**TRE Lands**"). They are non-prime agricultural area lands within the White Belt and have been colloquially described as a "hole-in-the-donut", being immediately adjacent to the southern urban boundary of the City and located between two employment areas. They are also adjacent

to and proximate to many of the City's Community Infrastructure and Major Activity Centres like the Turner Park Sports Complex, Les Chater YMCA, Turner Park Public Library and Mountain Police Station and are one of the main access points to the Chippewa Rail Trail.

It is without dispute that the TRE Lands can be easily integrated into the urban area through the extension of existing major arterial roads to provide a variety of housing opportunities on non-prime agricultural areas in close proximity to the City's core, to the City's future employment areas, to the Airport Employment Growth District and to the Redhill South Business Park, and will optimize the use of existing or planned infrastructure, including transportation infrastructure, in a cost-efficient manner.

The TRE Lands are available and suitable for urban development, and it is appropriate to include these Lands within the next urban boundary expansion to accommodate the City's growth to 2051. Inclusion of TRE Lands in the urban boundary has been recognized as appropriate in the City's Land Needs Assessment analysis.

With respect to the Draft Evaluation Framework and Phasing Criteria as set out in the Staff Report, our comments are as follows:

THE EVALUATION CRITERIA (Appendix A)

We generally agree that a set of evaluation criteria such as those presented in Appendix A (the "Evaluation Framework") are necessary to determine which lands should be brought into the urban boundary to satisfy the City's growth requirements to 2051.

We are supportive of the Evaluation Framework themes and the general descriptions provided, with the exception of the characterization and description of the Agricultural System theme, and the comments on the availability of infrastructure.

With respect to the theme of the Agricultural System, Growth Plan policy 2.2.8(f) with respect to Settlement Area Boundary Expansions states that:

> "*prime agricultural areas* should be avoided where possible. To support the *Agricultural System*, alternative locations across the upper- or single-tier municipality will be evaluated,

> **prioritized** and determined based on avoiding, minimizing and mitigating the impact on the *Agricultural System* and in accordance with the following…. i…. ii. Reasonable alternatives **that avoid *prime agricultural areas*** are evaluated; and iii. where *prime agricultural areas* cannot be avoided, lower priority agricultural lands are used (emphasis added);"

To be in conformity with the Growth Plan, the City must treat this Provincial policy requirement as a priority criterion relative to others given the language of the Growth Plan and the significant importance of the matter of preservation of prime agricultural areas.

We believe that the theme of the Agricultural System must be elevated within the Evaluation Framework, and that this criterion should recognize that lands which are not prime agricultural areas are to be given higher overall priority over lands which are prime agricultural areas. This direction and emphasis is evident in, and required by, the Growth Plan language.

With respect to the theme of Servicing Infrastructure, we agree that the noted "high level assessment of new infrastructure requirements" and "assessment of capacity in existing and planned" systems are the appropriate high level of study required at this point in order to ascertain the appropriateness of including particular lands into the urban boundary.

However, we believe that policies should be included in the Official Plan which require the undertaking of more detailed work for lands added to the urban boundary, including subwatershed studies, master environmental servicing plans and secondary plans immediately following their inclusion in the urban boundary.

THE PHASING CRITERIA (Appendix A and E)

We agree and acknowledge that phasing criteria are an important part of establishing and providing for the orderly and efficient implementation of new urban land use designations. However, we note, as per our comments on the Evaluation Criteria above, given the Province's direction to prioritize non-prime agricultural areas, the Agricultural System criteria should be the priority consideration with respect to phasing.
In addition, we are very concerned that the City is considering using phasing criteria in a manner inconsistent with the Growth Plan by phasing the timing of the inclusion of lands into the urban

boundary over the next 30 years. To that end, it appears Staff are recommending that the phasing criteria should be used to phase the actual inclusion of lands into the urban boundary, suggesting bringing in the lands in ten-year increments to the planning period horizon of 2051 based on the phasing criteria.

However, such an approach is contrary to the Province's clear direction that ***all*** of the lands required to accommodate growth to 2051 are to be brought into the urban boundary as part of this Official Plan Amendment. They are not to be added to the City's urban boundary in phases.

The recommended approach in the Staff Report is an incorrect and inappropriate application of phasing criteria to phased urban boundary expansions. It is our experience being involved with urban growth policies in official plans across the Greater Golden Horseshoe, that phasing policies are used to inform the orderly and efficient progression of development of lands after such lands have been brought into the boundary, not to inform their inclusion in phases after the need for all the lands has been determined, in order to accommodate the forecasted growth in the planning period.

The Province's direction is reinforced in its letter to the City dated February 23, 2021 (Appendix "E" to the Staff Report). It reiterates its position that the Growth Plan policies require municipalities to designate ***all*** land required to accommodate the growth forecasts to the 2051 planning horizon. It does not suggest in any way that they be phased into the urban boundary based on phasing criteria. This Provincial direction has not been acknowledged in the Staff Report.

In our opinion, the Province's letter confirms what is required of the urban boundary expansion Official Plan Amendment by the Growth Plan: all land needs to 2051 must be brought into the urban boundary at this time.

MAP OF WHITEBELT GROWTH OPTIONS (Appendix C)

According to our calculations, the net land area of the TRE Lands is closer to 330 hectares rather than the 275 hectares indicated on Appendix "C". None of the TRE Lands are prime agricultural area.

Further, according to our calculations, the Elfrida area only contains approximately 125 to 170 hectares of land which are not prime agricultural area, with the balance (approximately 760 to 805 hectares) being prime agricultural area.

CONCLUSION

In summary, the Evaluation Framework provided is generally supportable, save and except for the need to acknowledge the importance of the Agricultural System theme relative to other themes.

While we agree that phasing criteria will be an important component of the official plan policies applicable to lands brought into the urban boundary in ensuring that the progression of development occurs in an orderly and efficient manner, it is contrary to provincial policy to apply these phasing criteria to bringing lands needed to 2051 incrementally into the urban boundary, as is recommended in the Staff Report. As confirmed by the Province in its letter, all lands needed to achieve the 2051 forecasts must be brought into the urban boundary at this time.

Finally, we believe that the City should include policies in each land use designation for new urban areas which require the initiation of the studies necessary for the planning and development of the areas, including subwatershed studies, master environmental servicing plans and various secondary plan level studies.

We thank the City for the opportunity to provide our comments on the Staff Report. Should you have any questions, please do not hesitate to contact the undersigned or Ms. Susan Rosenthal.

Yours truly,

WeirFoulds LLP

Denise Baker
Partner

DB
cc. Ms. Heather Travis, Senior Project Manager
Mr. Steve Robichaud, Director, Planning and Chief Planner

Pilon, Janet

Subject: Freeze Hamilton's Urban Boundary

From: Sue Markey
Sent: May 31, 2021 11:24 AM
To: clerk@hamilton.ca
Subject: Freeze Hamilton's Urban Boundary

Dear City of Hamilton Office of the Clerk,

As a resident of Hamilton, I am writing to you to raise concerns about the expansion of the urban boundary of Hamilton. It has come to my attention that the City of Hamilton is looking at expanding its urban boundary into prime agricultural lands. Environmental groups such as Environment Hamilton, 350 Hamilton, and others are bringing attention to the impact the urban expansion will have on transit, affordable housing, the environment, and vulnerable communities.

As your constituent, I am asking that you vote to FREEZE Hamilton's urban boundary. This action is essential if we have any hope of building a sustainable, climate-resilient, inclusive future for Hamilton!

Thank you for your time.

Sincerely,
Sue Markey

Pilon, Janet

Subject: Regional Council Decision - Timing of Step 1 of the "Provincial Roadmap to Reopen"

From: Switzer, Barbara <Barbara.Switzer@york.ca> **On Behalf Of** Regional Clerk
Sent: May 27, 2021 4:30 PM
Subject: Regional Council Decision - Timing of Step 1 of the "Provincial Roadmap to Reopen"

On May 27, 2021 Regional Council adopted the following:

WHEREAS over 70% of the adult population in York Region has received their first dose; and,

WHEREAS over 65% of the adult population in Ontario has received their first dose; and,

WHEREAS hospitalizations, ICU occupancy and new admissions and case rates have all declined and continue to trend downward; and,

WHEREAS Step One of the Provincial roadmap states “may begin after 60 per cent of Ontario’s adults receive at least one dose of a COVID-19 vaccine and if, and only if, public health indicators, such as hospitalizations, ICU occupancy and new admissions and case rates indicate the province can safely move to this step of the roadmap.”; and,

WHEREAS according to an independent modelling company, a fourth wave for York Region is not on the cards if we re-open after June 2, 2021; and,

WHEREAS the Province “Stay at Home” order originally was to expire June 2, 2021;

THEREFORE BE IT RESOLVED THAT York Regional Council request the province consider entering Step 1 of the “Provincial Roadmap to Reopen” as of 12:01 am May 31, 2021; and,

BE IT FINALLY RESOLVED THAT a copy of this Motion be sent to the Honourable Doug Ford, Premier of Ontario, the Honourable Christine Elliott, Minister of Health, Dr Dave Williams, Chief Medical Officer of Health, all MPPs in the Province of Ontario, and all Heads of Council.

Regards,

Christopher Raynor | Regional Clerk, Regional Clerk’s Office, Corporate Services
---
The Regional Municipality of York | 17250 Yonge Street | Newmarket, ON L3Y 6Z1
O: 1-877-464-9675 ext. 71300 | christopher.raynor@york.ca | york.ca

Our Mission: **Working together to serve our thriving communities – today and tomorrow**

Pilon, Janet

Subject: 503901 - Hamilton City Council's Covid-19 Economic Recovery Suggestions

From: MinFinance / FinanceMin (FIN) <fin.minfinance-financemin.fin@canada.ca>
Sent: Wednesday, May 26, 2021 2:04 PM
To: Office of the Mayor <mayor@hamilton.ca>
Subject: Re: 503901 - Hamilton City Council's Covid-19 Economic Recovery Suggestions

Dear Mayor Eisenberg:

Thank you for your correspondence of January 6, 2021, written on behalf of the City of Hamilton, which was referred by the Office of the Prime Minister, the Right Honourable Justin Trudeau, and for sharing Hamilton City Council's ideas and suggestions. Please excuse the delay in replying.

Canadians have shown tremendous resilience in adapting to the challenges posed by the COVID 19 pandemic and the Government of Canada will keep taking action to support businesses, protect jobs, and keep Canadians safe and healthy.

One lesson this pandemic has taught us is that we need to match challenges with decisiveness and determination. And so, we will build back better to create a stronger, more resilient Canada.

Your thoughts and suggestions are an important part of deciding how we will keep strengthening the middle class; helping people working hard to join it; and continue creating jobs and building long-term competitiveness with clean growth.

Thank you again for writing on behalf of the City of Hamilton.

Sincerely,

The Honourable Chrystia Freeland, P.C., M.P.
Deputy Prime Minister and Minister of Finance

CORPORATION OF THE MUNICIPALITY OF CALVIN
Resolution

DATE: May 25, 2021 NO. 2021-136

MOVED BY Heather Olmstead

SECONDED BY Christine Shippam

"That Council hereby requests Staff to contact the Ministry responsible for the Alcohol and Gaming of Ontario to seek their assistance in implementing an additional level of licensing which would permit small organizations to hold fundraisers as a method of sustaining our community and organizations;

And further that all municipalities in Ontario are sent this resolution to seek their assistance in lobbying the Ministry."

CARRIED

DIVISION VOTE

NAME OF MEMBER OF COUNCIL	YEA	NAY
Coun Cross	X	
Coun Maxwell	X	
Coun Olmstead	X	
Coun Shippam	X	
Mayor Pennell	X	

Township of The Archipelago
9 James Street, Parry Sound ON P2A 1T4
Tel: 705-746-4243/Fax: 705-746-7301
www.thearchipelago.on.ca

May 21, 2021

21-091

Moved by Councillor Andrews
Seconded by Councillor Manners

RE: Bill 279 – Environmental Protection Amendment Act (Microplastics Filters for Washing Machines), 2021

WHEREAS microfibers are human-made strands less than 5mm composed of either synthetic or natural materials. Microfibers are shed through the wear and tear of textiles through the laundering process;

WHEREAS billions of microfibers are released into the Great Lakes daily from machine laundering of clothes. Studies have found a single load of laundry can release up to millions of microfibers into washing machine effluent, which flows to the wastewater treatment plant. Wastewater treatment can capture up to 99% of microfibers in sewage sludge, but microfibers are still released into aquatic ecosystems through treated effluent. Billions of microfibers are released into the aquatic ecosystem daily in the Great Lakes basin, either directly via treated final effluent, or indirectly as runoff from land-application of treated sewage sludge; and

WHEREAS microfiber contamination is widespread: Worldwide and local studies have shown microfibers present in commercial fish, Great Lakes fish (including Lake Trout, Rainbow smelt, Brown bullhead, etc.), honey, salt, Great Lakes beer, tap water, bottled water and much more; and

WHEREAS microfibers are the most prevalent type of microplastics in the environment and have been found in surface water, soil, biota, and atmospheric samples; and

WHEREAS a 2014 surface water study in Lake Erie, Lake Ontario, and their tributaries measured micoplastics at abundances between 90,000 and 6.7 million particles per square kilometer. These levels of microplastics are similar to or exceed concentrations found in ocean gyres like the “Great Pacific Garbage Patch; and

WHEREAS microplastics do not biodegrade; and

WHEREAS chemicals such dyes and flame retardants are added to textiles during manufacturing. Textiles can also absorb chemicals from their environment after manufacturing. Some of these chemicals are toxic, and harmful chemical compounds can be released into the environment via leaching from microfibers; and

WHEREAS a growing body of research shows that the effects of microplastics on animal life are far-reaching. Researchers have investigated the impacts of microplastics on gene expression, individual cells, survival, and reproduction. Mounting evidence shows that negative impacts can include decreased feeding and growth, endocrine disruption,

decreased fertility, and other lethal and sub-lethal effects. Some of these effects are due to ingestion stress (physical blockage), but many of the risks to ecosystems are associated with the chemicals in the plastic. Studies have shown that chemicals transfer to fish when they consume microplastics. When these fish end up on our dinner plates, we potentially increase the burden of hazardous chemicals in our bodies; and

WHEREAS a recent set of laundering experiments in the laboratory; have shown that an external filter can capture an average of 87% of fibres by count and 80% by weight before they go down the drain (McIlwraith et al. 2019). On a wider scale and in real-life context, Georgian Bay Forever, the University of Toronto and the Town of Parry Sound are completing a study that is measuring the effect that about 100 filters in households has on reducing microfibre pollution in the effluent of a wastewater treatment plant. The results of this study are to be released in August; and

WHEREAS add-on filters cost approximately $180-220 CDN to purchase and install, which is prohibitive for the average household. Accordingly, voluntary adoption rates are low; and

WHEREAS France has passed legislation (France 2020-105, Article 79) that requires future washing machines sold to have filters. California has introduced a bill (California AB 622), and Ontario has tabled Private Member's Bill 279 to prohibit sales of washing machines without a filter of mesh size 100 microns or smaller. Companies such as Arclik have manufactured washing machines with filters built directly into them;

NOW THEREFORE BE IT RESOLVED that the Great Lakes St. Lawrence Cities Initiative (Cities Initiative) recognizes that to date the largest documented source of environmental microfibers is washing machines, and that findings indicate washing machine filters mitigate the majority of fibres shed during machine washing; and

BE IT FURTHER RESOLVED that the Cities Initiative recognizes the need to require future sales of washing machines to include filters with a maximum mesh size of 100 microns; and

BE IT FURTHER RESOLVED that the Cities Initiative and its members call on the Ontario government to pass Bill 279, and to call on the Canadian and U.S. government to create appropriate regulatory measures to the same effect; and

BE IT FURTHER RESOLVED that until households can only buy new laundry machines outfitted with <100 micron filters, the Cities Initiative and its members call on provincial, state and federal governments to provide funding and education to help constituents reduce microfiber waste.

BE IT FINALLY RESOLVED that Council for the Corporation of the Township of The Archipelago directs its staff to submit this resolution to the Great Lakes St. Lawrence Cities Initiative; and forward this resolution to all municipalities in the Great Lakes watershed and to Federal and Provincial Representatives.

Carried.

Township of The Archipelago
9 James Street, Parry Sound ON P2A 1T4
Tel: 705-746-4243/Fax: 705-746-7301
www.thearchipelago.on.ca

May 21, 2021

21-092

Moved by Councillor Emery
Seconded by Councillor Sheard

RE: Bill 228 - Banning unencapsulated Polystyrene Foam

WHEREAS unencapsulated expanded and extruded polystyrene foam (PS foam) is a common and economical product used for dock flotation; and

WHEREAS unencapsulated PS foam, when used as floatation, deteriorates and breaks down through exposure to water, sunlight and chemicals (gasoline, oil & other contaminants), as well as from animals and physical impacts from boats and other debris; and

WHEREAS the environmental impacts associated with the breakdown of unencapsulated PS foam are significant. PS foam is one of the top items of debris found on shorelines, beaches, and surface water around the world. Widespread and global contamination has resulted in PS foam being found in the gut contents of wildlife, including in the Great Lakes - St. Lawrence River Basin. PS foam causes adverse effects to wildlife when ingested. Laboratory experiments show negative impacts of PS foam on feeding behaviour, growth, hepatosomatic index (HSI), and reproduction. Under certain conditions, PS foam leaches known toxics styrene and benzene. Floating particles of PS foam also has aesthetic impacts on shorelines and waterways; and

AND WHEREAS there is no Federal legislation in Canada regulating the use of unencapsulated expanded polystyrene foam (EPS) for docks to date. However, on May 13, 2021, the Province of Ontario passed *Bill 228: Keeping Polystyrene Out of Ontario's Lakes and Rivers Act*, to regulate and control its use for floats; and

NOW THEREFORE BE IT RESOLVED that the Great Lakes and St. Lawrence Cities Initiative (Cities Initiative) recognizes the need for PS foam to be encapsulated when used for flotation; and

BE IT FURTHER RESOLVED that the Cities Initiative and its members call on the Federal Government of Canada (Ministries of Fisheries and the Environment) the Province of Ontario (Ministry of Natural Resources & Forestry, Ministry of Environment, Conservation & Parks), the Province of Quebec, The United States (U.S.) Federal Government, and the U.S. States of New York, Pennsylvania,

Ohio, Indiana, Michigan, Illinois, Wisconsin and Minnesota to work in collaboration with each other to enact laws which:

1. ban unencapsulated polystyrene (PS) products in all new and replacement public and private floating facilities across the Great Lakes Region and the coasts of Canada and the United Sates;
2. find common standards of defining encapsulation with the goal of zero emissions of PS foam;
3. require the timely transition to approved encapsulated PS products, for all public and private floating facilities currently using unencapsulated PS foam; and
4. require the proper disposal of all unencapsulated expanded polystyrene (EPS) products currently being used for dock flotation.

BE IT FINALLY RESOLVED that Council for the Corporation of the Township of The Archipelago directs its staff to submit this resolution to the Great Lakes St. Lawrence Cities Initiative; and forward this resolution to all municipalities in the Great Lakes watershed and to Federal and Provincial Representatives.

Carried.

Pilon, Janet

Subject: SAY NO TO WAREHOUSE DEVELOPMENT ON WETLANDS And No to the LRT

From: Rosa Beraldo
Sent: May 30, 2021 5:25 PM
To: Jaime Tellier <jaime.tellier@conservationhamilton.ca>; Collins, Chad <Chad.Collins@hamilton.ca>; Ferguson, Lloyd <Lloyd.Ferguson@hamilton.ca>; Jackson, Tom <Tom.Jackson@hamilton.ca>; Pauls, Esther <Esther.Pauls@hamilton.ca>; Clark, Brad <Brad.Clark@hamilton.ca>; Pearson, Maria <Maria.Pearson@hamilton.ca>
Cc: Office of the Mayor <mayor@hamilton.ca>; clerk@hamilton.ca; donmurray@gmail.com
Subject: FW: SAY NO TO WAREHOUSE DEVELOPMENT ON WETLANDS And No to the LRT

Subject: SAY NO TO WAREHOUSE DEVELOPMENT ON WETLANDS

Hello City Councillors,

Please, please, vote to protect and save the wetlands on Garner Road in Ancaster.
I am a 18 year resident of Ancaster, and long-time Hamiltonian and I am so disappointed in our councillors and the lack of preservation that they have shown in light of the Brandon house and preserving Hamilton sustainability in these recent times. Business and benefit of few at the cost of our environment which is important to all.

These wetlands serve our environment and environmental community and cannot be simply "moved". McMaster University biologist James Quinn said he's concerned "mucking around" with the headwaters to Ancaster Creek will undermine efforts to improve its water quality downstream, including by the university. He said Ontario has already lost too many wetlands, which mitigate flooding and climate change, and it's not easy to create a new one, even with the right depth and hydrology, because it's not in the spot nature chose.
"You don't just pick it up and move it," Quinn said. "For that to develop into something like this (existing one) would take a very long time," he said.

"Especially the species that are living here, for them to find this new wetland, they're not going to wait around for this new wetland to become a decent wetland." This bulldozing may destroy the precious Ancaster Creek and Tiffany falls. Please vote to move this warehouse development elsewhere and preserve our wetlands, sacred to waterways in the area and the health of our environment.

Please, please save the wetlands and do not allow this warehouse motion to pass.

Sincerely,
Bianca Beraldo

Pilon, Janet

Subject: No to the LRT

From: Rosa Beraldo
Sent: June 2, 2021 12:35 PM
To: Ferguson, Lloyd <Lloyd.Ferguson@hamilton.ca>; Pearson, Maria <Maria.Pearson@hamilton.ca>; Wilson, Maureen <Maureen.Wilson@hamilton.ca>; Collins, Chad <Chad.Collins@hamilton.ca>; clerk@hamilton.ca; VanderBeek, Arlene <Arlene.VanderBeek@hamilton.ca>; Clark, Brad <Brad.Clark@hamilton.ca>; Pauls, Esther <Esther.Pauls@hamilton.ca>; Farr, Jason <Jason.Farr@hamilton.ca>; Partridge, Judi <Judi.Partridge@hamilton.ca>; Wilson, Maureen <Maureen.Wilson@hamilton.ca>; Nann, Nrinder <Nrinder.Nann@hamilton.ca>; Jackson, Tom <Tom.Jackson@hamilton.ca>; Whitehead, Terry <Terry.Whitehead@hamilton.ca>
Cc: Office of the Mayor <mayor@hamilton.ca>
Subject: No to the LRT

Please be advised as a tax payer of the City of Hamilton, I do not support the proposed LRT. This project does not serve or benefit the entire community, it clearly is only in the best interest of Liuna.
I as a tax payer am not in favour of paying any residual costs or maintenance of this system. Our city needs many things and a system shuttling a few from Eastgate Square to McMaster is not of any importance for the vast majority of citizens; the b-line fills that need. Also, it's not even of importance for the entire year, as school runs for 8 months, with breaks in-between due to exams, complete waste of tax payers money.

Going forward as a result of the pandemic students may continue to study from home, so mass transportation, especially to only one destination is not forward thinking. Therefore not something I support.

Sincerely,
Rosa Beraldo

Pilon, Janet

Subject: Correspondence for General Issues Ctte

From: Joshua Weresch
Sent: June 2, 2021 12:48 PM
To: clerk@hamilton.ca
Subject: Correspondence for General Issues Ctte

Dear Clerk:

Please find, below, a message to be included as public correspondence for the General Issues Committee, with hope to be included at today's meeting, if it hasn't already been adjourned, but certainly on the agenda of the next GIC. Thank you.

Regards,

Joshua Weresch

To the General Issues Committee of Hamilton, Ontario's City Council:

Hope this finds you well. I write in regards to the discussion about light-rail transit (LRT) at today's meeting of 2 June 2021.

I am asking, as a regular user of public transit since 2011, that you move to reject the $3,400,000,000 offered by the provincial and federal governments for LRT, unless it can be spent to improve the already-existing Hamilton Street Railway. As Gabriel Nicholson noted in the presentation he sent to your committee, the city's staff noted in 2010 that Bus Rapid Transit was the better-performing system.

The H.S.R. is already unionized, which means that its 'bus drivers receive support as union members, unlike the LRT which would be operated through Metrolinx and is not at this point a unionized venture. This city has a strong history of labour support, though currently private-sector unionization rates are at a dismal 15% provincially, so the support of a non-union venture is problematic, despite the support of LiUNA International, which is the only union to support Premier Ford publicly (https://www.cbc.ca/news/canada/hamilton/liuna-lrt-1.5402413). 'Buses are also more manoeuverable around private transit accidents. That built-in contingency and diversification of options will encourage more residents to use public transit. Time is important. Finally, taxes should not be increased for LRT but should be diverted from policing services so that public transit and all other public goods as decided democratically by the communities in Hamilton are supported; if taxes are increased, let's support the public goods we already have in place, transit that can work better for all residents.

Thank you for your time and attention in these regards.

Best,

Joshua Weresch

Community Services

Legislative Services

June 1, 2021
File #120203

The Right Honourable Justin Trudeau
Prime Minister
House of Commons
Ottawa, ON K1A 0A6
Justin.trudeau@parl.gc.ca

The Honourable Doug Ford
Premier of Ontario
Legislative Building, Queen's Park
Toronto, ON M7A 1A1
premier@ontario.ca

Honourable and Dear Sirs:

Re: Capital Gains Tax on Primary Residence

The Municipal Council of the Town of Fort Erie at its meeting of May 31, 2021 passed the following resolution:

Whereas primary residences are currently exempt from a capital gains tax, and

Whereas currently secondary and additional non-primary properties are subject to capital gains, and

Whereas the Federal Government is currently looking into a primary residence capital gains tax as they have recognized that affordable housing has become a serious issue in Canada, and

Whereas smaller communities including the Town of Fort Erie are seeing unprecedented higher selling prices that are outpacing prices in larger cities, and

Whereas many hard-working Canadians who have only a primary residence with no additional non-primary homes count on their home equity as financial aid to apply to upsizing or downsizing their home depending on their personal situation, and

Whereas a change in taxation to primary residences would be a significant financial blow to Canadians and would create an unfair, two-tiered taxation which could lead to depleted savings, inter-generational disparities, disparities among diverse groups such as seniors who may have a significant portion of their savings vested in their primary residence, as well as, reducing the ability of home ownership thereby a further, higher need for rentals, and

Whereas the Federal government could look at other means to slow down the rapidly escalating housing costs to improve housing affordability;

…2

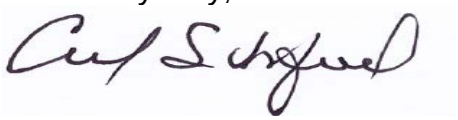
Now therefore be it resolved,

That: The Federal Government cease further consideration of eliminating capital gains tax exemptions on primary residences, and further

That: A copy of this resolution be circulated to The Right Honourable Justin Trudeau, The Honourable Doug Ford, Premier of Ontario, All Members of Parliament, All Members of Provincial Parliament, The Regional Municipality of Niagara, and all Municipalities, for their support.

Thank you for your attention to this matter.

Yours very truly,



Carol Schofield, Dipl.M.A.
Manager, Legislative Services/Clerk
cschofield@forterie.ca
CS:dlk
c.c. All Members of Parliament
All Members of Provincial Parliament
The Regional Municipality of Niagara
Ontario Municipalities

Ombudsman
ONTARIO

ONTARIO'S WATCHDOG
CHIEN DE GARDE DE L'ONTARIO

BY EMAIL

Council
City of Hamilton
71 Main Street West, 1st Floor
Hamilton, ON, L8P 4Y5

June 2, 2021

Dear Members of Council for the City of Hamilton:

Re: Report – Office of the Ontario Ombudsman

As you know, I have completed my investigation into whether the LGBTQ Advisory Committee for the City of Hamilton held a closed meeting on October 20, 2020, that violated the open meeting rules. A copy of the report was provided to the City and made public on my Office's website.

In accordance with s. 239.2(12) of the *Municipal Act, 2001*, the City is required to pass a resolution stating how it intends to address my report when I find that a meeting or part of a meeting was held contrary to the open meeting rules.

> **239.2 (12)** If a municipality or a local board receives a report from a person referred to in clause 239.1 (a) or (b) reporting his or her opinion, and the reasons for it, that a meeting or part of a meeting that was the subject-matter of an investigation by that person appears to have been closed to the public contrary to section 239 or to a procedure by-law under subsection 238 (2), the municipality or the local board, as the case may be, shall pass a resolution stating how it intends to address the report.

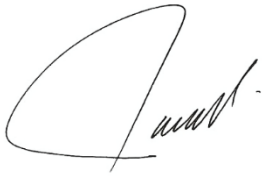
This requirement ensures a public record of council's intentions with respect to the recommendations made in my report, reflecting the accountability of council to act with transparency and uphold the open meeting rules.

On April 28, 2021, council passed a resolution to receive my report as correspondence. The resolution did not address how the City intends to address the report, as required by the Act.

Office of the Ombudsman of Ontario | Bureau de l'Ombudsman de l'Ontario
483 Bay Street / 483, rue Bay
Toronto ON, M5G 2C9
Tel./Tél. : 416-586-3300 / 1- 800-263-1830 - Complaints Line | Ligne des plaintes
Facsimile/Télécopieur : 416-586-3485 TTY/ATS: 1-866-411-4211
Email/Courriel : info@ombudsman.on.ca
www.ombudsman.on.ca

As I recognized in my report, I understand that the City has taken steps to improve the committee's open meeting practices going forward. The Clerk told my Office that the City has dedicated additional support for advisory committees and staff liaisons, and I commended the City for taking these steps. However, the steps taken by the City do not satisfy the Act's requirement to pass a resolution. The City should pass a resolution stating how it intends to address my report in accordance with s. 239.2(12) of the *Municipal Act, 2001* as soon as practicable.

Yours truly,



J. Paul Dubé
Ombudsman of Ontario

Office of the Ombudsman of Ontario | Bureau de l'Ombudsman de l'Ontario
483 Bay Street / 483, rue Bay
Toronto ON, M5G 2C9
Tel./Tél. : 416-586-3300 / 1- 800-263-1830 - Complaints Line | Ligne des plaintes
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Email/Courriel : info@ombudsman.on.ca
www.ombudsman.on.ca

TOWN OF
HALTON HILLS
Working Together Working for You!

June 1, 2021

The Honourable Doug Ford, Premier of Ontario
Via Email

Dear Premier Ford;

Re: Elimination of LPAT

Please be advised that Council for the Town of Halton Hills at its meeting of Tuesday, May 25, 2021, adopted the following Resolution:

Resolution No. 2021-0115

WHEREAS The Government of Ontario, on June 6, 2019, passed the *More Homes, More Choice Act*, 2019, (Bill108);

AND WHEREAS the changes to the Local Planning Appeal Tribunal (LPAT), contained in Bill 108 gives LPAT the authority to make final planning decisions based on a subjective "best planning outcome" approach rather that compliance with municipal and provincially approved official plans and consistency with provincial plans and policy;

AND WHEREAS Bill 108 restricts third party appeals of plans of subdivision only to the applicant, municipality, Minister, public body or prescribed list of persons;

AND WHEREAS Bill 108 takes local planning decision-making out of the hands of democratically elected municipal councils and puts it into the hands of a non-elected, unaccountable tribunal;

AND WHEREAS the LPAT adds cost and delays delivery of affordable housing by expensive, time consuming hearings, contrary to the intent of the *More Homes, More Choice Act*, 2019;

AND WHEREAS Regional and City/Town Councils have spent millions defending provincially approved plans at the OMB/LPAT;

AND WHEREAS Ontario is the only province in Canada that empowers a separate adjudicative tribunal to review and overrule local decisions applying provincially approved plans;

NOW THEREFORE BE IT RESOLVED THAT in the short term, the Minister of Municipal Affairs and Housing immediately restore the amendments to the Planning Act that mandated the evaluation of appeals on a consistency and conformity with Provincial policies and plans basis;

AND FURTHER THAT in the long term the Government of Ontario eliminate the LPAT entirely, as an antiquated body that slows delivery and adds costs to housing supply via expensive and drawn out tribunal hearings;

1 Halton Hills Drive, Halton Hills, Ontario L7G 5G2

Tel: 905-873-2600 Toll Free: 1-877-712-2205 Fax: 905-873-2347
haltonhills.ca

TOWN OF
HALTON HILLS
Working Together Working for You!

AND FURTHER THAT this resolution be forwarded to the Premier, the Minister of Municipal Affairs and Housing, Halton's Members of Provincial Parliament, Leaders of the New Democratic, Liberal and Green parties, the Association of Municipalities of Ontario, the Small Urban Mayors' Caucus of Ontario, Mayors and Regional Chairs of Ontario and Halton's local municipalities.

CARRIED

Attached for your information is a copy of Resolution No. 2021-0115.

If you have any questions, please contact Valerie Petryniak, Town Clerk for the Town of Halton Hills at 905-873-2600 ext. 2331 or valeriep@haltonhills.ca.

Yours truly,

Melissa Lawr
Deputy Clerk – Legislation

c. The Honourable Steve Clark, Minister of Municipal Affairs and Housing
Halton's Members of Provincial Parliament
Leaders of the New Democratic, Liberal and Green parties
Association of Municipalities of Ontario (AMO)
Small Urban Mayor's Caucus of Ontario
Mayors and Regional Chairs of Ontario
Halton Region
Town of Milton
Town of Oakville
City of Burlington

TOWN OF
HALTON HILLS

THE CORPORATION
OF
THE TOWN OF HALTON HILLS

Resolution No.: 2021-0115

Title: Elimination of LPAT

Date: May 25, 2021

Moved by: Mayor R. Bonnette

Seconded by: Councillor J. Fogal

Item No. 12.1

WHEREAS The Government of Ontario, on June 6, 2019, passed the *More Homes, More Choice Act*, 2019, (Bill108);

AND WHEREAS the changes to the Local Planning Appeal Tribunal (LPAT), contained in Bill 108 gives LPAT the authority to make final planning decisions based on a subjective "best planning outcome" approach rather that compliance with municipal and provincially approved official plans and consistency with provincial plans and policy;

AND WHEREAS Bill 108 restricts third party appeals of plans of subdivision only to the applicant, municipality, Minister, public body or prescribed list of persons;

AND WHEREAS Bill 108 takes local planning decision-making out of the hands of democratically elected municipal councils and puts it into the hands of a non-elected, unaccountable tribunal;

AND WHEREAS the LPAT adds cost and delays delivery of affordable housing by expensive, time consuming hearings, contrary to the intent of the *More Homes, More Choice Act*, 2019;

AND WHEREAS Regional and City/Town Councils have spent millions defending provincially approved plans at the OMB/LPAT;

AND WHEREAS Ontario is the only province in Canada that empowers a separate adjudicative tribunal to review and overrule local decisions applying provincially approved plans;

NOW THEREFORE BE IT RESOLVED THAT in the short term, the Minister of Municipal Affairs and Housing immediately restore the amendments to the Planning Act that mandated the evaluation of appeals on a consistency and conformity with Provincial policies and plans basis;

AND FURTHER THAT in the long term the Government of Ontario eliminate the LPAT entirely, as an antiquated body that slows delivery and adds costs to housing supply via expensive and drawn out tribunal hearings;

AND FURTHER THAT this resolution be forwarded to the Premier, the Minister of Municipal Affairs and Housing, Halton's Members of Provincial Parliament, Leaders of the New Democratic, Liberal and Green parties, the Association of Municipalities of Ontario, the Small Urban Mayors' Caucus of Ontario, Mayors and Regional Chairs of Ontario and Halton's local municipalities.

Mayor Rick Bonnette

Pilon, Janet

Subject: Open Resolution Proposal to Hamilton City Council

From: Mary Love
Sent: June 3, 2021 12:10 PM
To: clerk@hamilton.ca; letters@thespec.com
Subject: Open Resolution Proposal to Hamilton City Council

Open resolution proposal re: Hamilton City response to discovery of 215 remains of children on the grounds of the Kamloops Residential School

Dear City Clerk, Hamilton City Councillors, and Fellow Citizens of Hamilton,

Perhaps you are wondering what a meaningful response to the tragic and shameful discovery of the remains of 215 children on the grounds of the Kamloops Residential School might be for you as the Hamilton City Council, and for us as a city?

Please consider our proposal:

1. Our city has an excellent final report from the Hamilton Urban Indigenous Strategy submitted in 2019. This report asks (under Group 3: Public Art, Museum, Markers and Heritage) that we "Examine existing monuments and memorials in public spaces, such as the Sir John A. MacDonald monument in Gore Park, in order to create a collective and inclusive space for all." The time for this "conversation" (page 3 Hamilton Urban Indigenous Strategy Implementation Plan, February 2021) is well overdue and we urge you to act! We of the Extinction Rebellion Hamilton Indigenous Affinity Group request AGAIN that the John A MacDonald statue be removed and that the resolution below be voted on at your earliest convenience.

2. John A. MacDonald was a chief architect of the residential school system that was one part of the Canadian government's genocide agenda from day one that persists to today. The generational trauma of the residential schools (re-education camps) makes it impossible for that part of Gore Park to be "a collective and inclusive space for all" with that figure of colonial doom looming over it.

3. Charlottetown P.E.I. City Council has just unanimously passed a resolution to remove their statue of John A. MacDonald despite their special relationship with confederation. Having missed a chance earlier in the month to show the Indigenous community there that they understood the harm his statue's continuted presence represented, one of the Charlottetown councillors expressed regret (in the publication Saltwire) that it took the horrific discovery in Kamloops to make them act. Former senator Murray Sinclair said in a statement this week covered by CBCNEWS, "Canadians should be prepared for more discoveries like Kamloops."

4. Therefore, be it resolved that the Hamilton City Council declares that it is no longer willing to tolerate the Macdonald statue remaining in its present place of prestige, and that it be removed in consultation with the Urban Indigenous Strategy group members and other Indigenous community groups and members. This is the least you can do to show that you honour the memory of these lost children and are serious about "public art in a prominent location that honours mutual respect and the spirit of reconciliation" -not child abuse and genocide.

Respectfully submitted by Mary Love on behalf of the
XR Hamilton Indigenous Affinity Group

Mary Love

Feb. 4, 2021 Information Report on Implementation Plan for the Urban Indigenous Strategy
https://pub-hamilton.escribemeetings.com/filestream.ashx?DocumentId=254113

Please note recommendations 70-80 and apply to municipalities.
https://www.sootoday.com/local-news/94-truth-and-reconciliation-commission-recommendations-full-text-180956

Pilon, Janet

Subject: Residential School Tragedy

From: Zoë Kazakos
Sent: June 3, 2021 12:41 PM
To: aaron.silver@ontario.ca; kaisha.bruetsch@ontario.ca; karthi.gobinath@ontario.ca; david.big-canoe@ontario.ca; lesley.williams@ontario.ca; Sydney.Stonier@ontario.ca; Marc.Miller@parl.gc.ca; Pam.Damoff@parl.gc.ca; justin.trudeau@parl.gc.ca; premier@ontario.ca; horwatha-qp@ndp.on.ca; Matthew.Green@parl.gc.ca
Cc: arina.dmitrenko@ontario.ca; vitaliy.mazur@ontario.ca; clerk@hamilton.ca
Subject: Residential School Tragedy

To the entire governing body of Canada,

The discovery of 215 bodies, undocumented and unregistered deaths found outside of a residential school in Kamloops is devastating news, especially for the Indigenous community who have already suffered such loss at the hands of the Catholic Church and the Canadian Gov't. This heartbreaking discovery should have recognized by a day of mourning for all Canadians, as we all collectively acknowledge and mourn the genocide of our First Peoples. Even more disheartening, is that there are likely more bodies buried around the other residential schools around the country.

The federal government should be funding forensic archeology searches as an immediate priority. In addition to searching for these bodies, the government also needs to request the residential school records from the Vatican be released so that the bodies can be identified.

From the very first moment of colonization, the Canadian government has treated the Indigenous population as second class citizens as proven by a litany of racist political agendas. The fact that the Catholic Church and the Canadian government coordinated a full scale attack on the First Nations of our country through the residential school system/ prison system and the kidnapping of generations of children should be taught in schools at the youngest age.

The government and religious genocide against the Indigenous population is not up for debate, but it is up to the current government to address and reconcile with the Indigenous community, and prove that Indigenous lives matter.

The Truth & Reconciliation Commission came out in 2015 and it's despicable to hear how little the government has done. Justin Trudeau promised fresh drinking water to the Indigenous communities and yet across the country these communities are still without safe drinking water. I am beyond frustrated with the federal and provincial government's role in the Indigenous population's well being. The number of homes and communities without safe drinking water on Canadian soil is a travesty. It is a human rights abuse and it is happening on Canadian soil. A short hour outside of Toronto on the Curve Lake Reserve, fresh drinking water is unavailable and has been for 30 years. This should be a priority of the utmost concern for every level of government. How can a free country have countless pockets of third world conditions?

I would like to hear back from all of you on what steps the government (both provincially and federally) are taking to address these concerns and when we can start seeing action.

Sincerely,
Zoe Kazakos

Township of
HAVELOCK-BELMONT-METHUEN
www.hbmtwp.ca INC. 1998

June 3, 2021

The Honourable Doug Ford, Premier of Ontario
Legislative Building, Queen's Park
Toronto, ON M7A 1Y7
premier@ontario.ca

Via Email

Dear Premier Ford:

Re: Resolution – Support of the Use of Automatic Speed Enforcement (Photo Radar)

At the Regular Council Meeting of the Township of Havelock-Belmont-Methuen Council received the resolution sent by the Township of South-West Oxford on January 11, 2021 in regards to municipalities using Automatic Speed Enforcement, and passed the following resolution:

R-046-21 Moved by Councillor Pomeroy
Seconded by Councillor Webb

That staff are hereby directed to send correspondence supporting the resolution from the Township of South-West Oxford regarding the use of Automatic Speed Enforcement.
Carried.

A copy of the above noted resolution from the Township of South-West Oxford is attached for your reference. Your consideration of this matter is respectfully requested.

Sincerely,

Bianca Boyington

Bianca Boyington
Deputy Clerk

Copy: Dave Smith, MPP Peterborough-Kawartha
Maryam Monsef, MP Peterborough-Kawartha
The Association of Municipalities of Ontario
All Ontario Municipalities

312915 Dereham Line
R. R. # 1, Mount Elgin, ON N0J 1N0
Phone: (519) 877-2702; (519) 485-0477;
Fax: (519) 485-2932
www.swox.org

January 11, 2021

Premier Doug Ford
Legislative Building, Queens Park
Toronto, ON M7A 1A1

Dear Premier Ford:

Speeding on provincial, county and municipal roadways continues to put the lives of Ontarians at risk. While we have access to several tools to help mitigate speeding traffic, the one tool that is currently not fully available to us is Automatic Speed Enforcement (ASE) (aka Photo Radar). Over the past decade, in South West Oxford the vast majority of charges laid are for drivers travelling well in excess of the posted speed limit. The cost of providing police time for something that could be done through the use of technology is disturbing to our council. The Council feels that it would be far more effective to have police concentrate on other problems such as Break and Enters, illegal drugs and domestic problems.

We need a way to address the poor behaviours and habits that are putting our citizens at risk and tying up much needed first responder resources that could be better utilized to improve the well-being of our communities. Speeding, particularly through our small villages, creates community concerns for the safety and wellbeing of our children and other vulnerable members. We need your help.

In keeping with this The Council of the Township of South-West Oxford duly moved and carried the following resolution at the regular meeting held on January 5, 2021:
…*RESOLVED that the Council of the Township of South-West Oxford provide direction to the Clerk to send a letter to the Premier, MPP Ernie Hardeman, AMO and all Ontario municipalities in support of the use of Automatic Speed Enforcement (photo radar) by municipalities.*

Please help municipalities in the Province by passing the necessary regulations for municipalities to use ASE (if they choose) that will bring about the driving behavioural changes we need.

We look forward to your help with this issue.

Yours truly,

Mary Ellen Greb, CAO
c.c. AMO, Honourable Ernie Hardeman, Ontario Municipalities

Township of
HAVELOCK-BELMONT-METHUEN
www.hbmtwp.ca INC. 1998

June 3, 2021

The Honourable Doug Ford, Premier of Ontario
Legislative Building, Queen's Park
Toronto, ON M7A 1Y7
premier@ontario.ca

Via Email

Dear Premier Ford:

Re: Drainage Matters and the Canadian National Railway

At the Regular Council Meeting of the Township of Havelock-Belmont-Methuen Council received the resolution sent by the Municipality of Southwest Middlesex on December 7, 2020 in regards to drainage matters and the current working relationship with the Canadian National Railway (CNR) and passed the following resolution:

R-009-21 Moved by Deputy Mayor Gerow
Seconded by Councillor Ellis

That staff are hereby directed to send correspondence supporting the resolution from the Municipality of Southwest Middlesex regarding drainage matters on Canadian National Railway lands.

Carried

While the Township of Havelock-Belmont -Methuen does not have dealings with CN Rail, but rather with the Canadian Pacific Railway (CPR), the Township has experienced similar delays with drainage projects and agree that the situation with the major railway companies and municipalities needs to improve. Council directed staff to send correspondence in support for your resolution.

A copy of the above noted resolution from the Municipality of Southwest Middlesex is attached for your reference. Your consideration of this matter is respectfully requested.

Sincerely,

Bianca Boyington

Bianca Boyington
Deputy Clerk

Copy: The Honourable Marc Garneau, Minister of Transport
The Honourable Ernie Hardeman, Minister of Agriculture, Food and Rural Affairs
Dave Smith, MPP Peterborough-Kawartha
Maryam Monsef, MP Peterborough-Kawartha
The Association of Municipalities of Ontario
All Ontario Municipalities

SWM
SOUTHWEST MIDDLESEX

Municipality of Southwest Middlesex

December 7, 2020

Please be advised that the Council of Southwest Middlesex passed the following resolution at it's November 25, 2020 Council meeting:

Drainage Matters: CN Rail

Moved by Councillor McGill
Seconded by Councillor Vink

"WHEREAS municipalities are facilitators of the provincial process under the *Drainage Act* providing land owners to enter into agreements to construct or improve drains, and for the democratic procedure for the construction, improvement and maintenance of drainage works; and

WHEREAS municipal drain infrastructure and railway track infrastructure intersect in many areas in Ontario; and

WHEREAS coordination with national railways is required for the construction or improvement of drains that benefit or intersect with national railways; and

WHEREAS the national railways have historically participated in the process for construction, improvement and maintenance of drainage works; and

WHEREAS currently municipalities are experiencing a lack of coordination with national railways on drainage projects; and

WHEREAS the lack of coordination is resulting in projects being significantly delayed or cancelled within a year; and

WHEREAS municipal drains remove excess water to support public and private infrastructure and agricultural operations;

THEREFORE be it resolved that the Province of Ontario work with the Federal Minister of Transportation to address concerns regarding municipal drainage matters and need for coordination with the national railways; and

THAT Council circulate the resolution to the Provincial Ministers of Agriculture, Food, and Rural Affairs, and Municipal Affairs and Housing, and the Federal Minister of Transportation, the local MP and MPP, the Association of Municipalities of Ontario, and all municipalities."

Municipality of Southwest Middlesex Resolution #2020-274 Carried

Sincerely.

Jillene Bellchamber-Glazier
CAO-Clerk

Cc: The Honorable Marc Gardeau, Minister of Transport
The Honorable Ernie Hardeman, Minister of Agriculture, Food and Rural Affairs
Monte McNaughton, MPP Lambton-Middlesex-London
Lianne Rood, MP Lambton-Kent-Middlesex
The Association of Municipalities of Ontario
All Ontario Municipalities

Township of
HAVELOCK-BELMONT-METHUEN
www.hbmtwp.ca INC. 1998

June 3, 2021

The Honourable Doug Ford, Premier of Ontario
Legislative Building, Queen's Park
Toronto, ON M7A 1Y7
premier@ontario.ca

Via Email

Dear Premier Ford:

Re: Resolution – Continuous Increases of Cost for Municipal Insurance

At the Regular Council Meeting of the Township of Havelock-Belmont-Methuen Council received the resolution sent by the Municipality of Grey Highlands on January 28, 2021 in regards to the continuous increases of cost for municipal insurance and passed the following resolution:

R-047-21 Moved by Deputy Mayor Gerow
Seconded by Councillor Pomeroy

That staff are hereby directed to send correspondence supporting the resolution from the Municipality of Grey Highlands regarding continuous increases of cost for municipal insurance.
Carried.

A copy of the above noted resolution from the Municipality of Grey Highlands is attached for your reference. Your consideration of this matter is respectfully requested.

Sincerely,

Bianca Boyington

Bianca Boyington
Deputy Clerk

Copy: Honourable Peter Bethlenfalvy, Minister of Finance
Honourable Doug Downey, Attorney General of Ontario
Dave Smith, MPP Peterborough-Kawartha
Maryam Monsef, MP Peterborough-Kawartha
All Ontario Municipalities

Municipality of Grey Highlands | The place for all seasons

January 22, 2021

RE: Insurance Rates Resolution

Please be advised that the Council of the Municipality of Grey Highlands, at its meeting held January 20, 2021, passed the following resolution:

2021-39
Moved by Tom Allwood, Seconded by Aakash Desai

Whereas the cost of municipal insurance in the Province of Ontario has continued to increase – with especially large increases going into 2021; and

Whereas Joint and Several Liability continues to ask property taxpayers to carry the lion's share of a damage award when a municipality is found at minimum fault; and

Whereas these increases are unsustainable and unfair and eat at critical municipal services; and

Whereas the Association of Municipalities of Ontario outlined seven recommendations to address insurance issues including:

1. The provincial government adopt a model of full proportionate liability to replace joint and several liability.
2. Implement enhancements to the existing limitations period including the continued applicability of the existing 10-day rule on slip and fall cases given recent judicial interpretations and whether a 1 year limitation period may be beneficial.
3. Implement a cap for economic loss awards.
4. Increase the catastrophic impairment default benefit limit to $2 million and increase the third-party liability coverage to $2 million in government regulated automobile insurance plans.
5. Assess and implement additional measures which would support lower premiums or alternatives to the provision of insurance services by other entities such as nonprofit insurance reciprocals.
6. Compel the insurance industry to supply all necessary financial evidence including premiums, claims and deductible limit changes which support its own and municipal arguments

as to the fiscal impact of joint and several liability.
7. Establish a provincial and municipal working group to consider the above and put forward recommendations to the Attorney General;

Now therefore be it resolved that the Council for the Municipality of Grey Highlands call on the Province of Ontario to immediately review these recommendations and to investigate the unethical practice of preferred vendors who are paid substantial amounts over industry standards, despite COVID 19 delays, as insurance premiums will soon be out of reach for many communities and

Be it further resolved that this motion be provided to the Honourable Doug Ford, Premier of Ontario, the Honourable Peter Bethlenfalvy, Minister of Finance, the Honourable Doug Downey, Attorney General of Ontario, the Honourable Bill Walker, MPP for Bruce - Grey - Owen Sound, and all Ontario municipalities.
CARRIED.

As per the above resolution, please accept a copy of this correspondence for your information and consideration.

Sincerely,

Jerri-Lynn Levitt

Jerri-Lynn Levitt
Deputy Clerk
Council and Legislative Services
Municipality of Grey Highlands

Ministry of the Environment, Conservation and Parks

Office of the Minister

777 Bay Street, 5th Floor
Toronto ON M7A 2J3
Tel.: 416-314-6790

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Bureau du ministre

777, rue Bay, 5e étage
Toronto, Ontario M7A 2J3
Tél.: 416.314.6790

4.17

Ontario

June 3, 2021

357-2021-902

Lloyd Ferguson, Chair
Hamilton Region Conservation Authority
Lloyd.Ferguson@hamilton.ca

Lisa Burnside, CAO
Hamilton Region Conservation Authority
Lisa.Burnside@conservationhamilton.ca

Dear Ms. Burnside and Mr. Ferguson,

Thank you for your application submitted on March 9, 2021 on behalf of the Hamilton Region Conservation Authority (HRCA), seeking a Minister's exception under the *Conservation Authorities Act* related to recently proclaimed legislative amendments affecting chair and vice-chair appointments.

After carefully considering your application regarding the appointment of a chair and vice-chair, I am granting the HRCA an exception to subsections 17 (1.1) and (1.2) of the *Conservation Authorities Act* pursuant to my authority under clauses 17(1.3) (a) and (b). This exception allows the current chair and vice-chair to be re-appointed for a total of two more years, subject to re-election in both 2021 and 2022, and to therefore hold office for more than two consecutive terms. I am also granting an exception to allow the HRCA to re-appoint as chair and vice-chair members who have been appointed by the same participating municipality. This would mean there would be no rotation of the chair and vice-chair amongst participating municipalities for the next two years for the duration of the re-appointment, subject to re-elections in 2021 and 2022.

I note that the intent of the changes made through Bill 229, the *Protect, Support and Recover from COVID-19 Act (Budget Measures), 2020*, to section 17 of the *Conservation Authorities Act* were to encourage fuller representation and perspectives from participating municipalities in a conservation authority. I encourage the HRCA membership to take this into account when considering future appointments to the positions of chair and vice-chair. I would ask that you share this correspondence with all members of the HRCA, and please invite the Town of Puslinch to contact me in writing regarding the rotational requirements, should this be of concern.

…2

I appreciate the dedication of the HRCA for your continued work and contributions to protecting people and property from natural hazards, the conservation and management of conservation authority-owned lands, and your role in drinking water source protection. I look forward to continuing to work with you.

Sincerely,

Jeff Yurek
Minister of the Environment, Conservation and Parks

C: clerk@hamilton.ca
gschwendinger@puslinch.ca
ted.arnottco@pc.ola.org
donna.skelly@pc.ola.org
Debbie Scanlon, Manager, Conservation Authority Office, MECP
Chloe Stuart, Assistant Deputy Minister, Land and Water Division, MECP

PUBLIC WORKS COMMITTEE
REPORT 21-008

1:30 p.m.
Monday, May 31, 2021
Council Chambers
Hamilton City Hall
71 Main Street West

Present: Councillors A. VanderBeek (Chair), N. Nann (Vice-Chair), C. Collins, J.P. Danko, J. Farr, L. Ferguson, T. Jackson, S. Merulla, E. Pauls, and M. Pearson

Absent with Regrets: Councillor T. Whitehead – Leave of Absence

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THE PUBLIC WORKS COMMITTEE PRESENTS REPORT 21-008 AND RESPECTFULLY RECOMMENDS:

1. Green Fleet Strategy Report & Action Plan (PW03147(e)) (City Wide) (Item 8.1)

(a) That the Green Fleet Strategy Report, as identified in Appendix "A" attached to Public Works Committee Report 21-008, be received;

(b) That staff be directed to proceed with the Green Fleet Action Plan and implement the recommendations as outlined in Appendix "B" attached to Public Works Committee Report 21-008;

(c) That funding from the Unallocated Capital Reserve to support Annual Capital requests as outlined in Appendix "C" attached to Public Works Committee Report 21-008 to fund the implementation of the Green Fleet Strategy Action Plan that will realize 89 light duty fleet vehicles replaced by electrified vehicles be approved;

(d) That a new reserve fund be established to fund charging equipment replacement as required and will be funded through usage charges to be established by Fleet;

(e) That staff provide annual Communication Updates (accompanied with the Annual Energy Report) on progress of executing the Green Fleet Action Plan recommendations and impacts to Greenhouse Gases (GHG's) resulting from implemented initiatives;

(f) That the General Manager of Public Works, or their designate, be authorized and directed to submit and sign an application with supporting documentation including an application attestation, on behalf of the City of Hamilton, to Natural Resources Canada (NRCan), in accordance with the terms and conditions associated with the Zero Emission Vehicle Infrastructure Program by June 22, 2021;

(g) That the General Manager of Finance and Corporate Services, be authorized and directed to confirm the City of Hamilton's funding contribution in the amount of $300,000 towards the EV Charging Station Infrastructure Project and sign a Proof of Funding Form to that effect, in accordance with the terms and conditions associated with the Zero Emission Vehicle Infrastructure Program;

(h) That should the City's submission under the Zero Emission Vehicle Infrastructure Program be approved, staff be authorized and directed to tender and implement the EV Charging Station Infrastructure Project upon execution of a contribution agreement between the City of Hamilton and Her Majesty the Queen in right of Canada as represented by the Minister of Natural Resources Canada (NRCan) to receive funding from the Zero Emission Vehicle Infrastructure Program;

(i) That the City Solicitor be authorized and directed to prepare any necessary by-laws for Council approval, for the purpose of giving effect to the City's acceptance of funding from the Zero Emission Vehicle Infrastructure Program for the EV Charging Station Infrastructure Project; and,

(j) That the Mayor and City Clerk be authorized to execute all necessary documentation, including Contribution Agreements to receive funding from National Resources Canada (NRCan) under the Zero Emission Vehicle Infrastructure Program with content satisfactory to the General Manager, Public Works, and in a form satisfactory to the City Solicitor.

2. Free-Floating Carshare Pilot Program (PED20168(a)) (Wards 1, 2, and 3) (Item 10.1)

(a) That the City of Hamilton implement a pilot permit program to allow for free-floating carshare parking in Wards 1, 2, and 3 for an 18-month period and report back to the Public Works Committee prior to the end of the pilot;

(b) That the draft Amending By-law for On-Street Parking By-law 01-218 and Administrative Penalties By-law 17-225, attached as Appendix "A" and Appendix "B" to Report PED20168(a), which have been prepared in a form satisfactory to the City Solicitor, be approved; and,

(c) That a permit fee of $270.78 plus HST per free-floating carshare permit be included in the City's User Fees and Charges By-law under the heading "Division Parking and School Crossing - Hamilton Municipal Parking System" effective September 1, 2021.

3. Capital Lifecycle Renewal – Westoby Ice Plant (Emergency) (PW21035) (Ward 13) (Item 10.2)

That the design, supply, installation and warranty of the Westoby Arena Ice Plant replacement, located at 70 Olympic Drive, Dundas be funded from the Unallocated Capital Levy Reserve #108020 at an amount not to exceed $700K.

4. Private Tree Giveaway (Ward 6) (Item 11.1)

WHEREAS, the City of Hamilton has declared a climate emergency;

WHEREAS, increasing the urban tree canopy by providing trees for planting on private property has many environmental benefits to the residents of Ward 6 and the wider City; and,

WHEREAS, private tree giveaways are not currently funded under existing tree planting programs;

THEREFORE, BE IT RESOLVED:

(a) That the supply and distribution of approximately 100 approximately 1.5 metre tall native trees, at an upset limit cost of $5,000, be funded from the Ward 6 Capital Discretionary Account; and,

(b) That the Mayor and City Clerk be authorized and directed to execute any required agreement(s) and ancillary documents, with such terms and conditions in a form satisfactory to the City Solicitor.

5. Installation of Traffic Calming Measures at Various Locations throughout Ward 6 in Phase II (Item 11.2)

WHEREAS, residents are requesting the installation of speed cushions on various roadways throughout Ward 6, via petitions and neighbour engagement, to address roadway safety concerns as a result of speeding and cut-through traffic;

THEREFORE, BE IT RESOLVED:

(a) That Transportation Operations and Maintenance staff be authorized and directed to install traffic calming measures on the following roadways as part of the 2021 Traffic Calming program:

(i) Birchview Drive between Beryl Street and Limeridge Road East, Hamilton (2 speed cushions);

(ii) Gatineau Drive between Summer Place to Rideau Crescent, Hamilton (3 speed cushions);

(iii) Rideau Crescent between Moxley Drive to Gatineau Drive, Hamilton (2 speed cushions);

(iv) Larch Street between Moxley Drive and Billington Crescent, Hamilton (3 speed cushions);

(v) Princeton Drive between Fennell Avenue East and Sherwood Rise, Hamilton (1 speed cushion);

(vi) Moxley Drive between Mohawk Road East and Anson Avenue, Hamilton (4 speed cushions);

(b) That all costs associated with the installation of traffic calming measures at the identified locations throughout Ward 6 be funded from the Ward 6 Minor Maintenance Account (4031911606) at an upset limit, including contingency, not to exceed $84,000; and,

(c) That the Mayor and City Clerk be authorized and directed to execute any required agreement(s) and ancillary documents, with such terms and conditions in a form satisfactory to the City Solicitor.

FOR INFORMATION:

(a) CHANGES TO THE AGENDA (Item 2)

The Committee Clerk advised of the following changes to the agenda:

6. DELEGATION REQUESTS

6.2 Marco Viviani, Communauto, respecting Item 10.1 - Free-Floating Carshare Pilot Program (PED20168(a)) (for today's meeting)

9. PUBLIC HEARINGS / DELEGATIONS

9.1 Proposed Permanent Closure and Sale of a Portion of Road Allowance Abutting 38 Strachan Street West, Hamilton (PW21034) (Ward 2)

(a) Added Registered Speaker:

(i) Herman Turkstra, North End Neighbourhood Association

The agenda for the May 31, 2021 Public Works Committee meeting was approved, as amended.

(b) DECLARATIONS OF INTEREST (Item 3)

There were no declarations of interest.

(c) APPROVAL OF MINUTES OF THE PREVIOUS MEETING (Item 4)

(i) May 17, 2021 (Item 4.1)

The Minutes of the May 17, 2021 meeting of the Public Works Committee were approved, as presented.

(d) DELEGATION REQUESTS (Item 6)

(a) The following delegation requests were approved for today's meeting:

(i) Bianca Caramento, Bay Area Climate Change Council (BACCC), respecting Item 8.1 - Green Fleet Strategy Report & Action Plan (PW03147(e)) (Item 6.1)

(ii) Marco Viviani, Communauto, respecting Item 10.1 - Free-Floating Carshare Pilot Program (PED20168(a)) (Added Item 6.2)

For further disposition of this matter, refer to Items (g)(ii) and (g)(iii).

(e) CONSENT ITEMS (Item 7)

(i) Waste Management Advisory Committee Meeting Minutes - March 9, 2021 (Item 7.1)

The Minutes of the March 9, 2021 meeting of the Waste Management Advisory Committee, were received.

(f) STAFF PRESENTATIONS (Item 8)

(i) Green Fleet Strategy Report & Action Plan (PW03147(e)) (City Wide) (Item 8.1)

Tom Kagianis, Manager, Fleet Services, addressed Committee respecting Report PW03147(e), Green Fleet Strategy Report & Action Plan, with the aid of a presentation.

The presentation, respecting Report PW03147(e), Green Fleet Strategy Report & Action Plan, was received.

Consideration of Report PW03147(e), respecting the Green Fleet Strategy Report & Action Plan, was DEFERRED until after the Public Hearing and Delegations had been heard.

For further disposition of this matter, refer to Item 1.

(g) PUBLIC HEARINGS / DELEGATIONS (Item 9)

(i) Proposed Permanent Closure and Sale of a Portion of Road Allowance Abutting 38 Strachan Street West, Hamilton (PW21034) (Ward 2) (Item 9.1)

Councillor VanderBeek advised that notice of the Proposed Permanent Closure and Sale of a Portion of Road Allowance Abutting 38 Strachan Street West, Hamilton (PW21034) (Ward 2) was given as required under the City's By-law #14-204 – the Sale of Land Policy By-law.

The Committee Clerk advised that there was one registered speaker.

Registered Speaker:

1. Herman Turkstra, North End Neighbourhood Association

Herman Turkstra, North End Neighbourhood Association, addressed the Committee with concerns respecting the Proposed Permanent Closure and Sale of a Portion of Road Allowance Abutting 38 Strachan Street West, Hamilton (PW21034) (Ward 2).

The registered delegation was received.

The public meeting was closed.

Report PW21034, respecting the Proposed Permanent Closure and Sale of a Portion of Road Allowance Abutting 38 Strachan Street West,

Hamilton, was DEFERRED to the July 7, 2021 Public Works Committee meeting.

(ii) Bianca Caramento, Bay Area Climate Change Council (BACCC), respecting Item 8.1 - Green Fleet Strategy Report & Action Plan (PW03147(e)) (Added Item 9.2)

Bianca Caramento, Bay Area Climate Change Council (BACCC), addressed the Committee respecting Item 8.1 - Green Fleet Strategy Report & Action Plan (PW03147(e)).

The delegation from Krista Jamieson, respecting Item 8.1 - Green Fleet Strategy Report & Action Plan (PW03147(e)), was received.

For further disposition of this matter, refer to Item 1.

(iii) Marco Viviani, Communauto, respecting Item 10.1 - Free-Floating Carshare Pilot Program (PED20168(a)) (Added Item 9.3)

Marco Viviani, Communauto, addressed the Committee respecting Item 10.1 - Free-Floating Carshare Pilot Program (PED20168(a)).

The delegation from Marco Viviani, Communauto, respecting Item 10.1 - Free-Floating Carshare Pilot Program (PED20168(a)), was received.

For further disposition of this matter, refer to Item 2.

(h) GENERAL INFORMATION / OTHER BUSINESS (Item 13)

(i) Amendments to the Outstanding Business List (Item 13.1)

The following amendments to the Public Works Committee's Outstanding Business List, were approved:

(a) Items Requiring a New Due Date:

(i) Redevelopment / Reuse of the former King George School Site, at 77 Gage Avenue North
Item on OBL: V
Current Due Date: September 20, 2021
Proposed New Due Date: December 6, 2021

(ii) Municipal Class Environmental Assessment and Conceptual Design of Ancaster Elevated Water Reservoir
Item on OBL: AAP
Current Due Date: June 14, 2021
Proposed New Due Date: August 11, 2021

(iii) COVID-19 Recovery Phase Mobility Plan
Item on OBL: ABE
Current Due Date: June 14, 2021
Proposed New Due Date: July 7, 2021

(iv) Funding Options for a 5 Year and 10 Year Lead Water Service Line Replacement Plan
Item on OBL: ABJ
Current Due Date: June 14, 2021
Proposed New Due Date: August 11, 2021

(i) PRIVATE AND CONFIDENTIAL (Item 14)

The Committee deemed that a Closed Session discussion of Item 14.1 was not required, and approved the following in Open Session:

(i) Closed Session Minutes – May 17, 2021 (Item 14.1)

(a) The Closed Session Minutes of the May 17, 2021 Public Works Committee meeting, were approved, as presented; and,

(b) The Closed Session Minutes of the May 17, 2021 Public Works Committee shall remain confidential.

(j) ADJOURNMENT (Item 15)

There being no further business, the Public Works Committee adjourned at 3:05 p.m.

Respectfully submitted,

Councillor A. VanderBeek
Chair, Public Works Committee

Alicia Davenport
Legislative Coordinator
Office of the City Clerk

FINAL
REPORT
February
2021

Fleet Services Green Fleet Strategy and Report

PREPARED FOR THE CITY OF HAMILTON

RICHMOND SUSTAINABILITY INITIATIVES – FLEET CHALLENGE

LEAD AUTHORS: ROGER SMITH, MATTHEW PITTANA, JANA CERVINKA. CHIEF DATA ANALYST: HUGH ROBERTS

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TABLE OF CONTENTS

Terms and Abbreviations

AEC – Annual equivalent cost
B10 – A blend of 10% biodiesel and 90% fossil diesel; in this report, represents an annualized blend of B20 (used during summer months) and B5 (used during winter and shoulder months)
BAU – Business as usual
BEV – Battery-electric vehicle
BET – Battery-electric truck
CAC – Criteria air contaminants; a cause of ground level smog
CAFE – Corporate average fuel economy
Capex – Capital expense
Capital Replacement Ratio - Capital (for vehicle replacements) as a percentage of NPV
CIF – Cost inflation factor
CNG – Compressed natural gas
Controllable operating costs – For this report and benchmarking, operating expenses directly controllable by fleet management, including fuel, cost of capital, repairs & maintenance, inflation, and downtime
CO_2 or CO_2e – Carbon dioxide or carbon dioxide equivalent
CVOR – Commercial Vehicle Operating Registry
Downtime – Period when a vehicle is unavailable for use during prime business hours
E85 – A blend of around 85% ethanol and 15% gasoline
ECM – The electronic control module that manages a vehicle's computerized engine function
ELD – Electronic logging device
EV – Electric vehicle
FAR™ – Fleet Analytics Review™ (Fleet Challenge Excel software tool)
FMIS – Fleet management information system
GHG – Greenhouse gas (expressed in CO_2 equivalent tonnes)
GHG Intensity – A measure of GHGs produced relative to VKT or VMT (see below)
HD or HDV – Heavy-duty vehicle (Classes 7-8)
HEV – Hybrid-electric vehicle
HOS – Hours of service
ICE – Internal combustion engine
KPI – Key performance indicator
LCA – Lifecycle analysis
LD or LDV – Light-duty vehicle
LMHD – Light-, medium-, and heavy-duty vehicle
LPG – Liquid propane gas
LTCP – Long-term capital planning
LOF – Lube, oil, filter
Maintenance Ratio – Ratio of dollars spent on reactive (unplanned) repairs to preventive (planned) maintenance
MD or MDV – Medium-duty vehicle

Terms and Abbreviations (cont'd.)

MHD or MHDV – Medium- and heavy-duty vehicle
MHEV – Mild hybrid-electric vehicle
MT – Metric tonne
NPV – Net present value
OEM – Original equipment manufacturer
OOS – Out of service
Opex – Operating expense
Outlier – Vehicle with operating statistics outside of averages for similar fleet units
PDIC – Professional driver improvement course
PHEV – Plug-in hybrid electric vehicle
PM – Preventative maintenance
PMCVI – Periodic mandatory commercial vehicle inspection
Retention Cycle – The period that a vehicle remains in active service
RNG – Renewable natural gas
ROI – Return-on-investment
Solution – A technology, best management practice, or strategy to reduce fuel use and GHGs
SOP – Standard operating practice
TCO – Total cost of ownership
Uptime – Period when a vehicle is available for use during prime business hours (opposite of downtime)
Vehicle availability – See "Uptime"
VKT or VMT – Vehicle kilometres/miles travelled
WACC – Weighted average cost of capital
ZEV – Zero-emission vehicle

Disclaimer

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The information in the report is not an alternative to legal, financial, taxation, or accountancy advice from appropriately qualified professionals. For specific questions about any legal, financial, taxation, accountancy or other specialized matters, the City of Hamilton should consult appropriately qualified professionals. Without prejudice to the generality of the foregoing paragraph, we do not represent, warrant, undertake, or guarantee that the use of guidance in the report will lead to any particular outcomes or results.

Foreword

This Green Fleet Strategy and Report has been prepared for the City of Hamilton by Richmond Sustainability Initiatives (RSI) of Toronto, Ontario and its project team Fleet Challenge (FC), collectively referred to as RSI-FC. We have included this foreword because we feel it is important for readers of this report to first have a full understanding of the situation and context.

The report is based on our team's detailed data analysis of one-year of historical data for **1,307 City of Hamilton Fleet Services vehicles and equipment** as submitted by the City. This group of vehicles and equipment includes light-duty vehicles (cars, SUVs, pickup trucks, and vans), medium-duty trucks, heavy-duty trucks, and miscellaneous vehicles and equipment. The City's EMS, Fire, Transit, and Police fleets are excluded from this report.

The RSI-FC team has made considerable effort to make this report as meaningful and relevant as possible to the City of Hamilton in regard to its goals to decommission all diesel vehicles by 2030 and achieve a 100% electric fleet by 2050. We have researched, evaluated, and presented opportunities for fuel-use and GHG reduction that make economic sense and are reasonably attainable in the short to mid-terms.

Our analysis has been aided by using specialized software developed by RSI-FC, which is referred to as the Fleet Analytics Review™ (FAR) tool. Fuel-reduction solutions were analyzed using FAR, designed to efficiently estimate the cost-benefit and GHG emissions reduction potential, in the long-term (a 15-year horizon) of many best management practices (BMPs), low-carbon fuels, and current or emerging technologies that have been proven to be beneficial to commercial and municipal fleets.

This Green Fleet Strategy and Report encapsulates the FAR results, starting from our baseline review of the City of Hamilton's current-day fleet. We present a range of fuel-reduction solutions for the City's consideration. It provides a viable roadmap and a number of options for consideration by the Energy Fleet and Facilities (EFFM) Division of Public Works - solutions that can be implemented immediately and through to 2035.

We have made every effort to ensure that the business assumptions employed in our analysis are as accurate as possible and based on our many years of research into fuel-reduction options for commercial and municipal fleets. All estimates are based on published studies, research, and real data. Sources are noted throughout the document.

Fossil fuel use reduction translates directly to greenhouse gas reduction[1] (hereafter referred to as GHG reduction, carbon reduction, or CO_2 reduction); therefore, all references to fuel savings include the consequential GHG impacts (i.e., increase or decrease).

Prior to reviewing the report readers should be aware of and keep in mind the following:

[1] The terms "greenhouse gas," "GHG," "carbon," CO_2e and "CO_2" are synonymous for the purposes of this report.

Cautious Approach

All solutions explored in this report represent what our team considers to be possible, each with its own set of potentials. However, there are many variations that would modify capital expenses, operating expenses, and GHG emissions projections over time (e.g., switching from fossil fuels to alternate/renewable fuels earlier/later than modelled, phasing in battery-electric vehicles earlier/later than modelled or for segments of the fleet as opposed to fleet-wide implementation, etc.). Therefore, actual fuel/GHG reduction is tied to the *degree of achievement* in implementing each of the solutions and the timing of their implementation.

Challenges to Green Fleet Planning

Regardless of which fuel-switching options recommended in our report are ultimately selected by the City of Hamilton, the reality is that each will require some degree of extra effort; some will require additional cost to implement. For example, although units are capable of using biodiesel blends up to B20 (20% biodiesel and 80% fossil diesel) and/or higher blends of renewable diesel fuels, finding sources for these fuels or attending different retail commercial fuel stations may bring new operational challenges that must be resolved. Other examples are the effort and cost of installing DC fast-charging station(s) should electrification be the top priority in years to come, or the significant expense of compressed natural gas (CNG) or propane (LPG) refuelers.

Emissions Calculation Methods

Internationally, there are two standard reporting methods for vehicle carbon emissions modelling: (1) tailpipe combustion, and (2) fuel lifecycle (sometimes referred to as fuel cycle or well-to-wheel). Modelling of fuel lifecycle GHG emissions of motor fuels is used to assess the overall GHG impacts of the fuel, including each stage of its production and use in addition to the fuel actually used to power a fleet vehicle. Modelling of tailpipe emissions only includes the actual emissions produced by the vehicle itself through combustion. Lifecycle GHG emissions are, therefore, greater than tailpipe emissions.

While lifecycle emissions have been established for most fuel types, lifecycle emissions are extremely difficult to quantify for best management practices and also for electric vehicles because of the different mixes of electricity sources in different jurisdictions (i.e., fossil-fuel based, nuclear, and renewables). For this reason, to assess the potential GHG reduction on an “apples-to-apples” basis for each of the solutions evaluated in this report, we have employed the tailpipe combustion method.

Readers of this report should bear in mind that upstream emissions will diminish the estimated potential GHG reductions of fuel switching and electrification set out in this report to varying degrees. However, the results of our modelling employing the tailpipe combustion method gives a clear indication as to which solutions offer the greatest GHG reduction potential.

Of Further Consideration

In this report, we have calculated the City of Hamilton's fleet baseline and we have modelled go-forward scenarios from baseline to 2035 to provide a roadmap for implementation of fuel-reduction interventions/solutions. The interventions/solutions encompass three groups:

Group One: Lifecycle optimization and best management practices,

Group Two: Low-carbon fuel-switching, and

Group Three: Transition to battery-electric vehicles (BEVs).

We expect that the City of Hamilton may wish to evaluate unique combinations of these solutions different than the scenarios which we data-modelled, based on practicality, availability of models, corporate budgets, vehicle conditions, etc. For this purpose, the FAR software tool will be provided to the City for its own internal use post-project. The tool will be useful for efficiently evaluating any number of other fuel-saving solutions under consideration in the future.

As a backdrop to the objectives of this Green Fleet Strategy Report, our goal is to stimulate the City of Hamilton's interest in continuing to move its fleet towards a low-carbon future. We have made every effort to ensure our analysis is as accurate as possible, but at the time of actual implementation the business assumptions we have employed may have shifted. Therefore, we strongly urge the City to complete thorough cost-benefit analyses at any time in the future when considering implementing the recommended interventions/strategies we've outlined. Further, we suggest that a slow-start, cautious approach be taken which would include pilot testing new technologies in a small control group over at least four seasons of operation, carefully monitoring their performance and assessing the effectiveness of the solutions prior to any plans for wide-scale implementation.

Executive Summary

Low-carbon transportation is essential to both short-term GHG and fuel-use reduction and long-term decarbonization of the economy. In 2018, the transportation sector accounted for about 25% of greenhouse gas (GHG) emissions in Canada, second only to the oil and gas sector[2]. Municipalities can play a key role in cutting emissions by transitioning their fleets to low-carbon and/or electric vehicles, while saving fuel and maintenance costs.

In May 2020, following a formal, competitive Request for Proposal (RFP) process, the City of Hamilton's Energy Fleet and Facilities (EFFM) Division of Public Works engaged Richmond Sustainability Initiatives – Fleet Challenge (RSI-FC) of Toronto, Ontario, to develop a Fleet Services Green Fleet Strategy and Report.

About Richmond Sustainability Initiatives

Since 2005, RSI-FC has collaborated with fleet managers, technology providers, subject matter experts, and auto manufacturers to find viable solutions, technologies, and best management practices for reducing operating costs and vehicle emissions. From the beginning, we have remained a self-supporting and independently funded program without commercial biases or influences, providing fleet review and consulting services to dozens of leading private and public sector fleets in Canada and the United States.

RSI-FC has employed our innovative, leading-edge data modelling techniques and our proprietary software for the development of the Green Fleet Strategy and Report. Fleet Analytics Review™ (FAR) is a software tool designed and developed by our company specifically for complex green fleet planning. FAR enables our team to develop short- to long-term green fleet plans and strategies by calculating GHG emissions reductions and return-on-investment (ROI) for various best practices and technologies – all driven by actual historical data. In turn, this allows us to evaluate the business case of each solution and provide meaningful recommendations for long-term capital planning. Through the combination of our experience and the use of our software tools, we are delivering an advanced Green Fleet Strategy and Report for the City of Hamilton that is realistic and achievable.

Context

As a proactive response to the City's climate emergency declaration in 2019, a multi-departmental Corporate Climate Change Task Force comprised of City Staff was created. According to the City of Hamilton's Corporate Energy Policy, fleet and transit fuel consumption account for $16 million in operating expenses and 40% of corporate greenhouse gases, highlighting the benefit of implementing green fleet strategies to reduce both fuel-use and GHG emissions. One of the action

[2] Source: https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html

items for the Task Force is to investigate and identify a plan for all diesel vehicles to be decommissioned by 2030 and all vehicles to be electrified by 2050. This is where the Green Fleet Strategy and Report can play a role in providing recommendations and potential pathways for achieving these goals.

Hamilton's Fleet Profile

The City of Hamilton owns and operates a diverse fleet including cars, pickups, SUVs, medium- and heavy-duty trucks, and equipment. Hamilton's Fleet Services serves the City's population of 747,545[3] residents and its businesses. Some quick facts about Hamilton's fleet[4], are shown below. During the one-year review period (2019):

- All fleet vehicles were owned (not leased or rented) by the City of Hamilton
- The fleet's average age was 7.5 years (includes equipment units)
- All units were either fossil diesel or gasoline-powered, with the exception of ice maintenance vehicles (CNG-powered, one unit propane-powered)
- The original purchase price for the fleet, including vehicles and equipment was $95,158,752
- The current-day estimated replacement cost was $112,153,100
- The estimated market/trade-in value of the fleet was $46,193,264
- Kilometres-travelled was 11,033,700
- Fuel used was 3,701,629 litres
- Total cost of repairs and maintenance, fuel, capital & downtime was $19,911,820
- Average fleet fuel consumption was 36.1 l/100 km
- GHG emissions were 9,371 metric tonnes CO_2e

Green Fleet Strategy and Report – Objective

The primary objective of this Green Fleet Strategy and Report was to analyze the City of Hamilton's in-scope fleet[4] operations data and identify and assess operational improvements and new technologies to reduce GHG emissions from Fleet Services vehicles and equipment. The results presented herein are intended to provide an ambitious roadmap to the City of Hamilton in its quest for go-forward fossil fuel and GHG-reduction solutions to achieve the goals of the Corporate Climate Change Task Force.

Overview of Analysis

With the above-stated objective in mind, after completing our Best Management Practices Review (BMPR) of the City of Hamilton's Fleet Services, RSI-FC conducted lifecycle analysis (LCA) for all vehicle categories, then systematically assessed the impacts of various fuel-reduction solutions on

[3] Census Profile, Canada 2016 Census. Statistics Canada.
[4] Does not include EMS, Fire, Transit, or Police fleets

the City's fleet operations and capital budgeting, and developed recommendations for the Green Fleet Strategy Report. The analysis, using RSI's Fleet Analytics Review™ (FAR) software, included:

- Analysis and preparation of current-day baseline fleet data with data provided by the City
- Completion of lifecycle analysis (LCA) for all vehicle categories and determination of optimized lifecycles based on data provided
- A balancing exercise of fleet capital budgets with LCA-optimized lifecycles through consideration of ROI for units due for replacement, to model a lower-emissions pathway
- Preparation of 36 data models to evaluate the impacts (Opex, Capex, and GHG reductions) of go-forward fuel-reduction solutions relative to the 2019 baseline, over a 15-year budget cycle, which resulted in the completion of several long-term capital planning (LTCP) scenarios
- A review of low-carbon fleet options and recommendations for a structured, phased-in transition to battery-electric vehicles (BEVs) with consideration of LTCP

From our analysis, as we describe within this report, we have made recommendations that have potential for the City of Hamilton to optimize vehicle replacement practices, transition away from fossil fuels, optimize the use of capital towards BEV replacements and charging infrastructure, and ultimately achieve deep GHG reductions while maintaining stability in capital budget planning.

Go-Forward Fuel-Reduction Solutions

RSI-FC completed extensive research into known, credible, proven, and potentially viable fuel-reduction solutions for the City of Hamilton, currently or in the near future. The solutions we assessed include three groups (see below). For every solution in each of the three groups, we assessed the impacts relative to the 2019 operational baseline:

- Group One: Lifecycle optimization and best management practices (BMPs) or "house-in-order" strategies
- Group Two: Fuel switching or "messy middle" – interim, present-day solutions including renewable fuels (E85 ethanol, B10 biodiesel, RNG) and alternate fuels (CNG and LPG)
- Group Three: Battery-electric vehicle (BEV) technology

RSI-FC's proprietary Fleet Analytics Review™ (FAR) software was used to evaluate these options in the context of the existing fleet being reviewed. That is, after optimizing lifecycles, balancing capital budgets, and implementing "house-in-order" strategies, many fuel-saving options were modelled for

units due for replacement to estimate operating and capital cost changes as well as GHG emissions reductions over subsequent fiscal years (2020-2035) relative to baseline year 2019. The modelling was intended to demonstrate the potential impacts of implementation after the baseline year. For the purpose of data-modelling, the baseline fleet data provided by the City was for 2019. All scenarios were data-modelled from the 2019 baseline data to evaluate the potential impacts of each low-carbon solution relative to actual data from the in-scope Hamilton fleet at the time of analysis.

As a result of the processes we have employed in the preparation of Hamilton's Green Fleet Strategy and Report, the recommendations we provide herein are based on analysis of the fleet's historical data to forecast long-term impacts (the "past predicts the future"). Our strategies are pragmatic and fiscally-prudent, based on research, data-driven analysis, and sound economic principles and practices.

Preparing for an Electric Vehicle Future

Significant – and potentially contentious – among our recommendations in the following Green Fleet Strategy is a moratorium on replacing Hamilton's end-of-lifecycle internal combustion engine (ICE) vehicles with new ICE units. Vehicle investments are long-term; units purchased today will remain in service for a decade or longer. Globally, numerous jurisdictions have already legislated the end of the ICE – some as soon as 2030. Moreover, OEMs are quickly jumping on the bandwagon of battery-electric vehicle (BEV) production. On January 28, 2021, General Motors pledged to cease building gasoline and diesel cars, vans, and SUVs by 2035. ICE vehicles purchased today for a fleet with a current-day value in the millions of dollars may be nearly worthless when ICEs become obsolete.

ICE-powered vehicles will quickly become outdated as battery-electric vehicles (BEVs) rapidly take over. BEVs have a fraction of the moving parts of an ICE vehicle, cost far less to maintain, offer better performance, and can cost far less to operate. Concurrently, BEV prices are coming down; it is believed that BEVs may reach price-parity with ICEs as soon as 2025. For these reasons, if the condition of currently-owned Hamilton fleet ICE vehicles will allow it, we suggest prolonging their lifecycles until BEV replacements are available.

Today, only light-duty (cars, SUVs), transit buses and a handful of medium- and heavy-duty (MHD) truck BEV models are available. However, by 2022 the types of vehicles that comprise a major portion of the Hamilton fleet, including pickup trucks, will be available as BEVs. And by 2024, BEV MHD truck offerings will be more plentiful. The time is now to **begin preparing for the transition to BEVs** by investing in electric vehicle charging equipment while awaiting suitable BEVs to become readily available.

Summary of Key Results

RSI-FC data-modelled the fleet's 2019 baseline statistics and then assessed 35 low-carbon solutions (scenarios) categorized into three groups, in which we calculated the potential impacts of each relative to the 2019 baseline. These "what-if" scenarios assessed the potential outcomes if each of the low-carbon solutions being modelled were in place for the same types of vehicles, the same number of vehicles, travelling the same number of kilometres as in 2019.

In *Table 1* (below), the two Group One solutions displayed summarize the potential impacts of FAR data models #3 (lifecycle optimization) and #7 (best management practices).

Group One scenarios illustrate the projected capital (Capex) required and annual operating expenses (Opex) increases/decreases relative to the 2019 business-as-usual (BAU) baseline. These best practices are relatively low-cost, high-impact "house-in-order" solutions that we recommend as first steps in a carbon reduction strategy.

In Group Two, the estimated potential impacts over the 2019 baseline are displayed for implementation of each[5] fuel-switching solution data-modelled by our team. Results include, and build on, the benefits from Group One. We refer to this time period as the "messy middle" – the time period we are now in as we await more BEV models to become available – in which fleets must use multiple methods for reducing their environmental impacts.

In Group Three, the cumulative impacts of a multi-year (immediate to 2035) phase-in of battery-electric vehicles (BEVs) are shown. Like Group Two, the results include, and build on, the benefits from Group One.

Our approach and methodology is provided in *Section 3.0*, and details and results of each FAR scenario are provided in *Appendix D*. A summary of key recommendations is shown in *Table 2* (to follow in the Executive Summary). Details on fuel-reduction solutions can be found in *Appendix E*.

The actions and recommendations in this Green Fleet Strategy, if fully implemented, have the potential to reduce the City of Hamilton's fleet GHG emissions by **more than 90% by 2035**.

[5] Results for each Group Two solution include, and build on, the impacts of Group One (best practices). However, each fuel-switching solution is treated independently. That is, other than including Group One solutions as described, they are not cumulative.

Table 1: Key Results of FAR Scenario Analysis

GROUP ONE SOLUTIONS – BEST MANAGEMENT PRACTICES					
FAR Model No.	FAR Scenario	Timing	Vehicle Replacement Capex ($ mil)	Opex Impacts[6] Over 2019 Baseline ($ mil)	GHG Reduction Over 2019 Baseline (t)
3	**Balanced Capex and optimized lifecycles**	Immediate[7]	13.7	-2.82	-17
7	**Best Management Practices** (light-weighting, lower rolling resistance, driver eco-training, anti-idling policy & technologies, route planning and optimization, trip reduction)	Immediate[7]	13.7	-2.77	-2,928

[6] Opex includes the annual cost of capital for any investments in, and implementation of, fuel-reduction solutions.
[7] For data-modelling purposes, "immediate" means a one-year period immediately following the 2019 baseline for the same types of vehicles, the same number of vehicles, travelling the same number of kilometres as the baseline period.

GROUP TWO SOLUTIONS – FUEL-SWITCHING					
FAR Model No.	FAR Scenario[8]	Timing	Vehicle Replacement Capex ($ mil)	Opex Impacts Over 2019 Baseline ($ mil)	GHG Reduction Over 2019 Baseline (t)
8	**E85** (85% ethanol) fuel (passenger, pickups, vans)	Immediate[9]	0.099[10]	+0.3	-4,691
9	**B10** (10% avg. biodiesel - all diesel on-road units)	Immediate[9]	0.099[10]	-0.11	-3,110
11	**Compressed Natural Gas (CNG)** (LD pickups)	Immediate[9]	0.099[10]	+0.34[11]	-3,204
12	**CNG** (Classes 3-6)	Immediate[9]	0.099[10]	+0.3[11]	-3,266
13	**CNG** (Classes 2-8)	Immediate[9]	0.099[10]	-0.5[11]	-4,402
14	**Renewable Natural Gas (RNG)** (Classes 2-8)	Immediate[9]	0.099[10]	-0.5[11]	-8,177
15	**Liquified Propane Gas (LPG)** (LD units - passenger vehicles, pickups, vans)	Immediate[9]	0.099[10]	-0.072[11]	-3,100
16	**LPG** (LD and Truck Classes 2-8)	Immediate[9]	0.099[10]	-1.6[11]	-3,561

[8] Impacts from fuel-switching and BEV phase-in scenarios include, and build on, Group One scenarios (FAR #7).
[9] For data-modelling purposes, "immediate" is the one-year period immediately following the 2019 baseline if the same types of vehicles, the same number of vehicles, travelling the same number of kilometres as the baseline period, were switched to the low-carbon solution(s) being modelled.
[10] The Capex decrease shown is reflective of a recommended moratorium on purchasing new gas- and diesel-powered internal combustion engine (ICE) vehicles until battery-electric units become available (see report).
[11] For data-modelling purposes, the annual cost of capital for CNG or LPG new vehicle upgrades or conversions of existing vehicles were calculated and treated as annual vehicle operating costs (Opex), and then added to each unit's operating expenses. CNG/LPG fuelling infrastructure investment costs were apportioned and also treated as additional vehicle annual operating costs for all units modelled as CNG or LPG. The fast-fuelling system cost assumptions were $1.68M for CNG and $68k for LPG.

GROUP THREE – BATTERY-ELECTRIC VEHICLE PHASE-IN					
FAR Model No.	FAR Scenario[8]	Timing	Average Vehicle Replacement Capex[12, 13] ($ mil)	Average Opex Impact[12,13,14] Over 2019 Baseline ($ mil)	Total GHG Reduction[13] Over 2019 Baseline (t)
21-22	**BEV phase-in** (passenger vehicles only)	Immediate[9] - 2021	2.7	+.35	-2,943
21-24	**BEV phase-in** (passenger vehicles starting immediately-2022 and pickups in 2022)	Immediate[9] - 2022	5.7	+.47	-3,789
21-36	**BEV phase-in** (passenger vehicles starting immediately, pickups starting in 2022, and medium- and heavy-duty (MHD) trucks starting in 2024)	Immediate[9] - 2035	11.7	+1.2	-8,475

[12] For data modelling purposes, the increased cost of capital due to the higher purchase cost of BEVs was treated as an annual operating expense (Opex) increase for all BEV units modelled. The annual cost of capital for infrastructure investment in Level 2 charging (one Level 2 charger for every two BEVs) was apportioned and allocated to each BEV modelled, also as an increase in Opex.
[13] Capex and Opex impacts are averages for the implementation periods shown. GHG impacts are cumulative.
[14] Includes the impact of compounding inflation for each year of the 15-year period at current rate of inflation.

Summary of Key Recommendations

We summarize our main recommendations for Hamilton's Green Fleet Strategy in *Table 2*. Recommendations are a combination of: (1) potential opportunities for improvement of the City's fleet management practices, or "house-in-order" solutions; interim fuel-switching or "messy-middle" solutions; and (3) go-forward actions in preparation for the transition to battery-electric vehicles (BEVs).

Table 2: Summary of Key Recommendations for Hamilton's Green Fleet Strategy

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[15]/ Next Step
1	2	Asset Management	• Follow a historical data-driven lifecycle cost assessment, which is completed by modelling repair, maintenance, fuel, and cost of capital over the vehicle's entire lifecycle to determine the optimal replacement age of vehicles.	Immediate
2	2	Asset Management	• Consider implementing the green fleet asset management best practices recommended by RSI-FC as illustrated in the process flow chart (Page 25). With these processes the fleet will become green and right-sized.	Immediate
3	2	Vehicle Specifications	• Employ a total cost of ownership (TCO) approach to optimize the use of capital. • Consider TCO in competitive bidding proposal structures instead of the lowest compliant bid approach.	Immediate
4	2	Information Technology	• Create an education piece for idling reduction, operating efficiently, and reducing fuel consumption.	Immediate
5	2	Human Resources	• Add a driver eco-training module to existing Professional Driver Improvement Course (PDIC) safe driver training and consider eco-driver training for all drivers.	Immediate

[15] Immediate = 2021; short-term = 2022-2024; long-term = 2024-2035

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[15]/ Next Step
6	2	Fuel Management	• Measure and track fuel consumption and GHGs at the department and user-group levels to track progress and set tangible goals.	Immediate
7	2	Environment (LEED)	• Modernize and/or retrofit Fleet facilities to obtain LEED certification.	May need additional analysis (outside scope of this report)
8	2	Environment (BEVs)	• Invite frontline employees to take BEV test drives to build an affinity towards electric vehicles.	Immediate & short-term as additional BEV models become available
9	4	Deferred Spending (BEV Transition)	• If possible, avoid buying ICE replacement vehicles until suitable BEVs become available.	Immediate & short-term
10	4	15-Year LTCP Strategy	• Strictly through a lens of fiscal planning, prioritize replacement of units with BEVs *only if they would deliver return-on-investment (ROI)*.	Immediate, short-term & long-term
11	4	15-Year LTCP Strategy	• Allocate capital for charging infrastructure in the near-future to meet the demand in the mid- to long-term.	Immediate & short-term
12	4	Balanced Capex and Optimized Lifecycles	• Consider adopting the RSI-FC recommended lifecycle analysis (LCA) approach to extract maximum value from each vehicle.	Immediate
13	4	Balanced Capex and Optimized Lifecycles	• Consider balancing go-forward capital budgets as part of LTCP by deferring replacement of any units evaluated as being in above average, serviceable condition to later fiscal years.	Immediate
14	4	Balanced Capex and Optimized Lifecycles	• When the fleet's average age and uptime rates are determined to be at acceptable levels, consider re-investing in the fleet at the rate of depreciation.	Short-term

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[15]/ Next Step
15	4	Best Management Practices	• Consider job suitability of vehicles before proceeding with light-weighting enhancements.	Immediate
16	4	Best Management Practices	• In conjunction with driver training, consider route planning software, idling reduction initiatives and maintenance checks by integrating GPS tracking software to monitor driver activity and fuel consumption.	Immediate & short-term
17	4	Best Management Practices	• Consider a fuel-efficient driver incentive program in which drivers are incentivized to improve behaviours or reduce their travel.	Immediate
18	4	Fuel-Switching – Ethanol	• Consider the challenges associated with switching to E85, including supply, any additional infrastructure costs, and whether the potentially greater fuel cost is financially prudent. Should the City proceed with this solution, consider a pilot project with several units switched to E85 to determine the extent of the fuel-efficiency loss; if successful, consider a phased-in approach for other appropriate units.	Immediate & short-term
19	4	Fuel-Switching – Biodiesel	• Use a blend of 5% in winter and 20% in the summer and shoulder months. Consider a pilot project with several units switched to higher-blend biodiesel (B20), and if successful a phased-in approach for other appropriate units.	Immediate & short-term
20	4	Fuel-Switching – Natural Gas (including Renewable Natural Gas)	• If compressed natural gas (CNG) is of interest to the City as an interim solution until BEVs are available, investigate subsidies for CNG upgrades and a CNG vehicle fuelling station. Consider a small-scale pilot project with several high-mileage units switched to CNG, and if successful a phased-in approach for other appropriate units.	Immediate & short-term
21	4	Fuel-Switching – Liquified	• If LPG is of interest for high-mileage City units, as an interim solution until BEVs are available, consider a small-scale pilot	Immediate & short-term

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[15]/ Next Step
		Propane Gas (LPG)	project with several high-mileage units switched to LPG, and if successful a phased-in approach for other appropriate units.	
22	4	BEVs	• Consider a pilot project for several BEVs when they become available (e.g., pickups) to track range capabilities and cost savings and assess the units' performance for all seasons and varying weather conditions. Assuming the pilot project is successful, consider acquiring BEVs in bulk to replace units that would provide the greatest ROI.	Immediate & short-term
23	4	BEVs	• Continue to closely monitor the acquisition costs for BEVs and re-evaluate the business case (cost-benefit) for individual units as prices come down. Also continue to monitor the future availability of electric work/cargo vans, which are currently anticipated to be offered in battery-electric versions in the near future.	Immediate, short-term & long-term
24	4	BEVs (Charging Infrastructure)	• If relying on overnight charging infrastructure, consider supplying power to the charging equipment on two separate feeds from the grid to reduce the risk of local failure taking power away from the whole site.	Immediate, short-term & long-term
25	4	BEVs (Charging Infrastructure)	• Consider high-voltage training for technicians and closely monitor the launch of new BEV training programs.	Immediate, short-term & long-term

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Section 1.0: Introduction and Background

Climate change is an important global issue. The United Nations defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods[16]." The term includes major changes in temperature, precipitation, or wind patterns, among others, that occur over several decades or longer[17].

Greenhouse gases (GHGs) are gaseous compounds (such as carbon dioxide) that absorb infrared radiation, trap heat in the atmosphere, increasing global temperature and thus contributing to the greenhouse effect[18]. While there are several GHGs[19] to consider, when calculating emissions the most commonly used measure is carbon dioxide equivalent (CO_2e)[20]. This combines the effects of all the major GHGs into a single, comparable measure.

Over the past several decades, scientific evidence of climate change, also referred to as global warming due to the increasing temperatures of the global climate system, has been vast and unequivocal. Thus, the Paris Agreement (the Agreement, the Accord) was established with a goal of keeping global warming below two (2) degrees Celsius compared with preindustrial times. The Agreement entered into force on November 4th 2016. Canada is a signatory and as so has established aggressive carbon-reduction targets and plans.

In addition to climate change, emissions from engine exhausts also contribute to ground-level air pollution and human health risk. Criteria air contaminants (CACs) contribute to smog, poor air quality, and acidic rain. CACs include several gases, particulate matters and volatile organic compounds[21]. In scientific studies, CACs have been linked to increased risks of respiratory and cardiovascular diseases as well as certain cancers. The World Health Organization reports that in 2012 around seven million people died as a result of air pollution exposure; one in eight of total global deaths were linked to air pollution[22]. According to the American Medical Association, globally, an estimated 3.3

[16] Source: United Nations Framework Convention on Climate Change 1992: https://unfccc.int/files/essential_background/background_publications_htmlpdf/application/pdf/conveng.pdf
[17] Source: EPA. https://www3.epa.gov/climatechange/glossary.html
[18] Source: https://www.merriam-webster.com/dictionary/greenhouse%20gas
[19] GHGs include, but are not limited to carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), sulphur hexafluoride (SF_6), nitrogen triflouride (NF_3), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs).
[20] "Carbon dioxide equivalent is a measure used to compare the emissions from various greenhouse gases based upon their global warming potential. For example, the global warming potential for methane over 100 years is 21. This means that emissions of one million metric tonnes of methane is equivalent to emissions of 21 million metric tonnes of carbon dioxide." Source: https://stats.oecd.org/glossary/detail.asp?ID=285
[21] CACs include Total Particulate Matter (TPM), Particulate Matter with a diameter less than 10 microns (PM10), Particulate Matter with a diameter less than 2.5 microns (PM2.5), Carbon Monoxide (CO), Nitrogen Oxides (NOx), Sulphur Oxides (SOx), Volatile Organic Compounds (VOC), and Ammonia (NH3).
[22] Source: http://www.who.int/mediacentre/news/releases/2014/air-pollution/en/

million annual premature deaths (5.86% of global mortality) are attributable to outdoor air pollution[23], although ambient air pollution has been regulated under national laws in many countries.

With this said, socially responsible commercial and municipal fleets can play an important role in reducing GHG emissions and air pollution.

Fleet Sector Impact

Low-carbon transportation is essential to both short-term GHG and fuel-use reduction and long-term decarbonization of the economy. In 2018, the transportation sector accounted for about 25% of greenhouse gas (GHG) emissions in Canada, second only to the oil and gas sector[24]. Municipalities can play a key role in cutting emissions by transitioning their fleets to low-carbon and/or electric vehicles, while saving fuel and maintenance costs.

The transition to battery-electric vehicles (BEVs) of all classes will be a game-changer when these vehicles come to market in the next several years, both in terms of operational cost savings and the deep GHG emission reductions required to curb the most severe impacts of climate change. With significant and growing commitments to integrating BEVs into fleet operations this effect will continue to be a driving force in the transition to BEVs[25]. With continued improvements in range capability and charging infrastructure as the BEV market expands, the electrification of fleets will accelerate.

About Richmond Sustainability Initiatives

Since 2005, Richmond Sustainability Initiatives – Fleet Challenge (RSI-FC) has collaborated with fleet managers, technology providers, subject matter experts, and auto manufacturers to find viable solutions, technologies, and best management practices for reducing operating costs and vehicle emissions. From the beginning, we have remained a self-supporting and independently funded program without commercial biases or influences, providing fleet review, strategies and management consulting services to dozens of leading private and public sector fleets in Canada and the United States.

RSI-FC has employed our innovative, leading-edge data modelling techniques and our proprietary software for the development of this Green Fleet Strategy Report. Fleet Analytics Review™ (FAR) is a software tool designed and developed by our company specifically for complex green fleet planning. It enables our team to develop short- to long-term green fleet plans and strategies by calculating GHG emissions reductions and return-on-investment (ROI) for various best practices and technologies – all driven by actual historical data. In turn, this allows us to evaluate the business case of each solution and provide meaningful recommendations for long-term capital planning (LTCP).

[23] Source: https://jamanetwork.com/journals/jama/article-abstract/2667043
[24] Source: https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions.html
[25] Source: ChargePoint. Trends & Prediction in Fleet Electrification [pdf]. June 2020.

Through the combination of our experience and the use of our FAR software tool, we are delivering an advanced Green Fleet Strategy and Report for the City of Hamilton that is realistic and achievable.

Background

RSI-FC and the City of Hamilton's partnership dates back to 2005. In 2007, the City of Hamilton was publicly recognized by RSI's E3 Fleet Rating program and was officially recognized as Canada's first E3 Green Rated Fleet. Hamilton achieved significant reductions in fuel consumption and GHG emissions and, in doing so, earned a Silver Level E3 Fleet Rating. Since 2007, 14 more Canadian municipal fleets have followed the City of Hamilton's leadership example to become E3 Green Rated Fleets. Municipal fleets, including Hamilton, that have become E3 Green Fleet Rated set a high standard for others, and are a fine example of green fleet leadership.

During the years 2006 through to 2013, the Cities of Hamilton and Toronto partnered with Fleet Challenge (FC) to deliver the annual Green Fleet Expo (GFX). The GFX was a prime leadership opportunity for the City of Hamilton, which influenced hundreds of other municipalities and private sector companies to reducing their fuel consumption. The GFX was conceived, planned, and delivered by fleet management personnel from the Cities of Hamilton and Toronto in a three-way equal partnership with FC. In each of eight consecutive years, GFX attracted as many as 400 fleet managers from across Ontario and beyond to see and test-drive green, fuel-efficient vehicles, learn about advanced fuel-saving technologies, and hear presentations from recognized subject matter experts.

With a history of green fleet leadership and by engaging our team to develop its new Green Fleet Strategy Report, the City will continue to build its profile as a municipal leader in green fleet development and implementation practices.

As a proactive response to the City's climate change emergency declaration in 2019, a multi-departmental Corporate Climate Change Task Force comprised of City Staff was created. According to the City of Hamilton's Corporate Energy Policy, fleet and transit fuel consumption account for $16 million in operating expenses and 40% of corporate greenhouse gases, highlighting the benefit of implementing green fleet strategies to reduce both fuel-use and GHG emissions. One of the action items for the Task Force is to investigate and identify a plan for all diesel vehicles to be decommissioned by 2030 and all vehicles to be electrified by 2050. This Green Fleet Strategy and Report can play a role in providing viable recommendations and pathways for achieving these goals.

Green Fleet Strategy and Report – Objective

The primary objective of this Green Fleet Strategy and Report was to analyze the City of Hamilton's in-scope[26] fleet operations data and identify and assess operational improvements and new technologies to reduce GHG emissions from Fleet Services vehicles and equipment. The results presented herein are intended to provide an ambitious roadmap to the City of Hamilton in its quest for go-forward fuel-reduction solutions to achieve the goals of the Corporate Climate Change Task Force.

[26] This Green Fleet Strategy and Report does not include EMS, Fire, Transit, or Police fleets.

Section 2.0: Current Practices, Survey Results, and Baseline

In this section, we lay the groundwork for the Green Fleet Strategy and Report by providing a snapshot of the current state of Hamilton's in-scope fleet and fleet management practices. We present the results of our signature Best Management Practices Review™ (BMPR), the results of employee participant surveys, and compare Hamilton's baseline fleet data with urban peers from our proprietary municipal fleet database.

Best Management Practices Review

Over the past 15 years, RSI-FC has completed dozens of fleet reviews for Canadian and U.S. corporate and government entities. In doing so, we repeatedly observed many successful and effective Best Management Practices (BMPs) and Standard Operating Practices (SOPs) that are applicable and potentially beneficial to fleets in all business sectors. These practices range from business structure, human resources, safety, and maintenance practices through to operational policies. Our team concluded that proactive fleet managers would value an impartial, third-party, ground-up, and holistic review of their operations to identify gaps and opportunities for improvement. In response to this defined need, that is how BMPR™ (pronounced: bump·er ['bəmpər]) evolved. Beginning in 2014, and since that time, numerous fleets have participated in, and benefitted from, the BMPR program.

The in-scope fleets for Hamilton's Green Fleet Strategy and Report include Environmental Services (Forestry, Parks, Cemeteries, Horticulture, Refuse and Recycling), Traffic and Maintenance (including Roads), Water and Wastewater, Enforcement, and Planning and Economic development (By-Law, Building and Licensing). The fleets which are *not* included in this report are EMS, Fire, Transit, and Police.

The comprehensive BMPR process is comprised of the following specific areas of interest, each with its own set of focal points/topics:

1. Asset Management
2. Vehicle Specifications
3. Finance
4. Information Technology
5. Human Resources
6. Preventative Maintenance
7. Fuel Management
8. Environment
9. Communications

Section 2.0 (BMPR) is based on our dialogue with, and exchange of operational information with Hamilton's fleet management staff during in-depth BMPR discussions. In each of the nine sections of Section 2.0, we provide Hamilton fleet staff comments (please see headings shown in green font) from our BMPR discussions. Our team's observations and perspectives (please see headings shown in blue font), in which we identify potential gaps and opportunities for improvement for management's consideration.

1. Asset Management

Asset management has been described as "a systematic process of deploying, operating, maintaining, upgrading, and disposing of assets cost-effectively." Doing so effectively depends on having ready access to operating data, then making wise asset-management decisions based on, and informed by that data. In this area of the BMPR, we reviewed Hamilton's cradle-to-grave handling of its in-scope fleet assets.

Determining Lifecycles, the Decision Process for Vehicle Replacement

- For the Hamilton Fleet, the process starts with the fleet planning group – four subsections - planning, maintenance, parts, and materials and fuel, which occurs annually and involves a review of the reserve fund size and annual capital budget, as well as fleet complement analysis.

- Fleet analysis serves as a "first pass" based on a financing model. It is a review of critical factors including: maintenance cost, fuel consumption, mileage, and other factors to determine which vehicles to replace. The biggest trigger for replacement is maintenance cost; it is considered more important than age of vehicle. For example, for an 8-year lifecycle for an SUV, the first trigger is highest repair costs (excludes PM costs as they are fixed).

- Vehicle replacement decisions are based mostly on annual maintenance dollars by classification of vehicles. For example, the current system would favour replacement of a garbage truck vs 10 SUVs in a particular year.

- Every year, after determining vehicle replacement needs, a meeting takes place with fleet user-group representatives to hear their needs and feedback.

- Vehicle replacement is based on condition-based assessment; there is not a rating scale and assessment. Priorities are based on knowledge of the vehicle condition as opposed to fixed timelines.

- The capital budget is currently around $10 M/year.

Gaps and Opportunities for Improvement

- Green fleet asset management best practices recommended by RSI-FC are illustrated in a process flow chart (*Figure 1*, overleaf); with these processes a fleet will become green and right-sized.

- The issue with monitoring (maintenance) cost spikes of a vehicle as it ages is that when a vehicle that is not fully in use is shown as costing less, in reality it can be a stranded asset if it remains under-utilized until retirement/replacement.

- By following a historical data-driven lifecycle cost assessment, which is completed by modelling repair, maintenance, fuel, and cost of capital over the vehicle's entire lifecycle, the optimal replacement age of vehicles can be determined (such as by using RSI-FC's Lifecycle Analysis (LCA) software).

Reserve Fund Sustainability and Auction Proceeds

- For a number of years, contributions to the reserve fund were 54%, which was not sustainable. In the last seven years, it has gone up to 70% to 100%, and now the fund is able to meet the needs of the department.

- Auction funds from end-of-life vehicles go back into reserve funds, eventually being spent on fleet replacements; however, they do not necessarily go into the capital budget for that year.

Process for User Department Adding a Vehicle to Its Fleet

- Approval by council is required. The user department addresses this with Council through the capital budget process or during the year to prove the need is real, user-groups may be asked to provide data to make their business cases.

Real-Time Tracking of Current Book Values of Vehicle Assets

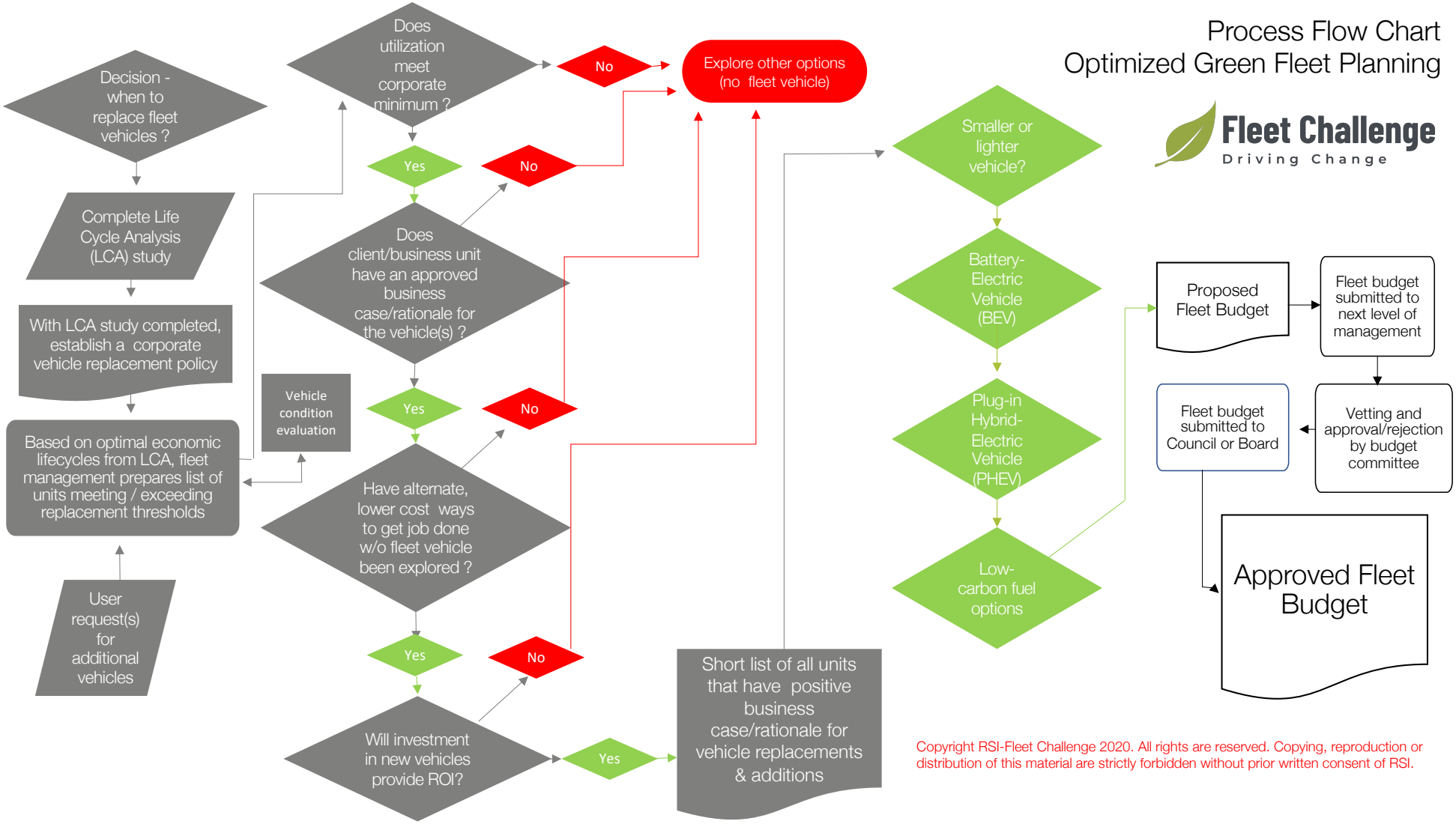
- Hamilton's Finance Department does not keep track of book value of vehicle assets. However, Public Works does have information on the original purchase price and replacement cost of vehicles.

- The Hansen software program that is employed by Hamilton Fleet tracks the original purchase price and the budget replacement cost but not depreciation.

Gaps and Opportunities for Improvement

- Having access to the current book-value of assets would help in determining optimal replacement cycles for different vehicle classes.

Figure 1: Process Flow Chart for Optimized Green Fleet Planning



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Vehicle Categorization Protocol

- In Hansen, there are upwards of 500 vehicle classifications to choose from, which have been narrowed down to 200 choices (still a very high number).

Gaps and Opportunities for Improvement

- Implementing a simpler categorization system, such as a high-level application of the Vehicle and Maintenance Repair Standards (VMRS) system developed by the American Trucking Associations (ATA), would make it far easier for narrowing down vehicle replacement options and making cost-comparisons. The VMRS system is an industry-standard benchmarking method employed by thousands of leading North American fleets.

2. Vehicle Specifications

Fleet managers should always prepare detailed specifications for new vehicles with consideration for past performance of similar vehicles (i.e., the past predicts the future). When planning the go-forward procurement of vehicles and vehicle components (such as engines and drivetrains), fleet managers should give preference to units that have demonstrated the lowest historical total cost of ownership (TCO) and highest reliability.

Management should avoid the pitfall of buying vehicles that simply cost the least to acquire and meet only basic requirements. Historical cost information about makes, models, and components should be frequently reviewed. This step enables informed procurement decisions based on TCO concepts, instead of purchasing vehicles based on lowest price.

Specifications for Tenders or RFQ for New Units

- Typically, once the capital budget is approved, Hamilton's Fleet analysts reach out to user groups to undergo needs-based analysis and discuss the viability of down-sizing when appropriate. For example, a one-ton van is replaced with a ½-ton van that meets operation needs.

- Vehicle demonstrations are scheduled for Hamilton's fleet and it's user-groups, vendors are vetted, tenders are issued, and the contract is awarded to the lowest compliant bidder. The tender is publicly issued for one month. The procurement process from start to finish is approximately three to six months depending on complexity.

- Once the contract is awarded, there are: (1) a pre-building meeting (for anything more complex like a sander or garbage truck), (2) pre-delivery inspections, and (3) final compliance inspections.

- The fleet planning group deems whether the unit is compliant and, if yes, hands it off to the user group. There is a 5-10% contingency line for the builder primarily for custom build projects.

- Multi-year contracts are currently in place.

Gaps and Opportunities for Improvement

- A greater level of knowledge transfer between user groups and procurement (e.g., regarding vehicle manufacturers pricing models and model revisions) may make a more seamless procurement process.

- Employing a total cost of ownership (TCO) approach would likely demonstrate where Fleet Services can optimize the use of its capital.

- Procurement should consider TCO in its competitive bidding proposal structures instead of the lowest compliant bid approach.

Practices Around Vehicle Right-Sizing

- Right-sizing is discussed with user groups and is not formal policy. For example, groups were moved from SUVs to EcoSports. The goal is to achieve the best fuel economy and motivate staff to choose the right size.

- User groups currently have the last right (no policy) because the user group is paying for the unit(s) (users can veto Fleet's recommendations). Fleet Services is trying to inform users that it is not about downsizing but more about right-sizing.

Standardization Regarding Vehicle Specs

- Standardization is a goal with benefits on both the procurement side and the user side from an operational and maintenance viewpoint. Fleet Services is moving in a positive way toward standardization. There is currently a five-year snow plow contract with two different styles of plows, but not multiple designs.

Gaps and Opportunities for Improvement

- Standardization, by limiting the number of brands, as in the example of the snow plows, is known to reduce costs and challenges relating to preventive maintenance (PM) and repairs.

3. Finance

A significant concern for fleet managers is fiscal sustainability – ensuring that the fleet operating budget is sufficient to cover annual operational expenses (Opex), and the annual capital (Capex) budget is adequate for actual vehicle replacement costs. A primary goal for a fleet manager is reducing vehicle capital and operating expenses without negatively affecting service levels (uptime). In this section aim to learn about the vehicle Opex and Capex as well as how vehicle costs are recovered.

Vehicle Ownership

- All fleet vehicles are owned (as opposed to being leased). User groups can rent vehicles through rental contract (local supplier); the only cost for these vehicles is fuel. There are options to use extended services instead of renting if vehicles are in good condition.

Vehicle/Equipment Chargeback System

- Users pay a contribution to the reserve fund for vehicle replacement and pay for PM, demand maintenance, and fuel. There is no extended-service vehicle reserve fund (admin. fee only).
- At the start of 2020, the hourly door rate increased to $116.

Gaps and Opportunities for Improvement

- MBN Canada, which keeps statistics for municipalities, can be used as a reference regarding door rates.

At-Fault Accidents/Negligent Damages

- These claims are dealt with by the risk group. The repair cost are paid by risk group – self-insured up to $50k. There is a small degree of impact on user groups; an annual review of department claims results in fees adjusted accordingly.
- In-house compliance officers are responsible for Professional Driver Improvement Course (PDIC) training.

Gaps and Opportunities for Improvement

- An independent safety review consultant contacted by RSI in 2020 recommends driver training sessions should take place regularly, suggesting intervals of three years.

Equipment Training

- User groups provide equipment-specific training (e.g., operating snow plows, lawn equipment, etc.) in a variety of ways using both internal and external training courses.

4. Information Technology

Fleet asset-management decision-making and analysis are best achieved by using dedicated and purpose-designed "best-of-breed" fleet management information systems (FMIS). For maximum management effectiveness and control, accurate and reliable fleet data is essential for managers to make well-informed, data-driven decisions for their fleet asset base. Hamilton Fleet uses the Hansen system at this time.

Regardless of the system used, an FMIS must list and track all vehicles, department/divisional assignments, cost and maintenance histories, manage fuel usage and reconciliation, schedule preventive maintenance events, track spare parts inventories, ensure audit-readiness, produce management and exception reports, prepare cost analyses, evaluate vehicle performance, provide document trail, and much more.

Route Planning

- Skyhawk GPS systems have been integrated into Hamilton Fleet Services for seven years, but the degree to which they are used is up to user groups. Overall, user groups are receptive to Skyhawk.

Corporate Idling Policy

- There is a corporate idling policy, but user groups set their own parameters and adherence. Driver idling is not looked at by Fleet Services, but there have been idling reduction discussions at the corporate level and Fleet, having driver trainers, is positioned well to being the champion.

Gaps and Opportunities for Improvement

- The creation of an education piece for idling reduction, operating efficiently, and reducing fuel consumption would be a welcome addition.

- Fleet Services can champion idling and GHG reduction initiatives with corporate oversight. Fleet can provide the tools, training, and advice but should not be expected to act as the "police" department; this should be dealt with at the corporate level.

5. Human Resources

Human resources pertains not only to Fleet Services personnel but also to the drivers of the fleet's vehicles, as indicated by the following focal points:

Driver Eco-Training

- Currently driver eco-training is not provided by Fleet Services.

Gaps and Opportunities for Improvement

- A driver eco-training module should be added to existing Professional Driver Improvement Course (PDIC) safe driver training.
- Eco-driver training is recommended for all drivers. Natural Resources Canada (NRCan) Smart Driver program is highly recommended by RSI-FC. See: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/greening-freight-programs/smartdriver-training-series/21048#city

Procedures/Components of the Driver Management Program

- Fleet Services has developed procedures for vehicle cleaning; there is a thorough city-wide Level 1 vehicle cleaning process which applies to operators, cab cleaners, and outside contractors.
- Covid-19 presents additional challenges for in-cab driver training. Operators are required to wear a mask and open a window.
- An additional consideration is changing cabin filters for better air quality (reduced exposure to potential infection).
- Fleet Services is considering in-cab cameras (outward facing towards road, inward facing towards driver).
- Driver training is triggered for certain reasons (e.g., a collision, recruitment) but not scheduled at a certain time interval. Professional Driver Improvement Course (PDIC) training is required for all new CVOR operators as part of their onboarding, for any drivers that have been involved in a preventable collision/incident, and as requested by User Groups.
- Safety and compliance driver manuals and procedures do exist; however, it is in the form of a full book (electronic version) as opposed to specific manuals for each vehicle type.

- Currently, driver's pre-trip inspections are on paper – user groups are asked to keep records and defects should be sent to Fleet Services as a work order.

Gaps and Opportunities for Improvement

- Scheduling professional driver improvement course (PDIC) driver refresher training at regular intervals may be a more risk-averse approach to driver management than having remedial training only.

- Creating individual driver manuals for each vehicle type may increase receptiveness of operators through more concise, targeted procedures which are less time-consuming to read through.

- Transitions to electronic logging devices (ELDs) may increase the efficiency of record-keeping on vehicle history.

- Canadian fleets must start transitioning to electronic logging devices (ELDs). The Transport Canada ELD mandate for commercial drivers is aimed at improving road safety and comes into effect in June 2021.

  Under the Ontario regulation[27], a driver is not required to keep a daily log for the day if:

  - On the operator's instructions, a commercial motor vehicle is driven solely within a radius of 160 kilometres of the driver's starting location.
  - The driver returns at the end of the day to the location from which he or she started.

  Log book exemption can create confusion when dealing with municipalities within 160 kilometres of the drivers starting location. Many believe this exempts municipalities from tracking hours of service. However, if a driver is not required to keep a daily log, RSI-FC believes the operator (the City of Hamilton) may be obligated to maintain records for the day.

- RSI-FC recommends expert legal review of the ELD matter prior to the June 2021 deadline.

6. Preventative Maintenance

A prime indicator of fleet management success is a high level of vehicle uptime. There are only two ways fleet managers can achieve increased uptime: (1) acquire newer, younger vehicles; or (2) ensure a highly effective preventive maintenance (PM) program is in place. If sufficient funds are not available

[27] Source: http://www.mto.gov.on.ca/english/trucks/commercial-vehicle-operators-registration.shtml

for purchasing newer vehicles, then fleet management must ramp up PM activities; otherwise, availability and reliability will suffer while operating costs increase. Safety may also be negatively affected as the fleet's vehicles continue to age.

PM Inspections

- For Hamilton, there are three PM levels:
  - PM C – PMCVI, LOF + inspection
  - PM B – LOF + minor PM
  - PM A – inspection only

- The frequency of inspections is based on a time-based system using the Hansen system, which is set up for three times per year for light- and heavy-duty vehicles.

- High-mileage units are identified by the Service Department and more frequent inspections are set up in Hansen.

- Off-road vehicle inspections are tailored more towards manufacturing specs.

- Regular oil is used. Synthetic oil is used only when required as per OEM standards.

- Waste oil is picked up by a vendor and re-sold/recycled.

- Oil filters are collected for recycling along with waste oil.

7. Fuel Management

The cost of fuel is usually one of the largest controllable costs for most fleets. Proactive fleet managers will make it one of their top priorities to ensure their fleet is as fuel-efficient as possible. Reducing fuel use is critical, both fiscally and environmentally.

A best management practice aimed at reducing fuel usage is to monitor the fleet's corporate average fuel efficiency (CAFE). We feel that CAFE is one of the most important key performance indicators (KPIs) for cost-conscious fleet managers to monitor and take actions for improvement.

CAFE is directly reflective of a fleet's footprint. In essence, CAFE is a measure that encompasses many facets of fleet operations ranging from driver behaviours (such as unnecessary idling, harsh driving, unnecessary trips) to right-sizing of vehicles for their assigned tasks (getting the job done with more fuel-efficient vehicles) to the use of alternate and renewable low-carbon fuels. CAFE is also impacted by the fleet's average age since older vehicles are less fuel-efficient than modern units, they burn more fuel and, consequently, cost more to operate and produce more emissions.

Current Alternate/Renewable Fuels Used in Fleet Services

- Zambonis are run by propane and CNG.
- There is no use of B10 or B20 biodiesel in Fleet Services.
- All packers are currently diesel and some are due for replacement. There is a push to replace them with CNG units but this requires large infrastructure costs.

CNG Infrastructure

- There is a natural gas station at Wentworth Street but it is likely to be decommissioned. Another natural gas station is at HSR (city bus facility) and there is discussion of a new bus facility that will have a fuelling station on site for Transit; this will depend on the level of funding. More than half the Transit Fleet is CNG and there are plans of increased commitment to CNG.
- There is discussion of partnering with a private contractor with a natural gas fuelling site and purchasing fuel. Purchasing retail fuel is not a normal practice; all City vehicles typically use City fuelling sites.

Key Performance Indicators

- Fleet Services currently does not have Key Performance Indicators (KPIs) for PM or GHGs, but there is a KPI for corporate average fuel economy (CAFE).

Gaps and Opportunities for Improvement

- A means of measuring and tracking fuel consumption and GHGs at the department and user-group levels may be beneficial for setting goals and making progress.

8. Environment

In Canada and around the world, leading companies and all levels of government have developed Green Fleet Plans to set out their short- and long-term carbon reduction targets; some may also include strategies for air/land/water pollution reduction.

A Green Fleet Plan may also include the fleet's green initiatives for its maintenance or parking garages. For fleets that outsource maintenance, plans may also define eco-standards for contractors, such as third-party suppliers.

Former Green Fleet Plan

- The former Hamilton Green Fleet Plan is from 2009. It has not been revised or reviewed; however, some deliverables and processes are still valid and in place.

Corporate Carbon Reduction Targets for Fleet Services

- Decommission all diesel vehicles by 2030
- Achieve net-zero carbon emissions before 2050
- Achieve 100% electrification for vehicles by 2050

ISO 14001 Standards

- The environmental management system was up to ISO 14001 standards but has not been refreshed.

Gaps and Opportunities for Improvement

- Consider reviewing the environmental management system with regard to current ISO 14001 standards.

LEED Certification of Fleet Facilities

- Fleet facilities are not LEED certified, but there has been progress in other City buildings.

Gaps and Opportunities for Improvement

- Consider modernizing and/or retrofitting Fleet facilities to obtain LEED certification.

Waste Management

- Initiatives were started years ago to reduce waste and separate garbage and recyclables.
- Filter and oil recycling are in place.
- There is proper storage and disposal of chemical cleaners at wash facilities. All wash pads have interceptors.

Gaps and Opportunities for Improvement

- Improvements can be made for recycling paper and cardboard, as well as for managing toxic waste.

Tire Recapping

- Truck tires are recapped for dump trucks, snow plows, and garbage packers.

Hybrid Vehicles

- There are many hybrid Ford Escapes in Fleet Services. The initiative has had tremendous success – some hybrids are 10+ years old and still performing well.

Battery-Electric Vehicles (BEVs)

- Currently, some reluctancy towards BEVs has been encountered. Fleet Services wants to have a comprehensive strategy and standardization to leverage local support and maintenance by buying in volume.
- There are two Kia Soul BEVs currently in service. As mentioned by Fleet staff, there needs to be a strategy before committing fully (to BEVs). Procurement requires three bids, and Kia was able to meet the City's timelines. Policy allows for circumvention of procurement policy, allowing for single bid.
- Two electric Olympia ice resurfacers are on order, as well as electric shop scrubbers/ sweepers.

Gaps and Opportunities for Improvement

- Operator feedback and employee engagement is important. Consider inviting frontline employees to take BEV test drives to build an affinity towards electric vehicles.

BEV Charging Stations

- There have been discussions of installing municipal charging stations in yards as there is insufficient public charging stations for use by municipal vehicles.

Gaps and Opportunities for Improvement

- With BEV options increasing and light-duty trucks (pickups) expected to be on the horizon within two years, as well as medium- and heavy-duty trucks in several years, it is important that the City allocate capital for charging infrastructure in the near-future to meet the demand in the mid- to long-term.

- A charging infrastructure Incentive program was offered by NRCan at the time of this writing but has since lapsed. See: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/zero-emission-vehicle-infrastructure-program/21876. The Government of Canada announced, through Budget 2019, $130 million over five years (2019-2024) to deploy a network of zero-emission vehicle charging (level 2 and higher) and refuelling stations in more localized areas where Canadians live, work, and play. Support is also available for strategic projects for electric vehicle and/or hydrogen infrastructure for corporate fleets, last-mile delivery fleets, and mass transit. This funding will be delivered through cost-sharing contribution agreements for eligible projects that will help meet the growing charging and refuelling demand.

9. Communications

Open communications and interaction are critical in every organization. Most employees like to feel engaged, empowered, and of value to their organization. Moreover, residents of municipalities appreciate hearing success stories. Good news stories about a fleet, whether regarding new cost-saving measures, safety, good deeds by its drivers, or eco-successes, are welcomed by most people. We believe that the Hamilton Fleet Services should, and can easily be a source of pride for the City, its employees, and its residents.

Media Releases Re: Greening Activities

- Currently, there is not a dedicated communications representative for Fleet Services, but there have been existing staff at the corporate level who have taken on additional responsibilities dedicated to climate change. There is interest from the climate change group to start a dialogue with Fleet Services. Fleet Services believes developing a comprehensive strategy for BEVs is part of the equation, which includes driver engagement and feedback.

Green Fleet Survey Results

Our organization recognizes the value of stakeholder engagement and user group participation in any go-forward plans under consideration for our fleet clients. With that focus in mind, RSI-FC set out to gain staff perspectives from the City of Hamilton's Fleet user groups around their currently assigned vehicle types and opinions/views on environmental issues and green fleet initiatives.

In person, face-to-face discussions are, by far, our teams first choice of available options for gathering information, hearing stakeholder feedback and obtaining buy-in. Unfortunately, due to the coronavirus pandemic, in-person meetings were not possible. Knowing that feedback from stakeholders is critical to go-forward planning, as a workaround we opted to instead conduct web-based online surveys of fleet user groups.

RSI-FC understands the importance of hearing the opinions of *all* stakeholders including both management and unionized staff. It was clearly communicated to all survey recipients that their responses were confidential and anonymous; as so, they were encouraged to express their opinions freely.

From experience RSI-FC knows that online surveys are not the ideal method for collecting opinions and gathering information. It is known in the industry that people are often reluctant to provide their personal opinions in this manner; typically, survey response rates are known to only be in the 10 to 15% range. However, in the absence of a better solution, such as face-to-face discussions, there were no other viable options.

The survey was sent to 343 individuals and we received a total of 32 responses, which translates to a response rate of just over 9%, in and around the range of the industry average. We were pleased that the responses we received were high-quality, rich in content, providing us with valuable feedback which we will discuss in this section. We provide a summary of the results below; for complete results with figures, please see *Appendix A*.

Breakdown of Survey Participants

There was a mix of unionized and management employees who participated in the survey (majority from management), and the majority of participants have worked at the City for 10 years or longer.

Most of the survey participants are middle-aged, and generally the male/female ratio of participants is close.

In terms of vehicle type driven, nearly all the survey participants drive light- to medium-duty passenger vehicles (cars, pickups, and SUVs).

Awareness of Environmental Issues

The overwhelming majority of survey participants agree with and/or support Hamilton's climate change emergency declaration, and there is very strong agreement that taking care of our environment should be a top priority. Global warming is ranked at the number one environmental problem by participants, but air and water pollution are a tied as a close second.

In addition to questions on ranking and level of agreement pertaining to environmental issues, survey respondents were given the chance to provide their own comments on the environment and Hamilton's climate change emergency declaration. One comment in particular, shared below, was eloquently written and was, overall, representative of participants' view on the matters:

"I agree that as a leader in our municipality the city needs to walk to talk. Although there are many pillars to climate change and the climate emergency, I agree that we need to look at our fleet and operating equipment to support the direction."

Another response seemed to be reflective of the individuals thoughts on the matter:

"I think climate change has been occurring for a long time - It's not something new and something should have been done about this long time ago"

Views on Pollution Factors and Fuel-Reduction Solutions

We asked participants about their opinions on various pollution factors, fuel-switching options (i.e., alternate/renewable fuel), and battery-electric vehicles (BEVs), to gain a perspective of views and predominant concerns to address in our go-forward Green Fleet Strategy.

Survey participants agree, overall, that all the pollution factors listed (age, fuel type, maintenance, driving habits, right-sizing, and trip planning) have moderate to large impacts on fuel-efficiency and pollution from fleet vehicles. Fuel type is the leading factor among respondents.

In terms of driving habits and behaviours, survey participants generally agree that fuel-efficient, eco-driver training would help them operate Fleet vehicles, as well as personal vehicles, more efficiently.

Regarding natural gas and propane as fossil-fuel alternatives to gasoline and diesel, survey participants generally agree that both natural gas- and propane-powered vehicles are more economical to drive than their conventional fuel counterparts, are reliable, and are safe to drive.

Regarding biodiesel and ethanol as substitutes for standard diesel and gasoline, respectively, survey participants generally agree that biodiesel and ethanol are feasible and safe fossil fuel substitutes; however, there does appear to be a slight knowledge gap/ lack of certainty surrounding these fuels among respondents. Moreover, there appears to be some concern or opposition surrounding the production of plant-based fuels due to the use of food crops.

Overall, there is strong support for and understanding of zero-emissions BEVs from the survey participants, who are confident in their range capabilities, power, heating/cooling, operating cost savings, pollution prevention, and availability now and in the near future.

Survey participants are, overall, very receptive to the wide range of fuel-reduction solutions listed. The highest rating (4.5/5) is for reducing unnecessary engine idling, while the lowest, yet still favourable, ratings are for renewable fuels (biodiesel and ethanol) and alternate fuels (natural gas and propane), with scores of 3.8/5 and 3.9/5, respectively. The switch to battery-only EVs is highly favoured with a rating of 4.3/5.

Synopsis

Participants were given the opportunity to provide their own comments on the various fuel-reduction solutions as well as “freestyle” section that allowed for comments on greening of the City of Hamilton’s fleet at large. There were several common areas of interest and concern which we have outlined below:

- Modernizing fleet units is preferred to extending the use of older units because of lowered emissions and repair costs.
- There is some interest in using renewable natural gas (RNG) from the City’s green bin waste to fuel vehicles and later, when the majority of the fleet transitions to BEVs, to use RNG to heat buildings.
- Regarding BEVs, there were numerous concerns regarding the pollution caused by the production of batteries as well as their disposal and recycling.
- Regarding BEVs, there is some uncertainty pertaining to cost savings vs capital costs.
- Regarding BEVs, there is some concern regarding the non-renewable electricity sources to fuel BEVs and their associated GHG emissions.

Based on the results of this survey and participant comments, it is clear that Fleet's user-group stakeholders are supportive of green fleet initiatives and aware of their benefits, particularly driver training, idling reduction, modernizing the fleet, downsizing/right-sizing, alternate fuels (natural gas and propane), and BEVs. Importantly, there appears to be a high level of willingness to participate in the City of Hamilton's transition to low-carbon vehicles and BEVs.

Baseline KPIs and Peer Fleet Comparison

RSI-FC collected baseline data of Hamilton's in-scope fleet from Fleet staff. The dataset provided to our team included a list of units, makes/models/years, asset values and ages, descriptions, fuel type, fuel cost, repair costs, and maintenance costs for a one-year review period (2019). Downtime data was not available for Hamilton. As a workaround, RSI estimated downtime based on an algorithm that assumes a unit is out of service when being repaired and, thus, repair hours are commensurate with downtime. It should be noted that the 12 peer municipal fleets tally downtime using inconsistent methods; downtime data provided may therefore be unreliable and we have provided it for informational purposes only.

RSI loaded input data into our proprietary software, Fleet Analytics Review™ (FAR), and completed a baseline analysis. In *Tables 3* and *4*, we compare a number of key performance indicators (KPIs) with other urban municipalities from our proprietary municipal fleet database.

Table 3: KPIs for Hamilton's fleet and municipal fleet database

KPI	Metric	Hamilton Fleet Units Included	Hamilton	Benchmark Data – 12 Urban Municipal Fleets
Corporate Average Fuel Economy (CAFE)	L/100 km	Vehicles + equipment	36.1	31.4
Average Downtime	Days/unit	Vehicles + equipment	10.9	7.4
Average PM Cost	$/unit	Vehicles only	$1,085	$1,897
Average Repair Cost	$/unit	Vehicles only	$4,482	$4,513
Average Cost of Capital	$/unit	Vehicles only	$1,337	$1,477
Average Age	Years	Vehicles + equipment	7.5	5.6

KPI	Metric	Hamilton Fleet Units Included	Hamilton	Benchmark Data – 12 Urban Municipal Fleets
Average Vehicle Kilometres - Travelled (VKT)	Km/unit	Vehicles only	13,246	14,889
Cost per Km	$/km	Vehicles only	$1.80	$0.97

Table 4: KPIs for Hamilton's fleet and municipal fleet database, by vehicle category

KPI	Metric	Vehicle Categories	Hamilton	Benchmark Data – 12 Urban Municipal Fleets
Average Age	Years	LD (Class 1, 2)	7.0	4.6
		LD Trucks (Class 3)	7.3	6.6
		MD Trucks (Class 5)	8.8	4.8
		HD Trucks (Class 7, 8)	7.2	7.4
		Equipment	9.5	-
Average VKT	Km/unit	LD (Class 1, 2)	13,625	15,222
		LD Trucks (Class 3)	16,829	13,022
		MD Trucks (Class 5)	11,810	13,683
		HD Trucks (Class 7, 8)	10,665	10,799
		Equipment	-	-
Cost per Km	$/km	LD (Class 1, 2)	$0.34	$0.62
		LD Trucks (Class 3)	$0.81	$0.62
		MD Trucks (Class 5)	$1.12	$3.05
		HD Trucks (Class 7, 8)	$2.45	$3.41
		Equipment	-	-

From the baseline data presented in *Tables 3* and *4*, there are several key points that we would like to outline, including:

- Hamilton's corporate average fuel economy (CAFE) and downtime are both higher than urban peers, potentially because its fleet is older by about two years (older vehicles are less fuel-efficient and often less-reliable).

- The cost per km is likely skewed to the high end in comparison to peers due to the inclusion of equipment in our analysis.

- Light-duty (LD) passenger cars, pickups, vans, and SUVs (Class 1, 2) as well as medium-duty (MD) trucks (Class 5) are considerably older than these same categories in peer fleets; however, the higher age of vehicles does not appear to be reflected in the cost per km for these vehicle categories (significantly lower than peer fleets).

- In comparison to Hamilton's peers, light-duty trucks (Class 3) are slightly older, are driven substantially more, and cost more per km, highlighting a potential area of focus for the City and the opportunity for significant fuel cost savings through acquisition of BEVs.

This preliminary analysis sets the stage for the main purpose of this Green Fleet Strategy and Report – specifically, to inform and model several fuel-reduction solutions for the City of Hamilton Fleet Services vehicles and equipment and provide an ambitious, yet feasible, long-term capital plan to achieve deep GHG emissions reductions.

Section 3.0: Approach and Methodology

RSI-FC maintains that fuel-reduction plans must be sustainable – both environmentally and financially. For this reason, RSI-FC's approach to developing our recommendations for Hamilton's sustainable fuel-reduction strategy is based on data modelling of the current situation and completing research on a number of go-forward solutions.

To achieve optimal efficiency in completing this type of analysis, our team developed Fleet Analytics Review™ (FAR), a software tool designed specifically for complex green fleet planning and evaluation of short- to long-term fuel-reduction strategies, both in terms of cost savings and GHG reductions.

About Fleet Analytics Review™

Fleet Analytics Review™ (FAR) is a user-friendly, interactive decision support tool designed to aid our team and fleet managers in developing short- to long-term green fleet plans by calculating the impacts of vehicle replacement and fuel-reduction solutions on operating costs, cost of capital, and GHG emissions. Moreover, it is used for long-term capital planning (LTCP) through an approach that works to balance, or smoothen, annual capital budgets and avoid cost spikes if possible. For a detailed FAR description, please see *Appendix B*.

Fuel-use and GHG reduction solutions were analyzed using FAR, designed to efficiently estimate the cost-benefit and GHG emissions reduction potential of many best management practices (BMPs), low-carbon fuels, and current or emerging technologies that have been proven to be beneficial to commercial and municipal fleets. The tool was used to evaluate these options in the context of the existing fleet being reviewed. That is, after optimizing lifecycles and implementing "house-in-order" strategies, fuel-saving options were modelled for units due for replacement to determine if they would deliver operating cost savings over subsequent fiscal years (after baseline to year 2035) and, if so, the potential GHG emissions reductions.

FAR will be licensed in perpetuity to the City of Hamilton for its internal use post-project. The FAR model is dynamic, and users can easily run future scenarios (such as assessing different vehicle types, fuels, or engine/drivetrain combinations) to see how such decisions impact operating expenses – ahead of their implementation, thereby heading off potentially costly errors.

Go-Forward Fuel-Reduction Solutions

Fuel-reduction solutions can generally be grouped into three categories – (1) best management practices (BMPs); (2) fuel switching; and (3) battery-electric – as described below (details on all fuel-reduction solutions researched by RSI-FC can be found in *Appendix E*):

1) **Best Management Practices.** FAR calculated the cost-benefit and GHG reduction, unit-by-unit and fleet-wide, of BMPs or "house-in-order" strategies including operational improvements such as fuel-efficient driver training, route planning, etc., as well as vehicle specifications enhancements such as improved aerodynamics, reduced rolling resistance, light-weighting, and others.

2) **Fuel Switching.** FAR calculated the cost-benefit and GHG reduction, unit-by-unit and fleet-wide, of switching vehicle fuels from fossil-based (e.g., diesel) to alternate ones that are less fossil-based (e.g., natural gas) or to renewable fuels (e.g., biodiesel).

3) **Battery-Electric Vehicles.** FAR calculated the cost-benefit and GHG reduction, unit-by-unit and fleet-wide, of switching to battery-electric vehicles (BEVs). Transitioning to BEVs is the ultimate GHG reduction strategy for a fleet. In this report, we model tailpipe emissions reduction; switching to electric reduces fuel consumption by 100% applying this method. However, in terms of lifecycle GHG emissions, BEVs are "fuelled" by electricity needed to charge the battery(ies), which can indirectly use fossil fuel depending on the source of electricity.

Fuel-reduction solutions will have variable rates of success. For example, if a fleet opts for aerodynamics packages on their trucks it may takes years to phase them in fully, so full fuel-savings results will accrue over a period of time. Similar logic applies to best practices. With driver training, for instance, given that humans all have different rates of learning and information retention, bad driving habits may creep back in over time (or conversely, drivers may improve over time).

The most effective idle-reduction strategy for a fleet often entails a combination of complementary technologies and best practices. For instance, several of the solutions have variable rates of adoption, such as electronic engine parameters, extra cab insulation, and driver training. The right combination will depend on the fleet's routes, fuel costs, climates of operation, maintenance cycles, training methods, driver support, fleet policies, and other factors.

Similarly, regarding fuel switching, fuel-use reduction potential will also be dependent on a multitude of factors, including driver training and habits, climates of operation, and maintenance cycles. For switching to BEVs, which can be regarded as a fuel switch with the source of "fuel" being the power grid, tailpipe emissions are zero and thus there is no range of fuel-reduction potential at the source (i.e., 100% reduction is achieved at the tailpipe). However, the amount of electricity that is needed to power these units will depend on the same aforementioned factors, influencing operation costs and GHG emissions depending on the source of electricity.

Steps to Producing Hamilton's Green Fleet Strategy

RSI-FC employed a multi-step approach in low-carbon, green fleet planning for Hamilton's Green Fleet Strategy. The steps include:

1) **Baseline Analysis.** At the outset, it is crucial to confidently know the current fleet baseline in terms of several key performance metrics ranging from cost, service levels (such as utilization and availability rates), and GHG emissions. For this step, we completed a FAR baseline analysis.

   For Hamilton, we received baseline data of the in-scope fleet from City staff. The dataset provided to our team included a list of units, makes/models/years, asset values and ages, descriptions, fuel type, fuel cost, repair costs, and maintenance costs for a one-year review period (2019). We loaded this input data into FAR and completed a baseline analysis.

2) **Business-as-Usual Review**. Most fleets have in place standard, business-as-usual (BAU) protocol/policies regarding vehicle replacement, capital budgeting, and fleet modernization planning. Fleet management generally employs pre-determined vehicle replacement guidelines (such as vehicles that will be replaced every "x" years or "y"-thousand kilometres travelled). Using FAR, RSI-FC analyzed the long-term outcomes of the fleet's current-day BAU vehicle replacement practices in terms of impacts on annual capital budgets, operating costs, and the GHG impacts of BAU budgeting.

3) **Lifecycle Analysis.** With RSI-FC's proprietary lifecycle analysis (LCA) software tool, our team input the fleet's historical data to calculate the optimal economic lifecycles for each vehicle category in the fleet. Please see more details of LCA practices and specifics for Hamilton later in this section.

4) **Data-Modelling Optimized Lifecycles.** With the fleets optimal economic lifecycles calculated via LCA modelling, we input these vehicle replacement cycles into FAR to data-model the outcomes in terms of long-term capital budgets. For Hamilton, we modeled a 15-year capital budget plan to year 2035 and go-forward operating cost and GHG emission impacts.

5) **Business Case Optimization.** For many of our client's fleets once optimized lifecycles have been modelled in FAR, it becomes very apparent that some vehicles deliver better return-on-investment (ROI) than others. One reason is that some vehicles that due for replacement based on the client's current replacement practices may have had lighter usage than other similar age units. For vehicles in better condition, service life can be extended to optimize the total cost of ownership (TCO). Lower ROI would result if a vehicle, still in good condition, was replaced prematurely; value will be lost.

For Hamilton, the approach used by RSI-FC's data analysts was to *defer* replacement of some vehicles to the ensuing capital budget years to ensure full value is received from each unit. Fleet managers everywhere make tough vehicle replace-or-retain decisions like this each year to optimize the use of available capital. Using RSI-FC's ROI-based approach to deferrals, year-over-year long term capital budgets can be balanced. Ideally, this step should be completed by Fleet staff based on vehicle condition assessments and to balance go-forward annual capital budgets. Without any knowledge of vehicle condition, for this step our team deferred any units which, based on the data provided, were shown to have lower operating costs (including cost of capital) than if replaced. This step allowed us to balance Hamilton's long-term capital budgets based on optimal ROI.

6) **"House-in-Order" Actions.** Before making commitments to fuel-switching or low-carbon technologies, RSI-FC believes it's essential to first get a fleet's "house in order" to save fuel and reduce GHG emissions. By this, we are referring to best management practices (BMPs) that should first be put in place, including:

   - **Enhanced Vehicle Specifications**. Low rolling resistance tires, aerodynamic vehicles, light-weighting, idle-reduction technologies, etc.
   - **Transportation Demand Management.** Trip reduction/avoidance and route planning/optimization
   - **Driver Training and Motivation.** Managing driver behaviours with eco-training and idle-reduction policies
   - **Fleet Downsizing.** Reducing the total number of low-utilization vehicles by undertaking a review to determine if some vehicles can be eliminated through early decommissioning
   - **Right-Sizing.** Specifying the correctly-sized vehicles for the job at hand

7) **"Messy-Middle" Solutions.** BEVs are undisputedly the optimal solution to GHG reduction and, for higher annual-mileage units, cost savings. However, today, only a limited number of BEV types are available. Battery-electric trucks (BETs) are coming, but in the meantime, many municipalities are seeking to get started with reducing their fleet GHGs right away. For these fleets, including the City of Hamilton, an intermediate answer is fuel-switching – transitioning away from fossil gasoline and diesel to alternate, lower-carbon fuels like propane and natural gas, or renewable fuels like ethanol and biodiesel.

In *Figure 2*, published lifecycle and combustion (tailpipe) emission factors[28] associated with many alternate and renewable fuels as per GHGenius[29] are shown.

Figure 2: Emissions Factors for Various Transportation Fuels

LIFECYCLE Emissions Factors				
	kg eq Co2 / L	Tonnes eq Co2 / L	lbs. eq Co2 / gallon (US)	Tons eq Co2 / gallon (US)
Gas	3.352	0.00335	27.974	0.01399
Diesel	3.543	0.00354	29.568	0.01478
B2 biodiesel	3.488	0.00349	29.110	0.01456
B5 biodiesel	3.406	0.00341	28.424	0.01421
B10 biodiesel	3.269	0.00327	27.281	0.01364
B20 biodiesel	2.995	0.00300	24.994	0.01250
B50 biodiesel	2.173	0.00217	18.135	0.00907
B100 biodiesel	0.803	0.00080	6.701	0.00335
E10 ethanol	3.138	0.00314	26.188	0.01309
E85 ethanol	1.344	0.00134	11.219	0.00561
CNG	2.939	0.00294	24.528	0.01226
Propane	2.107	0.00211	17.584	0.00879
CNG/gasoline	0.000	0.00000	0.000	0.00000
CNG/E10	0.000	0.00000	0.000	0.00000
Gas/propane	0.000	0.00000	0.000	0.00000
H2	0.000	0.00000	0.000	0.00000

Combustion (Tailpipe) Emissions Factors				
	kg eq Co2 / L	Tonnes eq Co2 / L	lbs. eq Co2 / gallon (US)	Tons eq Co2 / gallon (US)
Gas	2.216	0.00222	18.493	0.00925
Diesel	2.717	0.00272	22.674	0.01134
B2 biodiesel	2.664	0.00266	22.232	0.01112
B5 biodiesel	2.584	0.00258	21.568	0.01078
B10 biodiesel	2.452	0.00245	20.461	0.01023
B20 biodiesel	2.187	0.00219	18.248	0.00912
B50 biodiesel	1.391	0.00139	11.608	0.00580
B100 biodiesel	0.065	0.00006	0.542	0.00027
E10 ethanol	2.143	0.00214	17.884	0.00894
E85 ethanol	0.369	0.00037	3.079	0.00154
CNG	2.128	0.00213	17.762	0.00888
Propane	1.525	0.00153	12.727	0.00636
CNG/gasoline	0.000	0.00000	0.000	0.00000
CNG/E10	0.000	0.00000	0.000	0.00000
Gas/propane	0.000	0.00000	0.000	0.00000
H2	0.000	0.00000	0.000	0.00000

Source:
GHGenius version 3.11

For biodiesel, the emissions per unit mass/volume decreases as the biodiesel blend increases; however, fuel economy needs to be considered as well. The fuel economy for blends from B5 up to B20 is better than diesel; using blends in this range improves fuel economy and lowers GHG tailpipe emissions on the order of approximately 10 percent (see details in *Section 4.0* and *Appendix E*). To be conservative, we can estimate a tailpipe GHG reduction of at least several percent using biodiesel blends in this range.

For ethanol fuel blends, although both lifecycle and tailpipe measurement methods demonstrate CO_2e reductions on a per liter basis, net GHG reduction is greatly reduced and

[28] Source: GHGenius V 3.11, Natural Resources Canada. https://www.nrcan.gc.ca/energy/efficiency/transportation/7597
[29] GHGenius is a spreadsheet model that calculates the amount of greenhouse gases generated from the time a fuel is extracted or grown to the time that it is converted in a motive energy vehicle to produce power. Whether the fuel is burned in an internal combustion engine or transformed in a fuel cell, GHGenius identifies the amount of greenhouse gases generated by a wide variety of fuels and technologies, the amount of energy used and provided, and the cost effectiveness of the entire lifecycle.

will be more on the order of a few percent. This is because, in order to do the same work as gasoline, a much greater volume of ethanol is required (see details in *Section 4.0* and *Appendix E*). In FAR analysis, RSI-FC compensated for the estimated reduction in fuel-efficiency for ethanol blends.

Similarly, for compressed natural gas (CNG), to compare energy on an apples-to-apples basis, RSI-FC analyzed the amount of natural gas required to obtain the same energy content as a litre of diesel, also known as the diesel-litre equivalent (DLE). Based on the same work performed, a CNG vehicle has tailpipe emissions about 20-30% less than a comparable diesel or gasoline vehicle (see details in *Section 4.0* and *Appendix E*).

8) **Battery-Electric Vehicle Phase-in Planning.** Despite the advantages of BEVs, few, if any fleets would – or could – replace all their internal combustion engine (ICE) units immediately with BEVs given capital budgets constraints and the fact that BEV offerings are quite limited at this time. This means that BEVs must be phased-in over many years. For this reason, in our data-modelling for Hamilton RSI-FC data-modelled the gradual impacts of fleet BEV adaptation on a 15-year phased-in basis.

We believe that phasing-in of BEVs should occur based on optimized lifecycles to balance long-term budgets based on ROI. In other words, the first units to be replaced with BEVs should be those that have been assessed as the optimal candidate vehicles that will deliver the best ROI. These are typically units with higher utilization and fuel consumption.

For this purpose, FAR was used by our team to identify the units that will provide ROI if replaced by a BEV-equivalent. In a data-modeling exercise, our team then balanced Hamilton's go-forward capital budgets by making the switches from ICE to BEV units in sync with fiscal years in which the type/categories of BEVs are expected to be available.

For Hamilton, given that some units did not show ROI when replaced with a BEV, we phased-in BEVs (in accordance with the expected availability of BEV types) until eventually, by 2035, all units with anticipated battery-electric options in the market would be replaced. Our team reasoned that this approach was most appropriate given the objective of this report is to provide a roadmap for deep GHG emissions reduction, despite some lower mileage units being unlikely to deliver ROI if replaced with a BEV based on our modelling.

Lifecycle Analysis

Lifecycle analysis (LCA) is a structured approach to determine the best time to replace vehicles and equipment in terms of age, mileage, or other pertinent factors. LCA provides the empirical justification for replacement policies and facilitates the analysis and communication of future replacement costs.

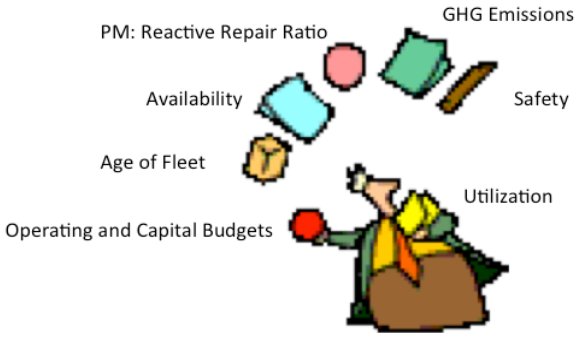
As LCA identifies capital strategies that will optimize vehicle lifecycles and return-on-investment (ROI), it should be the first step in long-term capital budget planning (LTCP).

LCA illustrates the total lifecycle cost of fleet vehicle types/categories. LCA can help determine:

- The age at which units should be considered for replacement.
- When replacement should occur, ideally before costs rise and reliability/safety is reduced, and before significant capital expenditure or refurbishment is necessary.

As shown in *Figure 3*, fleet management is a complex juggling act. Capital investment, operating expenses, depreciation, preventive maintenance levels, fuel consumption, aging of the fleet, availability, utilization, emissions, and inflation are interconnected issues. Making a change to any one of these critical considerations impacts all of them.

Figure 3: Fleet Management Juggling Act

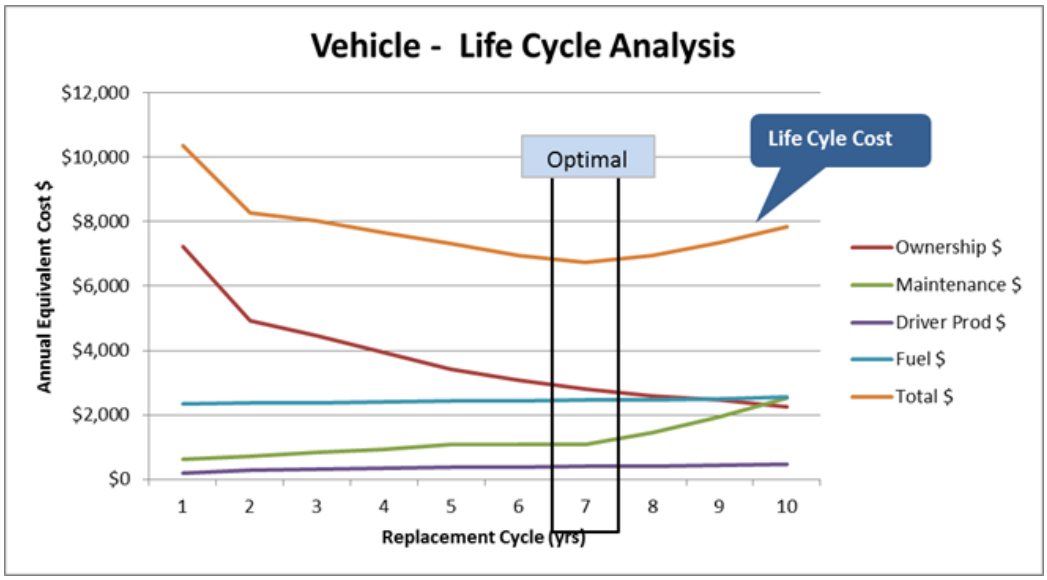


For example, deferred capital spending will result in an aging fleet, in turn resulting in higher reactive repair rates, more downtime, higher fuel consumption, (potentially) increased operating costs, and, ultimately, a larger overall fleet size to allow for more spare vehicles to compensate for the reduced reliability of primary vehicles. Counter to this, if vehicles are replaced too soon, value may be lost.

RSI-FC believes that the key to success is knowing the optimal economic lifecycle for each type of vehicle in a fleet. With that information, fleet managers can balance their go-forward capital spending to align with service level (uptime) and operating expenses (opex), and other essential success measures.

Figure 4 illustrates the concept of LCA. As a vehicle's age at retirement increases, ownership costs decrease and operating costs increase. In this example, the operating costs include maintenance, loss of driver productivity caused by reduced vehicle reliability, and fuel consumption. The sum of operating and ownership costs represents the “lifecycle cost curve.” The ideal time to replace vehicles is before the rise in operating expenses begins to outweigh the decline in ownership costs.

Figure 4: Lifecycle Analysis Example



The Lifecycle Cost Curve

The "lifecycle cost curve" and the ideal replacement cycle will be different for various types of vehicles and possibly even for individual vehicles of the same kind. Factors that can cause this variability include differences in vehicle makes/models, model year, equipment design, operating environment, or even operator habits. Recommended replacement cycles for a class of vehicles is an approximation of the optimal time to replace most units within that class based on the category-average cost and performance data, by model year.

Replacement cycles should be considered a guideline only, as some vehicles in poor or unsafe condition may require replacement before the criteria are met. Conversely, some vehicles that exceed the criteria may be in good condition and may not warrant replacement. Fleet managers need to exercise judgment and fleet management principles in either advancing replacement or delaying replacement of individual vehicles case by case.

Lifecycles for vehicles are determined by modelling the expected cash flows for owning and operating the vehicle. The approach involves forecasting a stream of costs over a study horizon (future period) for each type of vehicle and determining the replacement cycle that results in the lowest total cost of ownership (TCO).

For the City of Hamilton, a discounted cash flow analysis was completed for each vehicle class to complete the LCA. Net present value (NPV) was calculated for outgoing cash flows (vehicle purchase cost, maintenance cost, the impact of downtime on driver productivity cost, improved fuel efficiency

of a new vehicle compared to the old vehicle) and incoming cash flows (vehicle residual value) to calculate the total lifecycle cost for various vehicle retention periods.

The NPV amounts for cash flows were converted to annual equivalent cost (AEC) to provide a dollar amount, which is easy to relate to and enables comparison of alternative lifecycle costs. AEC is the fixed annual payment that that would be required to pay back the total of capital and operating costs over the study period. The AEC can be viewed as an average annual cost that considers the time value of money for future cash flows.

Fleet Age and Reliability

Most drivers know from personal experience that older vehicles are less reliable, break down more frequently, cost more to repair, and burn more fuel. Multiply that reality many times over as in a commercial fleet, and the impacts can be significant. In general, as commercial vehicle fleets age, higher operating expenses are incurred due to increased reactive repairs (unplanned repairs and breakdowns). Due to decreased reliability, downtime costs for spare/loaner vehicles increase as does the cost of productivity loss for drivers who are dependent on fleet vehicles to perform their daily work routines.

Downtime costs increase exponentially when more than one person is dependent on a single vehicle to complete their work routines. In addition to the cost of less reliable, aging vehicles and the associated increased downtime are the additional expenses of owning, maintaining, licensing, insuring and, parking spare, back-up vehicles.

Even when downtime is minimized through a rigorous preventive maintenance program, downtime costs are unavoidable and can be substantial for a municipality. Ongoing, uninterrupted capital re-investment in modernizing the fleet is critical to any organization that depends on a reliable fleet of vehicles to achieve its objectives and mission, as is the case for all municipalities. The benefits of a newer fleet include better fuel economy, increased vehicle uptime, lower risk of repair, increased safety and, possibly, improved employee morale. Moreover, a more modern and reliable fleet may result in a reduced fleet size since fewer spares will be necessary.

Providing capital to replace units each year with new vehicles is essential in for any organization that relies on its fleet to provide its core services to customers. A guideline for fleet replacement is to invest capital at the rate of depreciation. For example, if vehicles are depreciated over ten years, then 10% of replacement cost would be required each year to maintain the fleet's average age at the desirable level. However, this guideline is only valid if performance indicators such as uptime and fuel-efficiency are satisfactory. If not, a one-time increase in spending would help bring the fleet's average age and performance up to an acceptable level.

Vehicle Replacement Criteria

Today's vehicles are built better and last longer than ever before. With the right preventive maintenance, operating conditions, and driver behaviours, vehicle service lives can often be extended longer than in the past. The LCA completed for this report optimizes vehicle lifecycle costs based on vehicle age. Vehicle age was determined to be the best replacement criteria for the City of Hamilton, given the relatively low average utilization rates in the fleet. Because annual kms-travelled are low, most vehicles will time-out versus mileage-out at retirement.

For a few vehicle classes in Hamilton's fleet (Class 1 passenger vehicles, pickups, Class 2 vans and utility vans, Class 6 utility vans, and several Class 7 & 8 trucks), we recommend extending lifecycles. That stated, we strongly recommend a cautious approach before doing so. Vehicles approaching their end-of-lifecycles should be assessed case by case with a thorough ground-up and top-down physical assessment of the vehicle's condition, as this would serve to inform and confirm decisions around extending their lifecycles.

For higher annual mileage vehicles in the fleet, it is recommended that the City of Hamilton review the condition of high mileage vehicles at thresholds of 20,000 km/yr for light-duty vehicles (LDVs) and 25,000 km/yr for medium and heavy-duty vehicles (MHDVs) for potential early replacement. This decision should take place on a case-by-case basis as vehicles approach maximum age and km thresholds. The recommended vehicle replacement age can be multiplied by these values to determine mileage thresholds. For example, if the recommended lifecycle is ten years for a vehicle type, the recommended replacement mileage is 10 x 20,000 = 140,000 km.

Vehicle Replacement at the Rate of Depreciation

A guideline for fleet replacement is to invest capital at the rate of depreciation. For example, if new vehicles are amortized over five years, then 1/5th (20%) of the fleet's current NPV would be required each year to maintain the average age of the fleet at the desirable level.

Nb: This guideline is only valid if performance indicators such as uptime and fuel-efficiency are satisfactory – if not, then a one-time increased capital expenditure would help to bring the fleet's average age and performance up to an acceptable level.

Environmental Considerations

LCA is used to evaluate whether the increased costs of capital for newer, more modern, and fuel-efficient vehicles will be offset by lower fuel, repair, and downtime costs. For low-mileage units, the amount of fuel saved may be minimal, often resulting in lifecycle extension being the better financial option. However, aging a fleet to extract full value from each unit will defeat the fleet's progress toward modernization and reduced GHG emissions. For the City of Hamilton, when modelling

battery-electric vehicle (BEV) replacement, some units did not show ROI due to increased cost of capital exacerbated by low utilization. Given the objective of this report is to provide a roadmap for deep GHG emissions reduction, we phased-in BEVs (in accordance with the expected availability of BEV types) until by 2035, all units with anticipated battery-electric options in the market are replaced.

Key Parameters and Assumptions

The key LCA parameters and assumptions used for all vehicle classes are listed in *Table 5*.

Table 5: Key LCA Parameters and Assumptions

Parameter	Value	Description
Net Acquisition Cost	Varies by vehicle class	Based on average vehicle acquisition cost provided by the City of Hamilton
Cost of Capital/ Lease Rate	3.95%	Cost of funds for vehicle acquisition (the prime interest rate at the time of the LCA)
Discount Rate for NPV	1.75%	Rate used to discount cash flows
Sales Tax Rate %	1.76%	HST rate - municipalities
Tech. Prod Loss Hrs./Touch	2.5	Average loss in driver productivity each time a fleet technician services a vehicle. Work orders are deemed equivalent to "touches"
Tech. Labour Rate $/Hr.	$116	Estimated/typical hourly labour rate
CIF[30] on Maintenance	1.8%	Cost increase factor or inflation on parts and mechanic labour
CIF on Driver Rate	1.5 %	Cost increase factor or inflation on driver loaded labour rate
CIF on Vehicle	2%	Cost increase factor or inflation on vehicle replacement prices
CIF on Fuel	4%	An assumption based on market trends
Annual Vehicle Efficiency Improvement	2%	Fuel efficiency improvement factor for new vehicles compared to the vehicles being replaced (estimated by Fleet Challenge)
Average Km/Yr.	Varies by vehicle class	Annual distance travelled under the assumption that the new vehicle will travel the same distance as the old vehicle
Cash Flow Horizon (yrs.)	Varies by vehicle class	Discounted cash flow study period, adjusted based on the vehicle class (up to 20 years) and years of available data

[30] CIF = Cost Inflation Factor

LCA is based on average costs and utilization rates for each category of vehicles and provides a credible guideline to optimal vehicle replacement cycles. LCA does have limitations since its outcomes are based on average cost data for each category of vehicles. Some vehicles in poor or unsafe condition may require replacement before the LCA-calculated age criteria are met. Conversely, some vehicles that exceed the criteria may still be in good condition and not warrant replacement due to low usage or recent refurbishment. Therefore, the LCA-recommended replacement criteria should be used as a guideline and not an absolute rule. The physical condition of each unit should then be assessed case-by-case by trained and knowledgeable staff, familiar with the unit's usage and maintenance history before replacement decisions are finalized.

Data Challenges

The discipline of completing fleet LCA is dependent on historical cost data. LCA modelling software was designed and intended to be populated with a fleet's actual historical cost data. Without having cost data and performing LCA, vehicle replacement decisions may be based solely on intuition and personal observations – essentially the sentiments of someone who has a high degree of familiarity with the fleet. Often we have observed that “guesstimates” made by seasoned fleet managers can have a high degree of accuracy. However, today’s business decisions based on “gut” feelings often do not stand up to scrutiny and must be backed up by analytical data.

For the City of Hamilton, our team used an LCA modelling tool developed by RSI-FC in 2013 and refreshed in 2017. Our tool is dependent on actual fleet historical data when available for the model years and vehicle types being studied.

The City provided our team with records and data for its fleet. Despite good record-keeping, data was insufficient for some classes and ages of vehicles. More data means larger sample sizes that are essential for completing LCA. As a workaround, RSI-FC filled gaps in the City’s data with statistics from our proprietary database of Canadian municipal fleets. Our team has collected this data over more than 15 years and represents the results of fleet reviews and analyses we have completed for dozens of Canadian cities, towns, and regions. Being the amalgam of data from almost 50,000 municipal vehicles, our data was determined to be a suitable proxy for the City’s actual information.

For two vehicles/categories, including a Class 6 bus (just one in the fleet) and Class 6 utility vans, the sample sizes were insufficient due to the small number of Hamilton fleet units. Hamilton’s dataset included just one Class 6 bus and eight Class 6 utility vans – much less data than the minimum required for LCA. For these categories, data available from our municipal peer fleet database was used to fill data gaps[31].

[31] Peer municipal fleet data is highlighted in green in the LCA models prepared by our analysts.

LCA was completed for these vehicle categories based on Hamilton's actual historical operational data:

- Class 1 passenger vehicles
- Pickups (Classes 1 & 2)
- Class 2 vans and utility vans
- Class 3 pickups and utility vans
- Class 5 trucks
- Heavy-duty trucks (Classes 7 & 8)

Given the data shortcomings we've described, we also completed LCA by augmenting Hamilton's data with data from our municipal peer fleet database. The following LCAs are based mainly on peer data:

- Class 6 bus (one unit)
- Class 6 utility vans

Lifecycle Analysis Results Summary

LCA was calculated for each in-scope vehicle category in Hamilton's fleet. The LCA findings and recommended lifecycles are based on historical data from Hamilton's fleet, compiled by units and by ages for the review period. For two vehicle categories (Class 6 bus and Class 6 utility vans), LCA was conducted using peer fleet data as there was insufficient data from Hamilton's fleet due to a small number of units.

The LCA took into consideration the cost of downtime (as caused by reduced reliability), the year-to-year "rollup" of weighted average cost of capital (WACC), inflation, worker cost/hour, salvage and market values, inflation, and average kilometres-driven data. The results are summarized in *Table 6*. In *Appendix C*, we have included the LCA charts for each of vehicle category in Hamilton's fleet.

Table 6: Lifecycle Analysis Results Summary

Vehicle Category	Current Planned Lifecycles (years)	*Optimal Lifecycle Calculated through LCA (years)	Lifecycle Applied in FAR (years)	Recommended Change (+ or -) (years)	Data Source/Notes
Passenger (Class 1)	6 to 8	11	11	+3 to +5	Based on Hamilton fleet data[32] Assess each unit case-by-case based on accumulated km and vehicle condition
Pickups (Class 1-2)	8 to 10	7 to 11	Same as original	Unchanged	Based on Hamilton fleet data Assess each unit case-by-case based on accumulated km and vehicle condition
Class 2 vans and utility vans	8 to 10	9 to 10	10	0 to +2	Based on Hamilton fleet data Assess each unit case-by-case based on accumulated km and vehicle condition
Class 3 pickups & utility vans	8 to 10	5 to 6	Pickups same as original, utility vans 6	Pickups unchanged, utility vans -4	Based on Hamilton fleet data The decision to replace early should be based on a unit-by-unit condition assessment
Class 5 trucks	8 to 10	8 to 9	Same as original	Unchanged	Based on Hamilton fleet data
Class 6 buses	20	19 to 20	Same as original	Unchanged	Based on benchmark fleet data from municipal database
Class 6 utility vans	10	16	16	+6	Based on benchmark fleet data from municipal database Assess each unit case-by-case based on accumulated km and vehicle condition

[32] In the FAR input data provided by the City, several Ford Escapes listed as having a 6 year (72 month) lifecycle.

Class 7 trucks	8 to 12	8 to 9	9	-3 to +1	Based on Hamilton fleet data Assess each unit case-by-case based on accumulated km and vehicle condition
Class 8 trucks	7 to 20	9	9	-11 to +2	Based on Hamilton fleet data Assess each unit case-by-case based on accumulated km and vehicle condition

*Based on minimum annual operating costs and minimum rolling 3-year average operating costs

We strongly encourage the City of Hamilton to have Fleet Technicians complete vehicle condition evaluations during every preventive maintenance inspection. In this way, decisions around extending vehicle lifecycles can be founded on data and a solid understanding of each vehicle's actual condition. A simple rating system such as a numerical 1 to 5 indexing where 1 = poor condition and 5 = good condition would greatly assist capital budget planners in determining the highest priority units for replacement, If each vehicle's condition rating (1 to 5) was posted in each vehicle's profile in the Hansen system, it could be easily accessed for capital budget planning.

As we have described, vehicles approaching their end of lifecycle should be assessed case by case. A thorough ground-up and top-down physical assessment of each vehicle's condition, in conjunction with routine shop visits for preventive maintenance inspections, would serve to inform decisions around extending vehicle lifecycles.

Long-Term Capital Planning

After completing lifecycle analysis (LCA), the Fleet Analytics Review™ (FAR) software tool enables methodical, well-informed business decisions for long-term capital planning (LTCP) purposes.

Vehicle data provided by the City of Hamilton for the baseline year (2019) was input into FAR from the fleet's baseline data. The FAR tool calculated capital budgets for the ensuing fifteen years driven by vehicle lifecycles based on fleet management's vehicle retention practices (business as usual or BAU) and the optimized lifecycles that were calculated by RSI-FC's LCAs. On a unit-by-unit basis, FAR calculated (1) whether replacing units due for replacement would save Hamilton operating expenses or cost additional money, and (2) the GHG reduction impacts of vehicle replacements. The tool also calculated and displayed the costs (operating and capital) and GHG impacts of those decisions for the fleet as a whole.

Fleet management does not usually have unlimited capital budgets and so, they must make tough decisions around which vehicles to replace and which to delay replacement. Typically, when a fleet manager uses LTCP for the first time, year one will show a cost spike caused by previously deferred vehicles. Replacement of some of these units can be again delayed because they are still in good serviceable condition, have low mileage, or perhaps have just received a costly refurbishment that will extend the unit's life. Other vehicles may no longer have a purpose in the organization and could potentially be eliminated from the fleet.

For these reasons, each vehicle shown as due for replacement in the LTCP should be reviewed one-by-one and decisions made whether to extend the units life by one (or more) years or eliminate it from the fleet altogether. These decisions can be aided by an LTCP tool by displaying to the user whether a cost-saving is possible by replacing it.

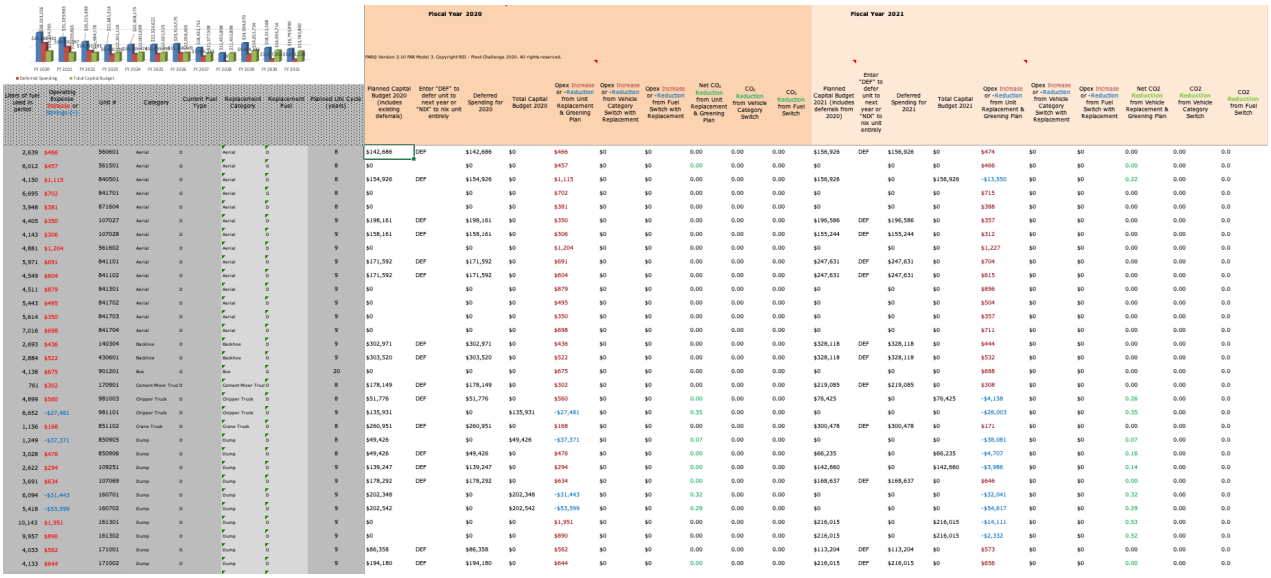
In FAR, replacement of units shown not to provide ROI can be deferred to the following year until replacement yields a net decrease in operating expenses (Opex). Following this method, a fleet manager can balance go-forward annual capital expenses (Capex) and avoid year-over-year cost spikes. This approach can keep the average age of the fleet at an acceptable level, provide the lowest cost and highest uptime, and reduce emissions.

While historical data in FAR will demonstrate whether a business case exists for vehicle replacement, the final step in LTCP depends on fleet management personnel's expertise. *No software tool can supplant this crucial role in capital budget planning.*

For the City of Hamilton, we modelled a 15-year budget cycle (to 2035) for business-as-usual (BAU) vehicle retention practices, optimized lifecycles, balanced Capex and optimized lifecycles (only replacing units with ROI), and a number of fuel-reduction solutions (additional best practices or “house-in-order” actions, fuel-switching or “messy-middle” solutions, and BEV phase-in planning).

A sample screen of the 15-year capital budgeting within FAR is shown in *Figure 5*.

Figure 5: Sample FAR Dashboard



FAR Scenarios

Using optimized lifecycles, we performed a number of scenario analyses to assess the potential impacts of fuel-reduction solutions. For each scenario, FAR calculated annual GHG emissions, operating costs, and capital requirements, which provided a long-term capital planning (LTCP) outlook from baseline to 2035.

In total, RSI-FC data-modelled the fleet's 2019 baseline statistics. We then assessed 35 low-carbon solutions (scenarios) in three groups, and we calculated the potential impacts of each relative to the 2019 baseline. These "what-if" scenarios assessed the potential outcomes if each of the low-carbon solutions were in place for the same vehicles, the same number of vehicles, travelling the same number of kilometres as in 2019.

Details and results for individual scenarios can be found in *Appendix D*. Highlights of FAR scenarios are described below and listed in *Table 7*.

- In FAR #1 (the 2019 baseline), we identified the outliers[33] and tallied the average performance for all categories of vehicles.

- In FAR #2, we assessed the potential impacts (annual GHG emissions, operating costs, and capital required) of optimized vehicle replacement practices based on our LCA study of Hamilton's fleet categories.

[33] For the purposes of this analysis, outliers are defined as vehicles with operating statistics (such as costs, fuel consumption, utilization, availability) 50% lower or higher than average for similar vehicles in the fleet. Outliers are identified within the FAR baseline data model.

- In FAR #3, using optimized lifecycles from FAR #2, going forward from the 2019 baseline, we performed long-term capital budget balancing by "replacing" (hypothetically) only those units which were shown to provide ROI. Our analysis team then data-modelled many low-carbon scenarios starting from after the baseline year to 2035 to evaluate the cost-effectiveness and GHG reduction of each (FAR #4 onward).

- In FAR #4-6, we assessed the potential impacts of several best management practices (BMPs) for the existing fleet that we believe should be addressed at the outset, prior to any more costly upgrades or replacements. FAR #3 essentially became our "new" baseline (new baseline #1). The cumulative impacts of implementing all of these BMPs, or "house-in-order" strategies, are modelled in FAR #7.

- In FAR #8 to 16, we data-modelled several "messy-middle" scenarios involving switching different combinations of vehicle classes to alternate and renewable fuels. The fuels we modeled are proven and mature green fleet, low-carbon solutions that may be possible today while awaiting the commercial availability of suitable BEVs. It is important to note that these scenarios also included replacement of some light-duty ICE units with BEVs in sync with fiscal years in which the type/categories of BEVs are expected to be available. FAR #7 served as a second "new" baseline (new baseline #2) under the assumption that all prior "house-in-order" strategies would be implemented. *Note: FAR #10, calling for a switch from diesel to gas, was not aligned with the main objective of guiding the City to achieve deep GHG emissions reductions from its fleet; therefore, we opted to exclude this scenario from our main analysis.*

- In FAR #21-36, we assessed the potential impacts of a long-term phase-in of BEVs, starting from the FAR #7 baseline (new baseline). We modelled the replacement of units due for replacement with BEVs in the light-duty (LD) category (cars, SUVs) starting immediately and 2021, which are currently the only options currently available. We then modelled the replacement of pickups starting in 2022, and medium- and heavy-duty (MHD) trucks beginning in 2024. Please see *Table 7* (below).

Table 7: City of Hamilton – Low-Carbon Fleet Scenarios

FAR #	Solution Description	Timing of Implementation for FAR Data Modelling
1	Baseline BAU	2019
2	Optimized lifecycles	Immediate
3	Balanced Capex and optimized lifecycles	Immediate
4	Enhanced Specs: light-weighting, LRR	Immediate
5	Driver Behaviours: eco-training & anti-idling policy/technologies	Immediate
6	TDM: route planning/optimization & trip reduction	Immediate
7	All house-in-order strategies (3, 4, 5 & 6)	Immediate
8	Fuel Switch: E85 (passenger, pickups, vans)	Immediate
9	Fuel Switch: B10 (annual blend, annualized – all diesel on-road units)	Immediate
10	Fuel Switch: diesel to gas (LMD)	Immediate
11	Fuel Switch: CNG LD (pickups)	Immediate
12	Fuel Switch: CNG MHD (Classes 3 to 6)	Immediate
13	Fuel Switch: CNG LMHD (Classes 2 to 8)	Immediate
14	Fuel Switch: RNG LMHD (Classes 2 to 8)	Immediate
15	Fuel Switch: LPG LD (passenger, pickups, vans)	Immediate
16	Fuel Switch: LPG LMHD (LD & Truck Classes 2 to 8)	Immediate
21, 22	BEV: LD (passenger)	Immediate
23, 24	BEV: LD passenger & pickups, bus	Immediate and onward (LD passenger) 2022 onwards (LD pickups)
25-36	BEV: LD passenger & pickups, bus, MHD trucks	Immediate and onward (LD passenger) 2022 onwards (LD pickups) 2024 onwards (MHD trucks)

Section 4.0: Hamilton's Low-Carbon and BEV Transition Plan

The primary objective of this Green Fleet Strategy was to analyze the City of Hamilton's in-scope fleet operations data and identify and assess operational improvements and new technologies to reduce GHG emissions from Fleet Services vehicles and equipment. Note that this Green Fleet Strategy does not include EMS, Fire, Transit, or Police fleets.

This baseline included data on service levels (uptime and utilization), operating costs, fuel consumption, and GHG emissions during the review period (2019). From the baseline, we modelled the impacts on go-forward 15-year budget cycles (to 2035) for business-as-usual (BAU) vehicle retention practices, optimized lifecycles, balanced Capex and optimized lifecycles (only replacing units with ROI), and a number of fuel-reduction solutions (additional best practices or "house-in-order" actions, fuel-switching or "messy-middle" solutions, and BEV phase-in planning). Details and results for individual scenarios can be found in *Appendix D*.

In this section, for simplicity and effectiveness, we encapsulated the FAR scenario results as one single 15-year long-term capital planning (LTCP) strategy, providing a roadmap for the Energy Fleet and Facilities (EFFM) Division of Public Works to implement the various solutions to year 2035.

The emphasis of our roadmap to 2035 is on BEV phase-in, as this is the most effective long-term GHG reduction strategy for a fleet as battery-electric technology continues to advance. Our team reasoned that this approach was most appropriate given the objective of this report is to assist Hamilton's Fleet Services to achieve deep GHG emissions reduction, despite some lower mileage units being unlikely to deliver ROI if replaced with a BEV based on our modelling.

Deferred Spending Recommended

The most impactful and perhaps controversial recommendation in our 15-year plan is to avoid and defer replacement – if at all possible - of any internal combustion engine (ICE) units that are due for replacement until BEV replacements are available for purchase.

We realize the difficulties of carrying out such a recommendation. However, it is widely known and accepted by automotive experts everywhere, including RSI-FC, that the world is clearly moving away from ICEs for BEVs. There is little – if any – remaining doubt about this reality.

BEV replacements are coming – pickups are expected to be available in 2022 and at least two manufacturers are already accepting orders for new pickups. Medium- and heavy-duty trucks are expected to be available by 2024 (or sooner).

Fleet vehicles are long-term investments with lifecycles of 10 years or longer. With that in mind, we assert that it would not be wise for Hamilton to invest capital in dying-technology ICE vehicles when BEVs, with all their known advantages, including potentially lower costs, less maintenance, etc., are just around the corner. An ICE vehicle purchased today will be an anachronism in just a few years and as so, a poor investment. Examples from the recent past include cassette tapes versus CDs, celluloid film versus digital media, and so on. In hindsight, few would choose to invest in these examples of past-tense technologies knowing they would soon become obsolete.

RSI-FC's position and our recommendation for Hamilton is to, if at all possible, avoid buying ICE replacement vehicles until suitable BEV units are available.

We acknowledge that deferring vehicle replacements until BEVs are available will be challenging. Extending the life of currently in-service ICE vehicles will require creative solutions – short-term rentals, open-ended leasing, vehicle refreshes or repairs may all form part of the range of answers to extending the lives of the Hamilton fleet's current ICE units until suitable BEV replacements are available. Each unit would need to be evaluated on a case-by-case basis.

FAR Scenario Results – 15-Year LTCP Strategy

Table 8 (overleaf) shows the year-by-year impacts of many possible low-carbon solutions that we evaluated in RSI-FC's 15-year low-carbon and BEV transition plan (15-year LTCP strategy). We present these as possible low-carbon solutions for the City of Hamilton's in-scope fleet vehicles, in terms of year of implementation, GHG emissions, changes in controllable operating costs (relative to the baseline year), and capital required for each option. *Figure 6* (overleaf) displays the same results but in graphical form.

Our team began by establishing the fleet's 2019 baseline (FAR #1). We then data-modeled optimized vehicle replacement practices (FAR #2), and then we balanced Capex year-over-year by replacing only those units which were shown to provide ROI (FAR #3).

Starting from FAR #3, we next data-modelled several additional best management practices (BMPs) in FAR #4-6 (Group One), which included:

- Enhanced vehicle specifications, including light-weighting and low-rolling resistance (LRR) tires (FAR #4);
- Driver eco-training and anti-idling policy and technologies (FAR #5); and
- Transportation demand management (TDM), including route planning/optimization and trip reduction (FAR #6).

The cumulative impacts of these best management practices (BMPs), or “house-in-order” strategies, are modelled in FAR #7.

Starting from FAR #7, which served as a new baseline under the assumption that all prior “house-in-order” strategies would be implemented, we data-modelled several “messy-middle” scenarios (Group Two) involving switching different combinations of vehicle classes to alternate and renewable fuels (FAR #8-16), which included:

- Ethanol-85 (E85) for flex-fuel capable passenger vehicles, pickups, and vans (FAR #8);
- B10 biodiesel (annualized blend, with B20 used in summer months and B5 used in winter and shoulder months) for all diesel on-road units (FAR #9);
- Compressed natural gas (CNG) for light-, medium-, and heavy-duty (LMHD) vehicles (three scenarios, FAR #11-13);
- Renewable natural gas (RNG) for LMHD vehicles (FAR #14); and
- Liquid propane gas (LPG) for LMHD vehicles (two scenarios, FAR #15-16).

These “messy-middle” solutions are proven and mature green fleet, low-carbon solutions that may be possible today while awaiting the commercial availability of suitable BEVs.

Starting from FAR #7 (new baseline #2), we assessed the potential impacts of a long-term phase-in of BEVs (Group Three) to 2035 for units due for replacement (FAR #21 to #36), including:

- Replacement of light-duty (LD) passenger vehicles (cars, SUVs) starting immediately-2021, which are the only options currently available (FAR #21, 22);
- Replacement of pickups starting in 2022 (FAR #23, 24); and
- Replacement of medium- and heavy-duty (MHD) trucks beginning in 2024 (FAR #25-36).

Although some units did not show ROI when replaced with a BEV due to increased cost of capital, we phased-in BEVs until eventually, by 2035, all units with anticipated battery-electric options in the market would be replaced. Strictly through a lens of fiscal planning our recommendation to the City of Hamilton is to prioritize replacement of units with BEVs *only if they would deliver ROI*.

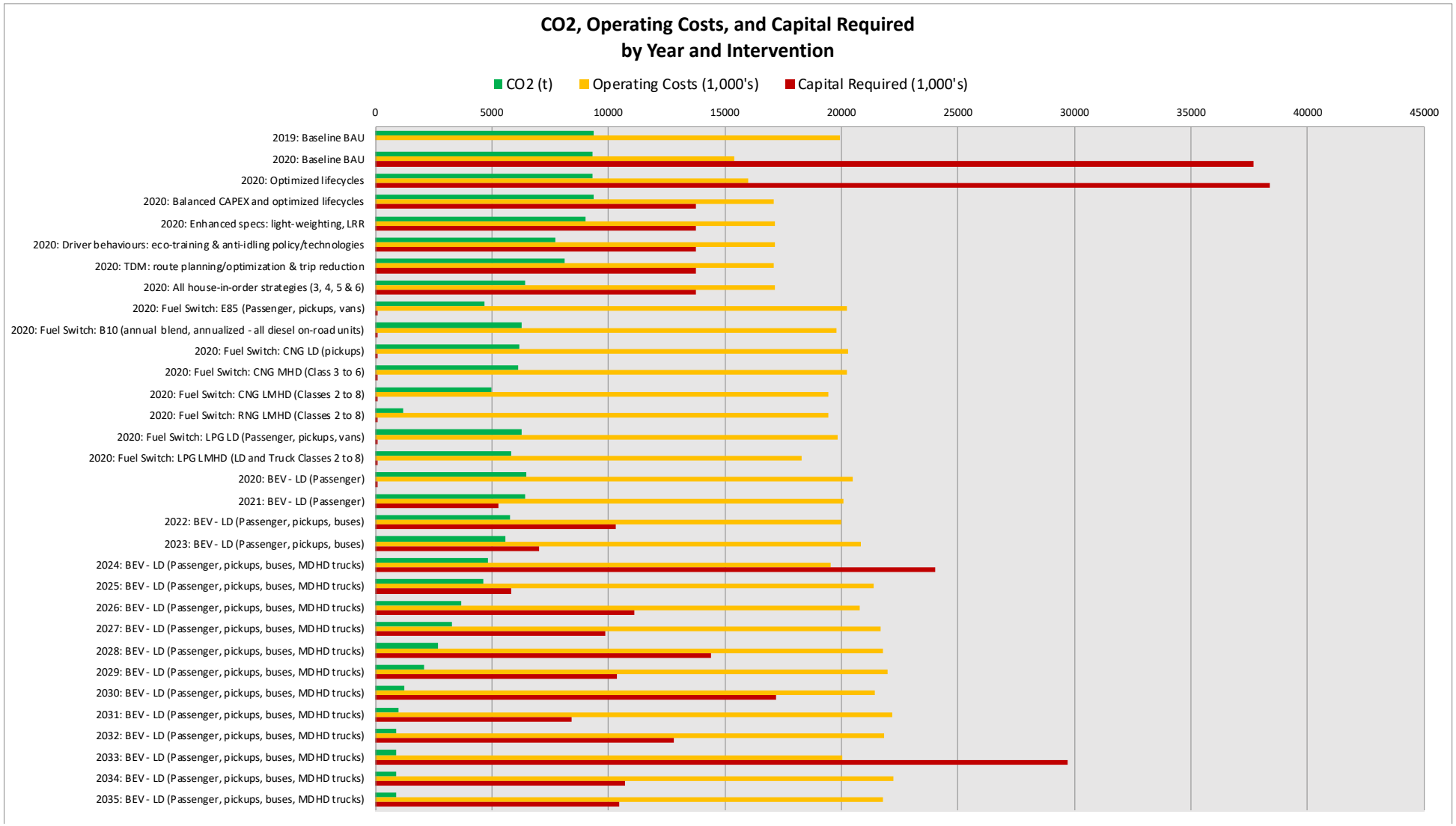
Table 8: Low-Carbon and BEV Transition Plan for City of Hamilton

FAR #	Solution	Timing of Data Modelling	CO_2 (t)	Projected Operating Costs (1,000's)	Projected Capital Required (1,000's)
1	Baseline BAU (current lifecycles)	2019	9,371	$19,912	$37,660
2	Optimized lifecycles	Immediate	9,308	$15,971	$38,333
3	Balanced Capex and optimized lifecycles	Immediate	9,354	$17,097	$13,735
4	Enhanced Specs: light-weighting, LRR	Immediate	9,010	$17,118	$13,735
5	Driver Behaviours: eco-training & anti-idling policy/technologies	Immediate	7,702	$17,116	$13,735
6	TDM: route planning/optimization & trip reduction	Immediate	8,094	$17,103	$13,735
7	All house-in-order strategies (3, 4, 5 & 6)	Immediate	6,443	$17,143	$13,735
Moratorium on buying new ICE vehicles until BEVs become available					
8	Fuel Switch: E85 (passenger, pickups, vans)	Immediate	4,680	$20,208[34]	$99
9	Fuel Switch: B10 (annual blend, annualized – all diesel on-road units)	Immediate	6,261	$19,800	$99
11	Fuel Switch: CNG[35] LD (pickups)	Immediate	6,167	$20,253	$99
12	Fuel Switch: CNG MHD (Classes 3 to 6)	Immediate	6,105	$20,209	$99
13	Fuel Switch: CNG LMHD (Classes 2 to 8)	Immediate	4,969	$19,408	$99
14	Fuel Switch: RNG LMHD (Classes 2 to 8)	Immediate	1,194	$19,408	$99
15	Fuel Switch: LPG LD (passenger, pickups, vans)	Immediate	6,271	$19,840	$99
16	Fuel Switch: LPG LMHD (LD & Truck Classes 2 to 8)	Immediate	5,810	$18,291	$99
21	BEV: LD (passenger)	Immediate	6,454	$20,466	$99
22	BEV: LD (passenger)	2021	6,428	$20,052	$5,286
23	BEV: passenger, pickups, bus	2022	5,789	$19,966	$10,328
24	BEV: passenger, pickups, bus	2023	5,582	$20,800	$7,033

[34] Operating expenses were shown to increase with E85 due to reduced fuel-efficiency plus minor additional fuel-handling expenses.
[35] To data-model the additional capital costs for CNG and LPG, including both the conversion costs for LMD vehicles (or upgrades to CNG for new class 8 HD units), and the cost of one (1) CNG fast-fill station ($1.68m) or one (1) LPG station ($68k), we apportioned these costs across all units selected for CNG or LPG assessment. The cost of capital was applied to each unit selected for CNG or LPG modelling as an additional annual operating expense.

FAR #	Solution	Timing of Data Modelling	CO_2 (t)	Projected Operating Costs (1,000's)	Projected Capital Required (1,000's)
25	BEV: passenger, pickups, bus, MDHD trucks	2024	4,813	$19,528	$24,035
26	BEV: passenger, pickups, bus, MDHD trucks	2025	4,609	$21,357	$5,822
27	BEV: passenger, pickups, buses, MDHD trucks	2026	3,679	$20,781	$11,086
28	BEV: passenger, pickups, buses, MDHD trucks	2027	3,305	$21,660	$9,875
29	BEV: passenger, pickups, buses, MDHD trucks	2028	2,677	$21,771	$14,398
30	BEV: passenger, pickups, buses, MDHD trucks	2029	2,097	$21,987	$10,362
31	BEV: passenger, pickups, buses, MDHD trucks	2030	1,259	$21,408	$17,176
32	BEV: passenger, pickups, buses, MDHD trucks	2031	1,005	$22,180	$8,419
33	BEV: passenger, pickups, buses, MDHD trucks	2032	897	$21,827	$12,823
34	BEV: passenger, pickups, buses, MDHD trucks	2033	896	$20,044	$29,707
35	BEV: passenger, pickups, buses, MDHD trucks	2034	896	$22,205	$10,700
36	BEV: passenger, pickups, buses, MDHD trucks	2035	896	$21,755	$10,462

Figure 6: Low-Carbon and BEV Transition Plan for City of Hamilton



Synopsis – 15-Year LTCP Strategy

In *Table 8* and *Figure 6* (above), we are recommending a plan to the City of Hamilton that calls for a moratorium on purchasing new ICE vehicles for the short term (two years for pickups, four years for MHDVs), while waiting for battery-electric counterparts to become available. The exception, of course, is for LD passenger BEVs which are currently available, such as the Kia Souls being acquired by the City, as well as other comparable options such as the Chevrolet Bolt. Our position is that fleets should re-consider buying fossil-fuelled units because internal combustion engine (ICE) vehicles are quickly becoming an outdated and archaic technology, and BEV replacements will soon be available. The purchase of new ICE vehicles now, whether gasoline or diesel, means that a fleet, like the City of Hamilton's Fleet, will commit to using new fossil-fuelled vehicles for approximately the next decade when zero-emissions BEVs, which are often more economical than their fossil-fuel counterparts, are just around the corner.

If Hamilton decides to proceed with a plan that is similar to the one RSI-FC is suggesting and have a moratorium on purchasing new (otherwise fossil-fuelled) vehicles, we recommend, in the interim, to allocate capital towards charging infrastructure required for the transition to BEVs for all vehicle categories. While both the transition to CNG and BEVs requires large infrastructure investments, as will be outlined in the next section (*Section 4.0)*, the cost of a fast-filling CNG station (well in excess of $1m CAD) is far greater than that of a DC fast charger ($50-200k[36] CAD).

In *Figure 6* (above), we can see that while CO_2e emissions decrease sharply over the next 15 years according to the plan we have proposed, there is a slightly increasing trend in operating costs, which may be counterintuitive given the enormous fuel savings potential for BEVs. This occurs for two reasons: (1) the cost of capital is currently greater for BEVs and we have assumed this to be the case going forward; and (2) we have included compound inflation in our analysis at a rate of 2.2%.

Fuel cost savings, for some units, are not great enough to offset the increased cost of capital due to relatively low mileage. Of course, the higher the kilometres travelled, the stronger the business case for BEVs becomes. For the City of Hamilton, the relatively high usage of Class 3 trucks potentially makes these vehicle very suitable candidates for BEV replacement. There is the likelihood that the acquisition cost of BEVs will decline with time as both supply and demand increase, and as battery technology continues to improve. However, we did not want to make this assumption based on speculation; rather, our FAR analysis uses current, real data as much as possible and limits assumptions.

In terms of capital costs, from *Figure 6* (above) the average annual capital required for each year of RSI-FC's BEV phase-in plan is about $11.7m. This is reasonable considering that the current replacement cost of the entire in-scope fleet, from our baseline analysis, is about $112m. Estimating

[36] Source: https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf

an average lifecycle to be 10 years, the annual capital required in our suggested LTCP is, roughly, on pace with the rate of depreciation ($112m divided by $11.7/year is roughly equal to 10 years).

Although some units did not show ROI when replaced with a BEV due to increased cost of capital, we phased-in BEVs until eventually, by 2035, all units with anticipated battery-electric options in the market would be replaced. Strictly through a lens of fiscal planning, our recommendation to the City of Hamilton is to replace units with BEVs *only if they would deliver ROI*. As mentioned, the relatively high-mileage Class 3 trucks potentially makes these vehicles very suitable candidates.

Solutions – Overview, Impacts, Feasibility, and Recommendations

Next, we provide details on all fuel-reduction solutions proposed in our 15-year low-carbon and BEV transition plan for the City of Hamilton. More details on all solutions that have been researched by RSI-FC, including the ones presented to the City, can be found in *Appendix E*.

Balanced Capex and Optimized Lifecycles

Overview

Once optimized lifecycles were modelled, it became apparent that some vehicles deliver better return-on-investment (ROI) than others. Some vehicles in the fleet may have received lighter usage than other similar age units, which may have been worked harder. For vehicles in better condition, their service life can be extended to optimize their lifetime total cost of ownership (TCO). Lower ROI would result if a vehicle, still in good condition, was replaced prematurely; value will be lost.

For Hamilton, the approach used by RSI-FC was to defer some vehicles to ensuing capital budget years to ensure full value is received from each unit. In data-modeling, without knowledge of the physical condition of units due for replacement based on vehicle ages, our analysts instead deferred vehicles showing low/no ROI to following budget years in order to balance annual year-over-year capital budgets. This step was intended to be an example of balancing long-term budgets using optimized lifecycles and ROI – in reality, fleet managers make similar decisions each year based on vehicle condition assessments and other information, such as maintenance history.

Impacts

In *Table 9*, we show the estimated impacts of optimized lifecycles, as determined by LCA, and balancing of long-term capital budgets as we have described. This scenario depicts “like-for-like” vehicle replacements (i.e., replacing gas-powered units with similar new gas-powered units) and prior to any new green fleet interventions.

Table 9: FAR Results for Balanced Capex & Optimized Lifecycles (FAR #3)

FAR Model No.	FAR Scenario	Timing	Vehicle Replacement Capex ($ mil)	Opex Impacts Over 2019 Baseline ($ mil)	GHG Reduction Over 2019 Baseline (t)
3	**Balanced Capex and optimized lifecycles**	*Immediate	13.7	-2.8	-17

* For data-modelling purposes, "immediate" is the one-year period immediately following the 2019 baseline.

Recommendations

- Consider adopting the RSI-FC recommended lifecycle analysis (LCA) approach to extract maximum value from each vehicle.
- Consider balancing go-forward capital budgets as part of long-term capital planning (LTCP) by deferring replacement of any units evaluated as being in above average, serviceable condition to later fiscal years.
- When the fleet's average age and uptime rates are determined to be at acceptable levels, consider re-investing in the fleet at the rate of depreciation.

Best Management Practices

Overview

Light-Weighting

Lighter vehicles consume less fuel, produce less emissions, and can carry larger payload. However, light-weighting may overstress some vehicles, increasing maintenance demand and lifecycle cost; therefore, fleet must exercise caution before choosing which vehicles to proceed with a light-weighting enhancement.

Low-Rolling Resistance Tires

Rolling resistance is the energy lost from drag and friction of a tire rolling over a surface[37]. The phenomenon is complex, and nearly all operating conditions can affect the final outcome. For heavy trucks, an estimated 15%–30% of fuel consumption is used to overcome rolling resistance.

[37] Source: https://afdc.energy.gov/conserve/fuel_economy_tires_light.html

A 5% reduction in rolling resistance would improve fuel economy by approximately 1.5% for light and heavy-duty vehicles. Installing LRR tires can help fleets reduce fuel costs. It's also important to ensure proper tire inflation (see section below).

Tires and fuel economy represent a significant cost in a fleet's portfolio. In Class 8 trucks, approximately one-third of fuel efficiency comes from the rolling resistance of the tire. The opportunity for fuel savings from low rolling resistance tires in these and other vehicle applications is substantial.

According to a North American Council for Freight Efficiency (NACFE) report, the use of low rolling resistance tires, in either a dual or a wide-base configuration, is a good investment for managing fuel economy. Generally, the fuel savings pay for the additional cost of the low rolling resistance tires. In addition, advancements in tire tread life and traction will reduce the frequency of low rolling resistance tire replacement.

Anti-Idling Policy and Technologies

An idling-reduction policy is a way to motivate fleet drivers to limit unnecessary idling. However, for an idling-reduction policy to be successful continuous enforcement such as spot-checks and fuel use tracking must be present. An idling-reduction policy could be used as an overarching commitment to idling reduction that is carried out though driver training and motivation sessions, rather than an initiative on its own.

There are several idling-reduction technologies available that can aid in idle reduction, including auxiliary power units (APU), stop/start devices, auxiliary cab heaters, battery backup systems, and block heaters/ engine preheaters. Their functionality, potential, and costs vary considerably and are described in *Appendix E* (FAR models a cost of $5,000 for all vehicle categories). To reap the most benefits any idling-reduction technology, installation should always be accompanied by behavioural solutions of driver training and motivation.

Driver Eco-Training

Driver training to modify driver behaviours and ongoing motivation to continue good behaviours are crucial components of successful idling-reduction programs. While most drivers understand the vehicle idling issue, many continue their inefficient practice of excessive idling due to lack of knowledge and/or motivation.

Driver training can be used to optimize the use of idle reduction technologies. The technologies can reduce idling but the drivers have the ability to override the technologies. Proper training can aid in utilizing the technologies to their full potential.

Further, driver training can promote good practices while on the road including progressive shifting, anticipating traffic flow, and coasting where possible.

Route Planning/Optimization and Trip Reduction

In addition to enhanced vehicles specifications and improved driver behaviours, fuel consumption and exhaust emissions can be further reduced through route planning/optimization and trip reduction.

Route planning software can be used optimize multi-stop trips. It can also be used for idling reduction initiatives by integrating GPS tracking software to monitor driver activity in real-time. Moreover, reporting and analytics features within route planning software can help with identifying when a fleet vehicle requires maintenance to ensure optimal fuel efficiency and thus minimize cost and emissions.[38]

Impacts

Each of the best management practices (BMPs) we analyzed have associated implementation costs which diminish the potential savings that can be attained. Regardless, each BMP we data-modelled was shown to potentially deliver Opex savings, as shown in *Table 10* (below). GHG reduction for each ranged from 361 to 1,669 tonnes. If all BMPs were fully and successfully implemented, we estimate that GHGs could be reduced by up to 2,928 tonnes with a net cost savings of almost $2.8m based on fuel cost reduction over the 2019 baseline. Again, this is based on a fleet configured as it is today at Hamilton with ICE vehicles only.

Table 10: FAR Results for Best Management Practices (BMPs) (FAR #4-7)

FAR Model No.	FAR Scenario	Timing	Vehicle Replacement Capex[39] ($ mil)	Opex Impacts Over 2019 Baseline ($ mil)	GHG Reduction Over 2019 Baseline (t)
4	Enhanced specs: light-weighting & LRR	Immediate[40]	13.7	-2.794	-361
5	Driver behaviours: driver eco-training & anti-idling policy/ technologies	Immediate[40]	13.7	-2.796	-1,669

[38] Source: https://blog.route4me.com/2020/05/carbon-emissions-reduction-route-optimization-helps-cut-tons-carbon-emissions/
[39] Based on Capex derived from optimized lifecycles from LCA and long-term Capex balancing
[40] For data-modelling purposes, "immediate" is the one-year period immediately following the 2019 baseline if the same vehicles, the same number of vehicles, travelling the same number of kilometres as the baseline period, were switched to the low-carbon solution(s) being modelled.

FAR Model No.	FAR Scenario	Timing	Vehicle Replacement Capex[39] ($ mil)	Opex Impacts Over 2019 Baseline ($ mil)	GHG Reduction Over 2019 Baseline (t)
6	TDM - route planning/optimization & trip reduction	Immediate[40]	13.7	-2.809	-1,277
7	FAR 7: All above "house-in-order" strategies	Immediate[40]	13.7	-2.769	-2,928

Recommendations

- Consider job suitability of vehicles before proceeding with light-weighting enhancements.
- In conjunction with driver training, consider route planning software, idling reduction initiatives and maintenance checks by integrating GPS tracking software to monitor driver activity and fuel consumption.
- Consider a fuel-efficient driver incentive program, such as through a green card initiative similar to one at the Lake Simcoe Region Conservation Authority in which drivers are incentivized to improve behaviours or reduce their travel through card stamping and prize draws[41].

Fuel Switching

Overview

Ethanol

Ethanol is a renewable fuel made from various plant materials known as biomass or feedstocks. Corn and wheat are most commonly used to produce ethanol. In most North American jurisdictions, renewable fuel standards require all gasoline sold to be a 5-10% ethanol blend (E5-10). Ethanol burns cleaner and more completely than gasoline or diesel fuel; blending ethanol with gasoline increases oxygen content in the fuel, thereby reducing air pollution[42].

[41] Source: ClimateWise Business Network. ClimateWise Member Spotlight: Lake Simcoe Region Conservation Authority
[42] Source: https://afdc.energy.gov/fuels/ethanol_fuel_basics.html

A higher blend of ethanol, known as E85 (85% ethanol, 15% gas) can lead to significant GHG reductions. The 15% gasoline is needed to assist in engine starting because pure ethanol is difficult to ignite in cold weather[43]. This fuel must be used in dedicated "flex-fuel" vehicles (FFVs), which can run on any combination of gasoline and ethanol blends (up to 85%).

In terms of tailpipe emissions, E85 has a GHG emissions reduction potential of about 30% when compared to the same volume of gasoline[44]. However, E85 contains about 27% less energy than gasoline per unit volume[45]. Given this energy loss, about 37% more E85 is required to achieve the same amount of work as gasoline. Therefore, the emissions reduction for the same work performed is actually about only 4% when compared to the energy equivalent of gasoline (i.e., for the same distance travelled the emissions for a vehicle running on E85 are 96% of those of a gasoline vehicle, which is 70% multiplied by 1.37 accounting for the additional volume required to achieve the same work).

Given the significant energy losses per unit volume as compared to gasoline, the cheaper cost of E85 per unit volume compared to gasoline does not offset the higher volume required to achieve the same distance travelled, likely making E85 more expensive than gasoline. Based on April 2020 fuel prices in the US, and accounting for energy equivalence (i.e., same distance travelled), E85 is about 16% costlier than gasoline[46].

If E85 is to be considered by Hamilton, it may be available at some retail fuel stations and can also potentially be delivered direct-to-vehicle. Alternatively, it could be stored and dispensed in bulk from an onsite fuelling station, but this would incur additional implementation costs. Ethanol tanks require a water monitoring system. In addition, a 10-micron filter, signage, and other upgrades are required to ensure the system is compliant. A pilot-test program is recommended to learn, with certainty, the efficiency impacts of using E85.

Biodiesel

Biodiesel is a renewable fuel made from vegetable oil and waste cooking oil, animal fats such as beef tallow and fish oil, and even algae oil[47]. Biodiesel is often referred to as fatty acid methyl ester or FAME[48].

Biodiesel can be blended in a variety of ratios with conventional fossil diesel. Much of the world uses a system known as the "B" factor to state the amount of biodiesel in any fuel mix (e.g., B2 indicates

[43] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/ethanol/3493
[44] Source: http://www.patagoniaalliance.org/wp-content/uploads/2014/08/How-much-carbon-dioxide-is-produced-by-burning-gasoline-and-diesel-fuel-FAQ-U.S.-Energy-Information-Administration-EIA.pdf
[45] Source: https://afdc.energy.gov/fuels/ethanol_benefits.html
[46] Source: https://afdc.energy.gov/fuels/prices.html
[47] Source: https://www.nrcan.gc.ca/energy/alternative-fuels/resources/nrddi/3669
[48] Source: https://www.neste.com/what-difference-between-renewable-diesel-and-traditional-biodiesel-if-any

2% biodiesel and 98% fossil diesel). Biodiesel blends include: B2, B5, B10, B20, blends greater than B20, and B100 (100% biodiesel, also known as "neat" biodiesel).[49]

Canadian regulations require fuel producers and importers to have an average renewable fuel content of at least 2% based on the volume of diesel fuel and heating distillate oil that they produce or import into Canada.

Tailpipe GHG emissions reductions are dependent on the biodiesel blend used; for a given unit mass or volume, the higher the blend, the lower the GHG emissions. B20, in particular, reduces CO_2 by 15% in comparison to conventional diesel per unit mass/volume[50]. However, actual tailpipe emissions reduction potential for the same distance travelled is dependent on both GHG emissions per unit mass/volume and fuel economy. B5 has been shown to improve fuel economy by as much as 10% in comparison to conventional diesel[51], whereas fuel economy can be 2% lower for B20 and as much as 10% lower for B100 (pure or "neat" biodiesel)[52]. Therefore, there may be a "sweet spot" for optimizing fuel economy and GHG emissions reduction using blends from B5 to approaching B20. Using blends in this range improves fuel economy and lowers GHG tailpipe emissions on the order of approximately 10 percent. Using biodiesel can also reduce several other tailpipe emissions including particulates and unburned hydrocarbons[53]. Moreover, the lifecycle CO_2 emissions can be significantly lower for biodiesel than for conventional diesel[54].

Natural Gas

Natural gas (NG), a fossil fuel composed of mostly methane, is one of the cleanest burning alternative fuels. It is also considered safer than traditional fuels since, in the event of a spill, NG is lighter than air and thus disperses quickly when released. NG can be used in the form of compressed natural gas (CNG) or liquefied natural gas (LNG) to fuel cars, buses, and trucks. Vehicles that use NG in either form are called natural gas vehicles (or NGVs).

NG is found in abundance in porous rock formations and above oil deposits. After NG is extracted from the ground, it is processed to remove impurities and compressed to be stored and transported by pipeline. CNG is used in traditional gasoline internal combustion engine vehicles that have been modified, or in vehicles which were manufactured for CNG use, either alone (dedicated), with a segregated gasoline system to extend range (dual-fuel), or in conjunction with another fuel such as

[49] Source: https://www3.epa.gov/region9/waste/biodiesel/questions.html
[50] Source: https://www.fueleconomy.gov/feg/biodiesel.shtml
[51] Source: https://www.consumerreports.org/cro/2012/05/diesel-vs-biodiesel-vs-vegetable-oil/index.htm
[52] Source: https://www.fueleconomy.gov/feg/biodiesel.shtml
[53] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/biodiesel/3509
[54] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/biodiesel/3509

diesel (bi-fuel). CNG is most commonly used in fleet vehicles like buses and heavy-duty trucks because it requires a larger fuel tank than gasoline and diesel fuel[55].

CNG has a higher energy content per unit mass than diesel but requires more storage space because it is less dense[56]. Unlike diesel, which is stored in liquid form, CNG is stored as a gas under high pressure. For this reason, the energy density and cost of natural gas is usually provided per unit mass (kg) instead of per unit volume (litres).

To compare energy on an apples-to-apples basis, we must look at the amount of natural gas required to obtain the same energy content as a litre of diesel, also known as the diesel-litre equivalent (DLE). The DLE of one kilogram of natural gas is 1.462 litres[57]. We can also understand this concept through the inverse relationship – 0.684 kg of natural gas are required to get the same energy content as one litre of diesel. However, a natural gas engine uses about 12% more natural gas than a comparably-sized diesel engine[58]. Therefore, the actual amount of natural gas required to obtain the same energy content as one litre of diesel is an estimated 0.77 kg.

Based on the same work performed and confirmed through the above analysis, a CNG vehicle has tailpipe emissions about 20-30% less than a comparable diesel or gasoline vehicle[59,60]. NGVs also emit up to 95% less nitrogen oxides (NO_x) compared to diesel and gasoline vehicles[61]. Furthermore, CNG vehicles do not emit particulate matter (PM10), a main cause of air pollution[62].

Renewable Natural Gas

RNG, or biomethane, is a fully renewable energy source that is fully interchangeable with conventional natural gas. Like conventional natural gas, RNG can be used as a transportation fuel in the form of CNG or LNG.

RNG production has become an important priority thanks to its environmental benefits. RNG production is usually based on capturing and purifying the gas from collected organic waste — anything from crop residues and animal manures to municipal organic wastes and food processing by-products.

[55] Source: https://consumerenergyalliance.org/2019/04/energy-explorer-cng-vs-lng/#:~:text=The%20reason%20you%20see%20CNG,requires%20a%20larger%20fuel%20tank.&text=Like%20CNG%2C%20LNG%20is%20compressed,state%20into%20a%20liquid%20state.
[56] Source: https://www.eia.gov/todayinenergy/detail.php?id=9991
[57] Source: http://cngva.org/wp-content/uploads/2017/12/Energy-Content-Factsheet-FINAL-EN.pdf
[58] Source: http://cngva.org/wp-content/uploads/2017/12/Energy-Content-Factsheet-FINAL-EN.pdf
[59] Source: https://brc.it/en/categorie_faq/cng/
[60] Source: https://envoyenergy.ca/cng-benefits/#:~:text=Commercial%20fleets%20all%20over%20the,solution%20for%20fuelling%20their%20fleets.
[61] Source: Northwest Gas Association – Natural Gas Facts
[62] Source: https://brc.it/en/categorie_faq/cng/

The use of RNG is a natural progression from the use of fossil-based CNG. While use of natural gas as fuel requires large infrastructure investments, RNG has a very high emissions reduction potential; different sources estimate the lifecycle emissions reduction to be between 75% and 90% compared to diesel. The carbon dioxide that is generated during the production and combustion of RNG is used in the regeneration of new biomass, representing a closed-loop cycle for carbon dioxide that is released[63].

Liquified Petroleum Gas

Propane, otherwise known as liquefied petroleum gas (LPG), is produced as part of natural gas processing and crude oil refining. In natural gas processing, the heavier hydrocarbons that naturally accompany natural gas, such as LPG, butane, ethane, and pentane, are removed before the natural gas enters the pipeline distribution system. In crude oil refining, LPG is the first product that results in the refining process.

Propane is a gas that can be turned into a liquid at a moderate pressure (160 pounds per square inch). It is stored in pressure tanks at about 200 psi and 100 degrees Fahrenheit. When propane is drawn from a tank, it changes to a gas before it is burned in an engine.

Propane has been used as a transportation fuel since 1912 and is the third most commonly used fuel in the United States, behind gasoline and diesel. More than four million vehicles fuelled by propane are in use around the world in light-, medium- and heavy-duty applications. Propane holds approximately 86% of the energy of gasoline and so requires more storage volume to drive a range equivalent to gasoline, but it is usually price-competitive on a cents-per-km-driven basis.

In terms of tailpipe emissions, propane has a GHG emissions reduction potential of about 31% when compared to the same volume of gasoline based on GHGenius version 3.11. However, as mentioned, propane contains about 14% less energy than gasoline per unit volume. Given this energy loss, about 16% more fuel is required to achieve the same amount of work as gasoline. Therefore, the emissions reduction for the same work performed is actually around 20% when compared to the energy equivalent of gasoline (i.e., for the same distance travelled the emissions for a vehicle running on propane are about 80% of those of a gasoline vehicle, which is 69% multiplied by 1.16 accounting for the additional volume required to achieve the same work).

Feasibility Considerations

Ethanol

- E85 can be used in flex-fuel ready gasoline vehicles with no further modifications.

[63] Source: Closing the Loop. Canadian Biogas Association. 2015.

- There are no infrastructure costs associated with E85 use if a fuelling station is attended or if E85 is delivered direct-to-vehicle.

- Alternatively, E85 could be stored and dispensed in bulk from an onsite fuelling station, but this would incur additional implementation costs.

- E85 is a cleaner burning fuel than gasoline, thereby reducing air pollution. This can result in cleaner intake valves and fuel injectors, and reduced knocking and pinging[64].

- E85 can improve vehicle performance (acceleration) because of its higher octane content[65].

- Given the significant energy losses per unit volume as compared to gasoline, the cheaper cost of E85 per unit volume compared to gasoline does not offset the higher volume required to achieve the same distance travelled, likely making this solution cost-prohibitive. In-fleet pilot testing is recommended.

- E85 cannot be used in small equipment such as most portable generators and other small engines, so a dedicated fuel tank would be required for exclusive use by flex-fuel capable vehicles only.

Biodiesel

- Blends of B20 and lower can be used in diesel equipment with no modifications, although certain manufacturers do not extend warranty coverage if equipment is damaged by poor quality fuel in these blends (see details in *Appendix D*).

- Since there are no vehicle conversion or infrastructure costs associated with biodiesel use, biodiesel could be immediately introduced to begin reducing fuel-use and emissions.

- Keeping biodiesel to a lower blend (i.e., B5 or B10) will have better cold weather operability properties than a higher blend (i.e., B20 +) due to thickening at low temperatures.

- Although production is abundant, there are a limited number of biodiesel vendors and distributors.

- Due to thickening at low temperatures, it may be prudent to store biodiesel fuel in a heated building or storage tank, as well as heat the fuel system's fuel lines, filters, and tanks.

- Biodiesel is as safe in handling and storage as petroleum-based diesel fuel.

[64] Source: https://driving.ca/chevrolet/auto-news/news/western-canadas-first-e85-ethanol-gas-station-ready-to-pump
[65] Source: https://www.canadianmanufacturing.com/regulation/ethanol-market-chasing-us-canadas-fueling-options-flatline-142054/

Natural Gas

- New NGVs for Class 5-8 vehicles may cost up to $50,000 ($45,000 modelled in FAR) more than their conventional diesel counterparts; therefore, the payback period may be substantial for lower mileage units.

- New NGVs for light-duty vehicles (LDVs) may cost up to $10,000 ($7,500 modelled in FAR) more than their conventional gasoline counterparts. In this case, depending on kilometres-travelled, the payback period may still be substantial.

- CNG fast-filling station infrastructure costs could run to $1m CAD or much more, ($1.68m modelled in FAR) depending on capacities and complexity, and this may be a conservative estimate. Slow-fill refuellers may be an option, but caution must be exercised to ensure protracted filling time does not create operational challenges.

- An operational concern is that in certain situations, such as a long-duration electrical power interruption, CNG compressor or other fuel system failure, etc., dedicated CNG vehicles (i.e., vehicles powered solely by CNG) would be sidelined, and this is a risk that must be managed.

- Unless subsidies were available to offset the cost, a major investment in an NG fueling system would need to be a long-term capital investment for it to be financially viable.

- CNG is still a non-renewable fossil fuel (albeit a clean-burning one).

- CNG may be a viable short-term solution for GHG reduction while awaiting suitable BEVs to become available. However, a ***long-term investment*** in very costly CNG fuelling infrastructure to support a ***short-term GHG reduction solution*** does not seem to be a prudent choice.

Renewable Natural Gas

- Without the commercial availability of RNG, there must be investment in an anaerobic digester to make RNG, adding to the already large cost of $1m or much more to build a CNG fuelling station and the significant additional cost of vehicle retrofits and/or new vehicle upgrades to CNG. Moreover, the quality of the RNG must be ensured to be of high enough standard to be used in natural gas-powered vehicles.

- Unlike CNG which would likely offer fuel cost savings, compressed RNG is approximately equal in price to diesel and gasoline in terms of diesel litre equivalent (DLE)[66]. Therefore, in many situations the use of RNG may not be a financially viable option. In our FAR modelling

[66] Source: https://www.canadianmanufacturing.com/regulation/ethanol-market-chasing-us-canadas-fueling-options-flatline-142054/

we assumed RNG price parity with fossil NG since no published market prices were available for RNG.

Liquified Propane Gas

- Propane vehicle conversions and fueling systems generally cost much less than natural gas systems, modelled at $6,000 and $68,000, respectively, in FAR. Depending on kilometres-travelled, the payback – and the payback period – may still be substantial.

Recommendations

Ethanol

- Consider the challenges associated with switching to E85, including supply, any additional infrastructure costs, and whether the potentially greater fuel cost is financially prudent. Should the City proceed with this solution, consider a pilot project with several units switched to E85 to determine the fuel-efficiency loss; if successful, consider a phased-in approach for other appropriate units.

Biodiesel

- Some precautions must be taken before making the switch to biodiesel, including using a lower blend due to viscosity issues at cold temperatures. We recommend using a blend of 5% in winter and 20% in the summer and shoulder months.

- Consider a pilot project with several units switched to biodiesel, and if successful a phased-in approach for other appropriate units.

Natural Gas (including Renewable Natural Gas)

- If CNG is of interest to the City, we recommend investigating subsidies for CNG upgrades and a CNG vehicle fuelling station.

- Consider a small-scale pilot project with several high-mileage units switched to CNG, and if successful a phased-in approach for other appropriate units.

Liquified Propane Gas

- If a strong business case for LPG can be shown for high-mileage units, consider a small-scale pilot project with several high-mileage units switched to CNG, and if successful a phased-in approach for other appropriate units.

Impacts

The potential impacts of the above-described fuel switching solutions are shown in *Table 10* (below). In reviewing *Table 11*, it is important to note the major reduction in Capex which is reflective of our recommendation to have a temporary moratorium on replacing end-of-lifecycle ICE vehicles with new ICEs.

Table 11: FAR Results for Fuel-Switching Scenarios (FAR #8-16)

GROUP TWO SOLUTIONS – FUEL-SWITCHING					
FAR Model No.	FAR Scenario[67]	Timing	Vehicle Replacement Capex ($ mil)	Opex Impacts Over 2019 Baseline ($ mil)	GHG Reduction Potential Over 2019 Baseline (t)
8	**E85** (85% ethanol) fuel (passenger, pickups, vans)	Immediate[68]	0.099[69]	+0.3	-4,691
9	**B10** (10% avg. biodiesel - all diesel on-road units)	Immediate[68]	0.099[69]	-0.11	-3,110
11	**Compressed Natural Gas (CNG)** (LD pickups)	Immediate[68]	0.099[69]	+0.34[70]	-3,204
12	**CNG** (Classes 3-6)	Immediate[68]	0.099[69]	+0.3[70]	-3,266
13	**CNG** (Classes 2-8)	Immediate[68]	0.099[69]	-0.5[70]	-4,402
14	**Renewable Natural Gas (RNG)** (Classes 2-8)	Immediate[68]	0.099[69]	-0.5[70]	-8,177

[67] Impacts from fuel-switching and BEV phase-in scenarios include, and build on, Group One scenarios (FAR #7).
[68] For data-modelling purposes, "immediate" is the one-year period immediately following the 2019 baseline if the same types of vehicles, the same number of vehicles, travelling the same number of kilometres as the baseline period, were switched to the low-carbon solution(s) being modelled.
[69] The Capex decrease shown is reflective of a recommended moratorium on purchasing new gas- and diesel-powered internal combustion engine (ICE) vehicles until battery-electric units become available (see report).
[70] For data-modelling purposes, the annual cost of capital for CNG or LPG new vehicle upgrades or conversions of existing vehicles were calculated and treated as annual vehicle operating costs (Opex), and then added to each unit's operating expenses. CNG/LPG fuelling infrastructure investment costs were apportioned and also treated as additional vehicle annual operating costs for all units modelled as CNG or LPG. The fast-fuelling system cost assumptions were $1.68M for CNG and $68k for LPG.

GROUP TWO SOLUTIONS – FUEL-SWITCHING					
FAR Model No.	FAR Scenario[67]	Timing	Vehicle Replacement Capex ($ mil)	Opex Impacts Over 2019 Baseline ($ mil)	GHG Reduction Potential Over 2019 Baseline (t)
15	**Liquified Propane Gas (LPG)** (LD units - passenger vehicles, pickups, vans)	Immediate[68]	0.099[69]	-0.072[70]	-3,100
16	**LPG** (LD and Truck Classes 2-8)	Immediate[68]	0.099[69]	-1.6[70]	-3,561

Battery-Electric Vehicles

Overview

Globally, vehicles are steadily moving away from the internal combustion engine toward zero-emission battery-electric vehicles (BEVs) and, eventually, hydrogen fuel cells.

Air quality is a growing concern in many urban environments and has direct health impacts for residents. Tailpipe emissions from internal combustion engines are one of the major sources of harmful pollutants, such as nitrogen oxides and particulates. Diesel engines in particular have very high nitrogen oxide emissions and yet these make up the majority of the global fleet. As the world's urban population continues to grow, identifying sustainable, cost-effective transport options is becoming more critical. Battery-electric vehicles (BEVs) are one of the most promising ways of reducing harmful emissions and improving overall air quality in cities.

Fleet managers who operate BEVs will see savings in maintenance and fuel costs. BEVs have considerably fewer parts than internal combustion engine (ICE) vehicles. A drivetrain in an ICE vehicle contains more than 2,000 moving parts, compared to about 20 parts in an BEV drivetrain. This 99% reduction in moving parts creates far fewer points of failure, which limits and, in some cases, eliminates traditional vehicle repairs and maintenance requirements, creating immense savings for fleet managers. BEVs do not require oil changes or tune-ups, do not require diesel exhaust fluid (DEF), and their brake lining life is greatly extended over standard vehicles due to regenerative braking. Though each fleet's electrification journey will be different, the transition to electricity offers significant cost reductions over the long term.

There has also been significant expansion in charging infrastructure through publicly available charging stations. As of early 2020, there were nearly 5,000 charging outlets across Canada, and

Natural Resources Canada is investing $130 million from 2019-2024 to further expand the country's charging network, making range anxiety even less of a barrier to BEV ownership.

Upstream Emissions

From a broader perspective, to have almost none or zero well-to-wheel emissions, the electricity used to recharge the batteries must be generated from renewable or clean sources such as wind, solar, hydroelectric, or nuclear power. In other words, if BEVs are recharged from electricity generated by fossil fuel plants, they cannot truly be considered as zero emission vehicles (ZEVs). Upstream emissions should be considered when evaluating the effectiveness of ZEVs in reducing emissions. Generally, when considering upstream emissions from electricity supply, BEVs still emit more than 50% less GHG emissions than their gasoline or diesel counterparts[71], and in some cases emit more than 80% less in a grid composed of mostly renewable electricity[72]. This level of emissions reduction is what cities need in order to collectively achieve the "deep decarbonization" necessary to mitigate the most serious impacts of climate change.

Battery-Electric Trucks

A new study[73] quantified what commercial EV-makers have been saying for years: electric trucks are a triple win. They save money for fleet operators, and reduce both local air pollution and GHG emissions. The study, which was commissioned by the National Resources Defense Council (NRDC) and the California Electric Transportation Coalition, and conducted by the international research firm ICF, looked at the value proposition for fleet operators of battery-electric trucks and buses (and apparently invented a new acronym: BETs).

Today, BETs have a significant upfront price premium compared to legacy diesel trucks and buses. However, the costs of battery packs and other components are rapidly falling, and the study found that, by 2030 or earlier, electric vehicles will offer a lower total cost of ownership (TCO) for nearly all truck and bus classes, even without incentives.

Medium- and heavy-duty battery-electric trucks are quickly being developed by many manufacturers. BETs offer a multitude of benefits, including:

- Less noise pollution
- Zero tailpipe GHG emissions
- Oil-free operation with very few moving parts

[71] Source: https://www.eei.org/issuesandpolicy/electrictransportation/Pages/default.aspx
[72] Source: https://blog.ucsusa.org/rachael-nealer/gasoline-vs-electric-global-warming-emissions-953
[73] Source: Posted January 2, 2020 by Charles Morris (https://chargedevs.com/author/charles-morris/) & filed under Newswire (https://chargedevs.com/category/newswire/), The Vehicles (https://chargedevs.com/category/newswire/the-vehicles/)

- Simple, low-maintenance electric powertrain with few components
- Longer lasting brakes due to regenerative braking system
- Potential to significantly extend range due to high regenerative braking from carrying heavy loads[74]. The heavier the truck load, the greater the energy produced from regenerative braking.
- Overnight recharging when the vehicle is not in operation and when demand for electricity is lower, which reduces energy costs
- Massive savings potential in total energy costs and service costs
- Competitive lifecycle costs over a 10-year operating life and are better suited over gasoline, diesel, or CNG when accounting for future economic trends

Electric Refuse Trucks

There is an existing and growing market for electric refuse trucks. Several manufacturers have battery-electric refuse trucks on the market (e.g., Volvo, Mack, BYD, Lion Electric), while other companies have converted existing refuse trucks to battery-electric (e.g., Motiv, Emoss). In additional to the benefits previously listed for battery-electric trucks at large, battery-electric refuse trucks offer:

- Range up to and exceeding 200 km[75] for a full day of operation (1,200 homes) on a charge
- Optimal visibility and turning radius
- No hydraulic pumps, valves, tubing, hoses, and fluid
- Arm and body movements powered by battery that drives electric motors for each function
- Savings of up to 80% on total energy costs and up to 60% on service costs

Diesel and CNG refuse trucks require much more input energy to achieve the required outcome relative to electric refuse trucks. Diesel and CNG refuse trucks are approximately 5 and 5.8 times less efficient than battery-electric refuse trucks, respectively, while hydrogen fuel cell electric trucks are approximately 1.8 times less efficient. This is because:

- Internal combustion engines (ICEs) are much less efficient than electric motors in converting input energy to output motion.

[74] Source: https://www.firstpost.com/tech/science/worlds-largest-electric-vehicle-is-a-110-tonne-dump-truck-that-needs-no-charging-7190131.html
[75] Source: https://electrek.co/2018/05/09/volvo-all-electric-garbage-truck/

- ICEs use energy when the truck is idling, coasting or braking. Electric motors not only don't use energy during these operations, they can act as a generator when coasting or braking, generating energy in a process known as regenerative braking.

- The heavier the refuse truck load, the greater the energy produced from regenerative braking. Depending on the topography of the collection zone, an optimized route can be analysed to further increase the energy efficiency of electric refuse trucks.

Impacts

The potential impacts of BEV phase-in solutions are shown in *Table 12*. It is important to note that Capex and Opex are average values over the implementation periods shown and GHG reduction potential values are cumulative impacts over the implementation periods shown.

Table 12: FAR Results for BEV Phase-in Scenarios (FAR #21-36)

GROUP THREE – BATTERY-ELECTRIC VEHICLE PHASE-IN					
FAR Model No.	FAR Scenario[76]	Timing	Average Vehicle Replacement Capex[77] ($ mil)	Average Opex Impact[77,78,79] Over 2019 Baseline ($ mil)	Total GHG Reduction[77] Over 2019 Baseline (t)
21-22	BEV phase-in (passenger vehicles only)	Immediate[80] - 2021	2.7	+.35	-2,943
21-24	BEV phase-in (passenger vehicles starting immediately-2022 and pickups in 2022)	Immediate[80] - 2022	5.7	+.47	-3,789

[76] Impacts from fuel-switching and BEV phase-in scenarios include, and build on, Group One scenarios (FAR #7).
[77] For data modelling purposes, the increased cost of capital for the additional purchase cost of BEVs were treated as annual operating expense increases for all BEV units modelled. The annual cost of capital for infrastructure investment in Level 2 charging (one Level 2 charger for every two BEVs) was apportioned and allocated to each BEV modelled, also as an increase in Opex.
[78] Capex and Opex impacts are averages for the implementation periods shown. GHG impacts are cumulative.
[79] Includes the impact of compounding inflation for each year of the 15-year period at current rate of inflation
[80] For data-modelling purposes, "immediate" is the one-year period immediately following the 2019 baseline if the same vehicles, the same number of vehicles, travelling the same number of kilometres as the baseline period, were switched to the low-carbon solution(s) being modelled.

GROUP THREE – BATTERY-ELECTRIC VEHICLE PHASE-IN					
FAR Model No.	FAR Scenario[76]	Timing	Average Vehicle Replacement Capex[77] ($ mil)	Average Opex Impact[77,78,79] Over 2019 Baseline ($ mil)	Total GHG Reduction[77] Over 2019 Baseline (t)
21-36	**BEV phase-in** (passenger vehicles starting immediately, pickups starting in 2022, and medium- and heavy-duty (MHD) trucks starting in 2024)	Immediate[80] - 2035	11.7	+1.2	-8,475

BEV Feasibility Considerations

- DC fast charging installation requires a commercial electrician[81] and costs an estimated $50,000 - $200,000 for equipment and installation[82].
- Overnight charging infrastructure may be more feasible than in-route charging infrastructure if there is limited service amperage[83].
- Heavy-duty trucks charged in a garage between 50 and 100 kW (equivalent to DC fast charging) would potentially take several hours to charge[84]. Caution must be exercised to ensure longer charging times do not create operational challenges.
- Extreme cold temperatures can significantly reduce range in BEVs due to heating of the cabin and heating of the battery itself[85]. Therefore, it is important account for this when purchasing BEVs to ensure sufficient range is provided to cover a day's worth of routes in the heart of winter.

[81] Source: https://calevip.org/electric-vehicle-charging-101
[82] Source: https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf
[83] Source: https://www.masstransitmag.com/home/article/12291796/bus-electrification-choosing-the-right-charging-method
[84] Source: https://www.plugincanada.ca/electric-bus-faq/
[85] Source: https://www.geotab.com/blog/ev-range/

- Power grid failure or local failure at a garage could pose a significant risk to operations. To mitigate this risk, backup generators can deal with short power outages. For longer outages, larger generators would be needed, but this would come at a very expensive cost. [86]

Recommendations

- Consider a pilot project for several BEVs when they become available (e.g., pickups) to track range capabilities and cost savings and assess the units' performance for all seasons and varying weather conditions.

- Assuming the pilot project is successful, consider acquiring BEVs in bulk to replace units that would provide the greatest ROI.

- Continue to closely monitor the acquisition costs for BEVs and re-evaluate the business case (cost-benefit) for individual units as prices come down. Also continue to monitor the future availability of electric work/cargo vans, which are currently not anticipated to be offered in battery-electric versions in the near future.

- If relying on overnight charging infrastructure, consider supplying power to the garage on two separate feeds from the grid to reduce the risk of local failure taking power away from the whole site[87].

- Consider high-voltage training for technicians and closely monitor the launch of new BEV training programs. A pilot for a new EV Maintenance Training Program for automotive technicians was successfully completed at BCIT and will be available to the public soon[88]. There is also an Electric Vehicle Technology Certificate Program offered by SkillCommons, managed by the California State University and its MERLOT program, which offers free and open learning materials electric vehicle development, maintenance, alternative/renewable energy, and energy storage[89].

Additional Considerations

B100 Biodiesel

In early 2020, a breakthrough technology allowed high-use dump trucks to run on 100% biodiesel (B100) in Ames, Iowa, a city that experiences extreme winters with blizzards and temperatures below -20°C. The following outlines how the system works[90]:

[86] Source: https://www.plugincanada.ca/electric-bus-faq/
[87] Source: https://www.plugincanada.ca/electric-bus-faq/
[88] Source: https://commons.bcit.ca/news/2019/12/ev-maintenance-training/
[89] Source: http://support.skillscommons.org/showcases/open-courseware/energy/e-vehicle-tech-cert/
[90] Source: Renewable Energy Group (REG). Getting Aggressive on Sustainability [pdf]. 2020.

- The fuel delivery system has a split tank – one for petroleum diesel and the other one for biodiesel installed on the truck.

- In cold weather, diesel is used on start-up. The system warms the biodiesel and automatically switches to B100.

- At shut-off, the truck idles for a couple minutes while the B100 is purged from the lines.

There have been no operational concerns from operators or service technicians, and B100 has proven to be an easy and extremely effective way for the City of Ames to have an immediate impact on its fleet GHG emissions. This potentially can be an additional and highly effective interim solution considered by the City of Hamilton.

NRCan Zero Emission Vehicle Infrastructure Program

The Government of Canada is committed to helping accelerate the decarbonization and electrification of our transportation sector, and charging infrastructure is a key component to achieving this. As mentioned earlier, Natural Resources Canada (NRCan) is investing $130 million from 2019-2024 to further expand the country's charging network, particularly level 2 and higher stations.

The funding will be delivered through cost-sharing contribution agreements for eligible projects, including:

- BEV charging infrastructure in parking areas intended for public use (e.g., service stations, restaurants, libraries, etc.);

- On-street charging infrastructure;

- Workplace charging infrastructure;

- On-road light-duty vehicle fleet (including municipal fleets);

- On-road medium- or heavy-duty vehicle fleets (including refuse trucks and public utility vehicles);

- Charging infrastructure for multi-unit residential buildings (MURBs); and

- Public transit charging infrastructure.

The City of Hamilton would be eligible for funding based on the project criteria listed above, however the funding window has since closed. NRCan's contribution through this program will be limited to

50% of total project costs, and the maximum funding and approximate costs for each type of charging infrastructure is shown in *Table 13* (directly taken from NRCan's website[91] with costs and charging rates from the City of Toronto's Electric Vehicle Strategy Report[92]):

Table 13: Specifications for NRCan's Zero Emission Vehicle Infrastructure Program, plus Approximate Total Costs and Charging Rates

Type of Infrastructure	Output	Maximum NRCan Funding	Total Costs (Equipment + Installation)	Approximate Charge Rate Per Hour
AC Level 2 (208/240V) Connectors	3.3 kW - 19.2kW	Up to 50% of total project cost, to a maximum of $5,000 per connector*	$5,000 - $10,000	40 km
DC Fast Charger	20 kW - 49 kW	Up to 50% of total project cost, to a maximum of $15,000 per fast charger	-	-
DC Fast Charger	50 kW and above	Up to 50% of total project cost, to a maximum of $50,000 per fast charger	$50,000 - $200,000	300+km

* To calculate the funding for level 2 chargers, each connector can count as a unit towards the minimum of 20 chargers if each connector can charge a vehicle at the same time.

Battery Replacement and Energy Storage

Most, if not all, BEV manufacturers have an eight-year or 100,000 mile (160,000 km) warranty on their batteries – whichever one (i.e., vehicle age or distance travelled) comes first[93]. However, the current prediction is that an EV battery will last from 10-20 years, depending on usage, before it needs to be replaced[94]. Consumer Reports estimates the average EV battery pack's lifespan to be at around 200,000 miles (320,000 km), which is nearly 17 years of use if driven 12,000 miles (19,200 km) per year. Therefore, in most cases, the vehicle will reach its end-of-life before there is a need for battery replacement.

[91] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/zero-emission-vehicle-infrastructure-program/21876
[92] Source: https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf
[93] Source: https://www.myev.com/research/ev-101/how-long-should-an-electric-cars-battery-last
[94] Source: https://www.edfenergy.com/electric-cars/batteries

When battery capacity falls below 80%, drivers may start to see a noticeable decline in range[95] – which would most likely occur at or after the typical vehicle replacement age because battery degradation is a very gradual process[96]. Once the EV battery capacity becomes undesirable for powering a vehicle, it can be used to power a building by contributing to a battery storage system, which stores energy from a battery that can be used at a later time[97]. For example, if a building is powered by renewable energy such as wind or solar, an "old" EV battery can be used to store energy produced while the wind is blowing or the sun is shining, and then release the stored energy during low-wind periods or at night. This method of generating electricity has multiple benefits, including:

- An effective way of continuing the life of an old EV battery;
- Reducing energy used from the grid, thereby reducing energy costs; and
- Increasing energy security when using renewables, which have variable energy outputs, by releasing stored energy during off-peak times.

When batteries do reach the end of their working life, they can be recycled, which typically involves separating out valuable materials such as cobalt and lithium salts, stainless steel, copper, aluminium, and plastic. Currently, about half of the materials in an EV battery pack are recycled, but with EVs expected to undergo an explosion in popularity over the next decade or so, car manufacturers are looking to improve this.[98]

[95] Source: https://www.edfenergy.com/electric-cars/batteries
[96] Source: https://www.myev.com/research/ev-101/how-long-should-an-electric-cars-battery-last
[97] Source: https://www.edfenergy.com/electric-cars/batteries
[98] Source: https://www.edfenergy.com/electric-cars/batteries

Section 5.0: Summary of Key Recommendations

In this section, we summarize our main recommendations for Hamilton's Green Fleet Strategy (*Table 14*). Recommendations are from *Section 2.0*, in which we identified potential opportunities for improvement of the City's fleet management practices, as well as from *Section 4.0*, in which we presented a 15-year long-term capital planning (LTCP) strategy and detailed fuel-reduction solutions for the City's consideration.

Table 14: Summary of Key Recommendations for Hamilton's Green Fleet Strategy

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[99]/ Next Step
1	2	Asset Management	• Follow a historical data-driven lifecycle cost assessment, which is completed by modelling repair, maintenance, fuel, and cost of capital over the vehicle's entire lifecycle to determine the optimal replacement age of vehicles.	Immediate
2	2	Asset Management	• Consider implementing the green fleet asset management best practices recommended by RSI-FC as illustrated in the process flow chart (Page 25). With these processes the fleet will become green and right-sized.	Immediate
3	2	Vehicle Specifications	• Employ a total cost of ownership (TCO) approach to optimize the use of capital. • Consider TCO in competitive bidding proposal structures instead of the lowest compliant bid approach.	Immediate
4	2	Information Technology	• Create an education piece for idling reduction, operating efficiently, and reducing fuel consumption.	Immediate
5	2	Human Resources	• Add a driver eco-training module to existing Professional Driver Improvement Course (PDIC) safe driver training and consider eco-driver training for all drivers.	Immediate

[99] Immediate = 2021; short-term = 2022-2024; long-term = 2024-2035

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[99]/ Next Step
6	2	Fuel Management	• Measure and track fuel consumption and GHGs at the department and user-group levels to track progress and set tangible goals.	Immediate
7	2	Environment (LEED)	• Modernize and/or retrofit Fleet facilities to obtain LEED certification.	May need additional analysis (outside scope of this report)
8	2	Environment (BEVs)	• Invite frontline employees to take BEV test drives to build an affinity towards electric vehicles.	Immediate & short-term as additional BEV models become available
9	4	Deferred Spending (BEV Transition)	• If possible, avoid buying ICE replacement vehicles until suitable BEVs become available.	Immediate & short-term
10	4	15-Year LTCP Strategy	• Strictly through a lens of fiscal planning, prioritize replacement of units with BEVs *only if they would deliver return-on-investment (ROI)*.	Immediate, short-term & long-term
11	4	15-Year LTCP Strategy	• Allocate capital for charging infrastructure in the near-future to meet the demand in the mid- to long-term.	Immediate & short-term
12	4	Balanced Capex and Optimized Lifecycles	• Consider adopting the RSI-FC recommended lifecycle analysis (LCA) approach to extract maximum value from each vehicle.	Immediate
13	4	Balanced Capex and Optimized Lifecycles	• Consider balancing go-forward capital budgets as part of LTCP by deferring replacement of any units evaluated as being in above average, serviceable condition to later fiscal years.	Immediate
14	4	Balanced Capex and Optimized Lifecycles	• When the fleet's average age and uptime rates are determined to be at acceptable levels, consider re-investing in the fleet at the rate of depreciation.	Short-term

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[99]/ Next Step
15	4	Best Management Practices	• Consider job suitability of vehicles before proceeding with light-weighting enhancements.	Immediate
16	4	Best Management Practices	• In conjunction with driver training, consider route planning software, idling reduction initiatives and maintenance checks by integrating GPS tracking software to monitor driver activity and fuel consumption.	Immediate & short-term
17	4	Best Management Practices	• Consider a fuel-efficient driver incentive program in which drivers are incentivized to improve behaviours or reduce their travel.	Immediate
18	4	Fuel-Switching – Ethanol	• Consider the challenges associated with switching to E85, including supply, any additional infrastructure costs, and whether the potentially greater fuel cost is financially prudent. Should the City proceed with this solution, consider a pilot project with several units switched to E85 to determine the extent of the fuel-efficiency loss; if successful, consider a phased-in approach for other appropriate units.	Immediate & short-term
19	4	Fuel-Switching – Biodiesel	• Use a blend of 5% in winter and 20% in the summer and shoulder months. Consider a pilot project with several units switched to higher-blend biodiesel (B20), and if successful a phased-in approach for other appropriate units.	Immediate & short-term
20	4	Fuel-Switching – Natural Gas (including Renewable Natural Gas)	• If compressed natural gas (CNG) is of interest to the City as an interim solution until BEVs are available, investigate subsidies for CNG upgrades and a CNG vehicle fuelling station. Consider a small-scale pilot project with several high-mileage units switched to CNG, and if successful a phased-in approach for other appropriate units.	Immediate & short-term
21	4	Fuel-Switching – Liquified	• If LPG is of interest for high-mileage City units, as an interim solution until BEVs are available, consider a small-scale pilot	Immediate & short-term

No.	Section	Area/ Topic	Recommendation(s)	Implementation Timing[99]/ Next Step
		Propane Gas (LPG)	project with several high-mileage units switched to LPG, and if successful a phased-in approach for other appropriate units.	
22	4	BEVs	• Consider a pilot project for several BEVs when they become available (e.g., pickups) to track range capabilities and cost savings and assess the units' performance for all seasons and varying weather conditions. Assuming the pilot project is successful, consider acquiring BEVs in bulk to replace units that would provide the greatest ROI.	Immediate & short-term
23	4	BEVs	• Continue to closely monitor the acquisition costs for BEVs and re-evaluate the business case (cost-benefit) for individual units as prices come down. Also continue to monitor the future availability of electric work/cargo vans, which are currently anticipated to be offered in battery-electric versions in the near future.	Immediate, short-term & long-term
24	4	BEVs (Charging Infrastructure)	• If relying on overnight charging infrastructure, consider supplying power to the charging equipment on two separate feeds from the grid to reduce the risk of local failure taking power away from the whole site.	Immediate, short-term & long-term
25	4	BEVs (Charging Infrastructure)	• Consider high-voltage training for technicians and closely monitor the launch of new BEV training programs.	Immediate, short-term & long-term

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Section 6.0: Green Fleet Strategy Discussion and Implementation

The results presented in this Green Fleet Strategy and Report are, as mentioned, intended to provide an ambitious roadmap to the City of Hamilton in its quest for go-forward fuel-reduction solutions to achieve the goals of the Corporate Climate Change Task Force.

Main Takeaways from FAR Scenario Analysis

In *Section 4.0*, we proposed a 15-year long-term capital planning (LTCP) strategy for the City to implement various fuel-reduction solutions to 2035. The emphasis is on BEV phase-in, as this, we believe, is the most effective long-term GHG reduction strategy for a fleet as battery-electric technology continues to advance. Our approach was to model "house-in-order" solutions first, then add the potential of fuel-switching interim solutions which we term the "messy middle," and, finally, phase-in BEVs as they become available in the near future for all vehicle classes. The GHG reduction impact of modelling these three steps together was an estimated 90% over the baseline (2019 review period) by 2035, which fulfils the deep GHG emissions reduction required to achieve the goals of the Corporate Climate Change Task Force.

In addition to presenting a condensed 15-year LTCP strategy with the various solutions being implemented as logical steps in time, we also modelled the solutions individually or in groups (e.g., best practices) to analyze their relative impacts. Note that all fuel-switching and BEV phase-in scenarios included (i.e., were in addition to) balanced Capex and optimized replacement cycles, as well as best management practices (BMPs). Here are the main takeaways for the City of Hamilton's consideration:

- Based on our modelling, optimized lifecycles and balanced Capex (replacing only those units which were shown to provide ROI) was shown to decrease annual Opex by around $2.8 m (average value) over the 2019 baseline. However, this intervention alone would only result in a ~ 1% decrease in GHG emissions over the baseline. Therefore, more solutions would have to be implemented to achieve deep GHG emissions reductions goals.

- Based on our modelling, implementing additional BMPs offers significant Opex reduction potential (average of $2.8m/year over the baseline) and GHG reduction potential (more than 31% over the baseline). In particular, implementing only driver eco-training and anti-idling policy/technologies would decrease emissions by an estimated 18% over the baseline, while implementing only route planning/optimization and trip reduction would lead to an estimated 14% reduction. This demonstrates the potentially significant impacts of "getting the house in order" before implementing any fuel-switching or battery-electric solutions.

- Based on our modelling, a BEV phase-in for passenger vehicles and pickups netted a GHG reduction of about 40% over the baseline. This demonstrates that passenger vehicles and

pickups contribute a significant amount to the total Hamilton Fleet emissions, highlighting a potential area of focus for the City ahead of the transition of medium- and heavy-duty (MHD) trucks to electric.

It is important to note that the scenarios are meant to provide guidance and stimulate thought regarding each individual solution, and not serve as an accounting-accurate evaluation. In reality, the City of Hamilton may consider multiple fuel-switching options in conjunction with one another, depending on unit age, vehicle condition, and kilometres-travelled.

BEV Transition

BEVs have a very high potential for achieving significant fuel cost savings and GHG emissions reductions for the City of Hamilton. With zero tailpipe emissions, transitioning the fleet to electric is the ultimate fuel-reduction solution. We are essentially suggesting a temporary moratorium on purchasing new ICE vehicles for the short term (two years for pickups, four years for MHDVs), while waiting for battery-electric counterparts to become available. The exception, of course, is for LD passenger BEVs which are currently available, such as the Kia Souls ordered by the City, as well as other comparable options such as the Chevrolet Bolt. Moreover, BEV refuse/recycling trucks and transit buses (the latter outside the scope of this report) are also available for purchase now.

Our position is that fleets should avoid buying fossil-fuelled units because internal combustion engine (ICE) vehicles are quickly becoming an outdated and archaic technology. The purchase of a new ICE vehicles now, whether gasoline or diesel, means that a fleet, like the City of Hamilton's Fleet, will commit to using new fossil-fuelled vehicles for approximately the next decade when zero-emissions BEVs, which are often more economical than their fossil-fuel counterparts, are just around the corner.

For municipalities, the "workhorse" of the fleet is the pickup truck. Of all the fleet vehicles in RSI-FC's 50,000 vehicle Canadian municipal fleet database, 46% are pickup trucks. In Hamilton's in-scope fleet, pickups comprise about 25% of the fleet based on the data provided (324 pickups out of a total of 1,307 units). At this time, there are at no BEV pickups available for purchase, but at least seven manufacturers are preparing BEV pickups to hit the market starting in the year 2022.

We expect that battery-electric models for Class 5-8 trucks will come to market in the near future – almost all truck manufacturers have announced plans to launch battery-electric trucks in these classes soon, likely by 2024. Several are taking orders now, including Lion Electric, Tesla, Nikola, and others.

CNG conversion is a solution that can potentially deliver significant fuel cost savings and GHG reductions; however, the cost of installing a fast fuelling system in far greater than installing a DC fast charger for BEVs. Moreover, if BEVs come down in price over time, the business case will continue to improve and potentially more units would demonstrate a positive ROI. Given that MHDVs are likely

moving away from the internal combustion engine toward battery-electric zero-emission units, a fleet-wide commitment to CNG may not be a prudent choice for the future.

For fiscal responsibility reasons, a phased-in approach is recommended for Hamilton to transition to a BEV fleet. The reality is that, since only LD BEVs are available now, and pickups are expected to be available in two years, followed by MHD trucks in about four years, a phase-in is the only option for the first few years. Municipal replacement cycles are long-term – up to 10 or 12 years – or more for some vehicles. Therefore, a BEV phase-in plan in the long term is needed for a balanced approach to capital spending.

Next Steps

Our Green Fleet Strategy describes the analysis we have completed to evaluate and determine viable fuel-reduction solutions that are available to the City of Hamilton, now and in the near future. We have presented the strengths, weaknesses, and cost-benefit analysis to help inform fleet management in decision-making around which solutions are effective interim solutions and which help to achieve longer-term goals. Such decisions should be made with consideration for budgets and cash flow planning, current and expected future business climate, and the level of ambition in achieving deep reductions in GHG emissions (and at the same time, potentially significant cost savings).

From our work in developing fuel-reduction strategies for more than a 15 years, we have observed that certain elements lead to the highest rates of successful implementation. These include:

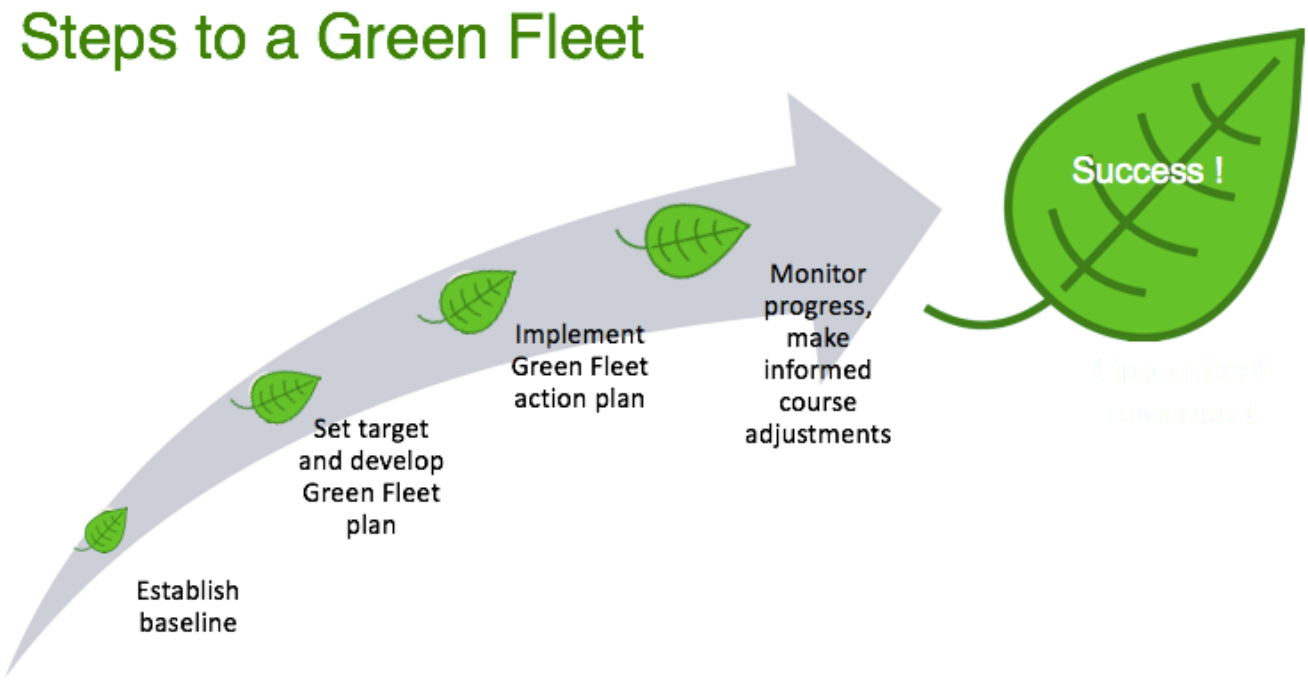
- A corporate culture that encourages environmental leadership;
- An internal “champion”;
- Commitment to greening the fleet – from the ground floor operational level up to the most senior level of the organization;
- Carefully managed risk and a willingness to experiment;
- A strong green fleet commitment stated in policy, clearly defined timelines, and responsibilities;
- Procurement policies that take into consideration lifecycle costs of vehicles;
- Carefully prepared green fleet plans that are based in reality and practicality;
- Reliable and consistent fleet operating data;

- Measurable, measured, and achievable goals – with a degree of stretch; and
- A strong communications team to share successes.

Figure 7 is a simple but effective visualization of the steps for achieving a successful green fleet. The first step (establishing baseline) has been achieved using the data provided by the City of Hamilton to inform the baseline analysis, and step two (setting target and developing green fleet plan) is well underway through RSI-FC's FAR analysis and recommendations presented in this report.

Our software tool, FAR, will be provided to the City of Hamilton for its own internal use post-project. The tool can be useful for both steps 3 and 4 (implementation and monitoring) to precisely evaluate any number and combination of fuel-saving solutions for specific units (implementation) as well as to re-evaluate solutions as progress is made (monitoring).

Figure 7: Steps to a Green Fleet



Appendix A: Green Fleet Survey Results

Figure 8: Breakdown of survey participants by employment status

What is your employment status with the City of Hamilton?

Answer	0% 100%	Number of Response(s)	Response Ratio
Full-time, unionized employee		9	28.1 %
Full-time, management employee		23	71.8 %
Part-time		0	0.0 %
Student or Intern		0	0.0 %
Retiree		0	0.0 %
Other		0	0.0 %
No Response(s)		0	0.0 %
	Totals	32	100%

Figure 9: Breakdown of survey participants by employment length

*How long have you been employed by the City of Hamilton?

Answer	0% 100%	Number of Response(s)	Response Ratio
Less than 6 months		0	0.0 %
6 months to less than 1 year		3	9.3 %
1 year to less than 10 years		12	37.5 %
10 years to less than 25 years		13	40.6 %
25 years or more		3	9.3 %
Other		1	3.1 %
No Response(s)		0	0.0 %
	Totals	32	100%

Figure 10: Breakdown of survey participants by age

Which is your age category? (optional question)

Answer	0% 100%	Number of Response(s)	Response Ratio
Younger than 18		0	0.0 %
18 - 24		0	0.0 %
25 - 34		2	6.2 %
35 - 44		9	28.1 %
45 - 54		12	37.5 %
55 - 64		7	21.8 %
65 or older		0	0.0 %
Prefer not to answer		2	6.2 %
No Response(s)		0	0.0 %
	Totals	32	100%

Figure 11: Breakdown of survey participants by gender

What is your gender? (optional question)

Answer	0% 100%	Number of Response(s)	Response Ratio
Male		17	53.1 %
Female		12	37.5 %
Prefer not to answer		3	9.3 %
No Response(s)		0	0.0 %
	Totals	32	100%

Figure 12: Breakdown of survey participants by vehicle type

*What type of vehicle do you drive at work to perform your job responsibilities?

Answer	0% 100%	Number of Response(s)	Response Ratio
No vehicle		7	21.8 %
Car		7	21.8 %
Pickup		7	21.8 %
Van		0	0.0 %
SUV		9	28.1 %
Medium-duty single-axle truck		0	0.0 %
Heavy-duty tandem axle truck (snow plow, dump, refuse trucks etc.)		0	0.0 %
Other		2	6.2 %
No Response(s)		0	0.0 %
	Totals	32	100%

Figure 13: Respondents' view on Hamilton's climate change emergency declaration

In March 2019, the City of Hamilton declared a climate change emergency. Since that time the Government of Canada and more than 400 other Canadian municipalities have done the same. Most of these organizations are implementing programs to reduce their carbon emissions. Please share your thoughts on the following:

Answer	0% 100%	Number of Response(s)	Response Ratio
I agree there is a climate change emergency		11	34.3 %
I support Hamilton's climate change emergency declaration		19	59.3 %
I do not agree there is a climate emergency		1	3.1 %
I do not support Hamilton's climate emergency declaration		0	0.0 %
I need more information about Hamilton's climate emergency declaration		1	3.1 %
I am undecided about this matter		0	0.0 %
This issue does not matter to me		0	0.0 %
Other		0	0.0 %
No Response(s)		0	0.0 %
	Totals	32	100%

Figure 14: Respondents' level of environment concern

Please tell us your thoughts about our environment. Do you feel our environment is (pick one below):

Answer	0% 100%	Number of Response(s)	Response Ratio
In good shape		1	3.1 %
In some trouble but can be saved with a little effort		9	28.1 %
In bad shape but a lot of effort might save it		22	68.7 %
In such bad shape little can be done about it		0	0.0 %
Other		0	0.0 %
No Response(s)		0	0.0 %
	Totals	32	100%

Figure 15: Respondents' level of agreement on the environment as a priority

There is a lot of attention to the environment these days. Do you agree the current level of concern is justified? (Do you agree it is really as bad as some people say it is?)

1 = Strongly disagree, 2 = Disagree, 3 = Undecided, 4 = Somewhat agree, 5 = Strongly agree

1	2	3	4	5	Number of Response(s)	Rating Score*
					32	4.7

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

Figure 16: Ranking of environmental problems by survey participants

*Which of the following do you feel are the biggest problems facing our environment? Please rate the following from 1 (smallest) to 5 (biggest):

1 = Smallest

Answer	1	2	3	4	5	Number of Response(s)	Ranking Score*
Toxic waste						31	2.7
Water pollution						31	3.3
Air pollution (ground level smog)						31	3.3
Global warming caused by greenhouse gas emissions						31	3.4
Other (please explain in the box below)						31	2.3

*The Ranking Score is the weighted average calculated by dividing the sum of all weighted rankings by the number of total responses.

Figure 17: Respondents' view on impacts of various pollution factors

*Thinking of pollution caused by vehicles, what are your thoughts on the impacts of each of the following (low to high impact)

1 = Very low impact, 2 = Low impact, 3 = Unsure/undecided, 4 = Has an impact, 5 = Has a big impact

Answer	1	2	3	4	5	Number of Response(s)	Rating Score*
The age of the fleet vehicles						32	4.2
The types of fuel used						32	4.4
Maintenance of the fleet vehicles						32	4.1
The driving habits of the vehicle operators						32	3.8
Vehicle that are over-sized for our job requirements						32	4.0
Unnecessary trips in vehicles						32	4.0
Routes that are not planned in a way to reduce distance						32	3.7

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

Figure 18: Respondents' level of agreement on efficacy of eco-driver training

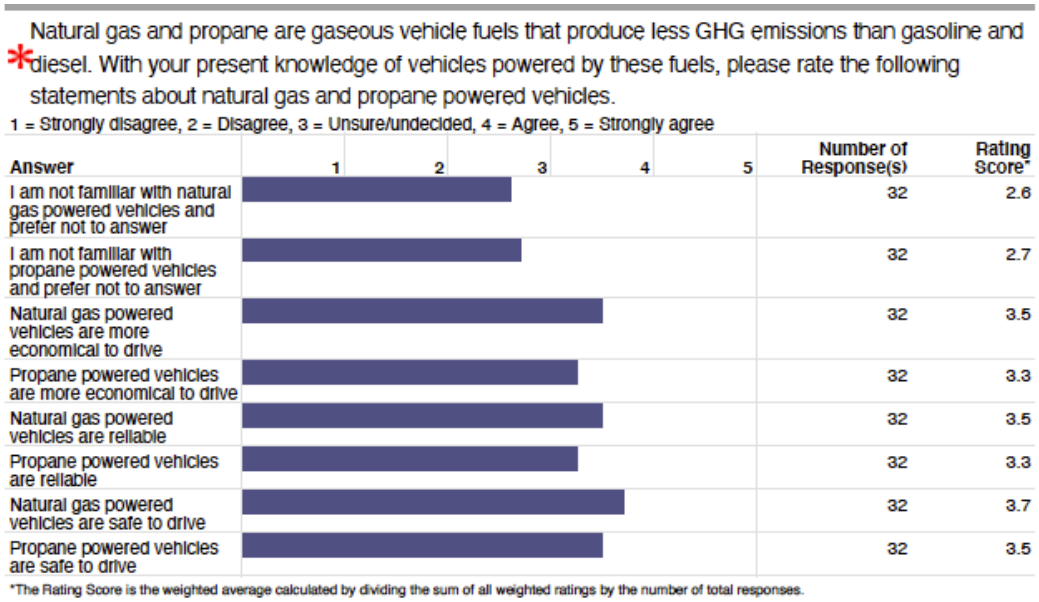
*This question is about driving habits and behaviors, and ways to help Hamilton's fleet vehicle drivers operate vehicles in the most fuel-efficient manner.Please provide your responses below.

1 = Disagree, 2 = Undecided/unsure, 3 = Agree

Answer	1	2	3	Number of Response(s)	Rating Score*
I would like to receive fuel-efficient, eco-driver training from the City of Hamilton				32	2.3
Learning eco-driving habits would benefit me in my personal life by saving me money on fuel				32	2.5
I am an excellent driver and eco-driver training would not benefit me in any way				32	1.6

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

Figure 19: Respondents' level of agreement on fuel economy, reliability, and safety of natural gas- and propane-powered vehicles



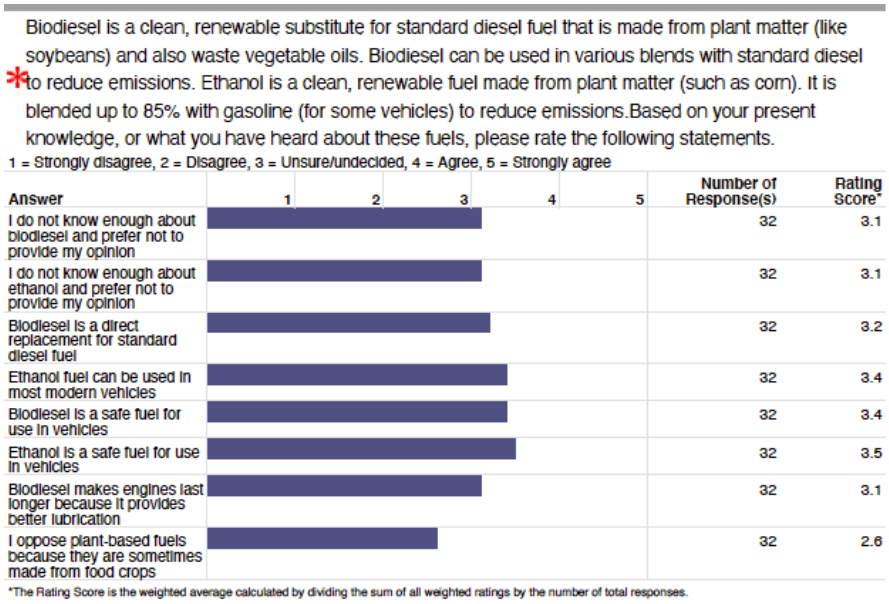
Natural gas and propane are gaseous vehicle fuels that produce less GHG emissions than gasoline and diesel. With your present knowledge of vehicles powered by these fuels, please rate the following statements about natural gas and propane powered vehicles.

1 = Strongly disagree, 2 = Disagree, 3 = Unsure/undecided, 4 = Agree, 5 = Strongly agree

Answer	1	2	3	4	5	Number of Response(s)	Rating Score*
I am not familiar with natural gas powered vehicles and prefer not to answer						32	2.6
I am not familiar with propane powered vehicles and prefer not to answer						32	2.7
Natural gas powered vehicles are more economical to drive						32	3.5
Propane powered vehicles are more economical to drive						32	3.3
Natural gas powered vehicles are reliable						32	3.5
Propane powered vehicles are reliable						32	3.3
Natural gas powered vehicles are safe to drive						32	3.7
Propane powered vehicles are safe to drive						32	3.5

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

Figure 20: Respondents' level of confidence and agreement on biodiesel and ethanol as fossil fuel substitutes



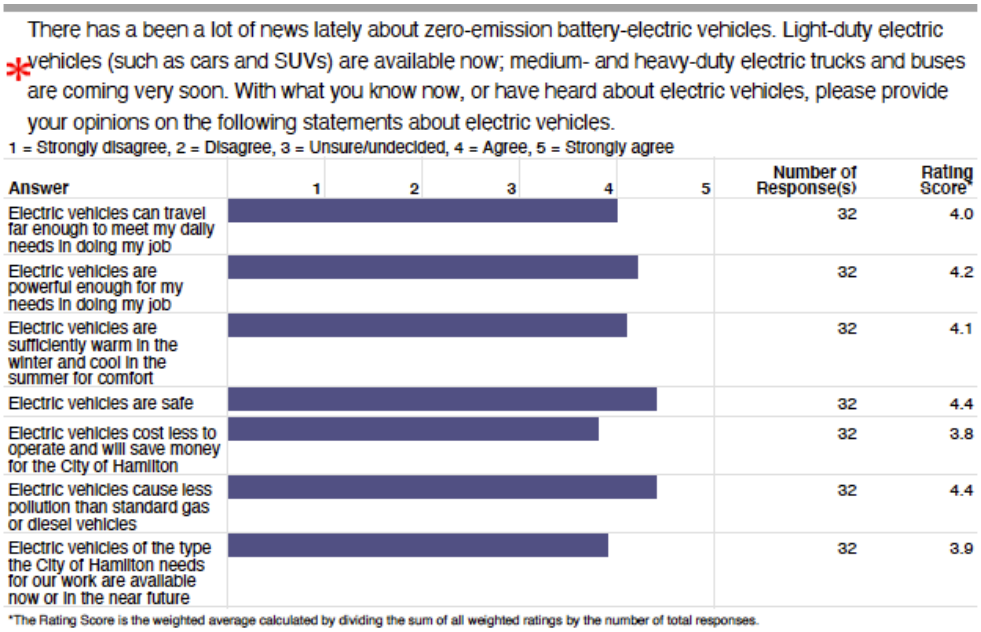
Biodiesel is a clean, renewable substitute for standard diesel fuel that is made from plant matter (like soybeans) and also waste vegetable oils. Biodiesel can be used in various blends with standard diesel to reduce emissions. Ethanol is a clean, renewable fuel made from plant matter (such as corn). It is blended up to 85% with gasoline (for some vehicles) to reduce emissions.Based on your present knowledge, or what you have heard about these fuels, please rate the following statements.

1 = Strongly disagree, 2 = Disagree, 3 = Unsure/undecided, 4 = Agree, 5 = Strongly agree

Answer	1	2	3	4	5	Number of Response(s)	Rating Score*
I do not know enough about biodiesel and prefer not to provide my opinion						32	3.1
I do not know enough about ethanol and prefer not to provide my opinion						32	3.1
Biodiesel is a direct replacement for standard diesel fuel						32	3.2
Ethanol fuel can be used in most modern vehicles						32	3.4
Biodiesel is a safe fuel for use in vehicles						32	3.4
Ethanol is a safe fuel for use in vehicles						32	3.5
Biodiesel makes engines last longer because it provides better lubrication						32	3.1
I oppose plant-based fuels because they are sometimes made from food crops						32	2.6

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

Figure 21: Respondents' level of confidence and agreement on BEVs



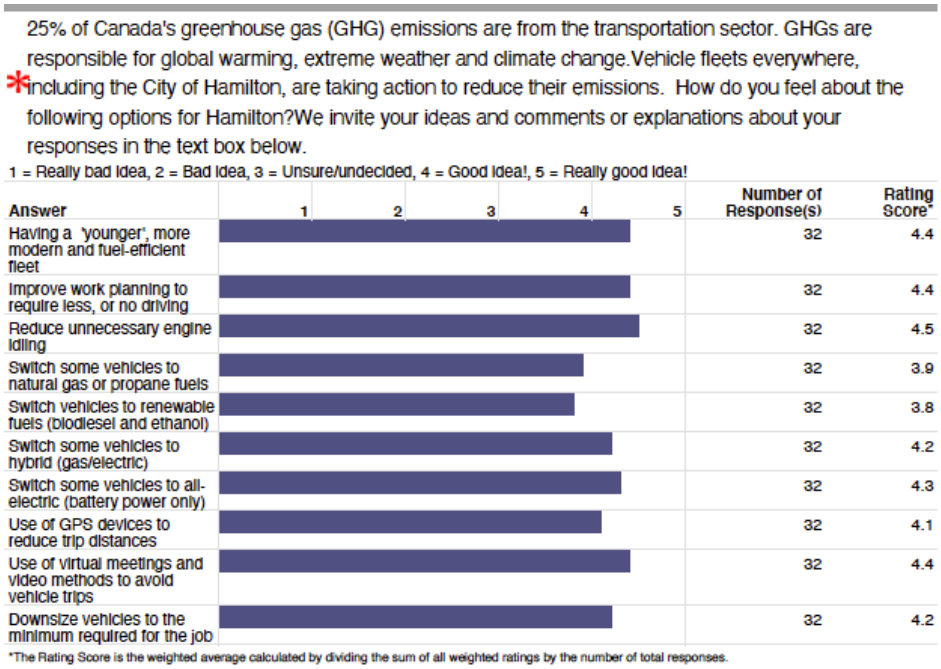
There has a been a lot of news lately about zero-emission battery-electric vehicles. Light-duty electric vehicles (such as cars and SUVs) are available now; medium- and heavy-duty electric trucks and buses are coming very soon. With what you know now, or have heard about electric vehicles, please provide your opinions on the following statements about electric vehicles.

1 = Strongly disagree, 2 = Disagree, 3 = Unsure/undecided, 4 = Agree, 5 = Strongly agree

Answer	1	2	3	4	5	Number of Response(s)	Rating Score*
Electric vehicles can travel far enough to meet my daily needs in doing my job						32	4.0
Electric vehicles are powerful enough for my needs in doing my job						32	4.2
Electric vehicles are sufficiently warm in the winter and cool in the summer for comfort						32	4.1
Electric vehicles are safe						32	4.4
Electric vehicles cost less to operate and will save money for the City of Hamilton						32	3.8
Electric vehicles cause less pollution than standard gas or diesel vehicles						32	4.4
Electric vehicles of the type the City of Hamilton needs for our work are available now or in the near future						32	3.9

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

Figure 22: Respondents' opinions on actions to reducing fleet GHG emissions



25% of Canada's greenhouse gas (GHG) emissions are from the transportation sector. GHGs are responsible for global warming, extreme weather and climate change.Vehicle fleets everywhere, including the City of Hamilton, are taking action to reduce their emissions. How do you feel about the following options for Hamilton?We invite your ideas and comments or explanations about your responses in the text box below.

1 = Really bad idea, 2 = Bad idea, 3 = Unsure/undecided, 4 = Good idea!, 5 = Really good idea!

Answer	1	2	3	4	5	Number of Response(s)	Rating Score*
Having a 'younger', more modern and fuel-efficient fleet						32	4.4
Improve work planning to require less, or no driving						32	4.4
Reduce unnecessary engine idling						32	4.5
Switch some vehicles to natural gas or propane fuels						32	3.9
Switch vehicles to renewable fuels (biodiesel and ethanol)						32	3.8
Switch some vehicles to hybrid (gas/electric)						32	4.2
Switch some vehicles to all-electric (battery power only)						32	4.3
Use of GPS devices to reduce trip distances						32	4.1
Use of virtual meetings and video methods to avoid vehicle trips						32	4.4
Downsize vehicles to the minimum required for the job						32	4.2

*The Rating Score is the weighted average calculated by dividing the sum of all weighted ratings by the number of total responses.

Appendix B: Fleet Analytics Review™

Fleet Analytics Review™ (FAR) is a user-friendly, interactive decision support tool designed to aid our team and fleet managers in developing short- to long-term green fleet plans by calculating the impacts of vehicle replacement and fuel-reduction solutions on operating costs, cost of capital, and GHG emissions. Moreover, it is used for long-term capital planning (LTCP) through an approach that works to balance, or smoothen, annual capital budgets and avoid cost spikes if possible.

FAR is a complex, sophisticated MS Excel software developed by the RSI-FC team in 2016. Since its inception, FAR has been used by our team as the foundational analysis platform for our work in helping fleets with green fleet planning and the transition to low-carbon fuels/technologies.

Clients to date for which reports were completed using FAR include:

- City of Kawartha Lakes (2020)
- Durham Region (2020)
- Town of Gander (2020)
- Town of Whitby (2020)
- Town of Aurora (2019)
- NW Natural Gas Distribution, Portland, OR, USA (2018)
- The County of Middlesex Centre (2017)
- The Region of Peel (2017)
- The Town of Enfield, CT, USA (2017)
- Toronto-Hydro Electric (2017)
- Winnipeg Airport Authority (2017)
- Greater Toronto Airport Authority (2016)
- Oxford County (2016)
- The City of Vaughan (2016 - 2018)

Purpose

The core functionality of the FAR software is to calculate the financial and GHG reduction impacts of vehicle replacements, operational improvements, and low-carbon fuels/technologies for a fleet.

In the context of assessing fleet modernization, FAR is especially useful in calculating the operating expense (opex) impacts of vehicles being retained in the fleet beyond their viable age and with diminishing salvage values. Aged, older-technology vehicles consume more fuel, produce more GHGs, usually cost more to operate, are less reliable, and may also present a safety risk. FAR automatically calculates and quantifies these impacts in a defensible business case format.

For fuel-reduction solutions under consideration by fleet management as a means of saving fuel costs and avoiding GHGs, including best management practices (BMPs), alternate or renewable fuels (natural gas, propane, biodiesel, etc.), and EVs (battery-electric, plug-in hybrid, or hybrid), FAR calculates the cost-benefit of the investment in vehicle upgrades, vehicle conversion costs, fuelling infrastructure, or EV charging infrastructure, i.e., whether these solutions would yield a net operating cost reduction, unit-by-unit and fleet-wide.

Approach

The FAR software tool employs a holistic approach – all relevant factors and controllable expenses are considered in its analysis. The data points in our approach include energy equivalency factors of each alternative fuel type (compared to a fossil diesel fuel baseline), vehicle upgrade costs, alternately-fuelled vehicle acquisition (or vehicle retrofit) capital costs, vehicle maintenance considerations (higher or lower maintenance demand), fuel system/charging infrastructure capital costs, and any additional expenses for storage, handling & dispensing the fuel(s). All of these factors are modelled within the context of planned vehicle lifecycles – a total cost of ownership (TCO) approach.

The FAR process uses historical cost metrics and vehicle operating data (i.e., miles/km-driven, fuel usage, repair and maintenance costs, unit age, cost of capital, downtime, residual value, etc.) to establish not only the fleet's fuel usage and GHG emissions baseline, but also financial and service levels (i.e., utilization, availability/uptime) performance.

FAR highlights "exception" units, vehicles that are performing in a sub-standard way in terms of cost and performance, thus potentially enabling management to identify the reason(s) and take appropriate action(s).

Go-Forward Fuel-Reduction Solutions

With the FAR baseline established, the software is used to analyze go-forward fuel-reduction solutions. FAR takes into consideration the Opex implications and determines whether Opex reductions will offset any capital expenses (Capex) including vehicle upgrades, vehicle conversions, "up-charges" for premium vehicles (e.g., EVs), and investment in infrastructure.

The FAR analysis includes, but is not limited to:

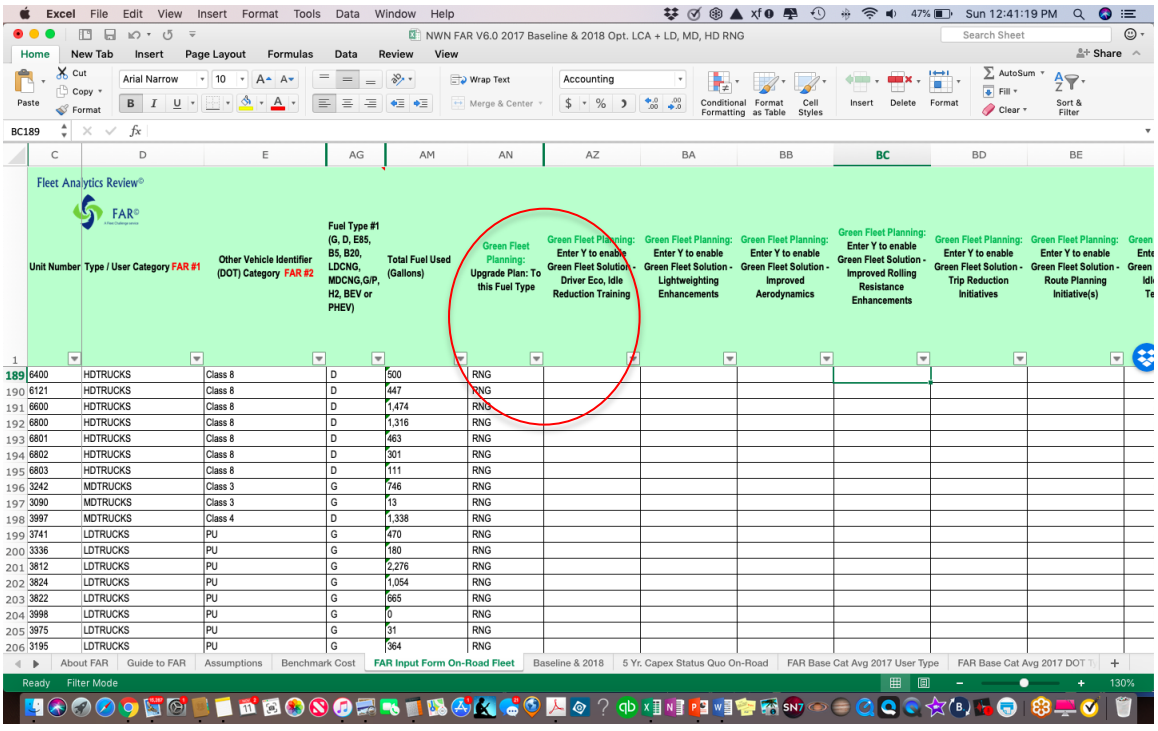
- The fuel usage and cost differential (+ or -) for the fuel type selected vs the current type (if applicable)
- The energy-efficiency difference

- The unit cost of upgrade for the fuel-saving technology
- The unit cost of conversion to the selected fuel type
- The cost of fueling infrastructure for the selected fuel type apportioned evenly to the chosen vehicles for the fuel-switch
- The cost of charging infrastructure for EVs apportioned evenly to the chosen vehicles to be replaced
- The cost of capital for vehicle replacement for the selected fuel type

FAR then calculates whether a cost-savings or return-on-investment (ROI) would result within the remaining lifecycle for each of the vehicles selected for the vehicle upgrade or fuel switch.

Figure 23 shows a screen capture from FAR demonstrating the FAR fuel-switching capabilities. In this example, the user is switching several light-, medium-, and heavy-duty trucks from their current fuel source to renewable natural gas (RNG), and this is accomplished simply by selecting the vehicle(s) to be evaluated and then choosing (in this example) RNG from a drop-down list.

Figure 23: Screen Capture of FAR Showing Fuel-Switching Options



FAR is user-friendly and intuitive; it is based on standard off-the-shelf MS Excel. It is dynamic, and users can run future scenarios (such as assessing different vehicle types, fuels, or engine/drivetrain combinations) to see how such decisions impact Opex ahead of their implementation, thereby mitigating risk and heading off potentially costly errors.

Recent Enhancements and Upgrades to FAR™

FAR V30.5 (beta) features upgrades and enhancements to the functionalities of the FAR tool. These include:

Fuel-Efficient Green Fleet Planning Tools – Fuel-Switching. FAR now includes several powerful "Green Fleet Planning" tools. One of these tools is used to estimate the financial and GHG impacts of switching vehicle fuels from fossil-based (gas or diesel) to alternate or renewable fuels or BEVs.

In the Input Form, FAR analysts may make choices as to fuel-switching (for example, changing all gas or diesel-powered vehicles in specific categories to E85, B5-B100 biodiesel, hybrid, plug-in hybrid, battery-electric, CNG, or even hydrogen fuel cells). FAR calculates the net cost and GHG reduction of the fuel-switch being considered, taking into consideration not just the fuel/electricity costs, but the change in fuel efficiency, as well infrastructure costs such as installing a CNG fueling station, electric vehicle chargers, etc.

Enhanced Vehicle Replacement Cost-Benefit Analysis. Comparisons and analysis regarding either (a) aging a vehicle (or vehicles) that are now due for replacement for another year or (b) going ahead and replacing the vehicle(s) is now based on the actual average historical peer fleet cost data from our proprietary municipal fleet database.

In FAR, when a vehicle is due for replacement, it calculates the annual cost for a new replacement vehicle (including the capital, fuel, repairs, PM, and downtime) and then compares that amount to the actual average cost for a similar vehicle —that is one-year older (from our peer fleet database). FAR now displays the cost-benefit of replacing each unit that is due for replacement in the 5+ yr Capex plan tab – in blue font each vehicle that will save Opex if it is replaced, and red font if it will incur more opex. This marks a significant change in FAR and eliminates all guesswork or sketchy assumptions and supplants it with real peer fleet operating cost data by model year and vehicle categories we have collected since 2006.

Fuel-Usage and GHG Reduction for New Vehicles. For each vehicle that is due for replacement, FAR now shows the potential fuel-usage and GHG reduction.

Appendix C: Lifecycle Analysis Charts

Table 15: LCA for passenger vehicles (Class 1) using Hamilton fleet data

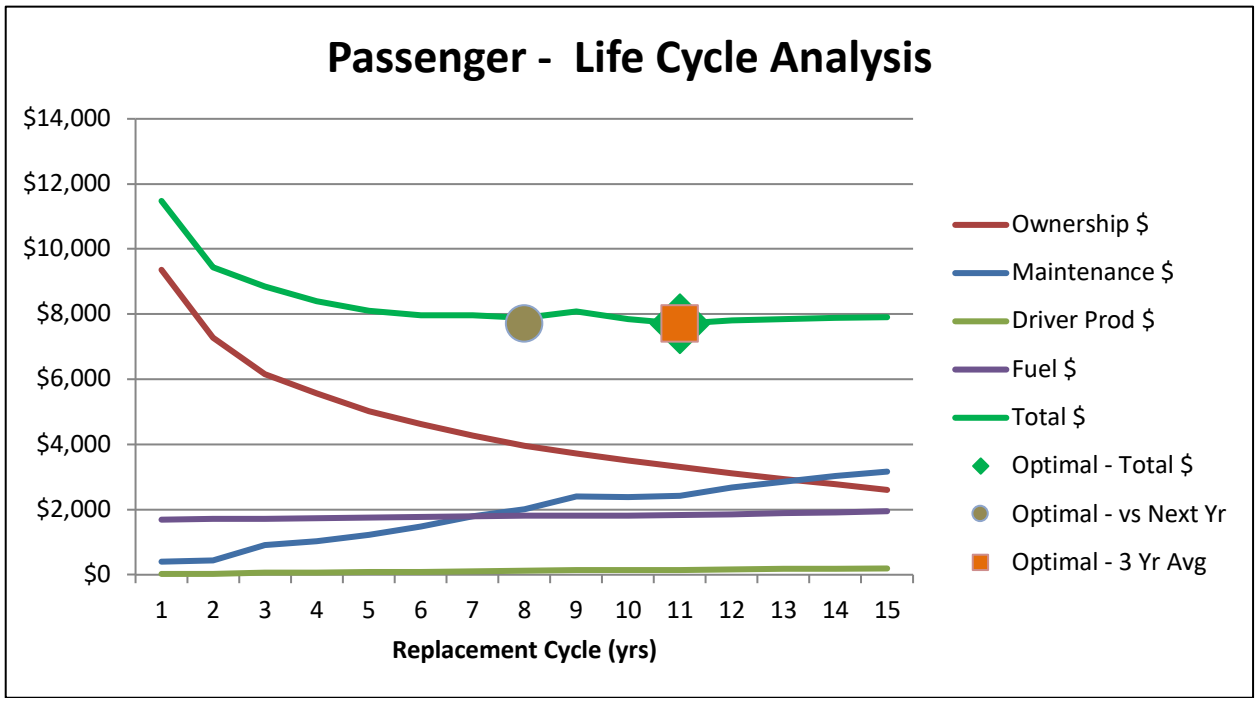


Table 16: LCA for pickups (Classes 1 & 2) using Hamilton fleet data

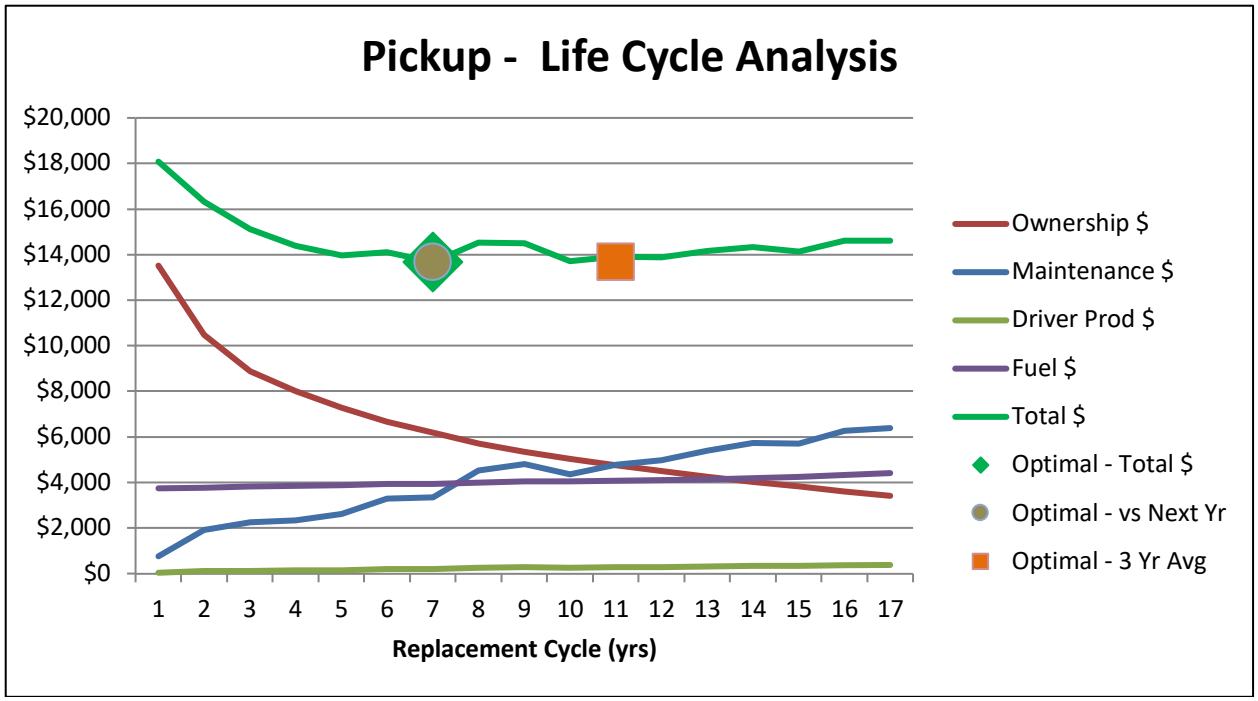


Table 17: LCA for Class 2 vans and utility vans using Hamilton fleet data

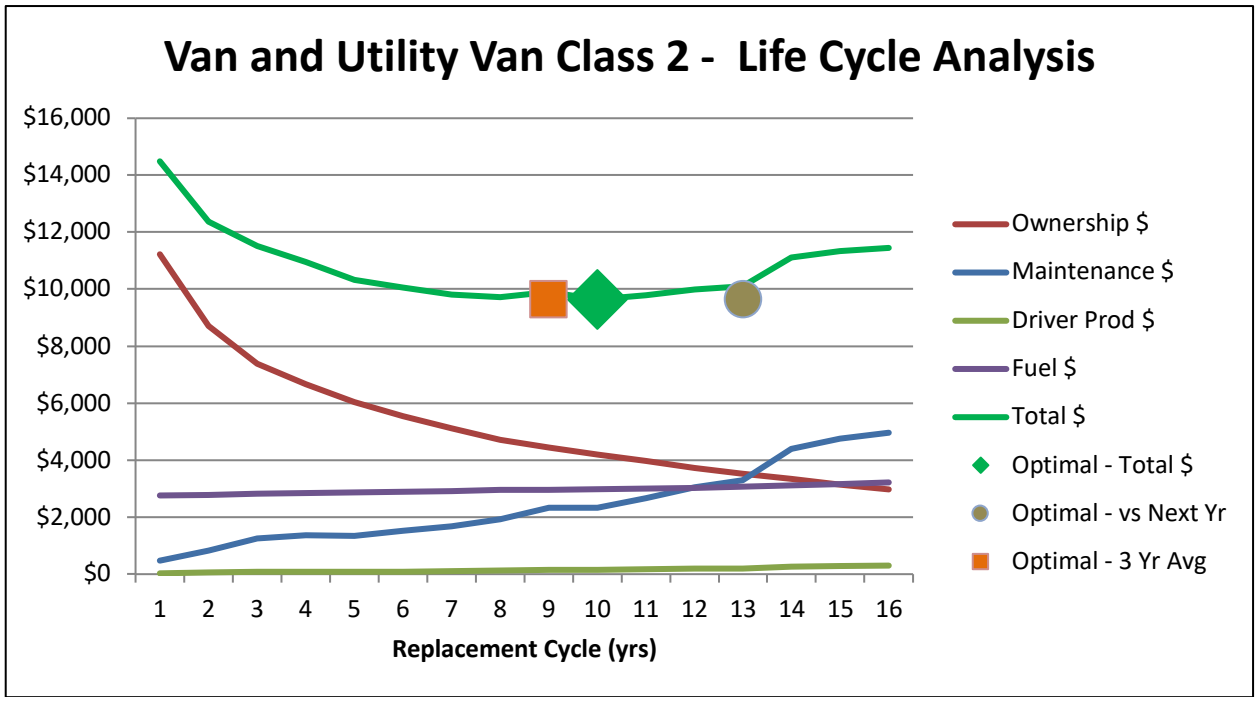


Table 18: LCA for Class 3 pickup trucks and utility vans using Hamilton fleet data

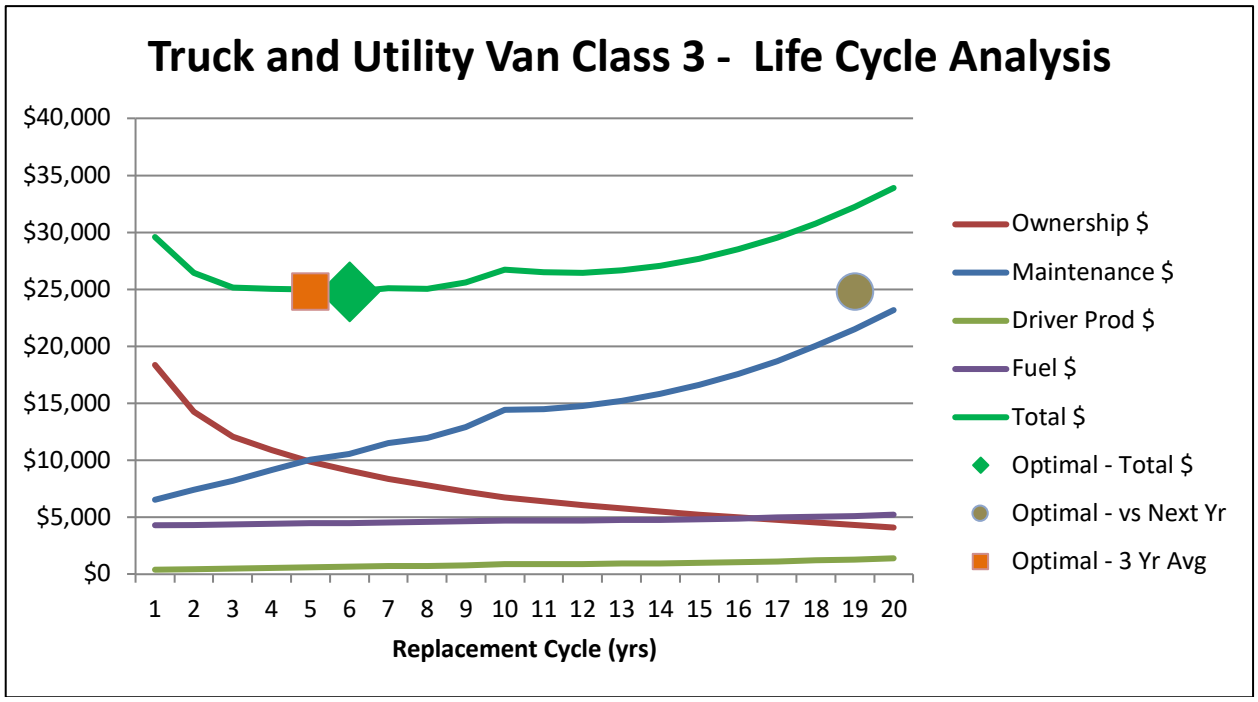


Table 19: LCA for Class 5 trucks using Hamilton fleet data

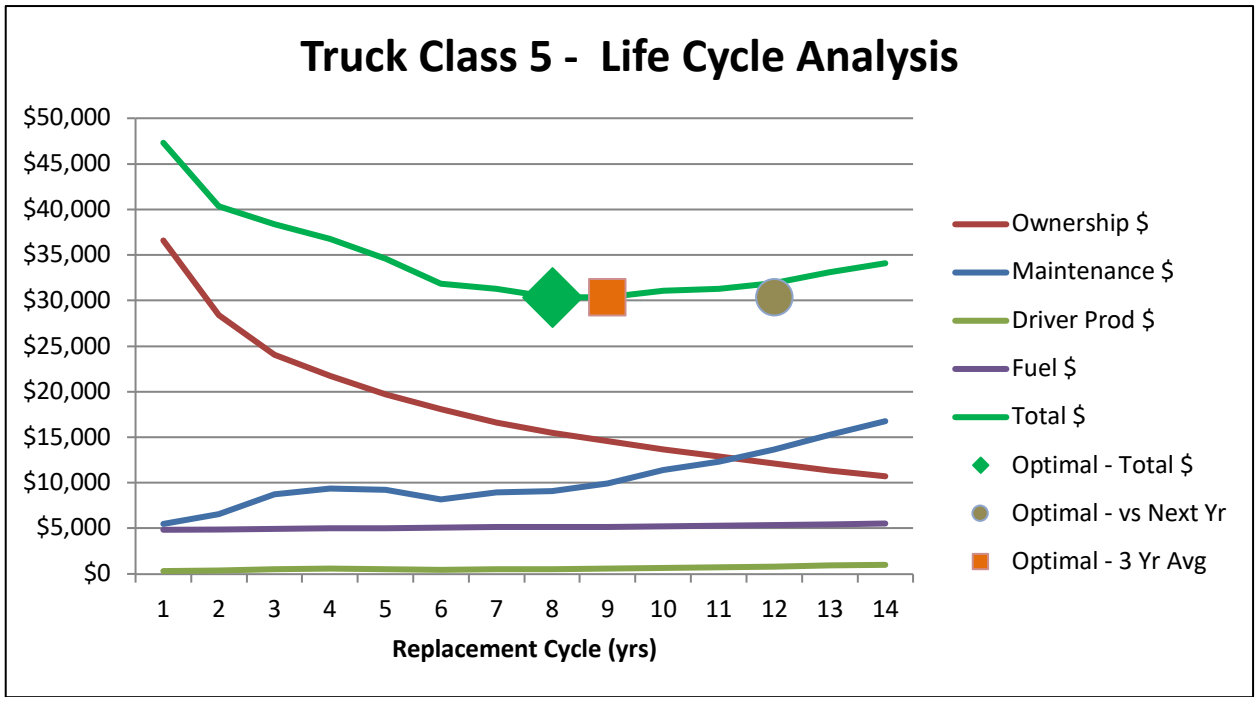


Table 20: : LCA for Class 6 utility vans using benchmark fleet data from municipal database

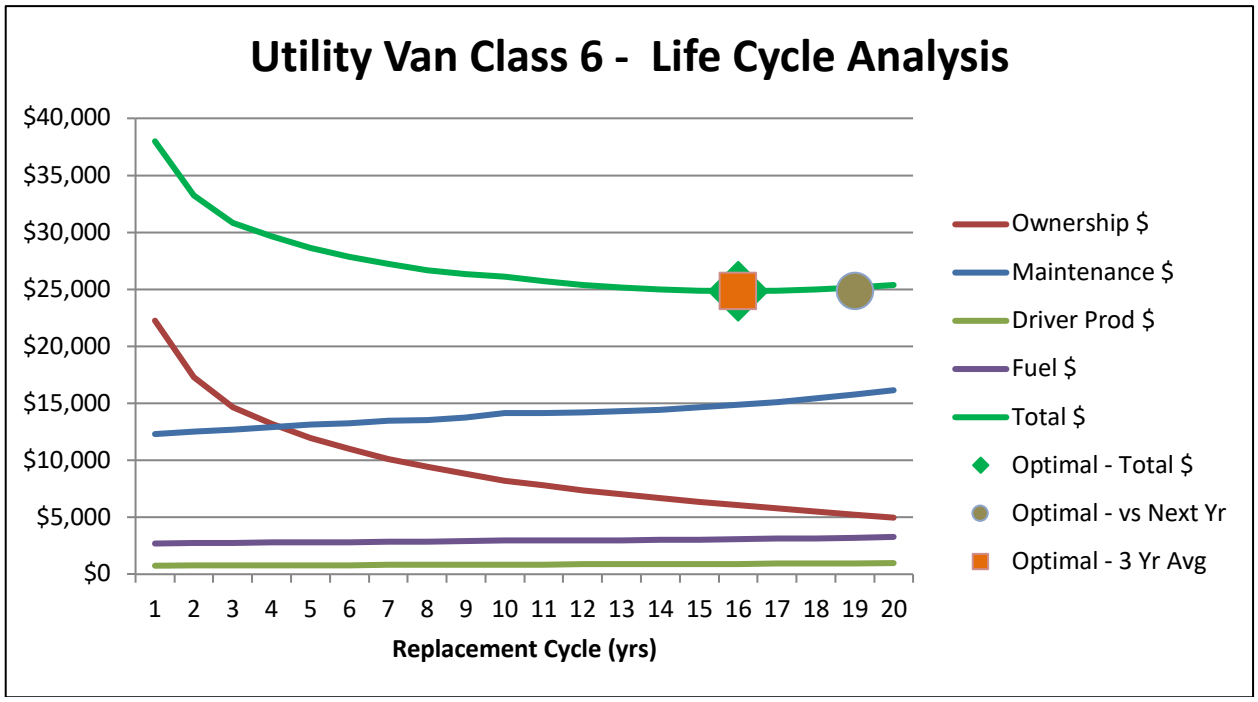


Table 21: LCA for Class 7 trucks using Hamilton fleet data

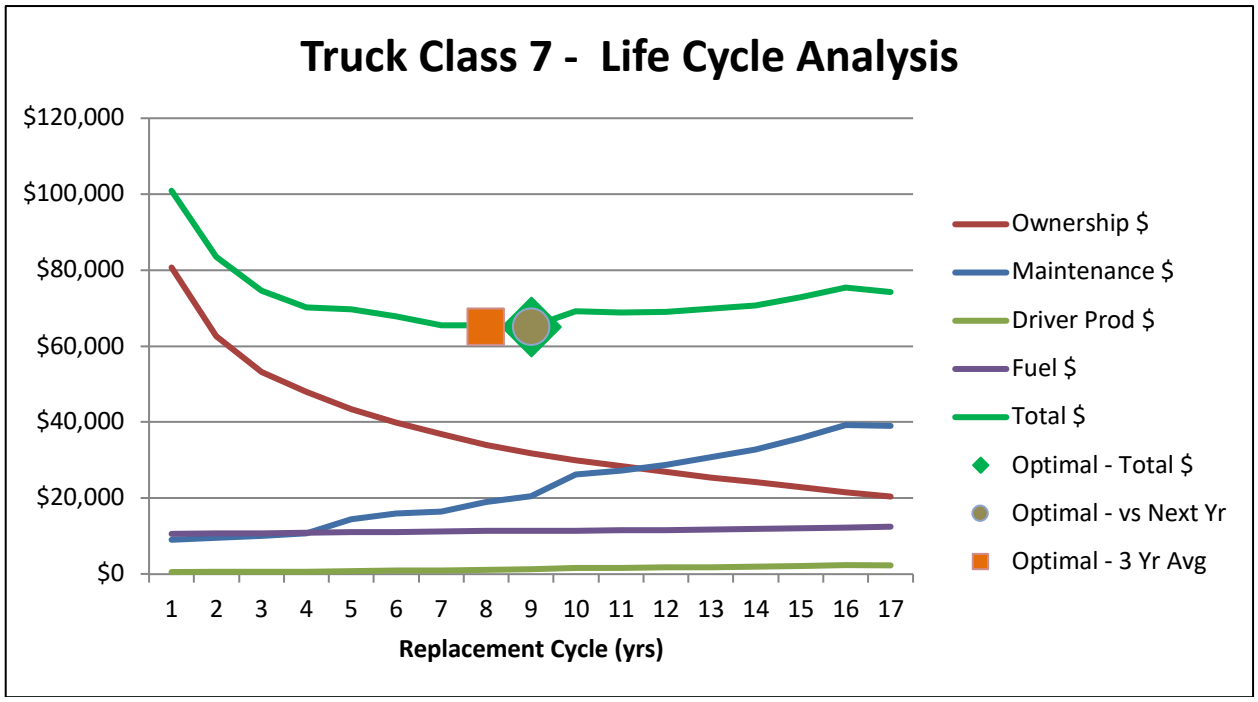
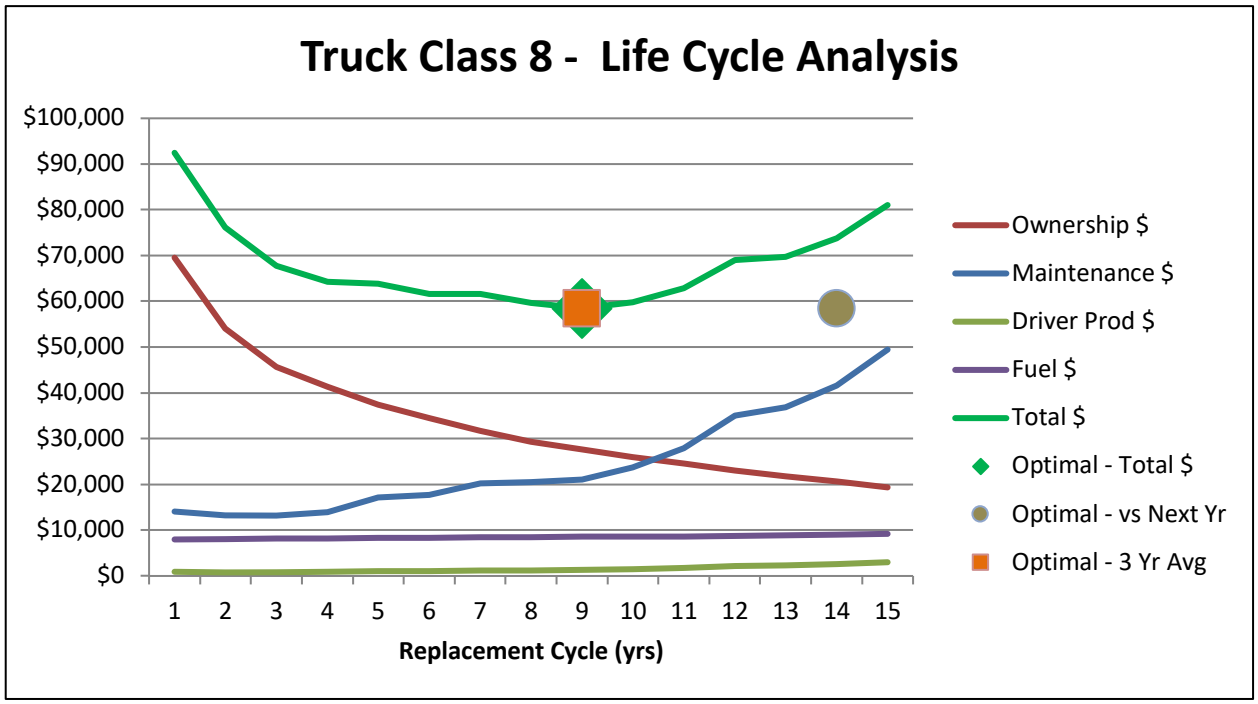


Table 22: LCA for Class 8 trucks using Hamilton fleet data



Appendix D: FAR Scenario Details and Results

RSI-FC's long-term capital planning (LTCP) begins with a baseline review. The FAR software tool was used to plot Hamilton's current-day baseline relative to the fleet's age and operating statistics in a one-year review period (2019). This baseline included data on service levels (uptime and utilization), operating costs, fuel consumption, and GHG emissions.

From the baseline, we modelled 15-year budget cycles (to 2035) for business-as-usual (BAU) vehicle retention practices, optimized lifecycles, balanced Capex and optimized lifecycles (only replacing units with ROI), and a number of fuel-reduction solutions (additional best practices or "house-in-order" actions, fuel-switching or "messy-middle" solutions, and BEV phase-in planning). Details and results for each individual scenario are presented below.

Business-as-Usual

FAR Scenario One modelled go-forward outcomes based on Hamilton's present-day vehicle and equipment replacement practices. These business-as-usual (BAU) outcomes included the impacts of current vehicle replacement cycles on operating expenses (opex), vehicle/equipment replacement capital requirements, and GHG emissions over a fifteen-year horizon.

Based on present-day replacement practices, it was estimated that $ 37.6 million would be required to replace all due or past-due units with new like-for-like vehicles (not EVs at this stage). It should be noted that numerous vehicles in the Hamilton fleet are beyond the current planned age for replacement – significant "catch-up" is required to modernize the fleet. In ensuing years, far fewer vehicles require replacement, bringing down capital spending to between $5 and 8 million in the following three fiscal years (2021-2023). However, there is an uneven capital spend projected in following years.

In the unlikely event that all vehicles due for replacement in 2020 were indeed replaced, operating expenses are forecasted to decrease by about $ 4.5 million and GHG emissions are estimated to decrease by over 60 tonnes CO_2e due to the increased fuel efficiency of newer vehicles.

The annual capital budget requirements, Opex, and GHG emissions to the year 2035 based on Hamilton's present-day BAU replacement practices are shown in *Table 23*.

Table 23: FAR #1 – 15-Year Capital Budget with BAU Vehicle Replacements

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 37,660,280	$ -	$ 37,660,280	-4.54	62.6
FY 2021	$ 7,999,083	$ -	$ 7,999,083	-4.98	74.2
FY 2022	$ 5,468,466	$ -	$ 5,468,466	-4.73	88.3
FY 2023	$ 5,346,491	$ -	$ 5,346,491	-4.55	97.5
FY 2024	$ 13,756,710	$ -	$ 13,756,710	-4.97	128.3
FY 2025	$ 8,220,390	$ -	$ 8,220,390	-4.51	136.3
FY 2026	$ 12,941,829	$ -	$ 12,941,829	-4.58	155.4
FY 2027	$ 13,420,845	$ -	$ 13,420,845	-4.13	183.1
FY 2028	$ 18,074,300	$ -	$ 18,074,300	-4.04	216.1
FY 2029	$ 6,462,137	$ -	$ 6,462,137	-4.40	217.3
FY 2030	$ 26,987,138	$ -	$ 26,987,138	-4.23	244.4
FY 2031	$ 11,056,060	$ -	$ 11,056,060	-4.82	244.4
FY 2032	$ 11,327,444	$ -	$ 11,327,444	-4.33	246.9
FY 2033	$ 6,463,354	$ -	$ 6,463,354	-4.59	247.0
FY 2034	$ 20,564,502	$ -	$ 20,564,502	-5.24	247.9
FY 2035	$ 7,297,240	$ -	$ 7,297,240	-4.57	248.3

Optimized Lifecycles

FAR Scenario Two calculated the impacts of optimized vehicle replacement cycles on operating expenses, vehicle/equipment replacement capital requirements, and GHG emissions over a fifteen-year horizon.

Based on optimized lifecycles, it was estimated that $ 38.3 million would be required to replace all due or past-due units with new like-for-like vehicles (not EVs at this stage), which is slightly greater than present-day replacement practices. Operating expenses are forecasted to decrease by about $ 3.9 million and GHG emissions are estimated to decrease by about 53 tonnes CO_2e over the baseline. Like BAU, there is an uneven capital spend projected in following years.

The impacts of optimized lifecycles determined through LCA modelling are shown in *Table 24*.

Table 24: FAR #2 – 15-Year Capital Budget with Optimized Lifecycles

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ -	$ 38,333,256	-3.94	53.1
FY 2021	$ 4,287,415	$ -	$ 4,287,415	-4.14	59.4
FY 2022	$ 6,344,770	$ -	$ 6,344,770	-4.56	75.5
FY 2023	$ 7,179,728	$ -	$ 7,179,728	-4.19	87.5
FY 2024	$ 12,647,854	$ -	$ 12,647,854	-4.35	116.9
FY 2025	$ 11,825,345	$ -	$ 11,825,345	-4.23	133.8
FY 2026	$ 13,167,300	$ -	$ 13,167,300	-3.79	154.8
FY 2027	$ 6,728,124	$ -	$ 6,728,124	-3.38	167.9
FY 2028	$ 12,784,565	$ -	$ 12,784,565	-3.35	196.3
FY 2029	$ 29,126,900	$ -	$ 29,126,900	-3.37	219.2
FY 2030	$ 13,360,939	$ -	$ 13,360,939	-3.57	236.3
FY 2031	$ 9,120,495	$ -	$ 9,120,495	-4.26	238.0
FY 2032	$ 11,122,230	$ -	$ 11,122,230	-4.09	238.1
FY 2033	$ 12,336,224	$ -	$ 12,336,224	-4.32	238.2
FY 2034	$ 16,125,922	$ -	$ 16,125,922	-4.43	239.1
FY 2035	$ 13,090,186	$ -	$ 13,090,186	-4.12	239.1

Balanced Capex and Optimized Lifecycles

Because a large number of fleet units are due for replacement under both current replacement practices and optimized lifecycles, in FAR Scenario Three we modelled a reduction of the first-year capital spend to a more reasonable, manageable amount as well as a more balanced capital year-to-year capital budget.

The long-term capital budgets shown in FAR Scenarios One and Two are clearly very unbalanced year-over-year. Seldom are fleet managers provided unlimited capital budgets to replace all units requiring replacement based on their assessments. For this reason, re-balancing long-term capital budgets is standard practice for fleet managers everywhere. Decisions must be made by management each year to defer the purchase of some units until later years to balance annual budgets going forward.

The “science” of making decisions around which vehicles should be deferred, and which must be replaced, is knowing, with confidence: (1) whether a vehicle’s replacement will deliver a return-on-investment (ROI), and (2) the physical condition of each unit. The former, (1), is what FAR was designed to do, while (2) is based on the skilled evaluations made by the fleet manager and his/her team. FAR calculates the potential ROI for each fleet vehicle due for replacement. This determination is made by comparing the cost of similar one-year older vehicles (using model-year and vehicle type

data from RSI-FC's peer fleet database) to the projected operating costs of new, replacement vehicles.

For FAR Scenario 3, to demonstrate our recommended process for balancing year-over-year long-term budgets and reducing the overall capital required in fiscal year one (2020), we deferred any units that showed little or no ROI to the following year. The same process was repeated by our team for each fiscal year from 2020 to 2035, taking into consideration vehicle age and mileage. *Note that RSI-FC did this for demonstration purposes only – it should be based on vehicle condition assessments.*

Readers of this report must understand that, to undertake this step, anyone making final determinations as to which vehicles ultimately should be replaced and which should be deferred to another year must confidently know each unit's condition. With this knowledge, units in good condition can be deferred to subsequent years to balance long-term budgets. As third-party consultants, RSI-FC does not have access to this information, and to reduce and apportion the required capital over a more extended period, we opted to defer instead:

1. Units with low/no ROI
2. Units that have most recently became due for replacement (to ensure past-due units get higher priority for replacement)
3. Lower-mileage units (to ensure that higher-mileage units are replaced first)

By selectively and strategically deferring the purchase of some units to later years using this prioritization protocol (above), the capital budget requirement was more balanced over the 15-year capital plan than FAR Scenarios One and Two with increasing capital spending towards the end of the period due to compounding inflation.

Table 25 shows the impacts of a balanced long-term budget, in consideration of ROI, vehicle age, and total kms-travelled.

Table 25: FAR #3 – 15-Year Balanced Capital Budget (for demonstration purposes only)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 24,598,492	$ 13,734,765	-2.81	16.5
FY 2021	$ 31,539,963	$ 19,500,097	$ 12,039,865	-3.75	36.2
FY 2022	$ 26,215,369	$ 14,231,193	$ 11,984,176	-3.25	61.2
FY 2023	$ 21,681,314	$ 9,480,195	$ 12,201,119	-2.46	80.6
FY 2024	$ 22,308,173	$ 10,305,474	$ 12,002,699	-2.46	109.1
FY 2025	$ 22,326,622	$ 10,305,099	$ 12,021,523	-2.31	126.4
FY 2026	$ 23,314,575	$ 11,258,109	$ 12,056,465	-1.84	146.7

FY 2027	$ 18,432,751	$ 7,055,243	$ 11,377,508	-1.36	164.4
FY 2028	$ 11,455,898	$ -	$ 11,455,898	-1.05	182.1
FY 2029	$ 24,509,970	$ 9,694,236	$ 14,815,734	-0.78	195.0
FY 2030	$ 18,311,568	$ 3,377,855	$ 14,933,714	-1.83	199.9
FY 2031	$ 16,793,990	$ 3,011,130	$ 13,782,860	-2.29	202.0
FY 2032	$ 13,398,036	$ -	$ 13,398,036	-1.63	203.1
FY 2033	$ 15,579,686	$ -	$ 15,579,686	-1.88	203.2
FY 2034	$ 16,284,071	$ 389,422	$ 15,894,649	-1.77	203.2
FY 2035	$ 15,887,190	$ -	$ 15,887,190	-1.48	203.2

Important Note Regarding FAR Scenario Three:

FAR Scenario Three was prepared *for demonstration purposes only.* RSI-FC prepared this scenario without any degree of knowledge regarding the mechanical condition of Hamilton's vehicles. In preparing Scenario 3 in FAR, our analysts deferred replacement of vehicles where the business case for replacement was low or did not exist. In the next pass at balancing the budgets we deferred units that most recently became due for replacement and we deferred units with lower mileage. Therefore, the amount of capital required for vehicle replacement in Scenario Three is reflective of vehicles due (or past-due) for replacement for which the investment in replacement vehicles were calculated to potentially provide optimal ROI.

LCA is not a guarantee of performance. It is only an averaging of operational costs by model year for groups of like vehicles within a fleet, to enable fleet managers to assess average annual economic costs by vehicle age. Within a fleet, some vehicles may have had lighter usage than average; other units may have recently been refurbished – either of these situations may enable extending lifecycles beyond the optimal life calculated by LCA.

For this reason, we recommend that long-term vehicle replacement planning should be a two-step process. It should begin with determining an initial list of units due/past-due for replacement via LCA-optimized lifecycles. Then, the actual condition of each vehicle due for replacement should be assessed case-by-case by fleet personnel who are knowledgeable and familiar with the condition of each unit. This process may allow safely extending vehicle lifecycles by deferring replacement of some units to ensuing years, thereby enabling the balancing of long-term capital plans.

Best Management Practices

Starting from FAR Scenario Three, we modelled the adaptation of what we have termed "house-in-order" strategies, which are best management practices (BMPs) we believe should be addressed at the outset, prior to any more costly upgrades or replacements. These Group One solutions focus on fuel-use reductions and include: (1) enhanced vehicle specifications, (2) driver eco-training, and (3) route planning and trip reduction.

In FAR Scenario Four (*Table 26*, below), we applied light-weighting and low rolling resistance (LRR) to appropriate units in Hamilton's in-scope fleet. In FAR Scenario Five (*Table #27*, below), we modelled the impacts of driver eco-training and anti-idling policy and technologies. In FAR Scenario Six (*Table #28*, below), we modelled the fuel-use reduction impacts of route planning/optimization and trip reduction.

In FAR Scenario Seven (*Table 29*, below), we assessed the impacts of all these house-in-order strategies combined. The result was a further decrease in operating expenses by about $40,000-60,000 every year for the fleet compared to FAR Scenario Three. Moreover, GHG emissions are modelled to decrease by, on average, over 3,000 tonnes CO_2e every year over the baseline and FAR Scenario Three – a significant reduction demonstrating the impact of house-in-order strategies alone, particularly from improved driver behaviours and route planning and trip reduction.

Table 26: FAR #4 - 15-Year Balanced Capital Budget with Light-Weighting and LRR

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 24,598,492	$ 13,734,765	-2.79	360.8
FY 2021	$ 31,539,963	$ 19,500,097	$ 12,039,865	-3.73	379.8
FY 2022	$ 26,215,369	$ 14,231,193	$ 11,984,176	-3.23	403.9
FY 2023	$ 21,681,314	$ 9,480,195	$ 12,201,119	-2.44	422.5
FY 2024	$ 22,308,173	$ 10,305,474	$ 12,002,699	-2.43	450.0
FY 2025	$ 22,326,622	$ 10,305,099	$ 12,021,523	-2.29	466.7
FY 2026	$ 23,314,575	$ 11,258,109	$ 12,056,465	-1.82	486.2
FY 2027	$ 18,432,751	$ 7,055,243	$ 11,377,508	-1.33	503.2
FY 2028	$ 11,455,898	$ -	$ 11,455,898	-1.02	520.2
FY 2029	$ 24,509,970	$ 9,694,236	$ 14,815,734	-0.76	532.6
FY 2030	$ 18,311,568	$ 3,377,855	$ 14,933,714	-1.81	537.4
FY 2031	$ 16,793,990	$ 3,011,130	$ 13,782,860	-2.26	539.5
FY 2032	$ 13,398,036	$ -	$ 13,398,036	-1.60	540.5
FY 2033	$ 15,579,686	$ -	$ 15,579,686	-1.85	540.6
FY 2034	$ 16,284,071	$ 389,422	$ 15,894,649	-1.74	540.7
FY 2035	$ 15,887,190	$ -	$ 15,887,190	-1.45	540.7

Table 27: FAR #5 - 15-Year Balanced Capital Budget with Driver Eco-Training and Idling Reduction Policy/Technologies

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 24,598,492	$ 13,734,765	-2.80	1668.4
FY 2021	$ 31,539,963	$ 19,500,097	$ 12,039,865	-3.73	1684.9
FY 2022	$ 26,215,369	$ 14,231,193	$ 11,984,176	-3.23	1705.4
FY 2023	$ 21,681,314	$ 9,480,195	$ 12,201,119	-2.44	1721.3
FY 2024	$ 22,308,173	$ 10,305,474	$ 12,002,699	-2.44	1744.5
FY 2025	$ 22,326,622	$ 10,305,099	$ 12,021,523	-2.29	1759.1
FY 2026	$ 23,314,575	$ 11,258,109	$ 12,056,465	-1.82	1775.7
FY 2027	$ 18,432,751	$ 7,055,243	$ 11,377,508	-1.33	1790.1
FY 2028	$ 11,455,898	$ -	$ 11,455,898	-1.03	1804.6
FY 2029	$ 24,509,970	$ 9,694,236	$ 14,815,734	-0.76	1815.1
FY 2030	$ 18,311,568	$ 3,377,855	$ 14,933,714	-1.81	1819.4
FY 2031	$ 16,793,990	$ 3,011,130	$ 13,782,860	-2.26	1821.1
FY 2032	$ 13,398,036	$ -	$ 13,398,036	-1.60	1822.0
FY 2033	$ 15,579,686	$ -	$ 15,579,686	-1.86	1822.1
FY 2034	$ 16,284,071	$ 389,422	$ 15,894,649	-1.74	1822.1
FY 2035	$ 15,887,190	$ -	$ 15,887,190	-1.45	1822.1

Table 28: FAR #6 - 15-Year Balanced Capital Budget with Route Planning/Optimization and Trip Reduction

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 24,598,492	$ 13,734,765	-2.81	1277.2
FY 2021	$ 31,539,963	$ 19,500,097	$ 12,039,865	-3.74	1294.4
FY 2022	$ 26,215,369	$ 14,231,193	$ 11,984,176	-3.24	1316.0
FY 2023	$ 21,681,314	$ 9,480,195	$ 12,201,119	-2.45	1332.7
FY 2024	$ 22,308,173	$ 10,305,474	$ 12,002,699	-2.45	1357.2
FY 2025	$ 22,326,622	$ 10,305,099	$ 12,021,523	-2.30	1372.4
FY 2026	$ 23,314,575	$ 11,258,109	$ 12,056,465	-1.83	1389.9
FY 2027	$ 18,432,751	$ 7,055,243	$ 11,377,508	-1.35	1405.1
FY 2028	$ 11,455,898	$ -	$ 11,455,898	-1.04	1420.3
FY 2029	$ 24,509,970	$ 9,694,236	$ 14,815,734	-0.78	1431.4
FY 2030	$ 18,311,568	$ 3,377,855	$ 14,933,714	-1.83	1435.8
FY 2031	$ 16,793,990	$ 3,011,130	$ 13,782,860	-2.28	1437.6
FY 2032	$ 13,398,036	$ -	$ 13,398,036	-1.62	1438.6
FY 2033	$ 15,579,686	$ -	$ 15,579,686	-1.87	1438.7
FY 2034	$ 16,284,071	$ 389,422	$ 15,894,649	-1.76	1438.7
FY 2035	$ 15,887,190	$ -	$ 15,887,190	-1.47	1438.7

Table 29: FAR #7 – 15-Year Balanced Capital Budget with All "House-in-Order" Strategies

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 24,598,492	$ 13,734,765	-2.77	2928.0
FY 2021	$ 31,539,963	$ 19,500,097	$ 12,039,865	-3.70	2942.1
FY 2022	$ 26,215,369	$ 14,231,193	$ 11,984,176	-3.20	2959.0
FY 2023	$ 21,681,314	$ 9,480,195	$ 12,201,119	-2.41	2972.3
FY 2024	$ 22,308,173	$ 10,305,474	$ 12,002,699	-2.41	2991.5
FY 2025	$ 22,326,622	$ 10,305,099	$ 12,021,523	-2.26	3004.0
FY 2026	$ 23,314,575	$ 11,258,109	$ 12,056,465	-1.79	3017.8
FY 2027	$ 18,432,751	$ 7,055,243	$ 11,377,508	-1.30	3029.8
FY 2028	$ 11,455,898	$ -	$ 11,455,898	-0.99	3041.8
FY 2029	$ 24,509,970	$ 9,694,236	$ 14,815,734	-0.73	3050.4
FY 2030	$ 18,311,568	$ 3,377,855	$ 14,933,714	-1.78	3054.3
FY 2031	$ 16,793,990	$ 3,011,130	$ 13,782,860	-2.23	3055.7
FY 2032	$ 13,398,036	$ -	$ 13,398,036	-1.57	3056.4
FY 2033	$ 15,579,686	$ -	$ 15,579,686	-1.82	3056.5
FY 2034	$ 16,284,071	$ 389,422	$ 15,894,649	-1.71	3056.6
FY 2035	$ 15,887,190	$ -	$ 15,887,190	-1.42	3056.6

Fuel Switching and BEV Phase-in

Starting from FAR Scenario Seven, we modelled the impacts of alternate and renewable fuels in conjunction with BEV phase-in, as well as BEV phase-in only, on the City of Hamilton's in-scope fleet. Group Two FAR Scenarios 8-16 involved switching different combinations of vehicle classes to alternate/renewable fuels, described below:

- FAR Scenario Eight: Ethanol-85 (E85) for passenger vehicles, pickups, and vans
- FAR Scenario Nine: B10 biodiesel (annualized blend, with B20 in summer months and B5 in winter and shoulder months) for all diesel on-road units
- FAR Scenarios 11-13: Compressed natural gas (CNG) for light-, medium-, and heavy-duty (LMHD) vehicles – pickups only for FAR #11, Class 3-6 for FAR #12, and Class 2-8 for FAR #13
- FAR Scenario 14: Renewable natural gas (RNG) for Class 2-8 vehicles
- FAR Scenarios 15-16: Liquid propane gas (LPG) for LMHD vehicles – LD only for FAR #15, and LD plus Truck Classes 2-8 for FAR #16

These “messy-middle” solutions are proven and mature green fleet, low-carbon solutions that may be possible today while awaiting the commercial availability of suitable BEVs. It is important to note that these scenarios also involved replacing ICE units with BEVs in sync with fiscal years in which the type/categories of BEVs are expected to be available. FAR Scenarios 21, 23, and 25 involved BEV phase-in only, as described below:

- FAR Scenarios 21: BEV replacement for passenger vehicles only
- FAR Scenarios 23: BEV replacement for passenger vehicles, pickups, and bus
- FAR Scenarios 25: BEV replacement for passenger vehicles, pickups, bus, and MDHD trucks

Tables 30-40 show the impacts for fuel-switching and BEV scenarios, with FAR Scenario Seven – balanced capital budgets (optimized lifecycles with consideration of ROI) and all “house-in-order” strategies – serving as the starting point.

Table 30: FAR #8 – E85 (passenger, pickups, vans) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 38,233,825	$ 99,431	0.30	4691.1
FY 2021	$ 46,167,545	$ 40,881,378	$ 5,286,167	-0.12	4699.0
FY 2022	$ 43,541,522	$ 33,213,503	$ 10,328,018	-0.18	5109.7
FY 2023	$ 36,510,293	$ 29,477,697	$ 7,032,596	0.67	5176.3
FY 2024	$ 32,613,383	$ 8,578,586	$ 24,034,797	-0.59	5862.9
FY 2025	$ 14,440,705	$ 8,618,404	$ 5,822,302	1.25	5947.7
FY 2026	$ 20,075,097	$ 8,989,582	$ 11,085,515	0.72	6556.5
FY 2027	$ 15,543,126	$ 5,667,997	$ 9,875,129	1.61	6838.0
FY 2028	$ 14,398,082	$ -	$ 14,398,082	1.72	7401.1
FY 2029	$ 14,304,323	$ 3,942,583	$ 10,361,741	1.95	7867.9
FY 2030	$ 20,216,346	$ 3,040,601	$ 17,175,745	1.41	8421.8
FY 2031	$ 10,533,943	$ 2,114,526	$ 8,419,416	2.19	8625.0
FY 2032	$ 12,823,022	$ -	$ 12,823,022	1.84	8715.7
FY 2033	$ 29,707,380	$ -	$ 29,707,380	0.06	8715.8
FY 2034	$ 11,089,632	$ 389,422	$ 10,700,210	2.21	8715.8
FY 2035	$ 10,462,129	$ -	$ 10,462,129	1.76	8715.8

Table 31: FAR #9 – B10 (all on-road diesel units) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 38,233,825	$ 99,431	-0.11	3110.2
FY 2021	$ 46,167,545	$ 40,881,378	$ 5,286,167	-0.54	3136.1
FY 2022	$ 43,541,522	$ 33,213,503	$ 10,328,018	-0.57	3755.5
FY 2023	$ 36,510,293	$ 29,477,697	$ 7,032,596	0.26	3961.3
FY 2024	$ 32,613,383	$ 8,578,586	$ 24,034,797	-0.90	4694.0
FY 2025	$ 14,440,705	$ 8,618,404	$ 5,822,302	0.93	4894.5
FY 2026	$ 20,075,097	$ 8,989,582	$ 11,085,515	0.44	5796.3
FY 2027	$ 15,543,126	$ 5,667,997	$ 9,875,129	1.36	6157.1
FY 2028	$ 14,398,082	$ -	$ 14,398,082	1.57	6754.9
FY 2029	$ 14,304,323	$ 3,942,583	$ 10,361,741	1.86	7312.4
FY 2030	$ 20,216,346	$ 3,040,601	$ 17,175,745	1.37	8123.8
FY 2031	$ 10,533,943	$ 2,114,526	$ 8,419,416	2.17	8368.0
FY 2032	$ 12,823,022	$ -	$ 12,823,022	1.84	8471.3
FY 2033	$ 29,707,380	$ -	$ 29,707,380	0.06	8471.4
FY 2034	$ 11,089,632	$ 389,422	$ 10,700,210	2.21	8471.4
FY 2035	$ 10,462,129	$ -	$ 10,462,129	1.76	8471.4

Table 32: FAR #11 – CNG (LD pickups) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 54,600,756	$ 54,501,325	$ 99,431	0.34	3203.9
FY 2021	$ 62,965,760	$ 57,603,168	$ 5,362,592	-0.07	3229.8
FY 2022	$ 60,674,478	$ 48,098,408	$ 12,576,070	-0.02	3789.1
FY 2023	$ 51,831,435	$ 43,923,269	$ 7,908,166	0.89	3948.2
FY 2024	$ 47,632,619	$ 11,123,123	$ 36,509,496	0.09	4705.2
FY 2025	$ 17,975,706	$ 11,192,060	$ 6,783,646	1.99	4870.6
FY 2026	$ 26,753,238	$ 11,612,138	$ 15,141,100	1.61	5770.6
FY 2027	$ 20,745,291	$ 7,521,838	$ 13,223,452	2.64	6135.7
FY 2028	$ 19,646,775	$ -	$ 19,646,775	3.00	6739.4
FY 2029	$ 20,147,308	$ 4,253,537	$ 15,893,771	3.49	7270.8
FY 2030	$ 26,680,346	$ 3,490,244	$ 23,190,101	3.16	8108.4
FY 2031	$ 13,888,852	$ 2,458,935	$ 11,429,917	4.07	8363.1
FY 2032	$ 16,345,081	$ -	$ 16,345,081	3.79	8471.1
FY 2033	$ 42,326,275	$ -	$ 42,326,275	2.04	8471.2
FY 2034	$ 15,111,215	$ 477,272	$ 14,633,943	4.20	8477.9
FY 2035	$ 14,304,827	$ -	$ 14,304,827	3.82	8477.9

Table 33: FAR #12 – CNG (Class 3-6) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 54,600,756	$ 54,501,325	$ 99,431	0.30	3266.4
FY 2021	$ 62,965,760	$ 57,603,168	$ 5,362,592	-0.12	3292.3
FY 2022	$ 60,674,478	$ 48,098,408	$ 12,576,070	-0.05	3833.9
FY 2023	$ 51,831,435	$ 43,923,269	$ 7,908,166	0.82	4034.2
FY 2024	$ 47,632,619	$ 11,123,123	$ 36,509,496	0.02	4786.2
FY 2025	$ 17,975,706	$ 11,192,060	$ 6,783,646	1.91	4982.0
FY 2026	$ 26,753,238	$ 11,612,138	$ 15,141,100	1.57	5830.0
FY 2027	$ 20,745,291	$ 7,521,838	$ 13,223,452	2.61	6190.4
FY 2028	$ 19,646,775	$ -	$ 19,646,775	2.95	6805.8
FY 2029	$ 20,147,308	$ 4,253,537	$ 15,893,771	3.42	7363.1
FY 2030	$ 26,680,346	$ 3,490,244	$ 23,190,101	3.19	8109.0
FY 2031	$ 13,888,852	$ 2,458,935	$ 11,429,917	4.08	8363.6
FY 2032	$ 16,345,081	$ -	$ 16,345,081	3.81	8471.6
FY 2033	$ 42,326,275	$ -	$ 42,326,275	2.06	8471.7
FY 2034	$ 15,111,215	$ 477,272	$ 14,633,943	4.22	8476.7
FY 2035	$ 14,304,827	$ -	$ 14,304,827	3.83	8476.7

Table 34: FAR #13 – CNG (Class 2-8) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 54,600,756	$ 54,501,325	$ 99,431	-0.50	4402.3
FY 2021	$ 62,965,760	$ 57,603,168	$ 5,362,592	-0.94	4428.1
FY 2022	$ 60,674,478	$ 48,098,408	$ 12,576,070	-0.83	4896.9
FY 2023	$ 51,831,435	$ 43,923,269	$ 7,908,166	0.06	5051.2
FY 2024	$ 47,632,619	$ 11,123,123	$ 36,509,496	-0.62	5631.5
FY 2025	$ 17,975,706	$ 11,192,060	$ 6,783,646	1.28	5787.9
FY 2026	$ 26,753,238	$ 11,612,138	$ 15,141,100	1.05	6485.1
FY 2027	$ 20,745,291	$ 7,521,838	$ 13,223,452	2.12	6778.6
FY 2028	$ 19,646,775	$ -	$ 19,646,775	2.58	7237.2
FY 2029	$ 20,147,308	$ 4,253,537	$ 15,893,771	3.15	7652.5
FY 2030	$ 26,680,346	$ 3,490,244	$ 23,190,101	3.01	8274.3
FY 2031	$ 13,888,852	$ 2,458,935	$ 11,429,917	3.94	8479.6
FY 2032	$ 16,345,081	$ -	$ 16,345,081	3.68	8565.2
FY 2033	$ 42,326,275	$ -	$ 42,326,275	1.93	8565.3
FY 2034	$ 15,111,215	$ 477,272	$ 14,633,943	4.08	8570.2
FY 2035	$ 14,304,827	$ -	$ 14,304,827	3.69	8570.2

Table 35: FAR #14 – RNG (Class 2-8) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 54,600,756	$ 54,501,325	$ 99,431	-0.50	8177.0
FY 2021	$ 62,965,760	$ 57,603,168	$ 5,362,592	-0.94	8202.8
FY 2022	$ 60,674,478	$ 48,098,408	$ 12,576,070	-0.83	8268.9
FY 2023	$ 51,831,435	$ 43,923,269	$ 7,908,166	0.06	8322.1
FY 2024	$ 47,632,619	$ 11,123,123	$ 36,509,496	-0.62	8377.9
FY 2025	$ 17,975,706	$ 11,192,060	$ 6,783,646	1.28	8430.0
FY 2026	$ 26,753,238	$ 11,612,138	$ 15,141,100	1.05	8506.6
FY 2027	$ 20,745,291	$ 7,521,838	$ 13,223,452	2.12	8582.7
FY 2028	$ 19,646,775	$ -	$ 19,646,775	2.58	8589.2
FY 2029	$ 20,147,308	$ 4,253,537	$ 15,893,771	3.15	8591.7
FY 2030	$ 26,680,346	$ 3,490,244	$ 23,190,101	3.01	8612.5
FY 2031	$ 13,888,852	$ 2,458,935	$ 11,429,917	3.94	8678.4
FY 2032	$ 16,345,081	$ -	$ 16,345,081	3.68	8700.7
FY 2033	$ 42,326,275	$ -	$ 42,326,275	1.93	8700.8
FY 2034	$ 15,111,215	$ 477,272	$ 14,633,943	4.08	8700.8
FY 2035	$ 14,304,827	$ -	$ 14,304,827	3.69	8700.8

Table 36: FAR #15 – LPG (passenger, pickups, vans) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 54,600,756	$ 54,501,325	$ 99,431	-0.07	3100.0
FY 2021	$ 62,965,760	$ 57,603,168	$ 5,362,592	-0.49	3123.3
FY 2022	$ 60,674,478	$ 48,098,408	$ 12,576,070	-0.39	3731.0
FY 2023	$ 51,831,435	$ 43,923,269	$ 7,908,166	0.54	3917.6
FY 2024	$ 47,632,619	$ 11,123,123	$ 36,509,496	-0.24	4678.4
FY 2025	$ 17,975,706	$ 11,192,060	$ 6,783,646	1.68	4867.5
FY 2026	$ 26,753,238	$ 11,612,138	$ 15,141,100	1.33	5779.8
FY 2027	$ 20,745,291	$ 7,521,838	$ 13,223,452	2.39	6142.3
FY 2028	$ 19,646,775	$ -	$ 19,646,775	2.75	6761.9
FY 2029	$ 20,147,308	$ 4,253,537	$ 15,893,771	3.25	7326.1
FY 2030	$ 26,680,346	$ 3,490,244	$ 23,190,101	2.92	8161.9
FY 2031	$ 13,888,852	$ 2,458,935	$ 11,429,917	3.86	8409.0
FY 2032	$ 16,345,081	$ -	$ 16,345,081	3.58	8514.5
FY 2033	$ 42,326,275	$ -	$ 42,326,275	1.83	8514.6
FY 2034	$ 15,111,215	$ 477,272	$ 14,633,943	3.99	8521.3
FY 2035	$ 14,304,827	$ -	$ 14,304,827	3.60	8521.3

Table 37: FAR #16 – LPG (LD, Truck Classes 2-8) & BEV Phase-in (passenger, pickups, buses, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 54,600,756	$ 54,501,325	$ 99,431	-1.62	3561.3
FY 2021	$ 62,965,760	$ 57,603,168	$ 5,362,592	-2.06	3584.6
FY 2022	$ 60,674,478	$ 48,098,408	$ 12,576,070	-1.86	4151.9
FY 2023	$ 51,831,435	$ 43,923,269	$ 7,908,166	-0.95	4335.5
FY 2024	$ 47,632,619	$ 11,123,123	$ 36,509,496	-1.51	5022.8
FY 2025	$ 17,975,706	$ 11,192,060	$ 6,783,646	0.41	5203.3
FY 2026	$ 26,753,238	$ 11,612,138	$ 15,141,100	0.34	6030.1
FY 2027	$ 20,745,291	$ 7,521,838	$ 13,223,452	1.48	6362.9
FY 2028	$ 19,646,775	$ -	$ 19,646,775	2.03	6922.4
FY 2029	$ 20,147,308	$ 4,253,537	$ 15,893,771	2.68	7438.1
FY 2030	$ 26,680,346	$ 3,490,244	$ 23,190,101	2.68	8182.5
FY 2031	$ 13,888,852	$ 2,458,935	$ 11,429,917	3.66	8409.1
FY 2032	$ 16,345,081	$ -	$ 16,345,081	3.42	8505.2
FY 2033	$ 42,326,275	$ -	$ 42,326,275	1.67	8505.3
FY 2034	$ 15,111,215	$ 477,272	$ 14,633,943	3.80	8512.1
FY 2035	$ 14,304,827	$ -	$ 14,304,827	3.42	8512.1

Table 38: FAR #21 – BEV Phase-in (passenger vehicles only)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 24,598,492	$ 13,734,765	-2.77	2928.0
FY 2021	$ 31,539,963	$ 19,500,097	$ 12,039,865	-3.71	2964.4
FY 2022	$ 26,215,369	$ 14,231,193	$ 11,984,176	-3.22	3024.7
FY 2023	$ 21,681,314	$ 9,480,195	$ 12,201,119	-2.44	3080.9
FY 2024	$ 22,308,173	$ 10,305,474	$ 12,002,699	-2.45	3151.0
FY 2025	$ 22,326,622	$ 10,305,099	$ 12,021,523	-2.31	3179.1
FY 2026	$ 23,314,575	$ 11,258,109	$ 12,056,465	-1.85	3263.2
FY 2027	$ 18,432,751	$ 7,055,243	$ 11,377,508	-1.39	3347.9
FY 2028	$ 11,455,898	$ -	$ 11,455,898	-1.08	3363.0
FY 2029	$ 24,509,970	$ 9,694,236	$ 14,815,734	-0.82	3371.6
FY 2030	$ 18,311,568	$ 3,377,855	$ 14,933,714	-1.87	3390.7
FY 2031	$ 16,793,990	$ 3,011,130	$ 13,782,860	-2.34	3455.8
FY 2032	$ 13,398,036	$ -	$ 13,398,036	-1.69	3477.9
FY 2033	$ 15,579,686	$ -	$ 15,579,686	-1.94	3478.0
FY 2034	$ 16,284,071	$ 389,422	$ 15,894,649	-1.83	3478.1
FY 2035	$ 15,887,190	$ -	$ 15,887,190	-1.55	3478.1

Table 39: FAR #23 – BEV Phase-in (passenger, pickups, bus)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 38,333,256	$ 24,598,492	$ 13,734,765	-2.77	2928.0
FY 2021	$ 30,499,253	$ 22,298,674	$ 8,200,579	-3.35	2956.2
FY 2022	$ 28,907,604	$ 13,613,263	$ 15,294,341	-3.84	3604.7
FY 2023	$ 20,344,001	$ 9,251,110	$ 11,092,891	-2.63	3816.3
FY 2024	$ 19,108,430	$ 9,939,929	$ 9,168,501	-2.52	3931.4
FY 2025	$ 23,072,790	$ 10,005,612	$ 13,067,178	-2.68	4092.6
FY 2026	$ 25,786,798	$ 10,866,937	$ 14,919,860	-2.43	4571.6
FY 2027	$ 16,932,741	$ 7,055,243	$ 9,877,498	-1.75	4707.0
FY 2028	$ 10,410,190	$ -	$ 10,410,190	-1.42	4793.1
FY 2029	$ 24,978,625	$ 8,601,122	$ 16,377,504	-1.27	4944.7
FY 2030	$ 18,611,265	$ 3,040,601	$ 15,570,664	-2.33	5307.4
FY 2031	$ 12,554,392	$ 2,114,526	$ 10,439,866	-2.49	5372.5
FY 2032	$ 15,175,457	$ -	$ 15,175,457	-2.66	5394.7
FY 2033	$ 16,801,175	$ -	$ 16,801,175	-2.59	5394.8
FY 2034	$ 14,198,391	$ 389,422	$ 13,808,968	-2.16	5394.8
FY 2035	$ 14,796,142	$ -	$ 14,796,142	-2.11	5394.8

Table 40: FAR #25 – BEV Phase-in (passenger, pickups, bus, MDHD trucks)

Budget Year	Planned Capital Budget	Deferred Spending	Total Capital Budget	Total Opex vs Baseline ($mil)	Total GHG Reduction vs Baseline (tonnes CO2e)
FY 2020	$ 54,600,756	$ 54,501,325	$ 99,431	0.55	2917.2
FY 2021	$ 62,965,760	$ 57,603,168	$ 5,362,592	0.14	2943.1
FY 2022	$ 60,674,478	$ 48,098,408	$ 12,576,070	0.15	3581.7
FY 2023	$ 51,831,435	$ 43,923,269	$ 7,908,166	1.02	3789.1
FY 2024	$ 47,632,619	$ 11,123,123	$ 36,509,496	0.21	4560.6
FY 2025	$ 17,975,706	$ 11,192,060	$ 6,783,646	2.09	4763.9
FY 2026	$ 26,753,238	$ 11,612,138	$ 15,141,100	1.68	5694.5
FY 2027	$ 20,745,291	$ 7,521,838	$ 13,223,452	2.71	6068.8
FY 2028	$ 19,646,775	$ -	$ 19,646,775	3.05	6696.7
FY 2029	$ 20,147,308	$ 4,253,537	$ 15,893,771	3.51	7276.6
FY 2030	$ 26,680,346	$ 3,490,244	$ 23,190,101	3.18	8114.2
FY 2031	$ 13,888,852	$ 2,458,935	$ 11,429,917	4.08	8368.8
FY 2032	$ 16,345,081	$ -	$ 16,345,081	3.81	8476.8
FY 2033	$ 42,326,275	$ -	$ 42,326,275	2.05	8476.9
FY 2034	$ 15,111,215	$ 477,272	$ 14,633,943	4.21	8483.6
FY 2035	$ 14,304,827	$ -	$ 14,304,827	3.83	8483.6

Appendix E: Details on Fuel-Reduction Solutions

This appendix of our report provides further detailed information on many of the 20+ fuel-reduction solutions modelled in FAR, which have been researched by RSI-FC – some of which have already been implemented by the City of Hamilton, and many of which are considered as potential new, go-forward strategies.

Best Management Practices

Best management practices – Group One - include: (1) enhanced vehicle specifications – vehicle choice and/or vehicle upgrades – which lower fuel consumption, lower GHG emissions, and improve overall performance; (2) proper maintenance procedures including tire inflation systems; and (3) fleet operational improvements including:

- Idling reduction initiatives
- Driver training to educate drivers on efficient driving practices
- Ongoing feedback and motivation to maintain good driving habits
- Route planning and optimization, including trip reduction, minimization, or elimination

Enhanced Vehicle Specifications at a Glance

There are a number of vehicle specifications that can aid in fuel-use and emissions reductions. *Table 41* lists sample vehicle specifications and their respective impacts.

Table 41: Strengths and Weaknesses of Enhanced Vehicle Specifications

Specification	Strengths	Weaknesses
Smaller Vehicles	Consume less fuel and thus have reduced emissions	Might not always be suitable for the job
Lighter Vehicles	Consume less fuel, produce less emissions, and can carry larger payload (e.g., if a truck is lighter by “x” pounds/kg, it can carry a commensurately increased payload), which increases efficiency	Light weighting may overstress some vehicles, increasing maintenance demand and lifecycle cost
Aerodynamically Designed Vehicles	Reduces fuel consumption and emissions	Minimal effectiveness in urban setting, high cost, increased maintenance

Specification	Strengths	Weaknesses
		demand for some solutions
Low Rolling Resistance (LRR) Tires and Wide-base Tires	Reduces fuel consumption and emissions, reduce frequency of tire replacement	Potential for on-road service issues, axle loading restrictions in some jurisdictions with wide-base tires
Electronically Controlled, Programmable Diesel Engines	Allow tailoring/minimizing power and torque needs, road speed, and idle time limits therefore reducing fuel consumption and emissions	Seldom give problems, however when they do, often require specialized and costly diagnostic skills (might need to be outsourced) with potentially protracted downtime
Idling-Reduction Devices	Reduces idle time and therefore lowers fuel use and emissions	Actual idling reduction benefits are dependent on the use of technologies by drivers, some who resent intervention by such devices; some may feel devices could cause a safety concern

Fleet Downsizing

Getting a fleet's "house in order" should include shedding any under-utilized vehicles, so that stranded capital tied up in low-usage units can be re-applied to fleet modernization and new electric vehicles (EVs). When exception data demonstrates that a vehicle's usage has been less than the organization's acceptable minimum threshold, the vehicle is incurring cost without serving a purpose. Hence, the vehicle is a liability, unless it has some redeeming value, i.e., a special-purpose or backup vehicle for emergencies, or a unit reserved for peak periods.

Low-usage units should be routinely and regularly reviewed to determine if there are more cost-effective ways of accomplishing the corporate end-goal. If a specific vehicle is used infrequently, management should consider creative solutions for a less costly travel mode, i.e., an inter-

departmental vehicle sharing arrangement, a 3rd party service-provider, video conferencing, use of employee's vehicles, etc.

A fleet's first step in cost reduction is to reduce the total number of low-utilization vehicles. Management should undertake a review to determine if some vehicles can be eliminated through early decommissioning.

Right-Sizing

In days past, some fleet managers subscribed to the adage "identify the size of truck you really need for the job — and then buy one bigger." Today, we know this is anachronistic thinking that led to fleets with oversized vehicles, poorer fuel economy, and higher operating costs and GHG emissions.

Instead, savvy fleet managers are leaving the old approach behind and employing the correct and most efficient approach, which is to right-size fleet vehicles – that is, correctly specify the size of vehicle for the job at hand, which leads to lower overall operating costs.

Job Suitability

The types of vehicles and the equipment staff members are fitted should be aligned with the vocational and load requirements. For example, a passenger sedan would be completely unsuitable for plowing snow or carrying loads of anything other than people. Rather, fleet vehicles types are matched specifically to the tasks at hand; in this case, a light-duty truck would be required for snow removal in, for example, parking lots.

Choose the Size Down When Appropriate

Acquiring light-duty (class 2a) vans and pick-ups as opposed to heavier-duty units (2b), which have higher acquisition and maintenance costs, is a recommended best management practice which results in a lower total cost of ownership.

A further example is with heavy-duty units; selecting a single-axle plow-dump unit, which has inherently lower operating costs than a tandem-axle unit, is recommended when appropriate (i.e., when the specific task at hand, or job suitability, is fulfilled by either unit).

Accounting for Limited Space

Limited space for roads, as a result of urban development and densification, may lead to an increased number of traffic roundabouts. Roundabouts pose unique problems for snowplows as well as refuse and recycling trucks because of tight turning movements and lack of adequate space to maneuver. Single axle units are shorter in overall length and, therefore, turn in a smaller radius than tandem or tridem axle units. They also cost less to acquire and maintain. The disadvantages

are that single axle trucks may have less traction/control in slippery conditions and have less load-carrying capacities, such as salt/sand or waste (less productivity). However, in urban, low-speed, traffic-congested environments with limited space, such as roundabouts, single axle plows or refuse/recycling trucks will have an advantage over multi-axle units. In this example, it is important to weigh the pros and cons for different sized vehicles; when space is tight, it is often recommended to go smaller when it is safe (i.e., at low speeds) and productivity is acceptable.

Right-Sizing Summary

In summary, it is important for a fleet to consider the following in regard to right-sizing:

- Ensure that fleet vehicles are matched specifically to the tasks at hand (i.e., are job suitable) in terms of both vocation and load requirements.
- When multiple sized units fulfil a task equally well, choose the size down.
- When space is limited, it is often best to choose smaller units, given that it is safe to do so and that the productivity level is acceptable.

Low Rolling Resistance (LRR) Tires

Rolling resistance is the energy lost from drag and friction of a tire rolling over a surface[100]. The phenomenon is complex, and nearly all operating conditions can affect the final outcome. With the exception of all-electric vehicles, it is estimated that 4%–11% of light-duty vehicle fuel consumption is used to overcome rolling resistance. All-electric passenger vehicles can use approximately 23% of their energy for this purpose. For heavy trucks, this can be as high as 15%–30%.

A 5% reduction in rolling resistance would improve fuel economy by approximately 1.5% for light and heavy-duty vehicles. Installing low rolling resistance tires can help fleets reduce fuel costs. It's also important to ensure proper tire inflation (see sections below).

Tires and fuel economy represent a significant cost in a fleet's portfolio. In Class 8 trucks, approximately one-third of fuel efficiency comes from the rolling resistance of the tire. The opportunity for fuel savings from low rolling resistance tires in these and other vehicle applications is substantial.

According to a North American Council for Freight Efficiency (NACFE) report, the use of low rolling resistance tires, in either a dual or a wide-base configuration, is a good investment for managing fuel economy. Generally, the fuel savings pay for the additional cost of the low rolling resistance tires. In addition, advancements in tire tread life and traction will reduce the frequency of low rolling resistance tire replacement.

[100] Source: https://afdc.energy.gov/conserve/fuel_economy_tires_light.html

Automatic Tire Inflation Systems (ATIS)

Proper tire inflation pressure is critical to the optimal operation of a commercial vehicle. Underinflated tires result in decreased fuel efficiency and increased tire wear[101]. A 0.5-1.0% increase in fuel consumption is seen in vehicles running with tires underinflated by 10 psi. Appropriate pressure reduces tire wear, increases fuel efficiency, and leads to fewer roadside breakdowns due to tire failures. An example of an automatic tire inflation system is shown in *Figure 24*.

Figure 24: Automatic Tire Inflation System (courtesy NACFE)

In the U.S., a large truckload carrier with 5,000 tractors and 15,000 trailers averaging 124,000 miles a year on tractors and 41,000 miles on trailers, conducted a fuel economy test with 60 trucks pulling trailers without tire inflation systems and 75 trucks matched with trailers with the systems installed. The results of the test showed a 1.5% improvement in fuel consumption for trucks with ATIS.

Tire Inflation with Nitrogen

Nitrogen is said to permeate tire walls up to four times slower than air. Tires will lose one to two psi over one month versus the six months it takes a nitrogen-filled tire to lose that same amount of pressure. As a result, the time spent adjusting the tire pressure is reduced.

Supporters of nitrogen for tire inflation claim better tire pressure retention. This is believed to result in:

- A smoother ride
- Improved steering and braking
- Reduced risk of blowouts by as much as 50 percent[102]
- Increased tires tread life by up to 30 percent, improving the tire's life and its grip to the road[103]
- Reduced fuel consumption by up to 6%[104]

[101] Source: https://nacfe.org
[102] Source: http://www.gonitrotire.com
[103] Source: http://www.gonitrotire.com
[104] The fuel consumption reduction estimates vary considerably. Enviro-fleets, A guide to helpful resources, June 2010, report an improvement of up to 10%, but the industry standard is between 3% and 6%.

It must be noted that it is not the nitrogen itself that improves the fuel efficiency, but rather the enhanced retention of inflation pressure over time[105]. Reduced tire pressure leads to increased fuel consumption. Therefore, if vehicle tire pressure is well monitored, there might not be a fuel consumption benefit of using nitrogen.

Idling Reduction

Idling reduction is an important concern for all leading fleets that are looking to optimize costs and reduce the environmental impact. Municipal fleet vehicles left idling for no apparent reason are seen by the public as being wasteful and polluting. These negative messages are potentially damaging to the reputation of any municipality.

Fuel consumption from idling of heavy-duty vehicles is significant. While we acknowledge there are times when idling is simply unavoidable, the U.S. Department of Energy estimates that unnecessarily idling heavy-duty vehicles wastes from half to one U.S. gallon (1.89 to 3.79 liters) or more per hour. Some fleets idle 30 to 50% or more of their operating time[106]. These are several main approaches to idling reduction, including:

- Idling-reduction policy
- Driver training and motivation
- Idling-reduction awareness and fact-based training
- Incentive programs
- Ongoing driver education
- The use of idling reduction devices, including:
    - Auxiliary power units (APU)
    - Stop/start devices
    - Auxiliary cab heaters
    - Battery backup systems
    - Block heaters / engine preheaters

Idling-Reduction Policy

An idling-reduction policy is a way to motivate fleet drivers to limit unnecessary idling. However, for an idling-reduction policy to be successful continuous enforcement such as spot-checks and fuel use tracking must be present. An idling-reduction policy could be used as an overarching commitment to idling reduction that is carried out though driver training and motivation sessions, rather than an initiative on its own.

[105] Source: NHTSA Report, 2009: https://one.nhtsa.gov/DOT/NHTSA/NRD/Multimedia/PDFs/.../2009/811094.pdf
[106] Source: FC Best Practices Manual 2008

When Engine Idling is Unavoidable

There are times when idling is unavoidable. These include:

- Cab heating/ventilation and air conditioning (HVAC)
- Power for critical equipment (such as the use of a PTO for ancillary equipment)
- Maintaining brake air pressure (MD and HD trucks)

It is important to differentiate between *unnecessary* idling and idling that is *unavoidable* due to operational requirements. The focus of all idling-reduction initiatives should be to reduce and, ideally, eliminate *unnecessary* idling and to explore alternatives of how to limit idling for operational purposes with solutions that do not impede with operations, but offer environmental and economic benefits.

Idling Reduction Devices

There are several idling-reduction technologies available that can aid in idle reduction. Their functionality, potential, and costs vary considerably and are described in *Table 42.* To reap the most benefits any idling-reduction technology, installation should always be accompanied by behavioural solutions of driver training and motivation.

Table 42: Idling Reduction Devices and Their Associated Costs

Technology	Description	Cost Estimates
Auxiliary Power Units (APU)	An APU consists of a small engine that provides power to heat and cool the cab, as well as to power accessories, heat the engine, and charge the start battery. DC-powered APU systems are also available.	APUs can cost anywhere from ~$8,500 to ~$10,000. Annual maintenance cost is estimated as high as $500.
Stop/Start Devices (Idle-Stop systems)	A stop/start system automatically shuts down and restarts the internal combustion engine to reduce the amount of time the engine spends idling. This technology is particularly useful for vehicles that spend significant amounts of time waiting at traffic lights or frequently come to a stop in traffic jams.	Stop/start devices typically are part of OEM hybrid vehicle systems, but more recently has also been introduced in regular combustion engine vehicles to reduce fuel consumption. Such devices can also be purchased separately (offered by companies like Bosch that also manufacturers OEM devices) and their costs average at about $300-$350.

Technology	Description	Cost Estimates
Auxiliary Cab Heaters	There are two types: 1) Gas- or diesel-fired auxiliary air heater: In most cases, it is fitted in the cab, drawing in cab air through a blower and heating it. 2) Gas- or diesel-fired auxiliary coolant heater: It is installed in a vehicle's engine compartment and enables the vehicle's own coolant circuit to work without the use of the entire engine. Such water-based auxiliary heaters use small amounts of fuel to heat up the liquid in the air-exchange system and provide warm air in the cabin. Compared to air-based auxiliary heaters, the advantage of water-based auxiliary heaters is that they also warm the engine in the process (similarly to block heaters), thus enhancing starting performance. Auxiliary coolant heaters are manufactured by companies like Webasto and Espar.	~$1,250 +
Battery Backup Systems	A battery backup system powers electric devices (emergency lights, etc.) without drawing power from the primary battery. The system consists of adding an isolator and an additional battery to a vehicle's electric system. When the vehicle is off, the isolator prevents power being drawn from the primary battery and instead uses the alternate battery to power any electronic systems. When the vehicle is running, both batteries are recharged; charging to the start battery is prioritized and it is charged first.	The system costs between $400-$600 plus the price of a battery which varies based on the required capacity.
Block Heater / Engine Preheater	Engine block heaters use power from electrical outlets in corporate facilities, where vehicles are parked overnight to heat the engine block. The block heater on	Block heaters cost between $70 and $150 and have a negligible annual maintenance cost.

Technology	Description	Cost Estimates
	timer can be set to switch-on a few hours before the vehicle is used to warm up the engine block. This decreases required warm-up idling time. This is a very low-cost option, and a necessity in Canadian winters; however, it is limited to reducing warm-up idling only.	

Emissions Reduction Potential

Despite the wide selection of idling reduction solutions, when it comes to internal combustion engines, there is no technology that completely eliminates CO_2 and other emissions. Only battery-electric and hydrogen fuel cell vehicle technologies can eliminate tailpipe emissions. Idling-reduction initiatives can be helpful in reducing unnecessary idling in the short and medium term, and as a segue to gradual transition to electric trucks and hydrogen fuel cells in the long-run.

Driver Training and Motivation

Idling-Reduction Training and Incentives

Driver training to modify driver behaviours and ongoing motivation to continue good behaviours are crucial components of successful idling-reduction programs. While most drivers understand the vehicle idling issue, many continue their inefficient practice of excessive idling due to lack of knowledge and/or motivation.

Driver training can be used to optimize the use of idle reduction technologies. The technologies can reduce idling but the drivers have the ability to override the technologies. Proper training can aid in utilizing the technologies to their full potential.

In addition to establishing corporate idling reduction policies, behaviour-based approaches for idling reduction include:

- Idling-reduction training for drivers; and
- Incentive programs to encourage drivers to limit idling.

For best results, these approaches should be used in conjunction. Regardless of the approach, the greatest impact pledges of idling-reduction should be made in a public forum. Moreover, idling-reduction targets should be customized as various fleet vehicles may have different operating

requirements and will benefit from targets that accurately reflect their work environment. Beginning from a measured starting point, progress should be evaluated at regular intervals to modify and adapt the approach if progress is not occurring.

Driver Eco-Training

Driver eco-training should be fact-based and aimed at increased awareness and promotion of good practices. Typically, eco-training courses address the following areas:

- Progressive shifting (or use of automated transmissions)
- Starting out in a gear that doesn't require using the throttle when releasing the clutch
- Shifting up at very low RPM
- Block shifting where possible (e.g., shifting from third to fifth gear)
- Maintaining a steady speed while driving
- Using cruise control where appropriate
- Anticipating traffic flow
- Coasting where possible
- Braking and accelerating smoothly and gradually
- Avoiding unnecessary idling

Driver eco-training programs vary considerably. They can be organized as short (typically an hour long) information sessions/workshops or can be considerably longer and involve more hands-on activities. Extended training can vary in length from a half to a full day, or can also be scheduled into shorter sessions over a period of time.

Online Training

Online training courses are gaining popularity thanks to their flexibility. This trend has accelerated due to the Covid-19 pandemic and the need for social distancing measures. It is strongly recommended that discussion sessions among the drivers be organized to review training topics to deepen their understanding and provide a forum for questions and concerns. The individual responsible for the idling reduction incentives program could facilitate such sessions.

In-Person Training

In-person driver eco-training courses vary greatly in length, depth, and format. These courses offer a more personalized approach, facilitate immediate discussion, and typically allow for practical application. For best results, eco-training could be combined with professional driver improvement training.

NRCan SmartDriver Training Series

SmartDriver provides free, practical training to help Canada's commercial and institutional fleets lower their fuel consumption, operating costs, and harmful vehicle emissions. Fleet energy-management training that helps truckers, transit operators, school bus driver, and other professional drivers is claimed by NRCan to improve fuel efficiency by up to 35 percent. RSI-FC highly recommends NRCan's SmartDriver training: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/greening-freight-programs/smartdriver-training-series/21048

Continuous Motivation

Studies have demonstrated that driver training benefits, although significant, are likely to diminish over time. Ongoing feedback and motivation is recommended as a preventive measure. This can include:

(1) Tracking Idling to Provide Feedback to Drivers

- Monitoring the progress of any initiative is crucial not only to determine the impact, but to also provide feedback to the drivers to provide them the opportunity to modify their behaviour.

- Practices that track and report fuel consumption establish a valuable monitoring basis. Knowledge and comprehensive factual information can help build a stronger business case and "buy-in" for idling reduction.

- Telematics technologies help managers and drivers track idling and provide measurable data to manage goals. Such technologies, however, can be expensive as they typically use GPS systems and OBD monitoring devices.

(2) Implementing a Corporate Idling Reduction Policy

- It is our opinion that in most cases drivers want to "do the right things." By ramping up communications about excessive idling and instituting a clear idling policy, a reduction of unnecessary idling will likely result.

(3) Ongoing Information Campaigns and Reminders

- In general, information campaigns are low-cost, easy to manage, and lead to a more knowledgeable and receptive public. To raise awareness of the issues these can be initiated even before driver training commences. Numerous resources that address idling awareness issues are available free of charge and ready to implement.

(4) Non-Monetary Incentives Programs

- There are a few approaches that can aid in motivating drivers to continue to apply the skills gained during eco-training. Competition among departments/teams to reduce idling can be an effective approach. Periodic recognition of high-performers can be either public or private. An example of a non-monetary reward might be the donation to a charity in the amount of the lowest idling department's fuel cost savings.

Summary and Potential Impact

Driver training is an initiative that attempts to change an individual's behaviour and thus the results are hard to predict and the variance is large. A multitude of aspects, such as the current level of driver education and driving practices, the level of idling, corporate culture and policy, and individual receptiveness and willingness to change will influence results. It is estimated that driver training has a potential to reduce vehicle fuel consumption by anywhere from 3% to 35%, with the typical results between 5% and 10%.

Route Planning and Optimization

In addition to vehicle upgrades, proper maintenance, driver training, and continuous motivation to maintain good driving habits, a fleet can further minimize fuel consumption and exhaust emissions through route planning and optimization. Route planning software can be used optimize multi-stop trips. There are different software available for categories in both public and private fleets (e.g., service dispatch software, courier software, trucking software, etc.)[107].

Route planning software used for delivery services ensures the minimum driving time for multi-stop trips by using advanced algorithms to arrive at the optimal route that provides the highest collective reduction in total driving time and, consequently, fuel consumption. This can also mean fewer vehicles and less traffic on the road at one time.[108]

Route planning software can also be used for idling reduction initiatives by integrating GPS tracking software to monitor driver activity in real-time. Moreover, reporting and analytics features within route planning software can help with identifying when a fleet vehicle requires maintenance to ensure optimal fuel efficiency and thus minimize cost and emissions.[109]

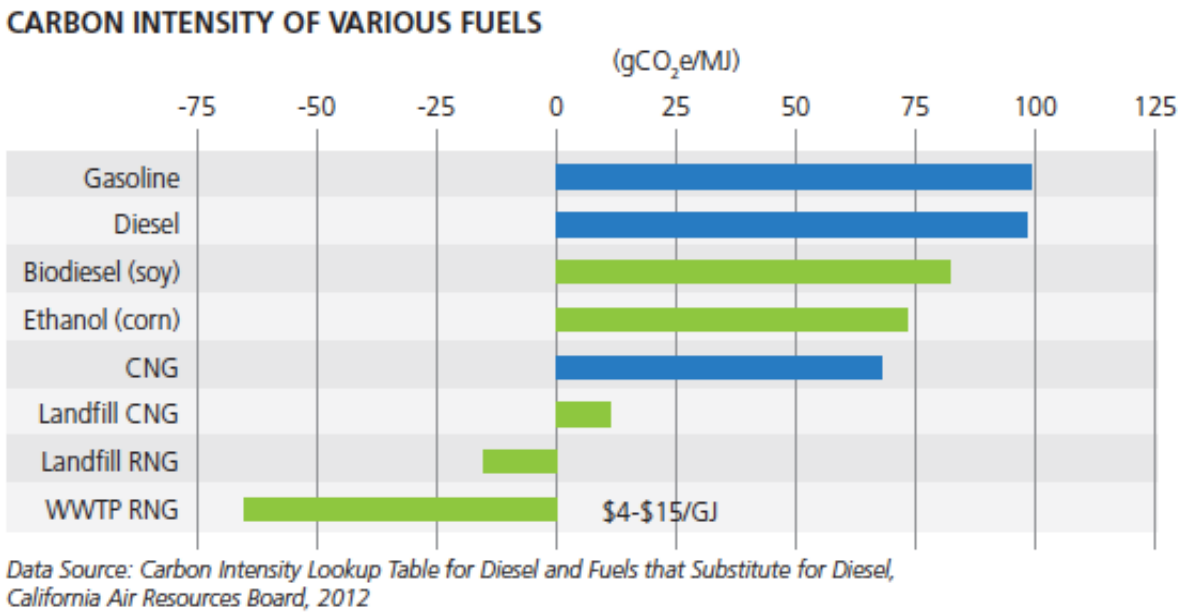
[107] Source: https://www.capterra.com/route-planning-software/
[108] Source: https://blog.route4me.com/2020/05/carbon-emissions-reduction-route-optimization-helps-cut-tons-carbon-emissions/
[109] Source: https://blog.route4me.com/2020/05/carbon-emissions-reduction-route-optimization-helps-cut-tons-carbon-emissions/

Low-Carbon Fuel Switching

Of all current-day fuel-reduction solutions, fuel switching is often the most expedient way to reduce emissions in the short term. As awareness of climate change issues amplify, the use of low-carbon fuels is gaining increased domestic and global interest. Fuel switching is a process of diverting a fleet's fuel consumption away from traditional fossil-based sources to either alternate or renewable energy sources.

Figure 25 shows the carbon intensity of various fuels relative to baselines for traditional fossil gasoline and diesel.

Figure 25: Carbon Intensity of Various Fuels



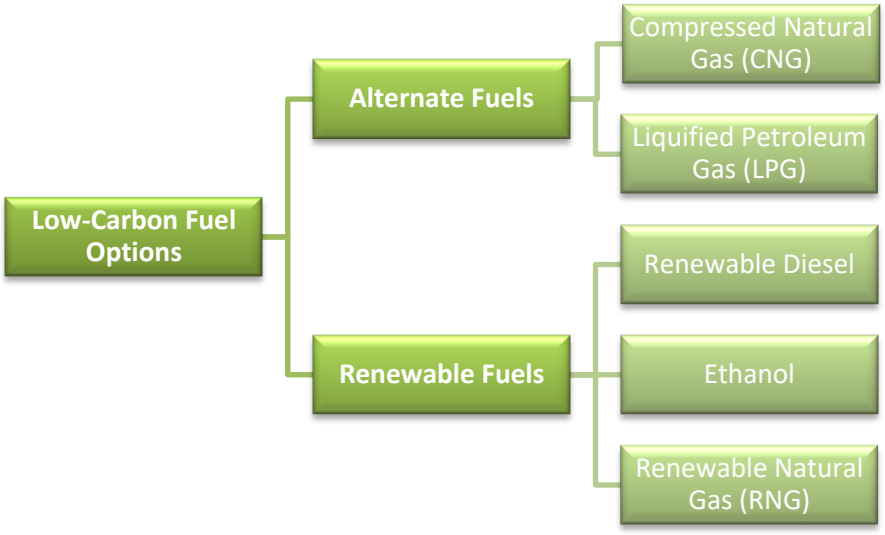
Data Source: Carbon Intensity Lookup Table for Diesel and Fuels that Substitute for Diesel, California Air Resources Board, 2012

No Pain, No Gain!

Unfortunately, regardless of which fuel-switching options are selected, the reality is that each will require some degree of effort to implement. For example, although transit buses are capable of using biodiesel and/or renewable diesel, obtaining the fuels would likely bring new operational challenges such as switching bulk suppliers and/or requiring extra efforts from vehicle drivers to attend different retail fuel stations instead of those they are accustomed to frequenting. Adding B10 biodiesel to the in-house fuelling supply system will require minor modifications, extra work routines, and procedures for staff to follow.

Figure 26 provides an overview of the low-carbon fuel alternatives now available to reduce a fleet's fuel consumption and GHG emissions.

Figure 26: Low-Carbon Fuel Options



An alternate route to changing the fuel used to power an internal combustion engine is to introduce a complete change such as battery-electric or hydrogen fuel cell vehicles. Some jurisdictions have already legislated elimination of the internal combustion engine in coming years. How successful that will be remains to be seen, but in response to the need to and regulation supporting the transition away from fossil fuels, zero-emission electric and fuel cell trucks are already planned for production. These technologies will be explained in later sections of this Appendix. First, we will explore low-carbon fuel options, also known as the "messy middle."

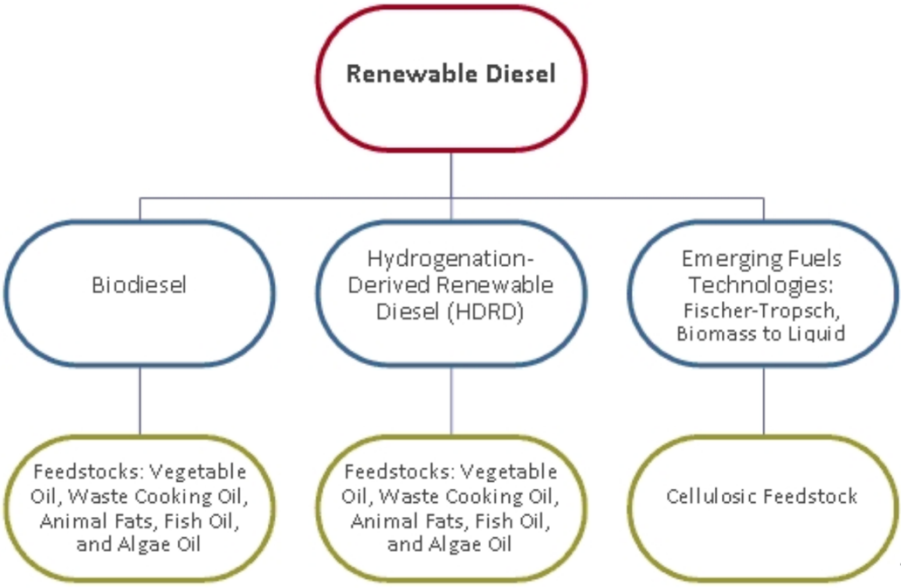
Renewable Diesel

Renewable diesel is a fossil diesel fuel substitute currently made from plant and animal oils and fats as well as from cellulosic feedstock consisting of agriculture and forest biomass[110]."

There are two main renewable diesels – biodiesel and hydrogenation-derived renewable diesel (HDRD), explained below – and other technologies to convert biomass into renewable diesel are being developed (outlined in *Figure 27)*[111]. All diesel fuel sold in Canada contains a percentage of renewable diesel owing to a renewable fuels standard.

[110] Source: https://www.nrcan.gc.ca/energy/alternative-fuels/resources/nrddi/3669
[111] Source: https://www.nrcan.gc.ca/energy/alternative-fuels/resources/nrddi/3669

Figure 27: Renewable Diesel Types and Feedstocks



Biodiesel Overview

Biodiesel is a renewable fuel made from vegetable oil and waste cooking oil, animal fats such as beef tallow and fish oil, and even algae oil[112]. In technical terms, biodiesel is a vegetable oil- or animal fat-based diesel fuel consisting of long-chain alkyl (methyl, ethyl, or propyl) esters made by chemically reacting lipids (e.g., vegetable oil, soybean oil, animal fat) with alcohol-producing fatty acid esters. Biodiesel is often referred to as fatty acid methyl ester or FAME[113].

Biodiesel can be blended in a variety of ratios with conventional fossil diesel. Much of the world uses a system known as the "B" factor to state the amount of biodiesel in any fuel mix (e.g., B2 indicates 2% biodiesel and 98% fossil diesel). Biodiesel blends include: B2, B5, B10, B20, blends greater than B20, and B100 (100% biodiesel, also known as "neat" biodiesel).[114]

Canadian regulations require fuel producers and importers to have an average renewable fuel content of at least 2% based on the volume of diesel fuel and heating distillate oil that they produce or import into Canada. The regulations include provisions that govern the creation of compliance

[112] Source: https://www.nrcan.gc.ca/energy/alternative-fuels/resources/nrddi/3669
[113] Source: https://www.neste.com/what-difference-between-renewable-diesel-and-traditional-biodiesel-if-any
[114] Source: https://www3.epa.gov/region9/waste/biodiesel/questions.html

units, allow trading of these units among participants and also require record-keeping and reporting to ensure compliance[115].

Blends of 20% biodiesel and lower can be used in diesel equipment with no or only minor modifications, although certain manufacturers do not extend warranty coverage if equipment is damaged by poor quality fuel in these blends.

Biodiesel used in its pure form (B100) may require certain engine modifications to avoid maintenance and performance problems. A new system recently emerged involving the use of a heated fuel storage tank in which the engine starts on standard diesel, and then after warm-up of the fuel tank, switches over to B100. The system is said to allow the use of B100 year-round in cold, winter conditions.

Hydrogenation-Derived Renewable Diesel vs Traditional Biodiesel

Hydrogenation-derived renewable diesel (HDRD) is made from animal fats or vegetable oils – alone or blended with petroleum – refined by a process called hydro treating. HDRD and traditional biodiesel (also known as fatty acid methyl ester or FAME, as stated earlier) are often confused; however, they are distinctly different products, even though both are made from organic biomasses. The differences can be found in their production process, cleanliness, and quality.

Unlike biodiesel, HDRD is made primarily from waste and residues and impurities are removed during the hydro treating process at a high temperature[116]. The outcome is a colorless and odorless fuel of an even quality that has an identical chemical composition to fossil diesel. It is also often called an "advanced biofuel" or "second-generation biofuel."

Traditional, first-generation FAME-type biodiesel, on the other hand, is produced by esterifying vegetable oils or fats. The esterification process restricts the use of poor quality or impure raw materials, such as waste and residues. The quality of traditional biodiesel also varies in other respects based on the raw materials used.

HDRD is cleaner and has a lower carbon footprint than petroleum-based diesel, and it can also operate at colder temperatures than fossil diesel and biodiesel. Therefore, HDRD can be used in higher concentrations than biodiesel and even as a standalone product in diesel engines. However, it generally cost significantly more than traditional biodiesel; biodiesel has been on average 60% cheaper than HDRD from 2010-2017[117].

[115] Source: https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/renewable.html
[116] Source: https://www.neste.com/what-difference-between-renewable-diesel-and-traditional-biodiesel-if-any
[117] Source: https://www.naviusresearch.com/wp-content/uploads/2019/05/Biofuels-in-Canada-2019-2019-04-25-final.pdf

Biodiesel At a Glance

Table 43: Strengths and Weaknesses of Biodiesel

Strengths	Weaknesses
1. Safe and non-toxic 2. Proven, mature technology in North America and Europe 3. No conversion costs to vehicles 4. Minor costs to convert fuelling infrastructure (tanks and pumps) 5. Warranty approved by most engine manufacturers[118,119,120] 6. Increases lubricity and therefore is known to extend engine life (Note: Today's ultra-low sulfur diesel suffers from reduced lubricity and biodiesel is commonly used to counteract this issue.) 7. Can reduce GHG emissions, depending on blend used and source of biodiesel	1. Although production is abundant, there are a limited number of vendors and distributors; locating vendors/suppliers may be challenging 2. Viscosity issues related to the higher-blends (B5 or higher) in cold weather conditions that require special attention 3. Possible perception that "food" production is sacrificed for fuel production 4. Potential of higher fuel cost, depending on blend and market conditions (Note: Prior to the recent market situation for oil, B20-B50 was approximately the same price or less than fossil diesel.) 5. Marginal level of reduced energy efficiency, which varies from 1% in the case of B20 reaching 7.5% in the case of B100

Biodiesel Emissions Reduction Potential

Tailpipe GHG emissions reductions are dependent on the biodiesel blend used; for a given unit mass or volume, the higher the blend, the lower the GHG emissions. B20, in particular, reduces CO_2 by 15% in comparison to conventional diesel per unit mass/volume[121]. However, actual tailpipe emissions reduction potential for the same distance travelled is dependent on both GHG emissions per unit mass/volume and fuel economy. B5 has been shown to improve fuel economy by as much as 10% in comparison to conventional diesel[122], whereas fuel economy can be 2% lower for B20

[118] Source: www.neste.com. Neste is a producer of renewable diesel. The company describes itself as the global leader in the renewable diesel market and wants to develop significant business from non-traffic renewable product markets by the end of the decade.
[119] Source: http://biodiesel.org/using-biodiesel/oem-information
[120] Source: https://www.afdc.energy.gov/fuels/biodiesel_blends.html
[121] Source: https://www.fueleconomy.gov/feg/biodiesel.shtml
[122] Source: https://www.consumerreports.org/cro/2012/05/diesel-vs-biodiesel-vs-vegetable-oil/index.htm

and as much as 10% lower for B100 (pure or "neat" biodiesel)[123]. Therefore, there may be a "sweet spot" for optimizing fuel economy and GHG emissions reduction using blends from B5 to approaching B20. Using blends in this range improves fuel economy and lowers GHG tailpipe emissions on the order of approximately 10 percent. Using biodiesel can also reduce several other tailpipe emissions including particulates and unburned hydrocarbons[124]. Moreover, the lifecycle CO_2 emissions can be significantly lower for biodiesel than for conventional diesel[125].

Biodiesel – Ease of Implementation

There are no vehicle conversion or infrastructure costs associated with biodiesel use. Therefore, either biodiesel or HDRD could be immediately introduced without delay to begin reducing emissions for a fleet following research into the optimal blends for operational needs and cold-weather considerations.

Biodiesel Production in Canada

In 2016, Canadian biodiesel production increased due to new production capacity coming on-line. Canada's biodiesel production was estimated to reach 400 million liters in 2016 and forecast to reach 550 million liters in 2017, but is still below the level needed to meet the federal mandate. The balance will continue to be met by imports.

Primary feedstocks remain canola, animal fat, and recycled oils. Canola feedstock was expected to account for nearly 29 percent of Canadian biodiesel production by the end of 2016 and in 2017. Cooking oil was forecast to account for 49 percent of the feedstock in 2016 and 46 percent on 2017. Soybean oil was expected to increase to 20 percent by 2017.

Biodiesel Gelling

Biodiesel is essentially oil; therefore, it solidifies in cold temperatures (commonly referred to as gelling). If the fuel begins to gel, it can clog engine filters and eventually thicken enough to prevent flow from the fuel tank to the engine. The temperature at which crystals begin to form is called the cloud point. The cloud point varies considerably from one biodiesel source to another. Due to Canadian climate conditions, the flow properties of biodiesel are an important consideration. It must be noted that even petroleum diesel can gel, thus additives are often used during wintertime as a preventative. In the case of biodiesel blends, such additives can aid in reducing the cloud point during winter months.

[123] Source: https://www.fueleconomy.gov/feg/biodiesel.shtml
[124] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/biodiesel/3509
[125] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/biodiesel/3509

According to the U.S. Department of Energy, the temperature at which B100 starts to gel will vary with the feedstock and can range from 0°C to 15°C. Soy is the most common source of biodiesel, and has a cloud point of 0°C.

Biodiesel blending aids in reducing the cloud point temperature, as conventional diesel has a considerably lower cloud point temperature. The goal for users is to ensure that the fuel's cloud point temperature is appropriate for weather conditions. The U.S. Department of Energy sought to obtain a biodiesel blend with cloud point safe for use in cold weather. They used a specially formulated cold weather conventional diesel fuel that has a cloud point of -38°C. This diesel was mixed with soy biodiesel to make a B20 blend. As a result, the cloud point of that B20 blend was -20°C. [126]

Generally speaking, keeping the biodiesel and diesel fuel to a lower blend (e.g., B10) will have better cold weather operability properties than a higher blend (e.g., B20 +).

Operational Considerations when Choosing Higher Biodiesel Blends

To minimize risk, a higher blend (B20 or higher, depending on the cloud point of a particular biodiesel) could be used in the warmest months of the year and B5 could be used during the rest of the year. Many Canadian and U.S. fleets using biodiesel follow this practice.

To maximize the overall impact of the biodiesel's usefulness in reducing GHGs it is recommended that the highest possible biodiesel blend be used during the summer months. For example, if diesel consumption remains relatively constant month-to-month, then using B20 during cold months (winter) and shoulder seasons (some of spring and fall) and B5 the rest of the year may be approximately equal to using an average annual blend of B10. However, for deeper emissions reduction, if B60 were used from June to August, and B5 during colder months, the yearly average equivalent would increase to B18.75.

Future Technologies to Support B100 Use

Emerging technologies are looking to address the cloud point issues via fuel heating systems. One such provider is *Optimus Technologies*[127] that offers heated fuel system solutions. This could prove to be a cost-effective way to use pure B100 biodiesel to maximize emissions reduction potential.

Given that these technologies are relatively new and results of further testing in real-world applications are limited, as well as the associated risks involved, RSI-FC does not recommend considering this solution for widespread implementation at this time. Nevertheless, a fleet should

[126] Source: https://www.afdc.energy.gov/uploads/publication/biodiesel_handling_use_guide.pdf
[127] Source: https://www.optimustec.com

periodically evaluate this and other technological advancements for potential application, with a openness to pilot-testing any technologies under review.

ASTM Standards

The American Society for Testing and Materials (ASTM) sets out standards for biodiesel, diesel, and heating oil. Four ASTM standards have relevance to consumer use of biodiesel and biodiesel blends, which are[128]:

ASTM D6751 - Biodiesel Blend Stock Specification B100
ASTM D975 - Diesel Fuel Specification
ASTM D7467 - 17 Standard Specification for Diesel Fuel Oil, Biodiesel Blend (B6 to B20)
ASTM D6468 - Standard Test Method for High Temperature Stability of Middle Distillate

Most commonly, manufacturers that support B20 usage will require the biodiesel to conform to ASTM specifications. B100 must conform to ASTM D6751 prior to blending, and the finished B20 blend must conform to ASTM D7467. Any product marketed as biodiesel must meet the standard set by the ASTM D6751.

BQ9000

Customers should purchase the biodiesel blend from a BQ9000 Certified Marketer. The B100 fuel used in the blend should be sourced from a BQ9000 Accredited Producer. BQ9000 Certified Marketers and Accredited Producers can be found at www.bq-9000.org.

Biodiesel fuel should meet ASTM D6751 or ASTM D7467 standards and fuel should be used within 6 months of production.

Storage and Handling

Biodiesel fuels have shown poor oxidation stability, which can result in long-term storage problems. When biodiesel fuels are used at low ambient temperatures, filters may plug and the fuel in the tank may thicken to the point where it will not flow sufficiently for proper engine operation. Therefore, it may be prudent to store biodiesel fuel in a heated building or storage tank, as well as heat the fuel system's fuel lines, filters, and tanks.

Additives also may be needed to improve storage conditions and allow for the use of biodiesel fuel in a wider range of ambient temperatures. To demonstrate their stability under normal storage and use conditions, biodiesel fuels tested using ASTM D6468 should have a minimum of 80% reflectance after

[128] Source: Fleet Challenge publication – Fleet Managers Comprehensive Guide to Use and Storage of Biodiesel

aging for 180 minutes at a temperature of 150°C. The test is intended to predict the resistance of fuel to degradation at normal engine operating temperatures and provides an indication of overall fuel stability.

Biodiesel fuel is an excellent medium for microbial growth. Since water accelerates microbial growth and is naturally more prevalent in biodiesel fuels than in petroleum-based diesel fuels, care must be taken to remove water from fuel tanks. The effectiveness of using conventional anti-microbial additives in biodiesel is unknown. The presence of microbes may cause operational problems, fuel system corrosion, premature filter plugging, and sediment build-up in fuel systems.

Health and Safety

Pure biodiesel fuels have been tested and found to be nontoxic in animal studies. Emissions from engines using biodiesel fuel have undergone health effects testing in accordance with EPA Tier II requirements for fuel and fuel additive registration.

Tier II test results indicate no biologically significant short-term effects on the animals studied other than minor effects on lung tissue at high exposure levels. Biodiesel fuels are biodegradable, which may promote their use in applications where biodegradability is desired (e.g., marine or farm applications). Biodiesel is as safe in handling and storage as petroleum-based diesel fuel.

Vehicle Warranties

Back in 2003, the Engine Manufacturers Association issued a technical statement indicating biodiesel use up to B5 should not cause engine or fuel systems problems[129]. Most North American engine manufacturers now offer full support using biodiesel blends up to a B20 with no vehicle modifications required[130].

Heavy-Duty Vehicle Warranties

Detroit Diesel, Caterpillar, Volvo and Cummins are the big four manufacturers of HD truck diesels. They all support the use of B20 in most of their modern engines. Older engines were produced with rubber which is eroded by biodiesel, instead of Viton injections system seals. In general, most modern engines are suited for biodiesel of up to 20% and ASTM standard biodiesel is required (almost all commercially produced biodiesel is ASTM standard).

[129]http://www.truckandenginemanufacturers.org/file.asp?A=Y&F=7036%2Epdf&N=7036%2Epdf&C=documents
[130] http://biodiesel.org/news/news-display/2017/01/17/automakers-fuel-the-u.s.-market-with-more-biodiesel-capable-diesel-vehicle-models

Caterpillar

B20 is approved for the majority of engine models. B20 is approved for Tier 4 Interim/Stage III B and beyond engines with after-treatment devices.

Cummins

Cummins approves the use of B20 biodiesel blends in the following engine models:

On-Highway: ISX, ISM, ISL, ISC and ISB engines certified to EPA '02 and later emissions standards, ISL, ISC and ISB engines certified to Euro 3.

Off-Highway: QSX, QSM, QSL, QSC, QSB6.7, QSB4.5 and QSB3.3 engines certified to Tier 3/Stage IIIA, QSM Marine, QSM G-Drive.

High Horsepower Off-Highway built after January 1, 2008: QSK78, QSK60, QSK50, K2000E, K50, QSK45, QSK38, K1500E, K38, QST30, QSK23, QSK19 and K19. Also, Marine QSK60, QSK50, K50 QSK45, QSK38, K38 QSK19, K19.

Cummins has approved B20 for the high horsepower engines listed above with the following fuel systems: Pressure Timed, High-Pressure Injection, Modular Common Rail Fuel Injection System and BOSCH Pump-Line-Nozzle.

Freightliner truck models equipped with Cummins engines are approved for use with B20 biodiesel blends. Custom Chassis Corporation (FCCC) is a division of Daimler Trucks North America (DTNA). Freightliner Custom Chassis manufactures premium vehicle chassis for walk-in cabs, motor homes, school buses and commercial buses. All FCCC vehicles are equipped with Cummins engines. Therefore, Freightliner and DTNA support the Cummins position of approval for the use of B20 biodiesel blends in all Freightliner Custom Chassis vehicles.

Volvo

Volvo Trucks affirms that the use of biodiesel up to a maximum B20 will not affect the manufacturer's mechanical warranty as to engine and emissions system related components, provided the biofuel used in the blend conforms to ASTM D6751, B1 to B5 blends conform to ASTM D975, and B6 to B20 blends conform to ASTM D7467.

Detroit Diesel

Detroit Diesel is a division of Daimler Trucks North America. Detroit Diesel Series 60 Engines manufactured after 2004 are compatible with biodiesel blends up to B20. It is not recommended to run blends higher than 5% biodiesel on Series 60 engines manufactured prior to 2004, as they may contain materials that are not compatible with biodiesel. Biodiesel blends must meet the specifications listed in the Detroit Biodiesel Policy.

Hino

Hino's complete product line of class 4 and 5 cab over, and class 6 and 7 conventional trucks, are now approved for up to B20 biodiesel usage.

All 2011 and 2012 model year cab over and conventional trucks powered exclusively with Hino's proprietary J-Series engines are approved to use B20 biodiesel blends that contain biofuel blend stock (B100) compliant to ASTM D6751, and blended fuel compliant to ASTM D975. B20 biodiesel meeting these standards is also approved for use in Hino's new 2012 diesel-electric hybrid COE truck.

Hino trucks built prior to the 2011 model year are approved to use B5 biodiesel. All biodiesel fuels used in Hino trucks must be purchased from a fuel handler licensed under BQ9000.

John Deere

All John Deere engines can use biodiesel blends. B5 blends are preferred, but up to B20 can be used providing the biodiesel used in the fuel blend meets the standards set by the ASTM D6751 or European Standard (EN) 14214.

John Deere engines without exhaust filters can operate on biodiesel blends below and above B20 (up to B100). For these engines, John Deere-approved fuel conditioners containing detergent/dispersant additives are required when using biodiesel blends of B20 or higher, and recommended when using lower biodiesel blends.

John Deere engines with exhaust filters should not use biodiesel blends above B20. For these engines, John Deere-approved fuel conditioners containing detergent/dispersant additives are required when using B20, and recommended when using lower biodiesel blends.

Mack

Mack Trucks states that the use of biodiesel up to a maximum B20 will not affect the manufacturer's mechanical warranty as to engine and emissions system related components, provided the biofuel used in the blend conforms to ASTM D6751, B1 to B5 blends conform to ASTM D975, and B6 to B20 blends conform to ASTM D7467.

Navistar

Navistar unconditionally warrants use of biodiesel blends up to and including B5 blends meeting the ASTM D975-08a standard. Use of B6-B20 blends in International® MaxxForce™ Diesel Engines 2007-up is at the discretion of the customer/operator and will not automatically void an engine warranty. However, if engine component failure can be directly attributable to use of a B6-B20 blend not provided by a BQ9000 certified fuel supplier, Navistar may, at its option, deny warranty on the affected engine or engine component.

Renewable Diesel Summary

Should supply be readily available, and the price point competitive with fossil diesel, renewable diesel may have good potential for a fleet due to the following:

- Implementation is straightforward and can be done without significant change management.
- No vehicle modifications are required.
- Minimal to no price increase for biodiesel, and possibly a decrease in price depending on prevailing market conditions as compared to conventional diesel fuel.
- Biodiesel blends higher than B2 and lower than B20 may provide substantially better fuel economy than conventional biodiesel, B2, and B100, thereby reducing fuel cost and CO_2 emissions.

Ethanol

Ethanol is a renewable fuel made from various plant materials known as biomass or feedstocks. Corn and wheat are most commonly used to produce ethanol. In most North American jurisdictions, renewable fuel standards require all gasoline sold to be a 5-10% ethanol blend (E5-10). Ethanol burns cleaner and more completely than gasoline or diesel fuel; blending ethanol with gasoline increases oxygen content in the fuel, thereby reducing air pollution[131].

[131] Source: https://afdc.energy.gov/fuels/ethanol_fuel_basics.html

A higher blend of ethanol, known as E85 (85% ethanol, 15% gas), is available in some areas and can lead to significant GHG reductions. The 15% gasoline is needed to assist in engine starting because pure ethanol is difficult to ignite in cold weather[132]. This fuel must be used in dedicated "flex-fuel" vehicles (FFVs), which can run on any combination of gasoline and ethanol blends (up to 85%). However, in some jurisdictions, it may be challenging to find a local supplier of E85 as it is only available through specialized providers.

Production of Ethanol

In chemical terms, ethanol production involves the fermentation of sugars or starches contained in grains or other feedstocks. Ethanol fuel is then distilled and dehydrated to create a high-octane, water-free alcohol[133].

Several steps are involved in making ethanol available as a vehicle fuel. First, biomass feedstocks are grown, collected, and transported to an ethanol production facility. Then, ethanol is made from these feedstocks at the production facility along with by-products such as animal feed and corn oil. Next, the fuel is transported to a blender/fuel supplier. Finally, ethanol is mixed with gasoline by the blender/fuel supplier at the desired blend (up to 85%) and distributed by truck to fueling stations.[134]

Feedstock Sources and Environmental Considerations

Corn and wheat are the most common feedstocks used to produce ethanol, requiring arable land to be grown. As a result, there are environmental considerations, including:

- Using food crops to produce fuel (i.e., the perception of food used as fuel)
- Using arable land to produce fuel reduces the available land to produce food, which potentially leads to increased food prices
- Use of fertilizers and pesticides to grow food-grade crops
- Upstream lifecycle emissions associated with land use, fertilizer production, crop growth, crop harvesting, crop transportation, and ethanol production

[132] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/ethanol/3493
[133] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/ethanol/3493
[134] Source: https://afdc.energy.gov/fuels/ethanol_fuel_basics.html

As biofuel technologies develop, the focus is turning towards feedstocks that take up less space and land, require less fertilizer and pesticide, and are more energy efficient. These include "cellulosic" feedstock or energy crops, namely tall grasses like switchgrass and miscanthus as well as fast-growing trees like hybrid poplar and willow. Energy crops are attractive because they produce energy efficiently, require only modest amounts of fertilizer and pesticides, and require less fertile soil than is needed for other crops. Technologies are also currently being developed to produce ethanol from wood and algae. It is expected that non-edible plant materials will become sources of ethanol in the future. Cellulosic materials cannot be used as food, so concerns for food production and pricing issues, as is the case with corn and wheat, would be avoided.

Emissions Reduction Potential

Emissions reductions from using ethanol as fuel instead of pure gasoline varies according to biomass used and percentage blend. Although the production and burning of ethanol produce emissions, the absorption of carbon dioxide from the growing of feedstocks can result in the net effect being a large reduction of GHG emissions compared to fossil fuels such as gasoline. The higher the ethanol blend, the greater the GHG reductions. [135]

In terms of lifecycle GHG emissions, E10 made from corn produces 3-4% less GHG emissions compared to gasoline, and E10 made from wood or agricultural cellulosic materials produces 6-8% less emissions compared to gasoline[136]. Corn-based E85 is estimated to reduce lifecycle GHG emissions by 25-50% compared to gasoline[137]. If cellulosic feedstocks are used, ethanol can have lifecycle GHG emissions reductions ranging from 88 – 108% compared to refined petroleum, meaning that potentially more carbon dioxide is captured when the feedstock crops are grown than released by a vehicle when ethanol is burned[138].

In terms of tailpipe emissions, E85 has a GHG emissions reduction potential of about 30% when compared to the same volume of gasoline[139]. However, E85 contains about 27% less energy than gasoline per unit volume[140]. Given this energy loss, about 37% more E85 is required to achieve the same amount of work as gasoline. Therefore, the emissions reduction for the same work performed is actually about only 4.1% when compared to the energy equivalent of gasoline (i.e., for the same distance travelled the emissions for a vehicle running on E85 are 95.9% of those of a gasoline vehicle,

[135] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/ethanol/3493
[136] Source: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/alternative-fuels/biofuels/ethanol/3493
[137] Source: https://www.tandfonline.com/doi/pdf/10.3155/1047-3289.59.8.912
[138] Source: https://afdc.energy.gov/fuels/ethanol_benefits.html
[139] Source: http://www.patagoniaalliance.org/wp-content/uploads/2014/08/How-much-carbon-dioxide-is-produced-by-burning-gasoline-and-diesel-fuel-FAQ-U.S.-Energy-Information-Administration-EIA.pdf
[140] Source: https://afdc.energy.gov/fuels/ethanol_benefits.html

which is 70% multiplied by 1.37 accounting for the additional volume required to achieve the same work).

Ethanol Cost

Given the significant energy losses per unit volume as compared to gasoline, the cheaper cost of E85 per unit volume compared to gasoline does not offset the higher volume required to achieve the same distance travelled, likely making E85 more expensive than gasoline. Based on April 2020 fuel prices in the US, and accounting for energy equivalence (i.e., same distance travelled), E85 is about 16% costlier than gasoline[141].

Flex-Fuel Vehicles

E85 cannot be used in a conventional, gasoline-only engine. Vehicles must be specially designed to run on E85. These flex-fuel vehicles can run on E85, gasoline, or any blend of the two. These vehicles feature specially designed fuel systems and other components that allow a vehicle to operate on a mixture of gasoline and ethanol, with mixtures varying from 0 percent to 85% ethanol. Also, given that ethanol is not as energy-efficient as gasoline and thus more fuel is required, the fuel tank in a flex-fuel vehicle must be larger than a conventional vehicle. These cars and trucks have the same power, acceleration, payload, and cruise speed as conventionally fueled vehicles and are priced similarly to gasoline-only vehicles.

Ethanol Supply and Storage

E85 is available at some retail fuel stations and can also potentially be delivered direct-to-vehicle. Alternatively, it could be stored and dispensed in bulk from an onsite fuel station. Ethanol tanks require a water monitoring system. In addition, a 10-micron filter, signage, and other upgrades are required to ensure the system is compliant.

Ethanol Summary

E85 has an excellent emissions reduction potential for a fleet, particularly when the fleet is already E85 capable (i.e., has flex-fuel vehicles). If electric vehicles are not a viable option, new light-duty vehicles purchases should be flex-fuel capable to further enhance the GHG reduction potential for a fleet.

The implementation of E85 vehicles can be expedient if there are only minimal costs and effort required to prepare the infrastructure for E85 storage. In addition, the availability of E85 supply in a particular jurisdiction must be confirmed to proceed with this alternative fuel option. The downfall is

[141] Source: https://afdc.energy.gov/fuels/prices.html

that there are significant energy losses per unit volume as compared to gasoline, which may make E85 more expensive because more is required to achieve the same distance travelled.

Natural Gas

Natural gas (NG), a fossil fuel composed of mostly methane, is one of the cleanest burning alternative fuels. It is also thought to be safer than traditional fuels since, in the event of a spill, NG is lighter than air and thus disperses quickly when released. NG can be used in the form of compressed natural gas (CNG) or liquefied natural gas (LNG) to fuel cars and trucks. Vehicles that use NG in either form are called natural gas vehicles (or NGVs).

NG is found in abundance in porous rock formations and above oil deposits. After NG is extracted from the ground, it is processed to remove impurities and compressed to be stored and transported by pipeline. CNG is used in traditional gasoline internal combustion engine vehicles that have been modified, or in vehicles which were manufactured for CNG use, either alone (dedicated), with a segregated gasoline system to extend range (dual-fuel), or in conjunction with another fuel such as diesel (bi-fuel). CNG is most commonly used in fleet vehicles like buses and heavy-duty trucks because it requires a larger fuel tank than gasoline and diesel fuel[142].

In Canada, business case modelling[143] demonstrated that the use of natural gas (NG) by medium and heavy-duty truck applications provides substantial economic and environmental benefits. The cost and placement of fuel storage tanks is the major barrier to wider and quicker adoption of CNG as a fuel. However, CNG offers many advantages for fleets, and although there are major upfront capital costs ($1m or far more), savings may ensue.

According to the Canadian Urban Transit Association (CUTA) more Canadian cities are transitioning their public transportation fleets away from diesel-powered buses and opting for transit vehicles fueled by NG[144], a trend that is gaining momentum across North America and worldwide. This is due in part to government regulations that mandate a reduction in nitrogen oxide and greenhouse gas emissions that harm air quality, as well as a heightened sense of awareness about the health threats caused by local and toxic diesel particulate emissions.

[142] Source: https://consumerenergyalliance.org/2019/04/energy-explorer-cng-vs-lng/#:~:text=The%20reason%20you%20see%20CNG,requires%20a%20larger%20fuel%20tank.&text=Like%20CNG%2C%20LNG%20is%20compressed,state%20into%20a%20liquid%20state.
[143] Source: Natural Gas Use in the Medium and Heavy-Duty Vehicle Transportation Sectorin Roadmap 2.0 June 2019
[144] Source: https://cutaactu.ca/en/news-media/natural-gas-buses-cost-operational-and-environmental-alternative

CNG at a Glance

Table 44: Strengths and Weaknesses of CNG

Strengths	Weaknesses
1. Lower fuel cost than gasoline or diesel on an energy-equivalent basis 2. Can be used in heavy-duty truck applications 3. A CNG-powered vehicle gets approximately the same fuel economy as a conventional gasoline vehicle on a diesel-gallon-equivalent basis 4. Potentially reduces GHG emissions by more than 20% compared to a diesel vehicle[145,146] 5. Lower CACs compared to other fuels 6. Low safety risk 7. Piping directly to fuelling sites reduces upstream emissions resulting from delivery	1. Vehicle conversion costs are significant but payback is typically in 3-10 years depending on the application and usage 2. An in-house CNG fuelling system carries *significant* capital costs 3. Additional electricity costs for CNG refuellers 4. Potentially increased fueling time: if slow refuellers are employed, fuelling will take overnight; with fast refuellers, fuelling will take approximately the same time as traditional gas/diesel vehicles 5. Scarcity of refuelling centres in Canada

Safety

According to the U.S. Department of Energy's Alternative Fuels Data Center, NGVs are safer than vehicles powered by gasoline or diesel and the industry is highly regulated to address any additional safety concerns. There are an estimated 11 million NGVs[147] in use in over 30 countries globally. Codes, standards and regulations ensure that CNG vehicles are safe and that CNG refueling stations have been installed according to industry standards.

Compressed natural gas (CNG) has several inherent properties that make it safer than diesel or gasoline, including the following:

- It has a higher ignition temperature than gasoline (about 1022°F, compared to about 482°F for gasoline).

[145] Source: https://brc.it/en/categorie_faq/cng/
[146] Source: https://envoyenergy.ca/cng-benefits/#:~:text=Commercial%20fleets%20all%20over%20the,solution%20for%20fuelling%20their%20fleets.
[147] Source: Closing the Loop. Canadian Biogas Association. 2015.

- Natural gas burns only if the concentration in air is within specific limits, which is between 5 and 15 percent; this property along with a high ignition temperature make combustion of CNG very unlikely.

- It is lighter than air, thus in the unlikely event of a leak it dissipates quickly into the atmosphere.

In addition, the CNG industry is highly regulated and there are a series of safety measures in place, including the following:

- Natural gas is odourless; however, for safety reasons it is odorized to enable easy leak detection. According to a safety article in the *Natural Gas Vehicle Knowledge Base*, the average person can detect odorized natural gas at concentrations as low as 0.3 percent.

- Fuel cylinders are significantly stronger than diesel tanks and fuel tanks are up to a half-inch thick and are made of steel, or a composite designed to be stronger than steel.

- Cylinders and tanks are fitted with valves to handle high pressure, prevent leakage and eliminate risks of explosion.

In the U.S., the Federal Transit Administration followed 8,331 natural gas utility, school, municipal, and business fleet NGVs that traveled 178.3 million miles on CNG. They found that the NGV fleet vehicle injury rate was 37% lower than the gasoline fleet vehicle rate. Furthermore, the examined fleet was involved in seven fire incidents, only one of which was directly attributable to failure of the natural gas fuel system. Finally, there were no fatalities compared with 1.28 deaths per 100 million miles for gasoline fleet vehicles.

Emissions Reduction Potential

Based on the same work performed, a CNG vehicle has tailpipe GHG emissions about 20-30% less than a comparable diesel vehicle[148,149]. NGVs also emit up to 95% less nitrogen oxides (NO_x) compared to diesel and gasoline vehicles[150]. Furthermore, CNG vehicles do not emit particulate matter (PM10), a main cause of air pollution[151].

[148] Source: https://brc.it/en/categorie_faq/cng/
[149] Source: https://envoyenergy.ca/cng-benefits/#:~:text=Commercial%20fleets%20all%20over%20the,solution%20for%20fuelling%20their%20fleets.
[150] Source: Northwest Gas Association – Natural Gas Facts
[151] Source: https://brc.it/en/categorie_faq/cng/

Feasibility Considerations

The business case for natural gas is, in most cases, made on the differential in price between diesel fuel and natural gas – the higher initial investment costs for NGVs are typically offset by the fuel savings by using CNG over diesel. New NGVs for fleets may cost up to $50,000 more than conventional diesel fleet vehicles (based on truck Classes 7, 8 and 9)[152,153]. New CNG buses can cost $120,000 more than conventional diesel buses[154,155], likely making the payback period longer than for trucks, depending on kilometres-driven.

For Class 5 to 7 medium-duty trucks in the fleet that are currently powered by gasoline, CNG conversions are available. Conversion costs range from $6k to $10k CAD. CNG powered trucks could be re-fueled with overnight slow-fill systems which cost much less than fast-fill systems. Trucks being considered for conversion to CNG must have ample available frame space for CNG tanks and often this is not possible due to the types of add-on equipment and bodies mounted on the trucks. CNG conversions may present operational challenges if their range was less than fossil-fuelled units. In the event of a power interruption, such as during a severe weather event or some other cause, overnight slow re-fuellers would cease to function and CNG powered vehicles would be sidelined, which could negatively affect the City's emergency preparedness plans.

An operational concern is that in certain situations, such as an electrical power interruption, CNG compressor or other fuel system failure, etc., dedicated CNG vehicles (i.e., vehicles powered solely by CNG) would be sidelined, and this is a significant risk that must be managed.

Infrastructure Costs

CNG filling station infrastructure costs could run to $1m or much more, depending on capacities and complexities, and this is a conservative estimate. A CNG station would consist of the following elements:

- Compressor
- Storage
- Dispenser
- Slow and fast fill positions
- Engineering and permitting
- Site prep and gas service

[152] Source: Closing the Loop. Canadian Biogas Association. 2015.
[153] Source: Consultations with Change Energy
[154] This value represents the additional cost, in CAD, of a CNG transit bus over a traditional diesel bus.
[155] Source: Electric Buses in Cities: Driving Towards Cleaner Air and Lower CO_2. Bloomberg Finance L.P. 2018.

Types of Filling Infrastructure

There are three main types of CNG fuelling stations:

(1) Slow-fill refuellers: use a compressor only; fuelling typically takes place overnight
(2) Fast-fill refuellers: storage capacity is required; fuelling time is 8 minutes per vehicle
(3) Hybrid refuellers: have both slow and fast-fill-up

Thinking Ahead

Despite the increased capital costs for NGVs and their fuelling systems, many fleets have embraced the technology and apparently achieved success from their investments. We emphasize that NG is a fossil fuel – albeit a clean burning one – and it is important to keep in mind the global shift away from internal combustion engines and non-renewable fossil fuels. Some jurisdictions have already legislated the end of the internal combustion engine.

Zero-emission battery-electric vehicle options are available "here and now" in the case of transit buses and fully electric Class 5 to 8 trucks are not far off in the future. Experts agrees that the world is transitioning to electric vehicles and, ultimately, hydrogen fuel cells. With that reality, the use of NG as a vehicle fuel may be considered as an interim solution for organizations wishing to achieve immediate carbon reductions in the short-term while awaiting the availability of EVs. Unless subsidies were available to offset the cost, a major investment in an NG fuelling system would need to be a long-term capital investment for it to be cost-effective. Few would disagree that a large capital investment with a protracted payback period would not be a prudent decision for what may be an interim, short-term solution with a marginal business case.

Natural Gas Summary

Should the goal be for a NG fuelling system to be a long-term capital investment, NG may have good potential for a fleet due to the following:

- A CNG vehicle saves fuel costs and has significantly reduced tailpipe CO_2 emissions compared to a diesel vehicle.
- NGVs nearly eliminate the emissions of nitrogen oxides (NO_x), and do not emit particulate matter (PM10).
- NG is considered safer than traditional fuels since, in the event of a spill, NG is lighter than air and thus disperses quickly when released.

Renewable Natural Gas

An alternative to fossil sources is renewable natural gas (RNG), which is a methane biogas – a gaseous product of the decomposition of organic matter obtained through biochemical process such as anaerobic digestion. It is recovered from landfills, wastewater treatment plants, anaerobic digesters at dairies, food processing plants, or waste processing facilities that are cleaned to meet natural gas pipeline standards.[156]

RNG, or biomethane, is a fully renewable energy source that is fully interchangeable with conventional natural gas. Like conventional natural gas, RNG can be used as a transportation fuel in the form of compressed natural gas (CNG) or liquefied natural gas (LNG).

RNG production has become an important priority thanks to its environmental benefits. RNG production is usually based on capturing and purifying the gas from collected organic waste — anything from crop residues and animal manures to municipal organic wastes and food processing by-products.

RNG at a Glance

Table 45: Strengths and Weaknesses of RNG

Strengths	Weaknesses
1. Interchangeable with fossil natural gas 2. Can be used to power natural gas vehicles without conversion 3. Very low GHG emissions 4. RNG can be produced year-round without intermittency	1. Costs for an anaerobic digester are considerable and depend on the required size and capacity

Production

In general, the feedstocks for RNG systems can be grouped into five broad categories, based on the primary source of the organic material:

- Agricultural organics
- Residential source separated organics (SSO)
- Commercial SSOs
- Landfill gas

[156] Source: https://www.mjbradley.com/sites/default/files/MJB%26A_RNG_Final.pdf

- Wastewater treatment residuals

Anaerobic digestion is a process during which the waste (from landfills or waste water treatment plants) is converted into methane and carbon dioxide in a digester or holding tank. The gas produced is then cleaned or purified to meet utility pipeline specifications. The digesters can be located at waste water treatment plants, landfills, or at green bin waste facilities.

Emissions Reduction Potential

When RNG is used to fuel fleet vehicles, GHG emissions reductions are significant; different sources estimate the lifecycle reduction to be between 75% and 90% compared to diesel. The carbon dioxide that is generated during the production and combustion of RNG is used in the regeneration of new biomass, representing a closed-loop cycle for carbon dioxide that is released[157].

Feasibility Considerations

Without the commercial availability of RNG in a fleet's jurisdiction, a fleet would need to invest in an anaerobic digester to make their own RNG. This would add to the already large cost of $1m or much more to build a CNG fuelling station. Also, unlike CNG which would likely offer fuel cost savings, compressed RNG is approximately equal in price to diesel and gasoline in terms of diesel litre equivalent (DLE)[158]. Therefore, in many situations the use of RNG is not a financially viable option. However, with GHG reduction potential of up to 90% compared to diesel, a fleet manager may still want to consider RNG as an option.

RNG Summary

The use of RNG is a natural progression from the use of fossil-based CNG. While use of natural gas as fuel requires large infrastructure investments, RNG has a very high emissions reduction potential.

RNG is thus an important fuel to consider for use in medium and heavy-duty vehicles. Nevertheless, the technology of producing RNG is still under development and it is expected to become more widespread in the near future.

Liquified Petroleum Gas

Propane, otherwise known as liquefied petroleum gas (LPG), is produced as part of natural gas processing and crude oil refining. In natural gas processing, the heavier hydrocarbons that naturally accompany natural gas, such as LPG, butane, ethane, and pentane, are removed before the natural

[157] Source: Closing the Loop. Canadian Biogas Association. 2015.
[158] Source: Closing the Loop. Canadian Biogas Association. 2015.

gas enters the pipeline distribution system. In crude oil refining, LPG is the first product that results in the refining process.

Propane is a gas that can be turned into a liquid at a moderate pressure (160 pounds per square inch). It is stored in pressure tanks at about 200 psi and 100 degrees Fahrenheit. When propane is drawn from a tank, it changes to a gas before it is burned in an engine.

Application

Propane has been used as a transportation fuel since 1912 and is the third most commonly used fuel in the United States, behind gasoline and diesel. More than four million vehicles fuelled by propane are in use around the world in light-, medium- and heavy-duty applications. Propane holds approximately 86 percent of the energy of gasoline and so requires more storage volume to drive a range equivalent to gasoline, but it is usually price-competitive on a cents-per-km-driven basis.

Propane vehicle conversions and fueling systems generally cost much less than natural gas systems.

Emissions Reduction Potential

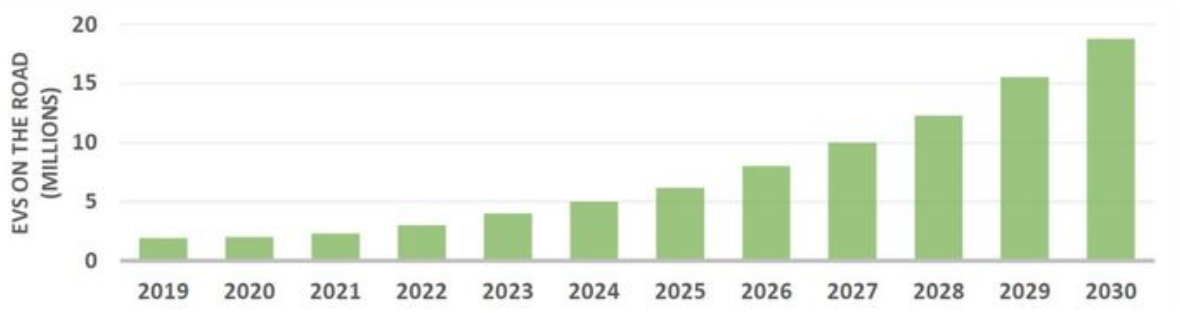
In terms of tailpipe emissions, propane has a GHG emissions reduction potential of about 31% when compared to the same volume of gasoline based on GHGenius version 3.11. However, as mentioned, propane contains about 14% less energy than gasoline per unit volume. Given this energy loss, about 16% more fuel is required to achieve the same amount of work as gasoline. Therefore, the emissions reduction for the same work performed is actually around 20% when compared to the energy equivalent of gasoline (i.e., for the same distance travelled the emissions for a vehicle running on propane are about 80% of those of a gasoline vehicle, which is 69% multiplied by 1.16 accounting for the additional volume required to achieve the same work).

Electric Vehicle Technologies

Over the past decade, electric transportation technologies including hybrid-electric vehicles (HEVs), plug-in hybrid electric vehicles (PHEVs), and battery-electric vehicles (BEVs), have been rapidly developing and quickly gaining popularity in the market. Electric vehicle (EV) technologies offer significantly reduced or no tailpipe emissions and vastly improved energy efficiency.

Today, EVs have reached their tipping point and sales are booming while the public vehicle charging infrastructure rapidly grows. Demand for EVs accelerated during the 2010s and is expected to continue accelerating during the 2020s, as shown in *Figure 28* for the United States.

Figure 28: Forecasted EV Growth in US (Source: Edison Electric Institute)



For fleet managers looking to reduce their annual fuel budget and corporate emissions, battery-electric, hybrids, and plug-in hybrids are a good option. Savvy fleet managers will seek applications where the type of vehicle used will deliver sufficient fuel cost savings to offset their additional cost of capital and, after the vehicles are fully depreciated (usually ~5 years), deliver net cost savings until the end of their economic lifecycle (often ~10 years).

There are a number of light-duty electric vehicle technologies currently available in the market. They include:

- **Mild Hybrid Electric Vehicles (MHEVs)**, which are equipped with internal combustion engines (ICEs) and a motor-generator in a parallel combination allowing the engine to be turned off whenever the vehicle is coasting, braking, or stopped and which restart quickly. MHEVs use a smaller battery than full hybrid electric vehicles (HEVs, see below) and do not have an exclusively electric mode of propulsion; rather, the motor-generator has the ability to both create electricity and boost the gas engine's output, resulting in better performance and reduced fuel use. Examples of MHEVs are the Honda Insight and the 2019 Ram 1500. [159]

- **Hybrid Electric Vehicles (HEVs)**, which use two or more distinct types of power, such as an ICE and a battery-powered electric motor as the modes of propulsion, albeit with very limited range when in electric mode. When an HEV accelerates using the ICE, a built-in generator creates power which is stored in the battery and used to run the electric motor at other times. This reduces the overall workload of the ICE, significantly reducing fuel consumption and extending range. Examples of HEVs include the Toyota Prius and Ford Fusion Hybrid. [160]

- **Plug-In Hybrid Electric Vehicles (PHEVs)**, which use rechargeable batteries, or another energy storage device, that can be recharged by plugging into an external source of electric power. PHEVs can travel considerable distances in electric-only mode, typically more than

[159] Source: https://www.autotrader.ca/newsfeatures/20180410/types-of-electric-vehicles-explained/
[160] Source: https://www.autotrader.ca/newsfeatures/20180410/types-of-electric-vehicles-explained/

25 km and up to 80 km for some models, due to their much higher battery capacity than hybrids. When the battery power is low (usually ~80% depleted), the gasoline ICE turns on and the vehicle functions as a conventional hybrid. Such vehicles typically have the same range as their gasoline counterparts. Examples of PHEVs include the Chevrolet Volt and Toyota Prius Prime.[161]

- **Battery-Electric Vehicles (BEVs)**, or all-electric vehicles, which are propelled by one or more electric motors using electrical energy stored in rechargeable batteries. BEVs are quieter than ICE vehicles and have no tailpipe emissions. In recent years, BEV range has been considerably extended, thereby providing much wider BEV applications and reducing range anxiety. Today, many BEV models have ranges exceeding 400 km, which provide much greater reliability when travelling longer distances. Recharging a BEV can take significantly longer than refuelling a conventional vehicle, with the difference depending on the level of charging speed; a full battery charge using a level 2 charger takes several hours, but charging from a nearly depleted battery to 70% at a fast (level 3) charge station can take 30 minutes[162]. Examples of BEVs include the Nissan Leaf, Chevrolet Bolt, and Tesla Model 3.

While commercial hybrid (HEV and PHEV) and full battery-electric (BEV) pickups, trucks and vans are still limited, options are quickly becoming available. Medium and heavy-duty battery-electric trucks are quickly being developed by many manufacturers. Demand for those offered by Tesla, Volvo, Freightliner, and others exceeds current supply and will soon be available for fleet purchase. Battery-electric buses are currently available for purchase.

Almost daily, manufacturers are announcing new electric cars, pickups, vans, buses and trucks of all gross vehicle weight ratings. There is no question that BEVs are taking over for traditional internal combustion engine (ICE) vehicles in a big way. Some jurisdictions have already legislated the end of ICEs. If they haven't done so already, fleet managers should start making plans for BEVs now.

While their upfront costs will be higher, BEVs have increasingly proven to be a viable solution to rising fuel costs and emissions. Since BEVs have few moving parts, tune-ups or oil changes are never required, and they seldom, if ever, require brake relining due to regenerative braking. And best of all, they burn zero fuel.

Plug-in hybrid electric vehicles would be an excellent solution for a low-mileage, return to base fleet. PHEVs have a much larger all-electric range as compared to conventional first-generation hybrid vehicles, and they eliminate any range anxiety that may be associated with all-electric vehicles, because the combustion engine works as a backup when the batteries have become depleted.

[161] Source: https://www.autotrader.ca/newsfeatures/20180410/types-of-electric-vehicles-explained/
[162] Source: https://www.autotrader.ca/newsfeatures/20180410/types-of-electric-vehicles-explained/

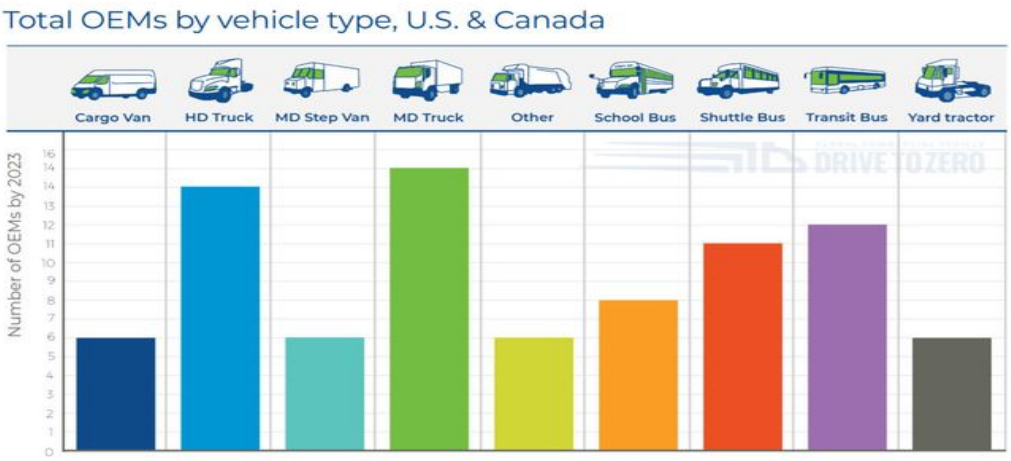
Zero Emission Battery-Electric Vehicles

Since the release of the first mass-produced BEV, the Nissan Leaf, which debuted in 2010 with an EPA range estimated at only 73 mi or 117 km[163], there has been a surge in lithium-ion battery production leading to a drastic decline in prices. Today, several more affordable BEV models have ranges exceeding 400 km, which provide much greater reliability when travelling longer distances. For example, the 2020 Tesla Model 3 Standard Plus has an EPA-estimated range of 402 km[164], while the 2020 Chevrolet Bolt has an EPA-estimated range of 417 km[165].

There has also been significant expansion in charging infrastructure through publicly available charging stations. As of early 2020, there were nearly 5,000 charging outlets across Canada, and Natural Resources Canada is investing $130 million from 2019-2024 to further expand the country's charging network, making range anxiety even less of a barrier to BEV ownership.

In addition to battery-electric pickups that are soon to emerge, emerging battery-electric buses and medium and heavy-duty trucks such as those planned by Tesla, Volvo, Freightliner, and other manufacturers are attracting considerable interest because of their the elimination of tailpipe GHG and CAC emissions, in addition to the potential for significant maintenance and fuel cost savings. In *Figure 29*, we see that the OEMs are quickly ramping up with other types of commercial EV trucks (medium- and heavy-duty truck categories) that are suited for municipal work environments.

Figure 29: Total EV OEMs by 2023 (Source: Calstart)



Fleet managers who operate battery-electric trucks and buses can see massive savings in maintenance and fuel costs. BEVs have considerably fewer parts than internal combustion engine

[163] Source: https://www.mrmoneymustache.com/the-nissan-leaf-experiment/
[164] Source: https://www.tesla.com/en_ca/model3
[165] Source: https://www.chevrolet.com/electric/bolt-ev

(ICE) vehicles. A drivetrain in an ICE vehicle contains more than 2,000 moving parts, compared to about 20 parts in an BEV drivetrain. This 99% reduction in moving parts creates far fewer points of failure, which limits and, in some cases, eliminates traditional vehicle repairs and maintenance requirements, creating immense savings for fleet managers. BEVs do not require oil changes or tune-ups, have no diesel exhaust fluid (DEF), and their brake lining life is greatly extended over standard vehicles due to regenerative braking. Though each fleet's electrification journey will be different, the transition to electricity offers significant cost reductions over the long term.

A new study[166] quantified what commercial EV-makers have been saying for years: electric trucks and buses are a triple win. They save money for fleet operators, and reduce both local air pollution and GHG emissions. The study, which was commissioned by the National Resources Defense Council (NRDC) and the California Electric Transportation Coalition, and conducted by the international research firm ICF, looked at the value proposition for fleet operators of battery-electric trucks and buses (and apparently invented a new acronym: BETs).

Today, BETs have an upfront price premium compared to legacy diesel trucks and buses. However, the costs of battery packs and other components are rapidly falling, and the study found that, by 2030 or earlier, electric vehicles will offer a lower total cost of ownership (TCO) for nearly all truck and bus classes, even without incentives.

Battery-Electric Vehicles at a Glance

Table 46: Strengths and Weaknesses of BEVs

Strengths	Weaknesses
- Well-designed, no noise, few moving parts, long warranties - Little/no maintenance - Government grants and incentives may be available - Effectively eliminates need for idling-reduction initiatives - Very positive driver feedback - Very positive public opinions - Potential for significant lifecycle GHG emissions, depending on electricity source	- High capital cost for battery-electric trucks/buses and chargers - Limited availability of new battery-electric trucks - For faster charging, 240V (Level 2) or 480V (DCFC) charging equipment required at extra cost - Existing electrical capacity at facilities may require significant upgrades to power charging stations for multiple vehicles - Potential driver range anxiety - Potential for costly battery replacements in aged BEVs

[166] Source: Posted January 2, 2020 by Charles Morris (https://chargedevs.com/author/charles-morris/) & filed under Newswire (https://chargedevs.com/category/newswire/), The Vehicles (https://chargedevs.com/category/newswire/the-vehicles/)

Air Quality and Upstream Emissions

Air quality is a growing concern in many urban environments and has direct health impacts for residents. Tailpipe emissions from internal combustion engines are one of the major sources of harmful pollutants, such as nitrogen oxides and particulates. Diesel engines in particular have very high nitrogen oxide emissions and yet these make up the majority of the global bus fleet. As the world's urban population continues to grow, identifying sustainable, cost-effective transport options is becoming more critical.

Battery-electric vehicles (BEVs) require electricity to recharge the batteries; therefore, electricity is effectively a "fuel" in these types of vehicles. Battery-electric vehicles (BEVs) may be defined as zero emissions vehicles (ZEVs) since the California Air Resources Board (CARB) defines a ZEV as a vehicle that emits no exhaust gas from the onboard source of power[167]. However, CARB's definition accounts for pollutants emitted at the point of the vehicle operation and the clean air benefits are usually local. Depending on the source of the electricity used to recharge the batteries, air pollutant emissions are shifted to the location of the electricity generation plants. For example, if electricity used for charging vehicles comes primarily from "dirty" sources such as coal, lifecycle vehicle emissions will result.
From a broader perspective, to have almost none or zero well-to-wheel emissions, the electricity used to recharge the batteries must be generated from renewable or clean sources such as wind, solar, hydroelectric, or nuclear power. In other words, if BEVs are recharged from electricity generated by fossil fuel plants, they cannot truly be considered as ZEVs. Upstream emissions should be considered when evaluating the effectiveness of ZEVs in reducing emissions. Generally, when considering upstream emissions from electricity supply, BEVs still emit more than 50% less GHG emissions than their gasoline or diesel counterparts[168], and in some cases emit over 80% less in a grid composed of mostly renewable electricity[169]. This level of emissions reduction is what cities need in order to collectively achieve the "deep decarbonization" necessary to mitigate the most serious impacts of climate change.

Charging Technologies

The time it takes to fully charge a BEV is dependent on the type (level) of charger used, the vehicle's technology (i.e., the maximum amount of current allowed by the vehicle, in amps), and range (i.e., battery capacity). Charging speed is expressed in kilometers/miles of range per hour of charging. BEVs can be charged by varying levels of chargers ranging from level 1-3 with the following general characteristics shown in *Table 47*[170]:

[167] Source: California Air Resources Board (2009-03-09). "Glossary of Air Pollution Terms: ZEV"
[168] Source: https://www.eei.org/issuesandpolicy/electrictransportation/Pages/default.aspx
[169] Source: https://blog.ucsusa.org/rachael-nealer/gasoline-vs-electric-global-warming-emissions-953
[170] Source: https://calevip.org/electric-vehicle-charging-101

Table 47: Characteristics of BEV Charging Levels

BEV Charging Levels	Outlet Voltage	Amperage	Added Range Per Hour
Level I	120V	12-16 amps	5-10 km
Level II	240V	16-40 amps	22-56 km
Level III	480+V	100+ amps	>250 km

Level 1 chargers can be plugged right into a standard outlet. They are the most economical option for private owners; however, at such a low charging rate it is usually not practical to use level 1 chargers exclusively. For example, it would take about 40 hours to fully charge a light-duty BEV with a range of 400 km starting at 20% battery (80 km range remaining).

Level 2 chargers are common in private households as well as public spaces such as mall parking lots. They incur an installation cost but are similar to common 240V installations such as the outlets that power clothes dryers. For a light-duty BEV with a range of 400 km and at 20% battery (80 km range remaining), it would take about eight hours to fully charge. Level 2, 240-volt chargers typically range in cost from around $1.5-5k, depending on electrical system requirements. Each Level 2 charger can serve two vehicles at any time of day; usually, charging is done overnight during the off-peak period. The vast majority of the time, BEV owners only need a level II charger; the exception is when travelling longer distances. During these times, much faster charging rates are required through level 3 charging.

Level 3, or Direct Current Fast Chargers (DCFCs), requiring inputs of 480+ volts and 100+ amps (50-60 kW)[171], are specialized systems designed to quickly charge vehicles and provide flexibility to owners travelling longer distances or in need to partial quick charge. For a light-duty BEV with a range of 400 km and at 20% battery (80 km range remaining), it would typically take less than one hour to fully charge. Installations of DCFCs require a commercial electrician due to the electrical load and wiring requirements[172]. The costs for installing a Level 3 DCFC vary greatly. Costs for a fast-charging station are dependent on the electrical supply available at the chosen charging site, site preparation costs including trenching, cable runs and many other installation considerations. Equipment and installation costs for DC fast charging stations can range from $50,000 to $200,000[173].

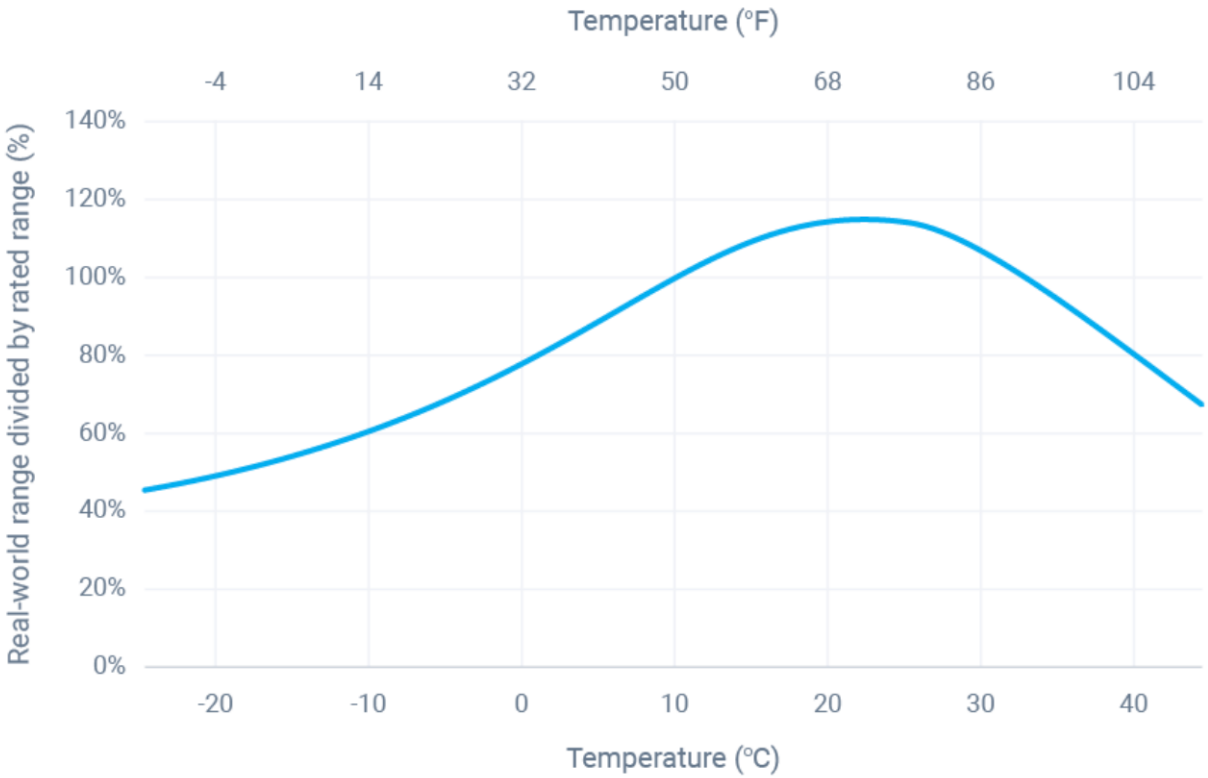
Impact of Temperature on Battery Performance

Canadians enjoy the ebbs and flows of seasonality and extreme temperatures. BEV range is adversely affected by cold and hot temperatures because of auxiliary heating and cooling – that is,

[171] Source: https://calevip.org/electric-vehicle-charging-101
[172] Source: https://calevip.org/electric-vehicle-charging-101
[173] Source: https://www.toronto.ca/wp-content/uploads/2020/02/8c46-City-of-Toronto-Electric-Vehicle-Strategy.pdf

heating/cooling the vehicle cabin, and heating/cooling the battery itself to maintain optimal performance. Batteries are susceptible to temperature fluctuations which hinder, but in some cases helps, range. For example, on a typical winter day in central Canada with a temperature at -15°C, range can drop by over 50% of the EPA estimated range, meaning that a BEV with a range of 400 km will only get 200 km (*Figure 30*, below). Conversely, at temperatures in the low-twenties, range can significantly exceed the EPA-estimated range given that other conditions are optimal (e.g., starting temperature, terrain, and driver habits). With some preparation and knowledge, owners and operators of BEVs can mitigate the effects of temperature on performance by pre-conditioning their vehicle (i.e., warming up or cooling down before use) as well as keeping their vehicle plugged in when temperatures are extreme; this allows the system to maintain battery temperature controls and also prolongs battery life.[174]

Figure 30: The Effects of Temperature on BEV Range



[174] Source: https://www.geotab.com/blog/ev-range/

Training Options and Recommendations

While there is a paucity of BEV technician training in Canada, due to the rapid onset of electric mobility we suspect that reality will soon change. A pilot for a new EV Maintenance Training Program for automotive technicians was successfully completed at BCIT and will be available to the public soon[175].

There is an Electric Vehicle Technology Certificate Program offered by SkillCommons, managed by the California State University and its MERLOT program, which offers free and open learning materials electric vehicle development, maintenance, alternative/renewable energy, and energy storage[176]. There is also a Hybrid and Electric Vehicles course offered at Centennial College in Toronto, which appears to focus more on hybrid systems than fully electric vehicles[177].

Before BEVs are deployed in a fleet to any great extent, we recommend high-voltage training for technicians. Published high-voltage guidelines specific to vehicle technicians servicing BEVs are not readily available through traditional sources. However, we suggest that anyone working with high voltage in any format, including BEVs, should be provided guidance on applying Occupational Health & Safety Management System fundamentals. This includes a “plan, do, check, and act” philosophy while working with energized electrical equipment[178]. Such training is available for non-electrical workers from Lineman’s Testing Laboratories (LTL) of Weston, Ontario. LTL offers an awareness-level course for non-electrical workers which is claimed by the company to provide a basic-level understanding of workplace electrical safety.

Aside from awareness training, fleet technicians should also have access to, and be trained on the use of, electrical-specific personal protective equipment (PPE). Such PPE would include tested and certified non-conductive gloves as well as non-conductive tools and equipment as a last line of defence, ensuring all such gear is appropriately used and maintained. Protective gloves and other PPE, as well as non-conductive tools, must be re-tested periodically to ensure safety.

BEV Summary

For light-duty vehicles and buses, and soon for medium- to heavy-duty trucks, BEVs have excellent potential for a fleet due to the following:

- Significant lifecycle GHG emissions reductions

[175] Source: https://commons.bcit.ca/news/2019/12/ev-maintenance-training/
[176] Source: http://support.skillscommons.org/showcases/open-courseware/energy/e-vehicle-tech-cert/
[177] Source: https://db2.centennialcollege.ca/ce/coursedetail.php?CourseCode=CESD-945
[178] Source: https://training-ltl.ca/

- Significant reduction in operational costs due to elimination of fuel consumption, low costs for electricity, and minimal maintenance costs

- Relatively low charging infrastructure costs in comparison to infrastructure costs for other fuel-reduction / emission-reducing technologies such as CNG

If BEVs were to be considered by a fleet, it would be prudent to consider installing a direct current fast charger (DCFC). Such a fast charger would enable fleet management staff to quickly charge their light-duty vehicles in situations where plugging in for overnight charging may not been possible or for emergency situations. For heavy-duty BEVs such as transit buses, it is important to consider that, depending on available amperage, a full charge may take several hours even with DCFCs.

Evaluation of the fleet to identify vehicles that have a potential for a replacement with a BEV should be completed. Furthermore, change management is recommended to be part of the transition process to help drivers accept and adapt to BEVs and overcome any lingering range anxiety.

Hydrogen Fuel Cells

Hydrogen fuel cells are able to produce electricity for motive power with zero emissions and therefore offer enormous environmental and sustainable energy benefits. Fuel cells are flexible in size, power density, and application. Industry experts are in general agreement that in the next phase zero-emission vehicle (ZEV) batteries will be recharged with onboard hydrogen fuel cells.

Although fuel cell technology has been around since 1960 (GM introduced the first fuel cell vehicle, the Electrovan, in 1966), adaptation of the technology has been slow. Only in recent years, supported by the focus on zero-emissions technologies, has the hydrogen fuel cell regained momentum. Leading (light-duty) vehicle manufacturers including Honda, Toyota and Hyundai have launched their first mass-production hydrogen-powered vehicles.

Sources of Hydrogen and Emissions

Hydrogen is the most abundant element in the universe. It can be produced from several sources including:

- Fossil sources include natural gas, coal, and oil

- Renewable energy sources such as wind, solar, geothermal, and hydroelectric power

Hydrogen also has a potential to be made locally at large central plants or in small distributed units at or near the point of use.

Although hydrogen vehicles have no tailpipe emissions, currently most hydrogen is produced from fossil sources. As a result, presently there are no emissions benefits to switching to a hydrogen powered vehicle – the lifetime emissions may be the same, or even higher, than those of conventional fuels.

At the same time, this technology has a high potential to be very clean through use of renewable sources, which would effectively eliminate all fuel-related emissions. Alas, due to low demand this technology is still too expensive to be commercially viable.

Currently, much work is taking place around the world toward "green" hydrogen from renewable sources. The hydrogen fuel cell trucks, shown in *Figure* 31, will be refueled with green hydrogen made from hydropower in Switzerland, as opposed to "grey" hydrogen made from methane with very high CO_2 emissions, which is the case in most countries.

Figure 31: Hydrogen Fuel Cell Trucks Bound for Switzerland

Fuel Cell Technology for Transportation

Hydrogen fuel cell vehicles (FCVs) are like electric vehicles in that they use an electric motor to power the drive wheels and have no smog-related or greenhouse gas tailpipe emissions. Rather than being plugged in to charge a battery, these vehicles use onboard fuel cells to generate electricity.

In a fuel cell, hydrogen from the fuel tank (filled similarly to gasoline/diesel) is combined with oxygen from the air to electrochemically generate electricity. Water is also produced in this process[179]. The electricity generated is used to power the vehicle. A fuel cell is two to three times more energy efficient than traditional gasoline or diesel engines.

[179] Source: https://www.epa.gov/greenvehicles/hydrogen-fuel-cell-vehicles

In the zero-emissions transportation area, fuel cells have particular benefits over electric vehicle technology, namely they can easily meet the extended range requirements and offer rapid refuelling to satisfy driver and consumer interests.

Technological Advancement

One of the main issues with the development of hydrogen transportation has been the shortage of hydrogen fuelling stations. Manufacturers are not willing to produce vehicles that customers cannot fuel, while developers are reluctant to build hydrogen stations (costing $2,000,000 and more) due to lack of demand.

A critical mass must be reached for most transportation technologies to develop and expand, typically done through governmental leadership and financial support, as with the evolution of electric vehicles.

California has made significant investments to develop the fuelling station network to support hydrogen fuelled vehicles. As of Spring 2017, there were thirty-six hydrogen fuelling stations in the U.S.; all but three were in California. There are currently about 2,000 hydrogen vehicles on California roads.

There are several medium and heavy-duty hydrogen vehicles being developed[180]:

California-based US Hybrid Inc., a company that has been building fuel cell engines for transit buses, step vans, and military vehicles for several years, recently unveiled its first Class 8 fuel cell port drayage truck featuring its proton-exchange membrane (PEM) fuel cell engine that will run at the Ports of Los Angeles and Long Beach. The fuel cell truck is estimated to have a driving range of 200 miles under normal drayage operation and can be fully refueled in less than nine minutes.

Salt Lake City start-up Nikola Motor Co. announced they are beginning to build their Nikola One, a hydrogen fuel cell semi-truck that produces 1,000 horsepower, can generate 2,000 pound-feet of torque, and travel 800 miles or more between fillings. The company has also announced plans to help move the industry one step further by constructing a fueling network of over 350 hydrogen stations in the U.S.

Toyota Motor Corp. has unveiled their “Project Portal” venture, a Class 8 truck powered by a hydrogen fuel cell. Toyota will begin testing the concept vehicle in real-world use shuttling shipping

[180] Source: http://www.gladstein.org/hydrogen-fuel-cell-trucks/?elqTrackId=6a5315625a44431c811600250fbe96e3&elq=f9398669248a444fa236415f8ae2dde6&elqaid=1302&elqat=1&elqCampaignId=700

containers between the ports of Los Angeles and Long Beach and various freight depots up to 70 miles away.

Kenworth Truck Co. was the first major heavy-duty truck maker to join the fuel cell race and recently announced they are developing a hydrogen fuel cell tractor to haul freight from the Southern California ports to nearby warehouses. The tractor uses lithium-ion batteries to power an electric motor.

UPS unveiled an extended range Class 6 fuel cell vehicle that it will deploy in its "Rolling Laboratory" fleet of alternative fuel and advanced technology vehicles.

Fuel Cell Powered Public Transit

In British Columbia, 20 fuel cell buses were operated in its transit fleet between 2010 and 2014. At the time, it was the largest fleet of its kind in the world, providing regular revenue transit service to residents in the community of Whistler, British Columbia[181]. In late 2014, the program was discontinued. It was estimated that the cost of Whistler's hydrogen buses were $1.34 per kilometre to maintain, versus 65 cents per kilometre for diesel-powered buses.

In the short-term, hydrogen vehicle technology is infeasible. Nevertheless, based on current trends future changes are expected as the market develops. Although progress on FCVs development has picked up speed, the technology has not yet been fully commercialized. Thus, it is extremely difficult to make projections of vehicle classes available in the future and their related costs.

Hydrogen Fuel Cell Summary

Fuel cell technology has a very high potential for future applications for vehicles in all classes. Nevertheless, the technology currently is still very expensive, lifecycle emissions are high, and FCVs as well as fuelling stations are not yet available. As a result, any projections of fuel cell application in the future must be approached with caution and understanding of the inherent limitations. Therefore, it is recommended that a fleet monitor the development and availability of fuel cell technology for future applications in fleet operations.

[181] Source: http://www.chFC.ca/say-h2i/cars-and-buses/cars-and-buses

GREEN FLEET STRATEGY - ACTION PLAN

Item	Recommendations	Implementation Timelines	Statement	Cost Impacts	GHG
1	Follow a historical data-driven lifecycle cost assessment, which is completed by modelling repair, maintenance, fuel, and cost of capital over the vehicle's entire lifecycle to determine the optimal replacement age of vehicles.	Previously Implemented/ Immediate	Previously Implemented: Fleet's current process for determining the optimal replacement age of an asset takes into consideration factors such as high maintenance cost, kilometres and replacement year. Immediate: Fleet will utilize the tools provided by Richmond Sustainability to enhance how data is analyzed. Applying this methodology will establish a more accurate approach to determining the optimal replacement cycles for each fleet classification	Costs will be monitored. Impacts to both capital and operating costs are possible	This recommendation may result in shorter or longer replacement cycles. GHG reduction will be impacted by changes in replacement cycles
2	Consider implementing the green fleet asset management best practices recommended by RSI-FC as illustrated in the process flow chart (Page 25). With these processes the fleet will become green and right-sized.	Previously Implemented/ Immediate	Previously Implemented: Fleet will continue to communicate with the operating departments in determining fit for purpose assets and advise on the availability of BEV assets. Immediate: Fleet will focus on becoming green and right-sizing the fleet by following the recommended best practices identified in the process flow chart (Page 25). Fleet will identify criteria to establish: what the corporate minimum will include, roles and responsibilities and determine what operational justification and level of authorization is required to go outside the corporate minimum	Costs will be monitored. Impacts to both capital and operating costs are possible	GHG reduction will be impacted by determined replacements
3.1	1) Employ a total cost of ownership (TCO) approach to optimize the use of capital.	Previously Implemented/ Immediate	Previously Implemented: Currently the driving factor when considering replacement is high maintenance cost Immediate: Fleet will apply the tools provided by RSI to enhance how TCO is calculate and apply a data driven approach to optimize the use of capital	Costs will be analyzed by utilizing the tools provided by RSI. Impacts to both capital and operating costs are possible	GHG reduction will be impacted by determined replacements
3.2	2) Consider Total Cost of Ownership(TCO) in competitive bidding proposal structures instead of the lowest compliant bid approach.	Long Term	TCO Procurement- Review in consultation with Procurement and align to the procurement bylaw. This approach provides a narrow view of costs associated with the initial purchase of an asset and factors such as planned maintenance. However, many variables with respect to unplanned work will need to be considered to confidently build this concept into the bidding process while remaining fair and transparent	No direct cost impacts associated with the implementation of this recommendation	No direct GHG reduction impacts associated with the implementation of this recommendation
4	Create an education piece for idling reduction, operatingefficiently, and reducing fuel consumption.	Immediate	Creation of posters for display in common areas. Have stickers made up for dashboards in vehicles. Create communication for display on monitors	Minimal	Reduction to GHG's specific to improved driver behaviours will be difficult to determine however it is a generally accepted principal that driver behaviours and awareness as they contibute to fuel consumption will result in favourable changes to fuel economy.
5	Add a driver eco-training module to existing Professional Driver Improvement Course (PDIC) safe driver training and consider eco-driver training for all drivers.	Immediate	Compliance section has added an anti-idling segment to the Driver Safety & Compliance Manual Training presentation. Met with the provider used to update our Driver Improvement Course content to include an eco driving segment. We can purchase an update to our program that contains a module which is approx. 50 minutes in length.	$3,000	Reduction to GHG's specific to improved driver behaviours will be difficult to determine however it is a generally accepted principal that driver behaviours and awareness as they contibute to fuel consumption will result in favourable changes to fuel economy.
6	Measure and track fuel consumption and GHGs at the Department/Division/Section/Group levels to track progress and set tangible goals.	Immediate	Staff will develop an ongoing fuel usage report to calculate total GHG's by Department/Division/Section/Group level and vehicle classification.	No direct cost impacts associated with the implementation of this recommendation	No direct GHG reduction impacts associated with the implementation of this recommendation

Item	Recommendations	Implementation Timelines	Statement	Cost Impacts	GHG
7	Modernize and/or retrofit Fleet facilities to obtain LEED certification.	Long Term	Will seek oppurtunities to implement as part of the Non-Public Facing Yards Review	Unknown at this time	Unknown at this time
8	Invite frontline employees to take BEV test drives to build an affinity towards electric vehicles.	Previously Implemented	Fleet schedules demonstrations to remain current with the industry and an opportunity for operating departments to test new technology and provide feedback. Since 2019 Fleet has arranged demonstrations of the following BEV units: Chevy Bolt EV, Kina Niro EV, Hyundai Ionic EV, Kia Soul EV, Mitsubishi PHEV, Toyota Hybrid. Fleet will continue to arrange demonstrations and communicate new technologies to the operating departments	No direct cost impacts associated with the implementation of this recommendation	No direct GHG reduction impacts associated with the implementation of this recommendation
9	If possible, avoid buying Internal Cumbustion Engine replacement vehicles until suitable BEVs become available.	Immediate	If possible, Fleet will avoid procuring ICE replacement vehicles until suitable BEVs become available. Fleet is recommending deferring ICE replacements for a maximum of two (2) years in the classifications where BEVs will be available within this timeframe. Fleet will provide options to the User Groups such as 1) rental units 2) short term leases 3) extended use (dependent on availability). However, as stated in recommendation 2 Fleet will identify criteria to establish: what the corporate minimum will include, roles and responsibilities and determine what operational justification and level of authorization required to go outside the corporate minimum	Cost impacts will result in increase to operating budgets (lease/rentals).	GHG reduction will be impacted by determined replacements. For each gas powered vehicle replaced with a BEV the GHG reduction per unit will be approximately •SUV: 3 tonnes annually •1/2 ton Pick Up: 5 tonnes annually
10	Strictly through a lens of fiscal planning, prioritize replacement of units with BEVs only if they would deliver return-on-investment (ROI).	Additional Analysis	Fleet will review and develop replacement criteria that will consider a return-on-investment strategy along with other impacts such as GHG reductions, manufacturers build schedules and available charging infrastructure.	Costs will be monitored. Impacts to both capital and operating costs are possible	GHG reduction will be impacted by determined replacements
11	Allocate capital for charging infrastructure in the near-future to meet the demand in the mid- to long-term.	Immediate	Based on the BEV replacement schedule Fleet Planning worked with the operating departments to determine appropriate charging locations. To provide charging stations to the 89 scheduled purchases of BEV's city staff are recommending 47 Level 2 Charging stations and 2 Level 3 charging stations. Fleet will partner with City Departments (IT, Energy Initiatives) to determine appropriate procurement method for short term and long-term supply. Ensure system will have the ability to communicate with various software platforms and have the capability to accommodate light/medium and heavy-duty fleet	Supply and installation of all 49 stations is expected to cost $593,000.00. Successful Grant funding application will reduce this amount by 50%	Based on historical average annual fuel consumption the city can realize a reduction of 335 tonnes of GHG's by replacing all 89 vehicles with a BEV option
12	Consider adopting the Richmond Sustainability's -Fleet Challenge recommended lifecycle analysis (LCA) approach to extract maximum value from each vehicle.	Immediate	By utilizing the Lifecycle Analysis tools provided by RSI-FC this will provide a component not previously available to Fleet Planning. The tool will provide algorythims using the RSI database resulting in enhanced accuracy in predicting optimal vehicle lifecycles and the ability to analyze/predict maintenance costs past a vehicles current expected life. Leveraging this tool will allow Fleet to schedule replacements prior to spikes in maintenance and downtime.	Costs will be monitored. Impacts to both capital and operating costs are possible	GHG reduction will be impacted by determined replacements. Affects could be mixed as a result of extending or reducing replacement cycles
13	Consider balancing go-forward capital budgets as part of Long Term Capital Planning by deferring replacement of any units evaluated as being in above average, serviceable condition to later fiscal years.	Additional Analysis	Fleet will consider a balance go forward capital replacement approach utilizing evaluation based criteria. Fleet will create a defined process that will include a ranking system, defined evaluation criteria, how it will be reported and applied to asset replacements	No direct cost impacts associated with the implementation of this recommendation	No direct GHG reduction impacts associated with the implementation of this recommendation
14	When the fleet's average age and uptime rates are determined to be at acceptable levels, consider re-investing in the fleet at the rate of depreciation.	Additional Analysis	Further analysis is required for this recommendation. Several factors to consider when addressing average age and uptime rates such as: acquiring newer vehicles or ensuring there is a highly-effective preventive maintenance (PM) program is in place. EAM system is expected to provide additional tools which will give Fleet the ability to address this recommendation	Additional analysis required to show impacts to capital and operating budgets	No direct GHG reduction impacts associated with the implementation of this recommendation

Item	Recommendations	Implementation Timelines	Statement	Cost Impacts	GHG
15	Consider job suitability of vehicles before proceeding with light weighting enhancements.	Previously Implemented	Fleet currently and will continue to work with the operating departments to develop an understanding of the operational needs when developing specifications for replacement assets. Fleet provides recommendations to ensure the assets are fit for purpose, downsize where possible and investigate lighter weight materials used in asset construction (ie: changing steel trailers to aluminum). Fleet will continue to research light weighting enhancements by staying in contact with manufacturer reps, virtual trade shows and communication with other municipalities	Costs will be monitored. Impacts to both capital and operating costs are possible	GHG will be difficult to determine however it is a generally accepted principal that lighter vehicles will contribute to favourable fuel economy.
16	In conjunction with driver training, consider route planning software, idling reduction initiatives and maintenance checks by integrating GPS tracking software to monitor driver activity and fuel consumption.	Additional Analysis	Met with our Automated Vehicle Location(AVL) provider and they are looking into different options that may be available for monitoring driver activity & fuel consumption	Unknown at this time	Reduction to GHG's specific to improved driver behaviours will be difficult to determine however it is a generally accepted principal that driver behaviours and awareness as they contibute to fuel consumption will result in favourable changes to fuel economy.
17	Consider a fuel-efficient driver incentive program in which drivers are incentivized to improve behaviours or reduce their travel.	Additional Analysis	This type of program may be difficult to implement. Monetary incentives would be costly. Determining who would receive any incentives may be challenging to ensure equality.	Unknown at this time	Unknown at this time
18	E85 Usage Consider the challenges associated with switching to E85, including supply, any additional infrastructure costs, and whether the potentially greater fuel cost is financially prudent. Should the City proceed with this solution, consider a pilot project with several units switched to E85 at first, and if successful a phased-in approach for other appropriate units	Additional Analysis	This recommendation will require installation of dedicated fuel storage tanks for this fuel type. Analysis required to decide where and how many tanks will be required to accommodate reasonable accessibility by the vehicles currently capable of using this fuel type. E85 contains about 27% less energy than gasoline per unit volume. Given this energy loss, about 37% more E85 is required to achieve the same amount of work as gasoline. Also need to consider cold weather ignition challenges.	Estimated 16% costlier that conventional gasoline, capital fuel storage tanks and dispenser infrastructure costs	4% reduction when compared to energy equivelent of gasoline
19	Biodiesel Some precautions must be taken before making the switch to biodiesel, including using a lower blend due to viscosity issues at cold temperatures. We recommend using a blend of 5% in winter and 20% in the summer and shoulder months. Consider a pilot project with several units switched to B10 at first, and if successful a phased in approach for other appropriate units.	Immediate	Trial of 20% blend for the summer and a 5% blend for the winter in two locations for one year.	Minor cost to perform due diligence service to fuel storage tanks and dispensers	Average annual GHG reductions expected to be between 10-12%
20	CNG If CNG is of interest to the City, we recommend investigating subsidies for CNG upgrades and a CNG vehicle fuelling station. Consider a small-scale pilot project with several high-mileage units switched to CNG, and if successful a phased-in approach for other appropriate units	Additional Analysis	This recommendation will require installation of natural gas compressor stations.The infastructure required for a Natural gas refuelling stations along with the mandated periodic maintnenace and inspections are costly resulting in an increase to capital and operating budgets. Converting to natural gas on a large scale will require several fuelling stations throughout the City to accommodate reasonable accessibility for refuelling. The possibility of concentrated areas of natural gas vehicles with a short term refuelling equipment lease or "pay per use" arrangement may have some benefit for a short term until electric or other more efficient options become available.	Diesel Litre Equivalent cost difference is 75% less. CNG compressor station can cost between $2-4 million depending on volume and flow requirements	Approximately 17% reduction compared to Diesel

Item	Recommendations	Implementation Timelines	Statement	Cost Impacts	GHG
21	Liquified Petroleum Gas(LPG) aka Propane If a strong business case for LPG can be shown for high-mileage units, consider a small scale pilot project with several high-mileage units switched to LPG, and if successful a phased-in approach for other appropriate units.	Additional Analysis	This recommendation will require installation of Propane dispensing stations. The infastructure required for a Propane stations along with the mandated periodic maintnenace and inspections are costly resulting in an increase to capital and operating budgets. Converting to Propane on a large scale will require several fuelling stations through the City to accommodate reasonable accessibility for refuelling.	A propane fuelling station is approximately $15,000	Approximately 30% reductions compared to gasoline
22	Consider a pilot project for several BEVs when they become available (e.g., pickups) to track range capabilities and cost Immediate & short-term savings and assess the units' performance for all seasons and varying weather conditions. Assuming the pilot project is successful, consider acquiring BEVs in bulk to replace units that would provide the greatest ROI.	Previously Implemented/ Immeidate	Previously Implemented: Licensing & By-law Services is currently piloting two (2) Kia Souls EV. Immediate: Fleet has drafted a 3 year forecast of 89 vehicles that can be replaced with BEV's and will be replaced as scheduled. Fleet will continue to investigate and survey the market for availability of demo models as new BEVs become available. Fleet is currently sourcing options for demonstration/pilot testing of Utility Vehicles, mowers and mini excavator	Two wheel drive SUV's are the only BEV's currently being sold. The cost increase is approximately 60% more than a gas powered SUV.	Based on historical average annual fuel consumption the city can realize a reduction of 335 tonnes of GHG's by replacing all 89 vehicles with a BEV option
23	Continue to closely monitor the acquisition costs for BEVs and re-evaluate the business case (cost-benefit) for individual units as prices come down. Also continue to monitor the future availability of electric work/cargo vans, which are currently anticipated to be offered in battery-electric versions in the near future.	Previously Implemented	Fleet will continue to regularly monitor the industry and meet with manufacturer representatives annually for an update on estimated pricing, configurations and BEV release dates into the market. Fleet will utilize this information when preparing the capital budget annual replacement	Costs will be monitored. Impacts to both capital and operating costs are possible	GHG reduction will be impacted by determined replacements
24	If relying on overnight charging infrastructure, consider supplying power to the charging equipment on two separate feeds from the grid to reduce the risk of local failure taking power away from the whole site.	Long Term	This recommendation will require further analysis and alignment to the yard rationalization review	No direct cost impacts associated with the implementation of this recommendation	No direct GHG reduction impacts associated with the implementation of this recommendation
25	Consider high-voltage training for technicians and closely monitor the launch of new BEV training programs.	Short Term	Staff will research available high voltage training.	This could impact both the operating budget as well as the capital. Operating budget impacts for training courses $1000/Technician. Possible diagnostic tooling and equipments costs.	No direct GHG reduction impacts associated with the implementation of this recommendation

Item	Recommendations	Implementation Timelines	Statement	Cost Impacts	GHG
26	Hydrogen Fuel Cell Summary Fuel cell technology has a very high potential for future applications for vehicles in all classes. Nevertheless, the technology currently is still very expensive, lifecycle emissions are high and Fuel Cell Vehicles (FCVs) as well as fuelling stations are not yet available. As a result, any projections of fuel cell application in the future must be approached with caution and understanding of the inherent limitations. Therefore, it is recommended that a fleet monitor the development and availability of fuel cell technology for future applications in fleet operations	Additional Analysis	Currently there are very limited number of vehicles available to consider hydrogen as a viable option. Additionally refueling infrastructure does not exist in the City of Hamilton and a large scale implementation would be required to show a reasonable ROI to fund the refuelling infrastructure. Other challenges include repair facility infrastructure and support.	Capital cost for refuelling infrastructure is estimated to be in excess of $2 million per site.	Currently most if not all hydrogen is produced from the burning of fossil fuels known as "Grey Source". Hydrogen from "Grey Sources" will have little to negative impacts to GHG's. Future hydrogen is expected from solar or wind "Green Source" which will show a favourable impact to GHG's
27	Renewable Natural Gas	Additional Analysis	A City wide strategy will be developed and implemented by Energy for the best use of RNG across City assets and operations.	Natural Gas compressor stations can cost between $2-4 million depending on volume and flow requirements	Use of RNG is determined to have net zero impact to GHG's
28	rolling resistance	Additional Analysis	This recommendation requires further analysis and testing. Fleet will consider including this technology in contract documents for new replacement vehicles where applicable. Further Analysis and involvement from tire provider and possible pilot on various types of vehicles and weather conditions to establish baseline	Exact cost associated with technology can not be directly identified. Cost benefit analysis will be performed on a case by case basis	Each solution will vary in its magnitude of GHG reductions, it is generally accepted that any reduction in rolling resistance will have a direct impact on GHG's reduction
29	RSI-FC recommends expert legal review of the Electronic Logging Device(ELD) matter prior to the June 2021 deadline	Previously Implemented	Contacted Ministry of Transportation to confirm ELD's are not required for our Fleet as we are exempt from using logs to capture hours of service as a municipality that operates within a 160 km radius and we do not cross any borders.	None	None
30	Anti-Idling Technologies	Previously Implemented/ Additional Analysis	Previoulsy Implemented: Anti-Idling technology is currently being utilized in accessories installed in Fleet assets such as cab heaters, inverters, shut down systems, LED lights. Additional Analysis: Fleet will continue to investigate technology to aid in anti idling to determine the optimal solution and process for educating operating departments	Exact cost associated with technology can not be directly identified. Cost benefit analysis will be performed on a case by case basis	Each solution will vary in its magnitude of GHG reductions. Any reduction in idling will have a direct impact on GHG's reduction

Previously Implemented
Immediate less than 1 year
Short Term 1-3 years
Long Term 3 years +
Additional Analysis Required

Green Fleet Strategy Incremental Capital Requirements 2022- 2024

GREEN FLEET STRATEGY CAPITAL REQUIREMENTS 2022-2024				
	REPLACEMENT YEAR			
	2022	2023	2024	Totals
Total Vehicle Replacements Per Year	36	13	40	89
Total Vehicle Capital Cost Per Year	$ 730K	$ 311K	$ 832K	$1.9M
Total EV Charging Station Installs Per Year	24	9	16	49
Total Charging Station Cost Per Year	$ 448K	$ 42K	$ 110K	$ 600K*(1)
Grand Total	$ 1.2M	$ 352K	$ 942K	$2.5M

* (1) Total investment for charging station is $600k, if the City is successful with its NRCan Application for Zero-Emission Vehicle Infrastructure Program (ZEVIP) grant, the City will receive $300k towards the capital contribution.

PLANNING COMMITTEE
REPORT
21-009

June 1, 2021
9:30 a.m.
Council Chambers, Hamilton City Hall
71 Main Street West

Present: Councillors J.P. Danko (Chair)
B. Johnson (1st Vice Chair), C. Collins, M. Pearson, L. Ferguson, M. Wilson and J. Partridge

Absent with Regrets: Councillor J. Farr (City Business)

THE PLANNING COMMITTEE PRESENTS REPORT 21-009 AND RESPECTFULLY RECOMMENDS:

1. Appeal to the Local Planning Appeal Tribunal (LPAT) on Official Plan Amendment and Zoning By-law Amendment for Lands Located at 468-476 James Street North (LS21018) (Ward 2) (Item 14.1)

(a) That recommendations (a) (i), (ii), and (iii) contained in Report LS21018 remain confidential, until made public, as the City's position before the LPAT; and,

(b) That the remainder of Report LS21018 and its appendices remain confidential.

2. Update regarding Local Planning Appeal Tribunal Appeals of 600 James St. N. (LS21003(a)) (Ward 2) (Item 14.2)

(a) That Report LS21003(a) respecting Update regarding Local Planning Appeal Tribunal Appeals of 600 James St. N., be received;

(b) That Report LS21003(a) and Appendix "A" be released to the public, after Council approval; and,

(c) That Appendix "B" to Report LS21003(a) remain private and confidential.

3. Instructions - Appeal to the Local Planning Appeal Tribunal (LPAT) for Lack of Decision on Urban Hamilton Official Plan Amendment Application (UHOPA-18-014) and Zoning By-law Amendment Application for Lands Located at 1630 Main Street West and 69 Sanders Boulevard, Hamilton (LS21007/PED21126) (Ward 1) (ZAC-18-035) (Item 14.3)

That the recommendations of Report LS21007/PED21126 be released to the public, after Council approval.

FOR INFORMATION:

(a) APPROVAL OF AGENDA (Item 2)

The Committee Clerk advised of the following change to the agenda:

1. PRIVATE AND CONFIDENTIAL (Item 14)

14.3 Instructions - Appeal to the Local Planning Appeal Tribunal (LPAT) for Lack of Decision on Urban Hamilton Official Plan Amendment Application (UHOPA-18-014) and Zoning By-law Amendment Application for Lands Located at 1630 Main Street West and 69 Sanders Boulevard, Hamilton (LS21007/PED21126) (Ward 1) (ZAC-18-035) – moved up in the agenda to be heard before Item 14.2.

The agenda for the June 1, 2021 meeting was approved, as amended.

(b) DECLARATIONS OF INTEREST (Item 3)

None declared.

(c) APPROVAL OF MINUTES OF PREVIOUS MEETING (Item 4)

(i) May 18, 2021 (Item 4.1)

The Minutes of the May 18, 2021 meeting were approved, as presented.

(d) PRIVATE AND CONFIDENTIAL (Item 14)

Committee moved into Closed Session respecting Items 14.1, 14.2 and 14.3, pursuant to Section 9.1, Sub-sections (e), (f), and (k) of the City's Procedural By-law 21-021, as amended, and Section 239(2), Subsections (e), (f), and (k) of the *Ontario Municipal Act, 2001*, as amended, as the subject matter pertains to litigation or potential litigation, including matters before administrative tribunals, affecting the municipality or local board; the receiving of advice that is subject to solicitor-client privilege, including communications necessary for that purpose; and, a position, plan, procedure, criteria or instruction to be applied to any

negotiations carried on or to be carried on by or on behalf of the municipality or local board.

(i) Appeal to the Local Planning Appeal Tribunal (LPAT) on Official Plan Amendment and Zoning By-law Amendment for Lands Located at 468-476 James Street North (LS21018) (Ward 2) (Item 14.1)

For disposition of this matter, refer to Item 1.

(ii) Update regarding Local Planning Appeal Tribunal Appeals of 600 James St. N. (LS21003(a)) (Ward 2) (Item 14.2)

For disposition of this matter, refer to Item 2.

(iii) Instructions - Appeal to the Local Planning Appeal Tribunal (LPAT) for Lack of Decision on Urban Hamilton Official Plan Amendment Application (UHOPA-18-014) and Zoning By-law Amendment Application for Lands Located at 1630 Main Street West and 69 Sanders Boulevard, Hamilton (LS21007/PED21126) (Ward 1) (ZAC-18-035) (Item 14.3)

For disposition of this matter, refer to Item 3.

(e) ADJOURNMENT (Item 15)

There being no further business, the Planning Committee adjourned at 9:59 a.m.

_____
Councillor J.P. Danko
Chair, Planning Committee

_____
Lisa Kelsey
Legislative Coordinator

GENERAL ISSUES COMMITTEE
REPORT 21-012

9:30 a.m.
Wednesday, June 2, 2021
Due to COVID-19 and the closure of City Hall, this meeting was held virtually.

Present: Mayor F. Eisenberger, Deputy Mayor J. Farr (Chair)
Councillors M. Wilson, N. Nann, S. Merulla, C. Collins, T. Jackson, E. Pauls, J. P. Danko, B. Clark, M. Pearson, B. Johnson, L. Ferguson, A. VanderBeek, J. Partridge

Absent: Councillor T. Whitehead – Leave of Absence

THE GENERAL ISSUES COMMITTEE PRESENTS REPORT 21-012, AND RESPECTFULLY RECOMMENDS:

1. Ancaster Village Business Improvement Area (BIA) Revised Board of Management (PED21108) (Ward 12) (Item 7.1)

That the following individual be appointed to the Ancaster Village Business Improvement Area (BIA) Board of Management:

(a) Dean Hodge

2. Business Improvement Area (BIA) Advisory Committee Minutes 21-004, April 13, 2021 (Item 7.2)

That the Business Improvement Area (BIA) Advisory Committee Minutes 21-004, April 13, 2021, be received.

3. Advisory Committee for Persons with Disabilities Report 21-005, May 11, 2021 (Item 10.1)

(a) Invitation to the Director of Housing Services to Discuss Accessible Housing Matters (Item 7.2(b))

WHEREAS, the Housing Issues Working Group of the Advisory Committee for Persons with Disabilities will benefit from the expertise of the Director of Housing Services, or their designate;

THEREFORE, BE IT RESOLVED:

(a) That the Director of Housing Services, or their designate, be invited to attend a future meeting of the Housing Issues Working Group of the Advisory Committee for Persons with Disabilities to discuss accessible housing matters including, but not limited to, the following:

(i) Reviewing and improving the Housing Application Process;

(ii) Confirming that the City's goal of 20% accessible housing has been achieved and identification of the minimum criteria required to be considered accessible;

(iii) Information regarding the modular housing project, including its level of accessibility;

(iv) The plan in place when there is a loss of accessible housing due to unforeseen circumstances, such as a building fire; and,

(v) The measures that the City is taking to ensure that future social housing incorporates 20% accessibility during this housing crisis.

(b) Approval of All Advisory Committee Event Date and Selection of a Presenters (Item 11.1)

WHEREAS, the Lesbian, Gay, Bisexual, Transgender and Queer (LGBTQ) Advisory Committee recommended that an All Advisory Committee Event be hosted for the purpose of providing City Advisory Committees with an opportunity to introduce themselves to one another and educate each other in terms of their respective Committee's purpose (mandate) and goals;

WHEREAS, an All Advisory Committee Event was approved by Hamilton City Council on April 14, 2021 (see Item 4 of Audit, Finance and Administration Committee Report 21-005 for reference);

WHEREAS, at the All Advisory Committee Event, each Advisory Committee will be allotted 5 minutes to introduce their respective

Committee's purpose (mandate) and discuss the successes and the challenges the Advisory Committee has experienced; and,

WHEREAS, the staff liaisons for each Advisory Committee met and mutually agreed upon a tentative date for the All Advisory Committee Event;

THEREFORE, BE IT RESOLVED:

(a) That the proposed date of Monday, September 27, 2021, commencing at 4:00 p.m., for the All Advisory Committee Event be approved; and,

(b) That Aznive Mallett and James Kemp be authorized to represent the Advisory Committee for Persons with Disabilities at the All Advisory Committee Event and deliver a 5-minute presentation on the Committee's behalf respecting the Committee's purpose (mandate), successes and challenges.

(c) Authorization for Advisory Committee for Persons with Disabilities Member(s) to Delegate on a Forthcoming City Staff Report respecting Accessible Captioning of Committee Meetings (Added Item 11.2)

WHEREAS, a City staff report respecting accessible captioning of Committee meetings is tentatively scheduled to be included on the May 20, 2021 Audit, Finance and Administration Committee meeting agenda; and,

WHEREAS, the Advisory Committee for Persons with Disabilities has a vested interest in the matter of accessible captioning of Committee meetings and wishes to ensure that they have the opportunity to delegate (if deemed necessary) upon the release of the staff report;

THEREFORE, BE IT RESOLVED:

That Paula Kilburn be authorized to delegate at the Audit, Finance and Administration Committee on behalf of the Advisory Committee for Persons with Disabilities respecting a forthcoming City staff report respecting accessible captioning of Committee meetings.

4. Downtown Entertainment Precinct Master Agreement (PED18168(g)) (City Wide) (Item 14.2)

(a) That the Master Agreement for the Downtown Entertainment Precinct assets, based substantially on the terms and conditions, outlined in Appendix "A" attached to Report PED18168(g), and such other terms and conditions deemed appropriate by the General Manager of Planning and Economic Development Department, in consultation with the General Manager of Finance and Corporate Services Department, and in a form satisfactory to the City Solicitor, be approved;

(b) That staff be authorized and directed to negotiate any agreements required to fulfil the objectives of the Master Agreement, based substantially on the terms and conditions outlined in Appendix "A" attached to Report PED18168(g), and such other terms and conditions deemed appropriate by the General Manager of Planning and Economic Development Department, in consultation with the General Manager of Finance and Corporate Services Department, and in a form satisfactory to the City Solicitor;

(c) That all costs related to completion of any agreements required to fulfil the objectives of the Master Agreement, to be funded to an upset limit of $500K from the HEF Annual Capital Program – Project ID Account No. 372214805 as a source of funding for any technical due diligence and expertise necessary to complete any agreements, be approved;

(d) That the General Manager, Planning and Economic Development Department or their designate, acting on behalf of the City, be authorized and directed to provide any requisite consents, approvals and notices related to the administration of any leases or any other agreements including those necessary for any applications for land use approvals or works contemplated in the Master Agreement for the Downtown Entertainment Precinct assets;

(e) That the City Solicitor be authorized and directed to take all necessary actions to complete the Master Agreement, and any other agreements required to fulfil the objectives of the Master Agreement for the Downtown Entertainment Precinct assets, including, without limitation, paying any necessary expenses, amending closing and other dates, conducting appropriate due diligence, and amending and waiving terms and conditions as deemed reasonable;

(f) That the Mayor and the City Clerk be authorized and directed to execute the Master Agreement, and any related agreements and ancillary documents for the Downtown Entertainment Precinct assets, all in a form acceptable to the City Solicitor;

(g) That staff be directed to report back to the General Issues Committee, as part of the 2022 budget process, on any operating budget, capital budget, and organizational changes required as a result of the implementation of the Master Agreement and any related agreements and ancillary documents;

(h) That staff be authorized and directed to draft Municipal Capital Facility Agreement By-Laws with respect to each of the FirstOntario Centre, FirstOntario Concert Hall and the Hamilton Convention Centre, to be put forward to General Issues Committee for approval;

(i) That staff be directed to incorporate the Extended Tax Incremental Grant Program or "Downtown Entertainment Precinct Advancement Program" detailed in Appendix "B" to Report PED18168(g) as part of staff's preparation of the Revitalizing Hamilton's Commercial Districts Community Improvement Plan By-law and be brought forward to Planning Committee for a statutory public meeting, in accordance with Section 17(15)(d) of the Planning Act;

(j) That staff be authorized and directed to develop and carry out a communications strategy to appropriately advise the public on pertinent aspects of the Master Agreement;

(k) That the direction provided to staff in Closed Session, respecting Report PED18168(g) - Downtown Entertainment Precinct Master Agreement, be approved;

(l) That, upon approval by Council, the direction provided to staff in Closed Session, respecting Report PED18168(g) - Downtown Entertainment Precinct Master Agreement, be publicly released; and,

(m) That Report PED18168(g), respecting the Downtown Entertainment Precinct Status Update and its appendices remain confidential and not be released as a public document.

FOR INFORMATION:

(a) APPROVAL OF AGENDA (Item 2)

The Committee Clerk advised of the following changes to the agenda:

5. COMMUNICATION ITEMS

5.1. Correspondence from Kate Manson-Smith, Deputy Minister, Ministry of Municipal Affairs and Housing, respecting the Three-Step Roadmap to Safely Reopen the Province of Ontario and Amendment to Orders under the *Reopening Ontario (A Flexible Response to COVID-19) Act* (ROA) 6.

Recommendation: Be received.

5.2 Correspondence respecting the Hamilton LRT Matter

5.2.a. Gabriel Nicholson

5.2.b. Lynda M. Lukasik, PhD, Executive Director, Environment Hamilton

5.2.c. Maria Antelo, Hamilton Community Legal Clinic

5.2.d. Tom Cooper, Director, Hamilton Roundtable for Poverty Reduction

5.2.e. Hamilton's Anchor Institution Leadership

5.2.f. Kojo Damptey, Executive Director, Hamilton Centre for Civic Inclusion

5.2.g. Correspondence from Denise Christopherson, CEO, YWCA Hamilton

5.2.h. Correspondence from Keanin Loomis, President & CEO, Hamilton Chamber of Commerce

5.2.i. Correspondence from the Hamilton Chamber of Commerce and LiUNA

5.2.j. Kim Martin, Executive Director, Social Planning and Research Council of Hamilton

Recommendation: Be received.

6. DELEGATION REQUESTS

6.1. Delegation Requests respecting the LRT Matter

Items 6.1.a. to 6.1.c. have been WITHDRAWN from the agenda by the requestors.

6.1.a. WITHDRAWN - Mike Collins-Williams, WestEnd Homebuilders' Association

6.1.b. WITHDRAWN - Keanin Loomis, President and CEO; and, Paul Szachlewicz, Policy and Government Relations Advisor, Hamilton Chamber of Commerce

6.1.c. WITHDRAWN - Alex Bishop, Concierge Group

6.1.d. Karl Andrus, Hamilton Community Benefits Network

8. PRESENTATIONS

8.1 Ministry of Transportation and Metrolinx Representatives to provide an update on activities related to Light Rail Transit (LRT) in the City of Hamilton

13. GENERAL INFORMATION / OTHER BUSINESS

13.1. Amendments to the Outstanding Business List

*13.1.b. Farmers' Market – Rent Relief and Governance Comparators
Current Due Date: June 2, 2021
Proposed New Due Date: August 9, 2021

The agenda for the June 2, 2021 General Issues Committee meeting was approved, as amended.

(b) DECLARATIONS OF INTEREST (Item 3)

Councillor M. Wilson declared an interest to Item 14.2, respecting Report PED18168(g), Downtown Entertainment Precinct Agreement, as her spouse is a Director/Stakeholder in the project.

(c) APPROVAL OF MINUTES OF PREVIOUS MEETINGS (Item 4)

(i) May 19, 2021 (Item 4.1)

The Minutes of the May 19, 2021 General Issues Committee meeting were approved, as presented.

(d) COMMUNICATION ITEMS (Item 5)

(i) Correspondence from Kate Manson-Smith, Deputy Minister, Ministry of Municipal Affairs and Housing, respecting the Three-Step Roadmap to Safely Reopen the Province of Ontario and Amendment to Orders under the *Reopening Ontario (A Flexible Response to COVID-19) Act* (ROA) 6 (Item 5.1)

The correspondence from Kate Manson-Smith, Deputy Minister, Ministry of Municipal Affairs and Housing, respecting the Three-Step Roadmap to Safely Reopen the Province of Ontario and Amendment to Orders under the *Reopening Ontario (A Flexible Response to COVID-19) Act* (ROA), was received.

(ii) Correspondence respecting the Hamilton LRT Matter (Item 5.2)

The following Communication Items, respecting the Hamilton LRT matter were received:

(a) Gabriel Nicholson (Item 5.2.a.)

(b) Lynda M. Lukasik, PhD, Executive Director, Environment Hamilton (Item 5.2.b.)

(c) Maria Antelo, Hamilton Community Legal Clinic (Item 5.2.c.)

(d) Tom Cooper, Director, Hamilton Roundtable for Poverty Reduction (Item 5.2.d.)

(e) Hamilton's Anchor Institution Leadership (Item 5.2.e.)

(f) Kojo Damptey, Executive Director, Hamilton Centre for Civic Inclusion (Item 5.2.f.)

(g) Correspondence from Denise Christopherson, CEO, YWCA Hamilton (Item 5.2.g.)

(h) Correspondence from Keanin Loomis, President & CEO, Hamilton Chamber of Commerce (Item 5.2.h.)

(i) Correspondence from the Hamilton Chamber of Commerce and LiUNA (Item 5.2.i)

(j) Kim Martin, Executive Director, Social Planning and Research Council of Hamilton (Item 5.2.j.)

(e) DELEGATION REQUESTS (Item 6)

(i) Karl Andrus, Hamilton Community Benefits Network, respecting the Hamilton LRT Matter (Item 6.1.d.)

The delegation request, submitted by Karl Andrus, Hamilton Community Benefits Network, respecting the Hamilton LRT matter, was approved for the June 2, 2021 General Issues Committee meeting.

(f) PRESENTATIONS (Item 8)

(i) Ministry of Transportation and Metrolinx Representatives to provide an update on activities related to Light Rail Transit (LRT) in the City of Hamilton (Item 8.1)

James Nowlan, Assistant Deputy Minister, Ministry of Transportation, Province of Ontario; and, Phil Verster, President and CEO, Metrolinx, provided an update on activities related to LRT in the City of Hamilton.

The General Issues Committee recessed for one half hour until 12:45 p.m.

The presentation, provided by the Ministry of Transportation and Metrolinx, respecting and update on activities related to LRT in the City of Hamilton, was received.

The delegation by Karl Andrus, Hamilton Community Benefits Network, respecting the Hamilton LRT Matter, was moved up on the agenda, prior to consideration of motions respecting the Hamilton LRT matter.

(g) PUBLIC HEARINGS / DELEGATIONS (Item 9)

(i) Karl Andrus, Hamilton Community Benefits Network, respecting the Hamilton LRT Matter (Item 9.1)

Karl Andrus, Hamilton Community Benefits Network, spoke respecting the Hamilton LRT matter.

The presentation provided by Karl Andrus, Hamilton Community Benefits Network, respecting the Hamilton LRT matter, was received and referred to staff for reference when looking at community benefits during the LRT process.

(ii) COVID-19 Verbal Update (Item 8.2)

Paul Johnson, General Manager of the Healthy & Safe Communities Department; and, Dr. Elizabeth Richardson, Medical Officer of Health, provided the update regarding COVID-19.

The verbal update regarding COVID-19 was received.

(h) MOTIONS (Item 11)

(i) Hamilton Light Rail Transit (LRT) Project Memorandum of Understanding (Item 11.1)

The Motion regarding the Hamilton LRT Project Memorandum of Understanding was DEFERRED to the June 16, 2021 GIC meeting with the following direction:

> That staff be directed to report back to the General Issues Committee regarding the net operating costs after the 18 buses on the B-line have been removed, eliminating Development Charge exemptions, fare revenue and the Hamilton Tax Increment Grant Program, and other incentives, that the City may build in to credit the cost of the LRT operations and maintenance.

(ii) Light Rail Transit (LRT) Supportive Development and a Summary of the Transit Oriented Corridor Policy (Item 11.2)

The appropriate staff from Planning and Economic Development was directed to report back to the June 16, 2021 General Issues Committee on LRT Supportive Development, by Ward, that has occurred in the last 10

years; is ongoing or is planned along the corridor from Eastgate to McMaster; an estimate of the private investment in dollars; a before and after picture on assessment for each of these projects; and, a summary of the current Transit Oriented Corridor policy and how it relates to the 3.4 Billion-Dollar investment.

(i) GENERAL INFORMATION / OTHER BUSINESS (Item 13)

(a) Amendments to the Outstanding Business List (Item 13.1.1)

The following amendments to the General Issues Committee's Outstanding Business List were approved:

(i) Feasibility of Creating a Technology Hub (Item 13.1.a.)
Current Due Date: May 5, 2021
Proposed New Due Date: July 5, 2021

(ii) Farmers' Market – Rent Relief and Governance Comparators (Item 13.1.b.)
Current Due Date: June 2, 2021
Proposed New Due Date: August 9, 2021

(j) PRIVATE & CONFIDENTIAL (Item 14)

(i) Closed Session Minutes – May 19, 2021 (Item 14.1)

(a) The Closed Session Minutes of the May 19, 2021 General Issues Committee meeting were approved; and,

(b) The Closed Session Minutes of the May 19, 2021 General Issues Committee meeting shall remain confidential.

Committee moved into Closed Session respecting Item 14.2, pursuant to Section 9.1, Sub-sections (c), and (k) of the City's Procedural By-law 21-021 and Section 239(2), Sub-sections (c) and (k) of the *Ontario Municipal Act*, 2001, as amended, as the subject matter pertains to a proposed or pending acquisition or disposition of land by the municipality or local board; and, a position, plan, procedure, criteria or instruction to be applied to any negotiations carried on or to be carried on by or on behalf of the municipality or local board.

(k) ADJOURNMENT (Item 14)

There being no further business, the General Issues Committee adjourned at 6:25 p.m.

Respectfully submitted,

_____
J. Farr, Deputy Mayor
Chair, General Issues Committee

Stephanie Paparella
Legislative Coordinator,
Office of the City Clerk

AUDIT, FINANCE AND ADMINISTRATION COMMITTEE REPORT 21-009

9:30 a.m.
June 3, 2021
Council Chambers
Hamilton City Hall

Present: Councillors L. Ferguson (Chair), B. Clark, C. Collins, B. Johnson, M. Pearson, A. VanderBeek, and M. Wilson

Also Present: Mayor F. Eisenberger

THE AUDIT, FINANCE AND ADMINISTRATION COMMITTEE PRESENTS REPORT 21-009 AND RESPECTFULLY RECOMMENDS:

1. CONSENT ITEMS (Item 7)

That the following Consent Items (Item 7), be received:

(a) 2021 First Quarter Request for Tenders and Proposals Report (FCS21008) (City Wide) (Item 7.1)

(b) 2021 First Quarter Emergency and Non-competitive Procurements Report (FCS21009) (City Wide) (Item 7.2)

(c) 2021 First Quarter Non-Compliance with the Procurement Policy Report (FCS21010) (City Wide) (Item 7.3)

2. Options for Relief from Municipal Charges for the Taxi and Snow Plow Industries (LS21020) (City Wide) (Item 7.4)

That Report LS21020, respecting Options for Relief from Municipal Charges for the Taxi and Snow Plow Industries, be received.

3. Development Agreement Surety Bonds (FCS21056 / LS21021) (City Wide) (Item 10.1)

(a) That Development Agreement Surety Bond Policy FPAP-DA-001 and accompanied Development Agreement Surety Bond Language Template, substantially in the form attached as Appendix “A” to Audit, Finance and Administration Committee Report 21-009, be adopted;

(b) That staff be directed to update the language used in the Development Agreement templates to permit surety bonds as an acceptable form of security; and,

(c) That staff be directed to bring forward a report to the Audit, Finance and Administration Committee which summarizes the uptake and any challenges encountered with Surety Bonds within 24 months of accepting the first Surety bond under the Development Agreement Surety Bond Policy.

4. Ancaster Tennis Club Loan Request (FCS21032) (Ward 12) (Item 10.2)

(a) That the General Manager, Finance and Corporate Services, be authorized and directed to enter into an interest free loan agreement with the Ancaster Tennis Club not to exceed $940,000, inclusive of the previously approved $290,000 through Report PW17089(a), pursuant to the City's External Loan Guidelines, for the construction of a new dome and related infrastructure to be repaid in full within 15 years of the loan advance, together with a General Security Agreement, both in a form satisfactory to the City Solicitor and General Manager, Finance and Corporate Services;

(b) That the Ancaster Tennis Club loan be repaid with annual payments on the anniversary dates of the loan advance as reflected in the repayment schedule attached hereto as Appendix "A" to Report FCS21032;

(c) That the Mayor and City Clerk be authorized to execute the Loan Agreement, the General Security Agreement and any ancillary documents required to give effect to the Ancaster Tennis Club loan;

(d) That the General Manager, Healthy and Safe Communities, be authorized and directed to execute a License Agreement, together with any ancillary documents with the Ancaster Tennis Club to allow the ongoing use of City property by the Ancaster Tennis Club and the addition of the infrastructure required to support the new Dome in a form satisfactory to the City Solicitor; and,

(e) That the General Manager, Healthy and Safe Communities Department, or designate, be delegated the authority to negotiate and grant naming rights to Rogers Canada for the City facility occupied by the Ancaster Tennis Club as required to permit the Ancaster Tennis Club to obtain sponsorship funding pursuant to the Community Tennis Facility Fund and to execute any necessary consents or agreements to facilitate the sponsorship and naming rights, with content acceptable to the General Manager of Healthy and Safe Communities Department, or designate and the City Solicitor.

5. Canada Healthy Communities Initiative Intake Two (FCS21020(a)) (City Wide) (Item 10.3)

(a) That the Public Space and Park Wi-Fi Connectivity Project, be approved as the City of Hamilton's submission for consideration to the Community Foundations of Canada for the requested funding amount of $250,000 in accordance with the terms and conditions associated with the Canada Healthy Communities Initiative;

(b) That the Mayor and City Clerk be authorized to execute all necessary documentation, including Funding Agreements to receive funding under the Canada Healthy Communities Initiative with content satisfactory to the General Manager, Finance and Corporate Services, and in a form satisfactory to the City Solicitor;

(c) That the City Solicitor be authorized and directed to prepare any necessary by-laws for Council approval, for the purpose of giving effect to the City's acceptance of funding from the Canada Healthy Communities Initiative for The Public Space and Park Wi-Fi Connectivity Project;

(d) That, should this funding application be successful, the ongoing operating costs for connectivity estimated at $30,000 be included in the 2022 Tax Operating Budget for consideration; and,

(e) That copies of Report FCS21020(a) be forwarded to local Members of Parliament.

6. 2019 Development Charges Amending By-law and Background Study Update (FCS21048) (City Wide) (Item 10.4)

(a) That the Development Charges Update Study prepared by Watson & Associates Economists Ltd. and dated March 5, 2021, attached hereto as Appendix "B" of Audit, Finance and Administration Committee Report 21-009, be approved;

(b) That, having considered the matters in Report FCS21048 including the changes incorporated into the 2019 Development Charges Amending By-law, attached hereto as Appendix "B" of Report FCS21048, no further meeting under s. 12 of the Development Charges Act, 1997 is required; and,

(c) That Appendix "B" attached to Report FCS21048 respecting the 2019 Development Charges Amending By-law, prepared in a form satisfactory to the City Solicitor, be passed and enacted.

7. Parkland Dedication Reserve Status Report as of December 31, 2020 (FCS21030) (City Wide) (Item 10.5)

(a) That Report FCS21030 "Parkland Dedication Reserve Status Report as of December 31, 2020" be received and made available to the public; and,

(b) That Report FCS21030 “Parkland Dedication Reserve Status Report as of December 31, 2020” be forwarded, if requested, to the Ministry of Municipal Affairs and Housing.

8. Citizen Committee Report - Committee Against Racism - Recommendations for the City's Hamilton.ca/coronavirus webpage with Respect to Anti-Asian Racism (Added Item 10.6)

That the City of Hamilton update the Coronavirus Website’s Choose Solidarity message (located at https://www.hamilton.ca/coronavirus) to acknowledge the increase in anti-Asian racism against Asian communities, provide information about resources to support individuals who have faced racism, and provide information about anti-racism education.

9. Appointments to the Committee Against Racism for the Remainder of the 2018 - 2022 Term (Item 14.1)

That the appointments to the Committee Against Racism, for the remainder of the 2018 – 2022 term of Council, be approved and released publicly following approval by Council.

FOR INFORMATION:

(a) CHANGES TO THE AGENDA (Item 2)

The Committee Clerk advised of the following changes to the agenda:

5. COMMUNICATIONS

5.1 Correspondence from the West End Home Builders’ Association, respecting the Adoption of Modern Pay on Demand Surety Bonds in Hamilton
Recommendation: Be received and referred to consideration of Item 10.1.

5.2 Correspondence from Brandon Campbell, President, Starward Homes, respecting the Adoption of Modern Pay on Demand Surety Bonds in Hamilton
Recommendation: Be received and referred to consideration of Item 10.1.

5.3 Correspondence from Mike Naples, Director, Masters Insurance Limited, respecting the Adoption of Modern Pay on Demand Surety Bonds in Hamilton
Recommendation: Be received and referred to consideration of Item 10.1.

10. DISCUSSION ITEMS

10.6 Citizen Committee Report - Committee Against Racism - Recommendations for the City's Hamilton.ca/coronavirus webpage with Respect to Anti-Asian Racism

The agenda for the June 3, 2021 Audit, Finance and Administration Committee meeting was approved, as amended.

(b) DECLARATIONS OF INTEREST (Item 3)

Councillor Ferguson declared an interest to Item 7.4, Options for Relief from Municipal Charges for the Taxi and Snow Plow Industries (LS21020), as he is an investor in the taxi industry.

Councillor Wilson declared an interest to Item 10.3, Canada Healthy Communities Initiative Intake Two (FCS21020(a)), as her spouse sits on the National Board that is deciding on the selection, as there may be a perceived interest.

(c) APPROVAL OF MINUTES OF PREVIOUS MEETING (Item 4)

(i) May 20, 2021 (Item 4.1)

The Minutes of the May 20, 2021 meeting of the Audit, Finance and Administration Committee were approved, as presented.

(d) COMMUNICATIONS (Item 5)

The following Communications Items (Item 5), were received and referred to consideration of Item 10.1:

(i) Correspondence from the West End Home Builders' Association, respecting the Adoption of Modern Pay on Demand Surety Bonds in Hamilton (Added Item 5.1)

(ii) Correspondence from Brandon Campbell, President, Starward Homes, respecting the Adoption of Modern Pay on Demand Surety Bonds in Hamilton (Added Item 5.2)

(iii) Correspondence from Mike Naples, Director, Masters Insurance Limited, respecting the Adoption of Modern Pay on Demand Surety Bonds in Hamilton (Added Item 5.3)

For disposition of this matter, refer to Item 3.

(e) CONSENT ITEMS (Item 7)

(i) Options for Relief from Municipal Charges for the Taxi and Snow Plow Industries (LS21020) (City Wide) (Item 7.4)

Councillor Ferguson relinquished the Chair to Councillor Pearson.

(i) Staff were directed to prepare correspondence to the Ministry of Transportation of Ontario, and other appropriate bodies respecting insurance for the taxi and snow plow industries.

(ii) Staff were directed to determine the number of snow plow operators in the last two years that have not been able to provide service due to insurance issues and report back to the Audit, Finance & Administration Committee.

Councillor Ferguson assumed the Chair.

(f) PUBLIC HEARINGS / DELEGATIONS (Item 9)

(i) The following Delegations addressed the Committee respecting Report FCS21056/LS21021, Development Agreement Surety Bonds (City Wide) (Item 10.1)

(a) Mike Collins-Williams, West End Homebuilders' Association (Item 9.1)

(b) Stephanie Kuntz, Marsh Canada (Item 9.2)

(c) Terri Johns, T Johns Consulting (Item 9.3)

(d) Sergio Manchia, Urbancore Group of Companies (Item 9.4)

The above Delegations, listed as Items 9.1 to 9.4, were received.

For disposition of this matter, please refer to Item 3.

(g) DISCUSSION ITEMS (Item 10)

(i) Ancaster Tennis Club Loan Request (FCS21032) (Ward 12) (Item 10.2)

Councillor Ferguson relinquished the Chair to move the motion.

For disposition of this matter, please refer to Item 4.

Councillor Ferguson assumed the Chair.

(h) GENERAL INFORMATION / OTHER BUSINESS (Item 13)

(i) Amendment to the Outstanding Business List (Item 13.1)

The following amendments to the Audit, Finance & Administration Committee’s Outstanding Business List, were approved:

(a) Items Considered Complete and Needing to be Removed:

Options for Relief from Municipal Fees and Charges for the Taxi Industry (FCS20067) (City Wide)

That staff be directed to consult with other municipalities to review the current situation with regards to high insurance premiums on the taxi and snow plow industries and report back with their findings.
Added: August 13, 2020 at AF&A - Item 8.2
Competed: June 3, 2021 at AF&A - Item 7.4
OBL Item: 20-H

Stimulating Local Development - Affordable Housing Projects - Cash-in-lieu Parking Policy – Downtown Secondary Plan Area - Temporary Period
That Finance and Legal staff be directed to report back to the Audit, Finance and Administration Committee on the potential for the use of surety bonds as financial security for development projects to secure municipal agreements.
Added: December 9, 2020 at GIC – Item 8.1(d)
Completed: June 3, 2021 at AF&A – Item 10.1
OBL Item: 20-N

Healthy Communities Initiative Intake One (FCS21020) (City Wide)
That staff report back on a recommended project for the City to submit to the second intake to the Canada Healthy Communities Initiative expected in May 2021.
Added: February 19, 2021 at Public Works – Item 9.4
Completed: June 3, 2021 at AF&A – Item 10.3
OBL Item: 21-D

(b) Items Requiring a New Due Date:

Review of Procurement Policies as it relates to Hiring Local Trades
That staff be directed to review the City's current procurement policy; review the procurement policies of other municipalities that now include provisions regarding hiring local trades; and re-examine Report FCS09109(c) Evaluation of the City of Hamilton Purchasing Program Update.
Current Due Date: August 2020
Updated Due Date: Q1 2022
OBL Item: G

(h) PRIVATE AND CONFIDENTIAL (Item 14)

Committee determined that discussion of Item 14.1 was not required in Closed Session, so the item was addressed in Open Session, as follows:

(i) Appointments to the Committee Against Racism for the Remainder of the 2018 - 2022 Term (Item 14.1)

For disposition of this matter, please refer to Item 9.

(i) ADJOURNMENT (Item 15)

There being no further business, the Audit, Finance and Administration Committee, adjourned at 10:58 a.m.

Respectfully submitted,

Councillor Ferguson, Chair
Audit, Finance and Administration
Committee

Angela McRae
Legislative Coordinator
Office of the City Clerk

Surety Bond Policy	Hamilton	
FPAP-DA-001		
Page 1 of 3		Approval: 2021-XX-XX

Development Agreement Surety Bond Policy	
POLICY STATEMENT	This Policy outlines the requirements of a surety bond to be an acceptable form of security for Development Agreements.
SCOPE	This Policy is applicable, in all cases, in which a Surety Bond is being evoked as security for a Development Agreement. Surety Bonds may be provided for any Development Agreement which is required to provide Security and may be for the full amount of security required or for a portion if supplemented with a Letter of Credit or cash, only where the language, in the associated Development Agreement, permits Surety Bonds.
PURPOSE (GUIDING PRINCIPLES)	To ensure the equitable and transparent administration of the use of Surety Bonds for Development Agreements.
RELATED LEGISLATION	Development Agreements are entered into under the *Planning Act, 1990, as amended,* and the required security that this Surety Bond Policy applies to is outlined in each of the respective Development Agreements.
TRANSPARENCY	This Policy, inclusive of Appendix A, is available publicly.
DEFINITIONS	
"Development Agreement"	Refers to any agreement entered into between the City of Hamilton and a land owner to regulate the provision of on-site and municipal works required to service land under development applications. Includes, but is not limited to, Plan of Subdivision, Site Plan, External Works Agreement, Joint Service Agreement and Consent Agreement.
"Security"	An amount required to be provided under a Development Agreement which will ultimately be returned to the developer after the terms of the Development Agreement have been executed to the City's satisfaction.
"Surety Bond"	A bond which guarantees the assumption of responsibility for payment of security in the event of default of a Development Agreement.
"Surety provider"	A company legally capable of acting as the surety in the surety bond agreement.

Surety Bond Policy	Hamilton	
FPAP-DA-001		
Page 2 of 3		Approval: 2021-XX-XX

DETAILS: USAGE AND LIMITATIONS	This Policy is applicable, in all cases, in which a Surety Bond is being evoked as security for a Development Agreement. Where financial security is required by the City, a term of any contract or as a condition of any planning approval, Development Agreement Surety Bonds are a satisfactory financial security provided they are issued to and received by the City in accordance with the following terms and conditions: 1. The Development Agreement Surety Bond shall be issued by a Canadian surety provider having a minimum credit rating of: (a) "A" or higher as assessed by Dominion Bond Rating Service Limited; (b) "A-" or higher as assessed by Fitch Ratings; (c) "A3" of higher as assessed by Moody's Investors Services Inc.; or (d) "A-" or higher as assessed by S&P. 2. The issuing company shall be incorporated in Canada for no less than ten (10) years and issue surety bonds in Canadian dollars. 3. The issuing surety provider must be an active institution monitored by the Office of the Superintendent of Financial Institutions (OSFI). 4. When a surety provider that has issued or has confirmed a surety bond received and held by the City, subsequently ceases, in the opinion of the City to meet all or any of the requirements of this Policy, the City may, in its discretion, and subject to Section 7 of this Policy, require a new security to its satisfaction, to be provided to the City within ten (10) days of demand for same and the original surety bond will be returned and / or exchanged for the replacement security. In the event the new security is not received as required, the City may draw upon the original Surety Bond. 5. Where there is doubt as to the credit rating or other qualification of a surety provider, the City's General Manager of Finance and Corporate Services shall be satisfied that the institution meets the guidelines of this Policy.

	6. The surety bond to be provided to the City issued by a surety provider shall be irrevocable and shall be in the form and on the terms of the "Development Agreement Surety Bond" template attached hereto as Appendix A. 7. Notwithstanding anything in this Policy, (a) the City may, in its discretion, decline a surety bond for any reason; (b) when a surety bond has been received and is being held by the City and the City is no longer satisfied that the surety bond adequately provides adequate protection, the City may require a new security to its satisfaction, to be provided to the City within ten (10) days of demand for same and the original surety bond will be returned and / or exchanged for the replacement security. In the event the new security is not received as required, the City may draw upon the original Surety Bond. Any deviations from the said approved form of Development Agreement Bond template shall be reviewed by and are subject to approval of the General Manager of Finance and Corporate Services and the City Solicitor.
POLICY OWNER	Director of Financial Planning, Administration and Policy
ADMINSTRATION	The Development Agreement Surety Bond Policy shall be administered by the Financial, Planning, Administration and Policy Division within the Corporate Services Department.
RELATED POLICIES	Irrevocable Letter of Credit Policy (FCS02016)
RELATED STANDARD OPERATING PROCEDURES	TBD

APPENDIX A TO POLICY FPAP-DA-001
DEVELOPMENT AGREEMENT SURETY BOND

BOND NO.: **AMOUNT: $**

KNOW ALL PERSONS BY THESE PRESENTS, that

,

as Principal, hereinafter called the "**Principal",** and

,

as Surety, hereinafter called the "**Surety**", are held and firmly bound unto , as Obligee, hereinafter called the "**Obligee**", in the amount of Dollars (**$**) lawful money of Canada, for the payment of which sum, well and truly to be made, the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

WHEREAS the Principal and Obligee have entered into, or will enter into, an agreement with reference number with respect to lands known as in the City of Hamilton (said agreement is by reference made a part hereof and is hereinafter referred to as the "**Development Agreement**").

NOW THEREFORE, the condition of this obligation is such that if the Principal shall, in the opinion of the Obligee do and perform all of the stipulations, conditions, covenants and terms of the Development Agreement, then this obligation shall be void and of no effect; otherwise, it shall remain in full force and effect.

PROVIDED, however, the foregoing obligation is subject to the following terms and conditions:

1. Whenever the Principal shall be declared in writing by the Obligee to be in default under the Development Agreement, and the Obligee intends to make a claim under this bond, the Obligee shall promptly notify the Principal and the Surety in writing of such default in the form of a Demand, the form of which is attached to this Bond as Schedule "A".

2. On determination by the Obligee, in its sole and absolute discretion, that the Principal is in default of its obligations under the Development Agreement, the Surety and Principal agree that the Surety will make payments to the Obligee for amounts demanded by the Obligee, up to an aggregate of the Bond Amount, within ten (10) business days after the Surety's receipt of a Demand from the Obligee at the address noted herein by hand or courier.

3. This Bond is irrevocable and payment will be made notwithstanding any objection by the Principal. Where a Demand in the prescribed form has been delivered to the Surety, it shall be accepted by the Surety as conclusive evidence of its obligation to make payment to the Obligee, and the Surety shall not assert any defence or grounds of any nature or description for not making payment to the Obligee, in whole or in part, pursuant to such Demand, including but not limited to any of the following reasons: that a Default has not occurred, that the Principal committed any fraud or misrepresentation in its application for the Bond, or that the amount set out in the Demand is not appropriate, warranted or otherwise not in accordance with the Development Agreement. The Surety's liability under this Bond is unconditional and shall not be discharged or released or affected by any arrangements made between the Obligee and the Principal or by any dispute between the Surety and Principal, or the taking or receiving of security by the Obligee from the Principal, or by any alteration, change, addition, modification, or variation in the Principal's obligation under the Development Agreement, or by the exercise of the Obligee or any of the rights or remedies reserved to it under the Development Agreement or by any forbearance to exercise any such rights or remedies whether as to payment, time, performance or otherwise (whether or not by any arrangement, alteration or forbearance is made without the Surety's knowledge or consent). All payments by the Surety shall be made free and clear without deduction, set-off or withholding.

4. The Obligee may make multiple Demands under this bond.

5. The amount of the Bond may be reduced from time to time as advised by notice in writing by the Obligee to the Surety.

6. Each payment made by the Surety under this Bond shall reduce the amount of this Bond.

7. In no event shall the Surety be liable for a greater sum than the amount of this Bond.

8. No right of action shall accrue upon or by reason hereof to or for the use or benefit of any person other than the Obligee.

9. When the Principal has completed all works required by the Development Agreement to the Obligee's satisfaction, all maintenance and rectification periods contained within the Development Agreement have expired, and the Obligee has finally assumed all works in writing, the Obligee shall return this Bond to the Surety for termination or advise the Surety in writing that this Bond is terminated, in accordance with the terms of the Development Agreement.

10. If the Surety at any time delivers at least ninety (90) days prior written notice to the Obligee and to the Principal of its intention to terminate this obligation, the Principal shall deliver to the Obligee, not less than thirty (30) days prior to the termination of this Bond, financial security in the amount of this Bond in a form acceptable to the Obligee. If the replacement financial security is not provided by the Principal or is not accepted by the Obligee, this Bond shall remain in effect.

11. Nothing in this bond shall limit the Principal's liability to the Obligee under the Development Agreement.

12. This Bond shall be governed by and construed in accordance with the laws of the Province of Ontario and the laws of Canada applicable thereto and shall be treated, in all respects, as a contract entered into in the Province of Ontario without regard to conflict of laws principles. The Principal and Surety hereby irrevocably and unconditionally attorn to the jurisdiction of the courts of the Province of Ontario.

13. All Demands and notices under this Bond shall be delivered by hand, registered mail or courier to the Surety, with a copy to the Principal at the addresses set out below, subject to any change of address in accordance with this Section. All other correspondence may be delivered by regular mail, registered mail, courier, or email. A change of address for the Surety is publicly available on the Financial Services Regulatory Authority of Ontario website. The address for the Principal may be changed by giving notice to the other parties setting out the new address in accordance with this Section.

The Surety:	**The Principal:**	**The Obligee:**
Name	**Name**	**Name**
Address	**Address**	**Address**
Email	**Email**	**Email**
Phone	**Phone**	**Phone**

IN TESTIMONY WHEREOF, the Principal has hereto set its hand and affixed its seal and the Surety has caused these presents to be sealed with its corporate seal duly attested by the signature of its authorized signing authority.

SIGNED AND SEALED this day of , **20** **,** in the presence of:

Per: _____
Name:
Title:

Per: _____
Name:
Title:

I / We have the authority to bind the Corporation.

_____
, Attorney in Fact

Schedule A

DEMAND – NOTICE OF DEFAULT

Date:

Surety:

Address:

Attention:

Re: Development Agreement Bond No. (the "Bond")

Principal: (the "Principal"

Obligee: (the "Obligee")

Agreement: (the "Development Agreement"

Dear ,

Pursuant to the above referenced Bond, The City of Hamilton hereby declares a default under the Development Agreement.

We hereby demand that the Surety honour its ten (10) day payment obligation as per the terms of the Bond and we hereby certify that we are entitled to draw on the Bond pursuant to the terms of the Development Agreement and demand payment of $ under the terms of the Bond.

Payment Instructions:

Yours truly,

THE CITY OF HAMILTON

Development Charges Update Study

City of Hamilton

Table of Contents

Report

Chapter 1
Introduction

1. Introduction

1.1 Background

The City of Hamilton imposes development charges (D.C.) to recover capital costs arising from the increase in needs for service related to growth. The City currently has a municipal-wide D.C. for the following services:

- Parkland Development;
- Indoor Recreation Services;
- Library Services;
- Long-Term Care;
- Health Services;
- Social & Child Services;
- Social Housing;
- Airport Lands;
- Parking Services;
- Provincial Offences Act (P.O.A.);
- Services Related to a Highway;
- Public Works Facilities, Vehicles, and Equipment;
- Police Services;
- Fire Protection Services;
- Paramedics;
- Transit Services;
- Waste Diversion; and
- Administration Studies currently split into two sub-categories.

In addition to the above services, the City also recovers water and wastewater costs associated with growth, through D.C.s in the urban serviced areas. Further stormwater costs are recovered via area specific charges in the combined sewer system vs. all other areas outside the combined sewer system area.

The basis for these D.C.s is documented in the “City of Hamilton Development Charges Background Study, Consolidated Report,” dated July 5, 2019 (the “2019 D.C. Study”),

which provided the supporting documentation for By-law 19-142. The D.C.s came into effect June 13, 2019.

The City's D.C.s have been indexed (in accordance with section 37 of the by-law) annually on July 6th, beginning in 2020, and are currently 3.92% higher than the 2019 rates implemented under By-law 19-142. The 2019 D.C.s (unindexed) are shown in Figure 1-1.

The purpose of this report is to update the current D.C. by-law in order to meet the requirements of the Development Charges Act (D.C.A.), as amended by Bill 108 (*More Homes, More Choice Act, 2019*), Bill 138 (*Plan to Build Ontario Act, 2019*), and Bill 197 (*COVID-19 Economic Recovery Act, 2020*), and Bill 213 (*Better for People, Smarter for Business Act, 2020)*. A full discussion on the amending legislation is provided in Chapter 2.

A summary of the changes contained in this D.C. Update are provided below:

- The legislation has removed the mandatory deduction for all services that remain eligible in the D.C. For the City, the 10% deduction may be removed for the following services:
    - Parkland Development
    - Indoor Recreation Services
    - Library Services
    - Long-Term Care
    - Health Services
    - Social & Child Services
    - Social Housing
    - Airport Lands
    - Parking Services
    - Provincial Offences Act (P.O.A.)
    - Paramedics;
    - Public Works Facilities, Vehicles & Equipment (where associated with other discounted services);
    - Waste Diversion; and
    - General Government (Studies).

- The listing of eligible services has been changed by the amending legislation. For the City, Municipal Parking and Airport Lands will no longer be an eligible service as of September 18, 2022 (the end of the transition period provided by the amending legislation). As well, only the components of Social and Child Services that relate to Childcare and Early Years remain eligible. The amendments to the D.C. by-law will reflect these changes.
- An additional change brought forth through Bill-197 related to establishing classes of services. A class of service may be composed of any number or combination of services and may include parts or portions of each D.C.-eligible service. As a result of these changes to the D.C.A., this addendum report provides for Growth Studies (formerly Administrative Studies) as a class of services and Public Works Facilities, Vehicles and Equipment. Further discussion on classes of services is provided in Chapter 2.
- The regulations have provided an additional mandatory D.C. exemption for an added dwelling unit in new residential buildings as well as related for universities. These exemptions are to be added to the City's D.C. by-law.
- Further changes related to the timing of payments for rental housing, institutional and non-profit development were proclaimed through Bill 108. Additionally, the D.C. amount for all developments occurring within 2 years of a Site Plan or Zoning By-law Amendment planning approval, shall be determined based on the D.C. in effect on the day of Site Plan or Zoning By-law Amendment application. If the development is not proceeding via these planning approvals, then the amount is determined as the earlier of the date of issuance of a building permit or occupancy. These changes will be addressed in the amending by-law, discussed in Chapter 5 and provided in Appendix C.

Figure 1-1
City of Hamilton
2019 Development Charges (2019 $)

Service	Residential					Non-Residential
	Single-Detached Dwelling & Semi-Detached Dwelling (per dwelling unit)	Townhouses & Other Multiple Unit Dwellings (per dwelling unit)	Apartments & Stacked Townshouses & Mobile Homes 2-Bedrooms+ (per dwelling unit)	Apartments & Stacked Townshouses & Mobile Homes Bachelor & 1-Bedrooms (per dwelling unit)	Residential Facility Dwelling & Lodging House & Garden Suite (per Bedroom)	per sq.ft. of Gross Floor Area
Municipal Wide Charges						
Services Related to a Highway	10,769	7,708	6,306	4,314	3,479	8.05
Public Works Facilities, Vehicles & Equipment	784	561	459	314	253	0.41
Police Services	524	375	307	210	169	0.26
Fire Protection Services	462	331	271	185	149	0.23
Paramedics	137	98	80	55	44	0.03
Transit Services	1,917	1,372	1,123	768	619	0.98
Waste Diversion	657	470	385	263	212	0.13
Parkland Development	2,352	1,683	1,377	942	760	0.11
Indoor Recreation Services	4,430	3,171	2,594	1,775	1,431	0.20
Library Services	1,045	748	612	419	338	0.05
Long Term Care	125	89	73	50	40	0.01
Health Services	1	1	1	-	-	-
Social & Child Services	15	11	9	6	5	-
Social Housing	648	464	379	260	209	-
Airport Lands	419	300	245	168	135	0.21
Parking Services	490	351	287	196	158	0.25
Provincial Offences Administration	40	29	23	16	13	0.02
Administrative Studies - Community Based Studies	330	236	193	132	107	0.17
Administrative Studies - Engineering Services Studies	166	119	97	66	54	0.08
Total Municipal Wide Charges	**25,311**	**18,117**	**14,821**	**10,139**	**8,175**	**11.18**
Urban Area Charges						
Wastewater Facilities	4,048	2,897	2,371	1,622	1,308	1.95
Wastewater Linear Services	5,415	3,876	3,171	2,169	1,749	2.61
Water Service	4,767	3,412	2,792	1,910	1,540	2.29
Total Urban Area Charges	**14,230**	**10,185**	**8,334**	**5,701**	**4,597**	**6.85**
Stormwater Services - Combined Sewer System: Stormwater Drainage and Control Services	3,948	2,826	2,312	1,582	1,275	-
Stormwater Services - Separated Sewer System: Stormwater Drainage and Control Services	10,462	7,488	6,127	4,191	3,380	2.16
Tota Urban Services - Combined Sewer System	**18,178**	**13,011**	**10,646**	**7,283**	**5,872**	**6.85**
Tota Urban Services - Separated Sewer System	**24,692**	**17,673**	**14,461**	**9,892**	**7,977**	**9.01**
Grand Total - Urban Combined Sewer System	**43,489**	**31,128**	**25,467**	**17,422**	**14,047**	**18.03**
Grand Total - Urban Sparated Sewer System	**50,003**	**35,790**	**29,282**	**20,031**	**16,152**	**20.19**
Additional Special Area Charges						
Dundas/Waterdown	1,971	1,410	1,154	789	637	1.04

1.2 Existing Policies (Rules)

Appendix A of this report sets out the rules governing the calculation, payment, and collection of D.C.s as provided in By-law 19-142.

1.3 Basis for the D.C. By-law Update

This D.C. update study provides for an amendment to the City's current D.C.s by-law (By-law 19-142) based on the legislative changes to the D.C.A. These include:

- Updating the D.C. analysis to remove the 10% mandatory deduction;
- Municipal Parking and Airport will no longer be eligible services as of September 18, 2022. Schedule A to the City's D.C. By-law will be amended to reflect this change;
- Creating classifications for Growth Studies and Public Works as classes of services; and
- Updating the D.C. policies in the by-law with respect to:
    - D.C. instalment payments;
    - D.C. rate freeze;
    - Mandatory exemption for new ancillary units and universities; and
    - Updated definitions (which have been established as part of Bill 108/197).

Details on the changes to the calculation and by-law are presented in Chapter 4 and Chapter 5 of this report, respectively. The draft amending by-law is presented in Appendix C to this report.

1.4 Summary of the Process

The public meeting required under section 12 of the D.C.A. has been scheduled for April 22, 2021. Its purpose is to present the update study to the public and to solicit public input. The meeting is also being held to answer any questions regarding the study's purpose, methodology and the proposed modifications to the City's D.C. by-law.

The process to be followed in finalizing the report and recommendations includes:

- consideration of responses received prior to, at, or immediately following the Public Meeting; and
- Council consideration of the amending by-law on June 9, 2021.

Figure 1-2 outlines the proposed schedule to be followed with respect to the D.C. by-law adoption process.

Figure 1-2
Schedule of Key D.C. Process Dates for the City of Hamilton

1.	Data collection, staff review, D.C. calculations and policy work	December 2020 to March 2021
2.	D.C. Stakeholder Sub-Committee Meeting	January 29, 2021
3.	Background study and proposed by-law available to public	March 5, 2021
4.	D.C. Stakeholder Sub-Committee Meeting	March 11, 2021
5.	Audit, Finance and Administration Committee Meeting (to Officially begin the 60-day circulation period)	March 25, 2021
6.	Public meeting advertisement placed in newspaper(s)	No later than April 1, 2021
7.	Public meeting of Council	April 22, 2021
8.	Audit, Finance and Administration Committee Meeting for consideration of the background study and passage of by-law	June 3, 2021
9.	Council considers adoption of background study and passage of by-law	June 9, 2021
10.	Effective date of the by-law	July 6, 2021
11.	Newspaper notice given of by-law passage	By 20 days after passage
12.	Last day for by-law appeal	40 days after passage
13.	City makes pamphlet available (where by-law not appealed)	By 60 days after in force date

1.5 Policy Recommendations

It is recommended that the City's current D.C. policies, as identified in Appendix A of this report, be continued.

Additionally, the new policies as stated in Bill 108, Bill 138, Bill 197, Bill 213 and O. Reg. 454-19 are recommended to be included. This is discussed in more detail in Chapter 2 of this report.

Chapter 2
Changes to the D.C.A. Legislation

2. Changes to the D.C.A. Legislation

2.1 Bill 108 – *More Homes, More Choice Act, 2019*

On May 2, 2019, the Province introduced Bill 108, which proposed changes to the D.C.A. The Bill has been introduced as part of the Province's "*More Homes, More Choice: Ontario's Housing Supply Action Plan*." The Bill received Royal Assent on June 6, 2019.

While having received royal assent, many of the amendments to the D.C.A. would not come into effect until they are proclaimed by the Lieutenant Governor (many of these changes were revised through Bill 197). At the time of writing, the following provisions have been proclaimed:

- Effective January 1, 2020, rental housing and institutional developments will pay D.C.s in six equal annual payments commencing at occupancy. Non-profit housing developments will pay D.C.s in 21 equal annual payments. Interest may be charged on the instalments, and any unpaid amounts may be added to the property and collected as taxes.
- Effective January 1, 2020 the D.C. amount for all developments occurring within 2 years of a Site Plan or Zoning By-law Amendment planning approval (for application submitted after this section is proclaimed), shall be determined based on the D.C. in effect on the day of Site Plan or Zoning By-law Amendment application. If the development is not proceeding via these planning approvals, then the amount is determined the earlier of the date of issuance of a building permit or occupancy.

On February 28, 2020, the Province released updated draft regulations related to the D.C.A. and the Planning Act. A summary of these changes is provided below:

Changes to Eligible Services – Prior to Bill 108, the D.C.A. provided a list of ineligible services whereby municipalities could include growth related costs for any service that was not listed. With Bill 108, the changes to the D.C.A. would now specifically list the services that are eligible for inclusion in the by-law. Further, the initial list of eligible services under Bill 108 was limited to "hard services," with the "soft services" being removed from the D.C.A. These services would be considered as part of a new

community benefits charge (discussed below) imposed under the Planning Act. As noted in the next section this list of services has been amended through Bill 197.

Mandatory 10% deduction – The amending legislation would remove the mandatory 10% deduction for all services that remain eligible under the D.C.A.

Remaining Services to be Included in a New Community Benefits Charge (C.B.C.) Under the Planning Act – It is proposed that a municipality may, by by-law, impose a C.B.C. against land to pay for the capital costs of facilities, services and matters required because of development or redevelopment in the area to which the by-law applies. The C.B.C. is proposed to include formerly eligible D.C. services (as noted below), in addition to parkland dedication and other types of cost formerly recovered under Section 37 of the Planning Act.

2.2 Bill 138 - *Plan to Build Ontario Together Act, 2019*

On November 6, 2019, the Province release Bill 138 which provided further amendments to the D.C.A. and Planning Act. This Bill received Royal Assent on December 10, 2019 and was proclaimed which resulted in sections related to the D.C.A. (schedule 10) becoming effective on January 1, 2020. The amendments to the D.C.A. included removal of instalment payments for commercial and industrial developments that were originally included in Bill 108.

2.3 Bill 197 - *COVID-19 Economic Recovery Act, 2020*

In response to the global pandemic that began affecting Ontario in early 2020, the Province released Bill 197 which provided amendments to a number of Acts, including the D.C.A. and Planning Act. This Bill also revised some of the proposed changes identified in Bill 108. Bill 197 was tabled on July 8, 2020, received Royal Assent on July 21, 2020, and was proclaimed on September 18, 2020. The following provides a summary of the changes:

2.3.1 D.C. Related Changes

List of D.C. Eligible Services

- As noted above, under Bill 108 some services were to be included under the D.C.A. and some would be included under the C.B.C. authority. However, Bill 197 revised this proposed change and has included all services (with some exceptions) under the D.C.A. These services are as follows:
    - Water supply services, including distribution and treatment services.
    - Wastewater services, including sewers and treatment services.
    - Storm water drainage and control services.
    - Services related to a highway.
    - Electrical power services.
    - Toronto-York subway extension.
    - Transit services.
    - Waste diversion services.
    - Policing services.
    - Fire protection services.
    - Ambulance services.
    - Library services
    - Long-term Care services
    - Parks and Recreation services, but not the acquisition of land for parks.
    - Public Health services
    - Childcare and early years services.
    - Housing services.
    - Provincial Offences Act services.
    - Services related to emergency preparedness.
    - Services related to airports, but only in the Regional Municipality of Waterloo.
    - Additional services as prescribed.

Classes of Services – D.C.

Pre-Bill 108/197 legislation (i.e. D.C.A., 1997) allows for categories of services to be grouped together into a minimum of two categories (90% and 100% services).

The amending legislation repealed and replaced the above with the four following subsections:

- A D.C. by-law may provide for any eligible service or capital cost related to any eligible service to be included in a class, set out in the by-law.
- A class may be composed of any number or combination of services and may include parts or portions of the eligible services or parts or portions of the capital costs in respect of those services.
- A D.C. by-law may provide for a class consisting of studies in respect of any eligible service whose capital costs are described in paragraphs 5 and 6 of s. 5 of the D.C.A.
- A class of service set out in the D.C. by-law is deemed to be a single service with respect to reserve funds, use of monies, and credits.

As well, the removal of 10% deduction for soft services under Bill 108 has been maintained.

10-Year Planning Horizon

- The "maximum" 10-year planning horizon has been removed for all services except transit.

2.3.2 Community Benefit Charges (C.B.C.)

While a Community Benefit Charge is not being considered within this report, a summary of the legislated changes is provided herein for information purposes.

C.B.C. Eligibility

- The C.B.C. is limited to lower-tier and single tier municipalities, whereas upper-tier municipalities will not be allowed to impose this charge.
- O.Reg. 509/20 was filed on September 18, 2020. This regulation provides for the following:
    - A maximum rate will be set as a percentage of the market value of the land the day before building permit issuance. The maximum rate is set at 4%. The C.B.C may only be imposed on developing or redeveloping buildings which have a minimum height of five stories and contain no less than 10 residential units.

- Bill 197 states that before passing a C.B.C. by-law, the municipality shall prepare a C.B.C. strategy that (a) identifies the facilities, services, and matters that will be funded with C.B.C.s; and (b) complies with any prescribed requirements.
- Only one C.B.C. by-law may be in effect in a local municipality at a time.

2.3.3 Combined D.C. and C.B.C. Impacts

D.C. vs. C.B.C. Capital Cost

- A C.B.C. may be imposed with respect to the services listed in s. 2 (4) of the D.C.A. (eligible services), "provided that the capital costs that are intended to be funded by the community benefits charge are not capital costs that are intended to be funded under a development charge by-law."

Transition – D.C. and C.B.C.

- The specified date for municipalities to transition to the D.C. and C.B.C. is two years after Schedules 3 and 17 of the COVID-19 Economic Recovery Act comes into force (i.e. September 18, 2022).
- Generally, for existing reserve funds (related to D.C. services that will be ineligible):
  - If a C.B.C. is passed, the funds are transferred to the C.B.C. special account;
  - If no C.B.C. is passed, the funds are moved to a general reserve fund for the same purpose.
  - If a C.B.C. is passed subsequent to moving funds to a general reserve fund, those monies are then moved again to the C.B.C. special account.
- For reserve funds established under s. 37 of the Planning Act (e.g. bonus zoning)
  - If a C.B.C. is passed, the funds are transferred to the C.B.C. special account;
  - If no C.B.C. is passed, the funds are moved to a general reserve fund for the same purpose;
  - If a C.B.C. is passed subsequent to moving funds to a general reserve fund, those monies are then moved again to the C.B.C. special account.

If a municipality passes a C.B.C. by-law, any existing D.C. credits a landowner retains may be used towards payment of that landowner's C.B.C.

2.4 Bill 213 – *Better for People, Smarter for Business Act, 2020*

On December 8, 2020, Bill 213 received Royal Assent. One of the changes of the Bill that took effect upon Royal Assent included amending the Ministry of Training, Colleges and Universities Act by introducing a new section that would exempt the payment of D.C.s for developments of land intended for use by a university that receives operating funds from the Government.

Due to this, a revision to the exemptions section will be made in the proposed amending D.C. by-law.

Chapter 3
Anticipated Development

3. Anticipated Development

3.1 Growth Forecast in the 2019 D.C. Study

The 2019 D.C. study provided for the anticipated residential and non-residential growth within the City of Hamilton. The growth forecast associated with services included in the background study is provided in Figure 3-1 below:

Figure 3-1
City of Hamilton
2019 D.C. Background Study – Growth Forecast Summary

Measure	10-Year City-wide 2019-2028	13-Year City-wide 2019-2031	13-Year Urban Area 2019-2031	13-Year Combined Sewer System 2019-2031	13-Year Separated Sewer System 2019-2031
(Net) Population Increase	65,046	86,183	86,142	8,007	78,135
Residential Unit Increase	33,274	42,848	42,435	9,278	33,530
Non-Residential Gross Floor Area Increase (sq.ft.)	28,791,900	39,111,300	38,758,400	8,031,700	30,726,700

Source: Watson & Associates Economists Ltd. Forecast 2019

For the purposes of this D.C. update, the 2019 D.C. Study growth forecast remains unchanged as the incremental growth is anticipated to remain the same.

Chapter 4
Updates to the City's D.C. Study

4. Updates to the City's D.C. Study

As noted earlier, the City's D.C. By-law 19-142 came into effect on June 13, 2019, being a by-law for the purposes of establishing and collecting a D.C. in accordance with the provisions of the D.C.A. The 2019 D.C. Study and by-law identified anticipated capital needs for recovery through D.C.s for municipal-wide services, urban-wide services, area specific urban services and a special area charge in Dundas/Waterdown.

This chapter of the report discusses the removal of the 10% mandatory deduction for municipal parks and recreation services (formerly parkland development and indoor recreation services), library services, growth studies, long term care, health services, social & child services, social housing, paramedics, airport lands, parking services, P.O.A., public works facilities, vehicles & equipment, and waste diversion. A discussion is also provided on the classification of Growth Studies and Public Works as classes of services. As these costs are being added as part of the 2019 D.C. Study, the capital costs are being presented in 2019 dollars.

As part of a D.C. amendment, consideration must be given to the historical service level calculation to ensure that the service level ceiling has not been exceeded in the updated calculations. These calculations have been undertaken and are included in Appendix B to this report. No service level has been exceeded by the calculations provided herein.

4.1 Municipal Parking Services

Given the change to the D.C.A. through Bill 197, the mandatory 10% deduction has been removed from D.C.-eligible services. Note: although municipal parking will become an ineligible service under the D.C.A as of September 18, 2022, the City is eligible to collect D.C.s for this service until that date (this will be highlighted in the updated by-law).

Figure 4-1 provides the updated capital project listing with the removal of the mandatory deduction. The growth-related studies related to Municipal Parking that were previously included in the Administrative Studies – Community Based Studies capital costs, have now been reclassified and included on this capital project listing. This adjustment allows staff to amend the by-law in the future to remove Parking Services from the D.C.s, without amending the calculation related to Growth Studies. This provides for a D.C.-eligible amount of $22.24 million.

In addition, an examination of the updated service standards has been undertaken as per section 5(1)4 of the D.C.A. The service standards for parking provide a combined D.C. level of service ceiling of $24.15 million, which is in excess of the growth-related capital needs and hence, no further adjustments are required. The service standards are provided in Appendix B.

Based on the City's 2019 D.C. Study, the costs allocated between residential and non-residential development based on the ratio of future anticipated population and employment are 63% residential and 37% non-residential over the 10-year forecast period.

Figure 4-1
City of Hamilton
Municipal Parking Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
1	Downtown Parking Structure	2023-2026	25,900,000	-		25,900,000	3,534,000		22,366,000	14,090,580	8,275,420
2	West Harbour Development - Parking Structure	2025-2028	30,180,000	4,930,000		25,250,000	21,824,000		3,426,000	2,158,380	1,267,620
3	Reserve Fund Adjustment						3,703,772		(3,703,772)	(2,333,376)	(1,370,396)
4	Parking Service Study	2019	200,000	-		200,000	50,000		150,000	94,500	55,500
	Total		**56,280,000**	**4,930,000**	**-**	**51,350,000**	**29,111,772**	**-**	**22,238,228**	**14,010,084**	**8,228,144**

4.2 Airport

The City's has been recovering land costs for airport expansion related to growth through D.C.s for many years with this practice being continued as identified in the 2019 D.C. Study. Given the change to the D.C.A. through Bill 197, the mandatory 10% deduction has been removed from D.C.-eligible services. Note: although airport will become an ineligible service under the D.C.A as of September 18, 2022, the City is eligible to collect D.C.s for this service until that date (this will be highlighted in the updated by-law).

Figure 4-2 provides the updated capital project listing with the removal of the mandatory deduction. This provides for a D.C.-eligible amount of $18.73 million.

In addition, an examination of the updated service standards has been undertaken as per section 5(1)4 of the D.C.A. The service standards for airport lands provide a combined D.C. level of service ceiling of $18.92 million, which is in excess of the growth-related capital needs and hence, no further adjustments are required. The service standards are provided in Appendix B.

Based on the City's 2019 D.C. Study, the costs allocated between residential and non-residential development based on the ratio of future anticipated population and employment are 63% residential and 37% non-residential over the 10-year forecast period.

Figure 4-2
City of Hamilton
Airport Lands Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
1	Requirements for Additional Airport Space	2019-2023	14,000,000	-		14,000,000	-		14,000,000	8,820,000	5,180,000
2	Requirements for Additional Airport Space	2024-2028	14,000,000	7,280,000		6,720,000	-		6,720,000	4,233,600	2,486,400
3	Reserve Fund Adjustment						1,990,849		(1,990,849)	(1,254,235)	(736,614)
	Total		**28,000,000**	**7,280,000**	**-**	**20,720,000**	**1,990,849**	**-**	**18,729,151**	**11,799,365**	**6,929,786**

4.3 Parks and Recreation Services

The City currently collects for Parks and Recreation under two categories, Parkland Development and Indoor Recreation Services. With the changes to the D.C. Act, these charges continue to be eligible as Parks and Recreation Services. For updated calculation purposes, we have continued to provide two sub-categories within this combine eligible service, the first being Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment and the second being Indoor Recreation Facilities, Vehicles & Equipment.

As discussed earlier, the capital costs included for Parks and Recreation have been modified to remove the mandatory 10% deduction. Figures 4-3 and 4-4 provide the updated capital project listings with the removal of the 10% deduction. The total D.C. eligible amount being included in the calculations for Parks and Recreation Services is $198.59 million.

Through the updated service standards provided in Appendix B, the maximum D.C. allowed to be recovered for Parks and Recreation is $273.11 million. This ceiling is in well in excess of the growth-related capital needs.

Based on the City's 2019 D.C. Study, as the predominant users of parks and recreation tend to be residents of the City, the forecasted growth-related costs have been allocated 95% to residential and 5% to non-residential.

Figure 4-3
City of Hamilton
Parks and Recreation Capital – Update
Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
1	John St. N. & Rebecca St. Park - Master Plan Implementation	2019-2022	3,860,000	-		3,860,000	3,319,600		540,400	513,380	27,020
2	Nash Orchard Park	2021-2022	832,000	-		832,000	-		832,000	790,400	41,600
3	Highland Road Park	2020	776,000	-		776,000	-		776,000	737,200	38,800
4	Highbury Meadows North Park	2020	703,000	-		703,000	-		703,000	667,850	35,150
5	Cherry Beach Lakefront Park	2021	969,000	-		969,000	-		969,000	920,550	48,450
6	The Crossings Park	2022	838,000	-		838,000	-		838,000	796,100	41,900
7	Brooks at Rymal Park	2020	883,000	-		883,000	-		883,000	838,850	44,150
8	Lancaster Heights Park	2020	675,000	-		675,000	-		675,000	641,250	33,750
9	Fletcher Road Parkette	2022	191,000	-		191,000	-		191,000	181,450	9,550
10	Ancaster Meadows Park	2019	641,000	-		641,000	-		641,000	608,950	32,050
11	Parkside Hills Park	2022	607,000	-		607,000	-		607,000	576,650	30,350
12	Clear Skies proposed park	2023-2024	978,000	-		978,000	-		978,000	929,100	48,900
13	Gatesbury Park Upgrades - New fitness area, skateboard feature and basketball	2019-2021	498,000	-		498,000	498,000		-	-	-
14	Meadowlands Community Park Spraypad	2019-2020	475,000	-		475,000	237,500		237,500	225,625	11,875
15	Broughton West Park Upgrade for New Spray Pad	2021-2022	475,000	-		475,000	237,500		237,500	225,625	11,875
16	Alexander Park - Upgrade for new skate park	2019	532,000	-		532,000	266,000		266,000	252,700	13,300
17	Mcquesten Park - Additional Fitness Equipment	2020	270,000	-		270,000	135,000		135,000	128,250	6,750
18	Waterfalls Viewing - Albion Falls New Access on South Side	2019	1,320,000	-		1,320,000	660,000		660,000	627,000	33,000
19	Chedoke Falls - New Access to Upper and Lower Falls	2019-2022	4,528,000	-		4,528,000	2,264,000		2,264,000	2,150,800	113,200
20	Skateboard Study Implementation at Various Locations Throughout the City	2019-2028	11,190,000	6,714,000		4,476,000	-		4,476,000	4,252,200	223,800
21	Johnson Tew New Arboretum	2019-2021	150,000	-		150,000	75,000		75,000	71,250	3,750
22	Billy Sherring - Class C Field Replace & Upgrade to Class A Artificial	2027	1,200,000	1,115,700		84,300	84,300		-	-	-

Figure 4-3 Continued
City of Hamilton
Parks and Recreation Capital – Update
Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
23	Waterford Park	2019-2022	1,122,000	-		1,122,000	561,000		561,000	532,950	28,050
24	Summit Park Phase 10 Binbrook	2019	500,000	-		500,000	-		500,000	475,000	25,000
25	William Connell Toboggan Hill	2022	1,224,000	-		1,224,000	-		1,224,000	1,162,800	61,200
26	William Connell Play Structure, Parking Lot, Landscaping	2028	1,700,000	1,598,000		102,000	-		102,000	96,900	5,100
27	Roxborough Park	2019	765,000	-		765,000	765,000		-	-	-
28	Provision for Elfrida Park Developments (8 neighbourhood parks & 1 community park)	2023-2028	7,710,200	-		7,710,200	-		7,710,200	7,324,690	385,510
29	Waterdown South Skinner Park (Asset ID 1013)	2019	624,000	-		624,000	-		624,000	592,800	31,200
30	Waterdown South Parkette 2 Water Tower (Asset ID 30)	2023	174,000	-		174,000	-		174,000	165,300	8,700
31	Waterdown South Parkette 1 (Asset ID 54) Skinner Road and Burke Avenue	2021	157,000	-		157,000	-		157,000	149,150	7,850
32	Waterdown South Smoky Hollow Park (Asset ID 72)	2021	676,000	-		676,000	-		676,000	642,200	33,800
33	Waterdown South Parkette 3 (Asset ID 71)	2023	82,000	-		82,000	-		82,000	77,900	4,100
34	Bookjans West Park	2019	570,000	-		570,000	-		570,000	541,500	28,500
35	Heritage Green Community Sports Park - Future Phases	2021-2023	2,405,000	-		2,405,000	-		2,405,000	2,284,750	120,250
36	Brian Timmis Field Development - Stadium Precinct Park	2020-2021	8,657,000	-		8,657,000	4,946,900		3,710,100	3,524,595	185,505
37	Fruitland/Winona Parkland Development	2023	1,237,000	-		1,237,000	-		1,237,000	1,175,150	61,850
38	Red Hill Phase 3 & 4 Park	2019	650,000	-		650,000	-		650,000	617,500	32,500
39	Spencer Creek Estates	2020	340,000	-		340,000	-		340,000	323,000	17,000
40	Lewis Road Park (Winona)	2019-2021	700,000	-		700,000	-		700,000	665,000	35,000
41	Confederation Park - Little Squirt Works & Area Redevelopment	2019-2020	1,530,000	-		1,530,000	765,000		765,000	726,750	38,250

Figure 4-3 Continued
City of Hamilton
Parks and Recreation Capital – Update
Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
42	Confederation Park - Sports Park Development - Phase 2 (Natural play area, tree planting)	2020	4,243,000	2,291,200		1,951,800	424,300		1,527,500	1,451,125	76,375
43	Confederation Park - Central Village - Pkg. Lot & Roadways, Phase 1	2029-2036	3,366,000	3,366,000		-	-		-	-	-
44	Confederation Park - Sports Park Development - Phase 3 (Picnic areas and shelter, parking lot lighting, tree planting, site furniture)	2020	803,000	433,600		369,400	80,300		289,100	274,645	14,455
45	Confederation Park - Central Village - Public Realm & Square	2029-2036	2,805,000	2,805,000		-	-		-	-	-
46	Confederation Park - West Entrance and Naturalizing the Go Karts Site	2021-2026	612,000	-		612,000	-		612,000	581,400	30,600
47	Confederation Park - Internal Trail Between Central Village and Beaches Grill	2029-2036	204,000	204,000		-	-		-	-	-
48	Confederation Park - Boardwalk to Beach	2021-2026	459,000	275,400		183,600	-		183,600	174,420	9,180
49	Confederation Park - General Trail Upgrades	2021-2026	204,000	61,200		142,800	102,000		40,800	38,760	2,040
50	Confederation Park - Group Picnic Area	2029-2036	561,000	280,500		280,500	280,500		-	-	-
51	Confederation Park - Central Parking Lot & Volleyball Centre Area	2029-2036	357,000	357,000		-	-		-	-	-
52	Confederation Park Soccer Field Area	2021-2026	51,000	36,700		14,300	5,100		9,200	8,740	460
53	Confederation Park - Wild Waterworks Property Upgrades	2021-2026	408,000	122,400		285,600	204,000		81,600	77,520	4,080
54	Confederation Park - Woodland Restoration - Phase 1	2021-2026	408,000	122,400		285,600	204,000		81,600	77,520	4,080
55	Confederation Park - Woodland Restoration - Phase 2	2029-2036	408,000	204,000		204,000	204,000		-	-	-
56	Confederation Park - Van Wagners Marsh Upgrades Phase 1	2021-2026	408,000	122,400		285,600	204,000		81,600	77,520	4,080

Figure 4-3 Continued
City of Hamilton
Parks and Recreation Capital – Update
Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
57	Confederation Park - Van Wagners Marsh Upgrades Phase 2	2029-2036	408,000	204,000		204,000	204,000		-	-	-
58	Confederation Park - Signage - Phase 2	2021-2026	255,000	-		255,000	-		255,000	242,250	12,750
59	Confederation Park - Park Corridor Upgrades along Van Wagners Beach Road	2021-2026	612,000	-		612,000	-		612,000	581,400	30,600
60	Confederation Park - Lighting along Strip	2021-2026	561,000	-		561,000	-		561,000	532,950	28,050
61	Confederation Park - Pumping station, sanitary forcemain, and electrical servicing for Lakeland area	2021-2026	918,000	-		918,000	-		918,000	872,100	45,900
62	Confederation Park - Public Art & Site Work - Centennial Pkwy Entrance	2029-2036	612,000	612,000		-	-		-	-	-
63	Confederation Park - Centennial Intersection & Entrance	2029-2036	4,998,000	4,998,000		-	-		-	-	-
64	Confederation Park - Primary infrastructure for servicing the central village and ice skating facility	2029-2036	2,193,000	2,193,000		-	-		-	-	-
65	Confederation Park - Services for Adventure Village Expansion	2029-2036	153,000	153,000		-	-		-	-	-
66	West Harbour Parkland Development - Gas Dock and Marina Services	2019	1,200,000	-		1,200,000	600,000		600,000	570,000	30,000
67	West Harbour Pier 5-7 Marina Shoreline Rehab (HWT) (Additional funds)	2019	810,000	-		810,000	202,500		607,500	577,125	30,375
68	West Harbour Pier 5-7 Boardwalk (HWT)	2019-2021	7,325,000	-		7,325,000	1,831,300		5,493,700	5,219,015	274,685
69	West Harbour Pier 6 Artisan Village (HWT)	2021-2021	4,170,000	-		4,170,000	2,085,000		2,085,000	1,980,750	104,250
70	West Harbour Pier 7 Commercial Village (HWT)	2019	3,050,000	-		3,050,000	1,525,000		1,525,000	1,448,750	76,250
71	West Harbour Pier 8 Shorewall Rehab	2019-2028	16,575,000	5,635,500		10,939,500	9,945,000		994,500	944,775	49,725

Figure 4-3 Continued
City of Hamilton
Parks and Recreation Capital – Update
Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
72	West Harbour Macassa Bay - Shoreline Improvements	2019-2028	5,305,000	3,381,900		1,923,100	1,326,300		596,800	566,960	29,840
73	West Harbour Macassa Bay Boardwalk and Trail	2019-2028	7,000,000	4,462,500		2,537,500	1,750,000		787,500	748,125	39,375
74	West Harbour Pier 8 Greenway	2021-2028	1,235,000	629,900		605,100	494,000		111,100	105,545	5,555
75	West HarbourBayfront Park Upgrades Phase 3 (Entrance Fountain)	2021-2028	780,000	165,800		614,200	585,000		29,200	27,740	1,460
76	West Harbour - Bayview Park Remediation and Redevelopment	2021-2028	2,275,000	966,900		1,308,100	1,137,500		170,600	162,070	8,530
	Trails			-			-				
77	Ancaster Creek Trail	2023	920,500	-		920,500	-		920,500	874,475	46,025
78	Churchill Park Trail	2020-2022	381,000	-		381,000	-		381,000	361,950	19,050
79	Chedoke Rail Trail Extension	2029-2030	240,300	240,300		-	-		-	-	-
80	Chedoke Rail Trail, Claremont Link	2029-2030	245,200	245,200		-	-		-	-	-
81	Glenburn Court - Battlefield Creek Trail	2024	235,100	-		235,100	-		235,100	223,345	11,755
82	Sam Manson Park Trail	2020	104,200	-		104,200	-		104,200	98,990	5,210
83	Park Trail Connections - Upper James St. to Limeridge Mall Hydro Corridor Trail	2027-2031	969,600	436,300		533,300	484,800		48,500	46,075	2,425
84	First Road West Link	2021-2022	376,200	-		376,200	-		376,200	357,390	18,810
85	Heritage Green Sports Park Link	2022	200,000	-		200,000	-		200,000	190,000	10,000
86	Summerlea West Park - Fletcher Road Parkette Link	2027	687,000	618,300		68,700	-		68,700	65,265	3,435
87	Filman Road Link - North Segment	2022	275,900	-		275,900	-		275,900	262,105	13,795
88	Filman Road Link - South Segment	2022	539,700	-		539,700	-		539,700	512,715	26,985
89	Meadowlands Trail System Links	2020-2024	1,700,000	-		1,700,000	-		1,700,000	1,615,000	85,000
90	Tollgate Drive Link	2030	259,400	259,400		-	-		-	-	-
91	Spencer Creek, Main Street and Thorpe Street Link	2029-2031	3,731,000	3,731,000		-	-		-	-	-
92	Spencer Creek, Mercer Street and Governor's Road Lin	2029-2031	710,300	710,300		-	-		-	-	-
93	Cascade Trail Link	2029-2031	313,500	313,500		-	-		-	-	-
94	Dundas Valley Link	2029-2031	1,138,000	1,138,000		-	-		-	-	-

Figure 4-3 Continued
City of Hamilton
Parks and Recreation Capital – Update
Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
91	Spencer Creek, Main Street and Thorpe Street Link	2029-2031	3,731,000	3,731,000		-	-		-	-	-
92	Spencer Creek, Mercer Street and Governor's Road Lin	2029-2031	710,300	710,300		-	-		-	-	-
93	Cascade Trail Link	2029-2031	313,500	313,500		-	-		-	-	-
94	Dundas Valley Link	2029-2031	1,138,000	1,138,000		-	-		-	-	-
95	Borer's Creek Trail Link	2027	786,200	629,000		157,200	-		157,200	149,340	7,860
96	Waterdown Pipeline Trail Link	2019-2020	422,000	-		422,000	211,000		211,000	200,450	10,550
97	Parkside Drive - Robson Link	2019	181,500	-		181,500	-		181,500	172,425	9,075
98	Highway 5 - Mountain Brow Road Link	2019	600,000	-		600,000	-		600,000	570,000	30,000
99	East Mountain Trail Loop	2019-2020	854,000	-		854,000	811,300		42,700	40,565	2,135
100	Joe Sam's New Trail Connection Through the Park	2019-2020	100,000	-		100,000	-		100,000	95,000	5,000
101	Confederation Park - Growth Related Debt Interest (Discounted)	2019-2034	1,573,689	722,300		851,389	-		851,389	808,820	42,569
102	Reserve Fund Adjustment		3,984,856	-		3,984,856	-		3,984,856	3,785,613	199,243
	Total		**160,675,345**	**52,555,600**	**-**	**108,119,745**	**39,715,700**	**-**	**68,404,045**	**64,983,843**	**3,420,202**

Figure 4-4
City of Hamilton
Parks and Recreation Capital – Update
Indoor Recreation, Buildings in Parks, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
1	Valley Park Community Centre Expansion	2019-2021	1,800,000	-		1,800,000	180,000		1,620,000	1,539,000	81,000
2	Norman Pinky Lewis Recreation Centre Expansion	2023-2025	6,600,000	-		6,600,000	3,300,000		3,300,000	3,135,000	165,000
3	Winona Community Centre	2022-2024	26,500,000	-		26,500,000	-		26,500,000	25,175,000	1,325,000
4	Elfrida Community Centre	2027-2036	27,500,000	22,000,000		5,500,000	-		5,500,000	5,225,000	275,000
5	Binbrook Community Centre	2028	27,500,000	14,025,000		13,475,000	-		13,475,000	12,801,250	673,750
6	Sackville Expansion	2026	6,700,000	-		6,700,000	-		6,700,000	6,365,000	335,000
7	Waterdown Community Centre	2025-2027	27,000,000	-		27,000,000	-		27,000,000	25,650,000	1,350,000
8	Riverdale Community Hub & Domenic Agostino Riverdale Community Centre Expansion	2020-2022	11,000,000	-		11,000,000	-		11,000,000	10,450,000	550,000
9	Riverdale Community Hub & Domenic Agostino Riverdale Community Centre Expansion - Growth Related Debt Interest (Discounted)	2023-2038	1,436,413	-		1,436,413	-		1,436,413	1,364,592	71,821
10	William Connell Park Washroom and changeroom Facilities (under construction)	2019	3,700,000	-		3,700,000	-		3,700,000	3,515,000	185,000
11	Sir Wilfrid Laurier Gymnasium	2020-2021	8,650,000	-		8,650,000	-		8,650,000	8,217,500	432,500
12	Sir Wilfrid Laurier Gymnasium - Growth Related Debt Interest (Discounted)	2022-2037	1,488,247	-		1,488,247	-		1,488,247	1,413,835	74,412
13	Mt. Hope new Rec Centre	2025-2028	4,850,000	-		4,850,000	-		4,850,000	4,607,500	242,500
14	William Connell Ward 8 Ice Loop	2028	4,360,000	-		4,360,000	-		4,360,000	4,142,000	218,000
15	Ancaster Tennis Bubble	2019-2020	1,000,000	-		1,000,000	-	1,000,000	-	-	-

Figure 4-4 Continued
City of Hamilton
Parks and Recreation Capital – Update
Indoor Recreation, Buildings in Parks, Vehicles & Equipment

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
16	Parkdale Outdoor Pool Washroom & Changeroom	2019-2021	3,000,000	-		3,000,000	2,640,000		360,000	342,000	18,000
17	Dundas Valley Washroom	2019	565,000	-		565,000	-		565,000	536,750	28,250
18	Durand Park Washroom Building	2019	325,000	-		325,000	-		325,000	308,750	16,250
19	Stadium Precinct Park Fieldhouses & Washrooms	2020	5,200,000	-		5,200,000	-		5,200,000	4,940,000	260,000
20	Confederation Park - Sports Park Buildings Phase 1: Gatehouse	2019	700,000	-		700,000	-		700,000	665,000	35,000
21	Confederation Park - Sports Park Buildings Phase 2: Fieldhouse and Staff Works Yard	2020-2024	5,500,000	-		5,500,000	-		5,500,000	5,225,000	275,000
22	Confederation Park - Ice skating rink/loop, field house & zamboni	2027-2036	3,570,000	-		3,570,000	-		3,570,000	3,391,500	178,500
23	West Harbour Washroom/Concession	2021-2022	1,000,000	-		1,000,000	500,000		500,000	475,000	25,000
24	Reserve Fund Adjustment						6,112,363		(6,112,363)	(5,806,745)	(305,618)
	Total		**179,944,660**	**36,025,000**	**-**	**143,919,660**	**12,732,363**	**1,000,000**	**130,187,297**	**123,677,932**	**6,509,365**

4.4 Library Services

With respect to library services, adjustments have been made to reflect the removal of the mandatory 10% deduction. Figure 4-5 provides the capital project listing with the removal of the mandatory deduction.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for Library provide a D.C. ceiling of approximately $29.64 million. Given that the capital program is $28.66 million, the D.C.-eligible capital amounts are within the level of service ceiling. In addition to the capital program, outstanding debt of $1.55 million is also included in the D.C. calculations.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 95% residential and 5% non-residential. This is to acknowledge that although library usage is predominantly residential based, there is some use of the facilities by non-residential users.

Figure 4-5
City of Hamilton
Library Services – Updated Capital Listing

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
	Facilities:										
1	South Mountain Complex - Turner Park - Debt Principal (Discounted)	2019-2023	1,129,104	-		1,129,104	-		1,129,104	1,072,648	56,455
2	South Mountain Complex - Turner Park - Debt Interest (Discounted)	2019-2023	94,210	-		94,210	-		94,210	89,500	4,711
3	Binbrook Expansion Growth Related Debt Principal	2020-2035	2,016,500	-		2,016,500	998,000		1,018,500	967,575	50,925
4	Binbrook Expansion Growth Related Debt Interest (Discounted)	2020-2035	243,530	-		243,530	-		243,530	231,353	12,176
5	Valley Park - Expansion & Renovation - Construction*	2020	6,452,000	-		6,452,000	262,000	1,250,000	4,940,000	4,693,000	247,000
6	Valley Park - Furnishings for Expansion	2020	1,347,000	-		1,347,000	-		1,347,000	1,279,650	67,350
7	Valley Park - Expansion - Growth Related Debt Interest (Discounted)	2020-2035	1,215,970	-		1,215,970	-		1,215,970	1,155,171	60,798
8	Winona/Stoney Creek - New - Furnishings for New Facility	2024-2025	1,000,000	-		1,000,000	-		1,000,000	950,000	50,000
9	Winona/Stoney Creek - New - Construction (Estimated 9,000 sq. ft.)	2024-2025	5,000,000	-		5,000,000	-		5,000,000	4,750,000	250,000
10	Mount Hope - Replacement & Expansion - Construction (Estimated 5,000 sq. ft.)	2022-2023	3,500,000	-		3,500,000	1,841,400		1,658,600	1,575,670	82,930
11	Mount Hope - New - Furnishings for Expansion	2022-2023	500,000	-		500,000	-		500,000	475,000	25,000
12	Ancaster - Expansion - Construction (estimated 20,000 sq. ft.)	2024	8,500,000	-		8,500,000	5,590,000		2,910,000	2,764,500	145,500
13	Ancaster Furnishings for Expansion	2024	1,500,000	-		1,500,000	-		1,500,000	1,425,000	75,000
14	Greensville - New Library	2019	2,434,000	-		2,434,000	1,789,700		644,300	612,085	32,215
15	Greensville - Furnishings	2019	441,000	-		441,000	-		441,000	418,950	22,050
16	Carlisle - Replacement/Renovation	2020	2,500,000	-		2,500,000	2,500,000		-	-	-
17	Lower City New/Expanded Library (Estimated 8,000 sq. ft.)	2025	5,241,000	4,297,600		943,400	-		943,400	896,230	47,170

Figure 4-5 Continued
City of Hamilton
Library Services – Updated Capital Listing (cont'd)

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 95%	Non-Residential Share 5%
	Facilities:										
18	Elfrida - New Branch (Estimated 12,000 sq. ft.)	2030	7,000,000	7,000,000		-	-		-	-	-
19	Central Library - Phase IV - Local History & Archives - Renovations	2022	1,500,000	-		1,500,000	1,500,000		-	-	-
20	New Permanent Location For Red Hill (Estimated 15,000 sq. ft.)	2025	8,000,000	1,417,000		6,583,000	6,272,000		311,000	295,450	15,550
21	Saltfleet Move to Stoney Creek (Estimated 15,000 sq. ft.)	2025	8,000,000	1,498,700		6,501,300	6,172,300		329,000	312,550	16,450
22	New North End Branch (Estimated 8,000 sq. ft.)	2025	5,500,000	4,510,000		990,000	-		990,000	940,500	49,500
	Vehicles:										
23	Bookmobile - Electronic	2020	550,000	-		550,000	-		550,000	522,500	27,500
	Collection Materials:										
24	Valley Park - Expansion - Materials	2020	1,272,300	-		1,272,300	-		1,272,300	1,208,685	63,615
25	Winona/Stoney Creek - New - Materials	2024-2025	405,200	-		405,200	-		405,200	384,940	20,260
26	Mount Hope Materials	2022-2023	396,400	-		396,400	-		396,400	376,580	19,820
27	Ancaster Materials	2024	593,600	-		593,600	-		593,600	563,920	29,680
28	Greensville Materials	2019	121,700	-		121,700	-		121,700	115,615	6,085
29	Carlisle Materials	2020	125,000	-		125,000	-		125,000	118,750	6,250
30	Expanded Lower City Branch Materials	2025	262,050	214,900		47,150	-		47,150	44,793	2,358
31	Red Hill Permanent Location Materials	2025	620,000	508,400		111,600	-		111,600	106,020	5,580
32	Saltfleet - Expansion - Materials	2025	620,400	508,700		111,700	-		111,700	106,115	5,585
33	New North End Branch Materials	2025	400,000	328,000		72,000	-		72,000	68,400	3,600
	Reserve Fund Adjustment:										
34	Reserve Fund Adjustment		189,220	-		189,220	-		189,220	179,759	9,461
	Total		**78,670,183**	**20,283,300**	**-**	**58,386,883**	**26,925,400**	**1,250,000**	**30,211,483**	**28,700,909**	**1,510,574**

4.5 Growth Studies

A change brought forth through the Bill-197 amended legislation concerned classes of services. A class of service may be composed of any number or combination of services and may include parts or portions of each D.C.-eligible service. Section 7 of the D.C.A. states that a D.C. by-law may provide for any D.C.-eligible service or the capital costs with respect to those services. These provisions allow for services to be grouped together to create a class for the purposes of the D.C. by-law and D.C. reserve funds.

In addition, Section 7(3) of the D.C.A. states that:

> "For greater certainty, a development charge by-law may provide for a class consisting of studies in respect of any service listed in subsection 2 (4) whose capital costs are described in paragraphs 5 and 6 of subsection 5 (3)."

As a result of these changes to the D.C.A., this update study provides for the former "Administrative Studies – Community Based Studies" and "Administrative Studies – Engineering Services Studies" to be combined and categorized as a class of services entitled "Growth Studies." Growth Studies provide for studies comprised of the following services:

- Water Services;
- Wastewater Services;
- Stormwater Drainage and Control Services;
- Services Related to a Highway;
- Fire Protection Services;
- Policing Services
- Ambulance Services (formerly referred to as Paramedics);
- Transit Services;
- Waste Diversion;
- Parks and Recreation Services;
- Library Services;
- Long Term Care;
- Public Health;
- Child Care and Early Years;

- Housing Services; and
- P.O.A.

Figure 4-6 depicts how the costs of capital projects are allocated across the services. For planning related studies, a deduction of 10% has been applied to recognize the extent to which some studies relate to non-D.C.-eligible services. Most planning studies, along with development charge studies, have been allocated to the class of based on the proportion of the total net growth-related capital costs for each service included in the D.C. background study, in the following manner:

- Water Services – 11.15%
- Wastewater Services – 22.13%
- Stormwater Services – 17.06%
- Services Related to a Highway – 30.68%
- Policing Services – 1.26%
- Fire Protection Services – 1.11%
- Ambulance Services – 0.19%
- Transit Services – 3.54%
- Waste Diversion – 1.02%
- Parks and Recreation – 9.24%
- Library Services – 1.4%
- Long-Term Care – 0.23%
- Public Health – 0.00%
- Child Care and Early Years – 0.02%
- Housing Services – 0.87%
- P.O.A. 0.07%

Other studies, such as joint water & wastewater studies, have been split 50%/50% to each service, studies related to water, wastewater, stormwater, and roads have been allocated 25% to each service, and other studies have been shared based on the proportionate amount of growth-related capital associated with the services that benefit from the studies.

In updating the list of studies to be included for this D.C. update, the parking related study was removed as mentioned in section 4.1 above. In addition, there were a number of studies included in the 2019 D.C. study that have been removed as they do

not specifically relate to a service on the revised eligible list of services. Finally, the cost of undertaking this D.C. update process was included.

In addition to the classification as a class of service, and allocation of studies between eligible services, the mandatory 10% deduction has been removed for non-planning related studies. The total revised growth-related capital costs included in the updated D.C. calculations equal $16.06 million.

The capital costs have been allocated 63% residential and 37% non-residential based on the incremental growth in population to employment for the 10-year forecast period, consistent with the 2019 D.C. Background Study.

Figure 4-6
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
1	**Development Charge Study**											
1a	Development Charge Study	Water Services	2019	81,470	-		81,470	-		81,470	51,326	30,144
1b	Development Charge Study	Wastewater Services	2019	161,710	-		161,710	-		161,710	101,877	59,833
1c	Development Charge Study	Stormwater Drainage and Control Services	2019	124,710	-		124,710	-		124,710	78,567	46,143
1d	Development Charge Study	Services Related to a Highway	2019	224,230	-		224,230	-		224,230	141,265	82,965
1e	Development Charge Study	Policing Services	2019	9,220	-		9,220	-		9,220	5,809	3,411
1f	Development Charge Study	Fire Protection Services	2019	8,120	-		8,120	-		8,120	5,116	3,004
1g	Development Charge Study	Ambulance Services	2019	1,400	-		1,400	-		1,400	882	518
1h	Development Charge Study	Transit Services	2019	25,880	-		25,880	-		25,880	16,304	9,576
1i	Development Charge Study	Waste Diversion Services	2019	7,480	-		7,480	-		7,480	4,712	2,768
1j	Development Charge Study	Parks & Recreation Services	2019	67,520	-		67,520	-		67,520	42,538	24,982
1k	Development Charge Study	Library Services	2019	10,250	-		10,250	-		10,250	6,458	3,792
1l	Development Charge Study	Long-Term Care	2019	1,720	-		1,720	-		1,720	1,084	636
1m	Development Charge Study	Public Health	2019	30	-		30	-		30	19	11
1n	Development Charge Study	Child Care and Early Years	2019	140	-		140	-		140	88	52
1o	Development Charge Study	Housing Services	2019	6,380	-		6,380	-		6,380	4,019	2,361
1p	Development Charge Study	Provincial Offences Act	2019	540	-		540	-		540	340	200
	Sub-Total			**730,800**	**-**	**-**	**730,800**	**-**	**-**	**730,800**	**460,404**	**270,396**
2	**Development Charge Study Update**											
2a	Development Charge Study Update	Water Services	2021	5,570	-		5,570	-		5,570	3,509	2,061
2b	Development Charge Study Update	Wastewater Services	2021	11,060	-		11,060	-		11,060	6,968	4,092
2c	Development Charge Study Update	Stormwater Drainage and Control Services	2021	8,530	-		8,530	-		8,530	5,374	3,156
2d	Development Charge Study Update	Services Related to a Highway	2021	15,340	-		15,340	-		15,340	9,664	5,676
2e	Development Charge Study Update	Policing Services	2021	630	-		630	-		630	397	233
2f	Development Charge Study Update	Fire Protection Services	2021	560	-		560	-		560	353	207
2g	Development Charge Study Update	Ambulance Services	2021	100	-		100	-		100	63	37
2h	Development Charge Study Update	Transit Services	2021	1,770	-		1,770	-		1,770	1,115	655
2i	Development Charge Study Update	Waste Diversion Services	2021	510	-		510	-		510	321	189
2j	Development Charge Study Update	Parks & Recreation Services	2021	4,620	-		4,620	-		4,620	2,911	1,709
2k	Development Charge Study Update	Library Services	2021	700	-		700	-		700	441	259
2l	Development Charge Study Update	Long-Term Care	2021	120	-		120	-		120	76	44
2m	Development Charge Study Update	Public Health	2021	-	-		-	-		-	-	-
2n	Development Charge Study Update	Child Care and Early Years	2021	10	-		10	-		10	6	4
2o	Development Charge Study Update	Housing Services	2021	440	-		440	-		440	277	163
2p	Development Charge Study Update	Provincial Offences Act	2021	40	-		40	-		40	25	15
	Sub-Total			**50,000**	**-**	**-**	**49,998**	**-**	**-**	**50,000**	**31,500**	**18,500**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
3	**Development Charge Study (to 2041)**											
3a	Development Charge Study (to 2041)	Water Services	2023	81,470	-		81,470	-		81,470	51,326	30,144
3b	Development Charge Study (to 2041)	Wastewater Services	2023	161,710	-		161,710	-		161,710	101,877	59,833
3c	Development Charge Study (to 2041)	Stormwater Drainage and Control Services	2023	124,710	-		124,710	-		124,710	78,567	46,143
3d	Development Charge Study (to 2041)	Services Related to a Highway	2023	224,230	-		224,230	-		224,230	141,265	82,965
3e	Development Charge Study (to 2041)	Policing Services	2023	9,220	-		9,220	-		9,220	5,809	3,411
3f	Development Charge Study (to 2041)	Fire Protection Services	2023	8,120	-		8,120	-		8,120	5,116	3,004
3g	Development Charge Study (to 2041)	Ambulance Services	2023	1,400	-		1,400	-		1,400	882	518
3h	Development Charge Study (to 2041)	Transit Services	2023	25,880	-		25,880	-		25,880	16,304	9,576
3i	Development Charge Study (to 2041)	Waste Diversion Services	2023	7,480	-		7,480	-		7,480	4,712	2,768
3j	Development Charge Study (to 2041)	Parks & Recreation Services	2023	67,520	-		67,520	-		67,520	42,538	24,982
3k	Development Charge Study (to 2041)	Library Services	2023	10,250	-		10,250	-		10,250	6,458	3,792
3l	Development Charge Study (to 2041)	Long-Term Care	2023	1,720	-		1,720	-		1,720	1,084	636
3m	Development Charge Study (to 2041)	Public Health	2023	30	-		30	-		30	19	11
3n	Development Charge Study (to 2041)	Child Care and Early Years	2023	140	-		140	-		140	88	52
3o	Development Charge Study (to 2041)	Housing Services	2023	6,380	-		6,380	-		6,380	4,019	2,361
3p	Development Charge Study (to 2041)	Provincial Offences Act	2023	540	-		540	-		540	340	200
	Sub-Total			**730,800**	**-**	**-**	**730,790**	**-**	**-**	**730,800**	**460,404**	**270,396**
4	**Development Charge Study**											
4a	Development Charge Study	Water Services	2028	81,470	-		81,470	-		81,470	51,326	30,144
4b	Development Charge Study	Wastewater Services	2028	161,710	-		161,710	-		161,710	101,877	59,833
4c	Development Charge Study	Stormwater Drainage and Control Services	2028	124,710	-		124,710	-		124,710	78,567	46,143
4d	Development Charge Study	Services Related to a Highway	2028	224,230	-		224,230	-		224,230	141,265	82,965
4e	Development Charge Study	Policing Services	2028	9,220	-		9,220	-		9,220	5,809	3,411
4f	Development Charge Study	Fire Protection Services	2028	8,120	-		8,120	-		8,120	5,116	3,004
4g	Development Charge Study	Ambulance Services	2028	1,400	-		1,400	-		1,400	882	518
4h	Development Charge Study	Transit Services	2028	25,880	-		25,880	-		25,880	16,304	9,576
4i	Development Charge Study	Waste Diversion Services	2028	7,480	-		7,480	-		7,480	4,712	2,768
4j	Development Charge Study	Parks & Recreation Services	2028	67,520	-		67,520	-		67,520	42,538	24,982
4k	Development Charge Study	Library Services	2028	10,250	-		10,250	-		10,250	6,458	3,792
4l	Development Charge Study	Long-Term Care	2028	1,720	-		1,720	-		1,720	1,084	636
4m	Development Charge Study	Public Health	2028	30	-		30	-		30	19	11
4n	Development Charge Study	Child Care and Early Years	2028	140	-		140	-		140	88	52
4o	Development Charge Study	Housing Services	2028	6,380	-		6,380	-		6,380	4,019	2,361
4p	Development Charge Study	Provincial Offences Act	2028	540	-		540	-		540	340	200
	Sub-Total			**730,800**	**-**	**-**	**730,790**	**-**	**-**	**730,800**	**460,404**	**270,396**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
	Water & Wastewater Studies:											
5a	Integrated Water and Wastewater Master Plan	Water Services	2019-2028	750,000	-		750,000	-		750,000	472,500	277,500
5b	Integrated Water and Wastewater Master Plan	Wastewater Services	2019-2028	750,000	-		750,000	-		750,000	472,500	277,500
6a	Water and Sanitary Sewer Models	Water Services	2019-2028	65,000	-		65,000	32,500		32,500	20,475	12,025
6b	Water and Sanitary Sewer Models	Wastewater Services	2019-2028	65,000	-		65,000	32,500		32,500	20,475	12,025
7a	Centennial Secondary Plan - Servicing Study	Water Services	2019-2028	100,000	-		100,000	-		100,000	63,000	37,000
7b	Centennial Secondary Plan - Servicing Study	Wastewater Services	2019-2028	100,000	-		100,000	-		100,000	63,000	37,000
	Transit Studies:											
8	Hamilton West Interregional Transit Terminal Location Study	Transit Services	2019-2022	84,300	-		84,300	75,900		8,400	5,292	3,108
9	Rapid Ready & 10 Year Strategy Review	Transit Services	2019-2028	150,000	-		150,000	75,000		75,000	47,250	27,750
10	James Mountain Road - Transit only Roadway Feasibility Study	Transit Services	2020-2023	112,400	-		112,400	56,200		56,200	35,406	20,794
	Future Transit Hubs and Stations:											
11	SCUBE Transit Terminal Study	Transit Services	2019	242,400	-		242,400	-		242,400	152,712	89,688
	Operations Facilities:											
12	Yards Need Study											
12a	Yards Need Study	Water Services	2025-2028	20,230	-		20,230	-		20,230	12,745	7,485
12b	Yards Need Study	Wastewater Services	2025-2028	40,460	-		40,460	-		40,460	25,490	14,970
12c	Yards Need Study	Stormwater Drainage and Control Services	2025-2028	30,350	-		30,350	-		30,350	19,121	11,229
12d	Yards Need Study	Services Related to a Highway	2025-2028	53,950	-		53,950	-		53,950	33,989	19,961
12e	Yards Need Study	Parks & Recreation Services	2025-2028	16,870	-		16,870	-		16,870	10,628	6,242
12f	Yards Need Study	Transit Services	2025-2028	6,740	-		6,740	-		6,740	4,246	2,494
	Sub-Total			**168,600**	**-**	**-**	**168,600**	**-**	**-**	**168,600**	**106,219**	**62,381**
	Police:											
13	Police - Space Needs Study (GRIDS II)	Policing Services	2019	56,200	-		56,200	-		56,200	35,406	20,794
14	Police Business Plan	Policing Services	2019	32,000	-		32,000	24,000		8,000	5,040	2,960
15	Police Business Plan	Policing Services	2022	32,000	-		32,000	24,000		8,000	5,040	2,960
16	Police Business Plan	Policing Services	2025	32,000	-		32,000	24,000		8,000	5,040	2,960
17	Police Business Plan	Policing Services	2028	32,000	-		32,000	24,000		8,000	5,040	2,960
	Waste Diversion:											
18	Waste Management Research & Development Program	Waste Diversion Services	2019-2023	1,229,100	-	245,820	983,280	882,500		100,780	63,491	37,289
19	Waste Management Research & Development Program	Waste Diversion Services	2024-2028	1,229,100	-	245,820	983,280	882,500		100,780	63,491	37,289
20	Solid Waste Management Master Plan Approvals	Waste Diversion Services	2019-2021	561,000	-	140,250	420,750	63,100		357,650	225,320	132,330
	Library Studies:											
21	Library Master Plan	Library Services	2022	25,000	-		25,000	6,300		18,700	11,781	6,919
22	Service Model Master Plan	Library Services	2020	25,000	-		25,000	6,300		18,700	11,781	6,919

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
	Parks:				-							
23	Trails Masterplan Update	Parks & Recreation Services	2021	204,000	-		204,000	51,000		153,000	96,390	56,610
24	Parks Master Plans	Parks & Recreation Services	2019-2023	1,214,200	-		1,214,200	303,600		910,600	573,678	336,922
25	Recreation Studies	Parks & Recreation Services	2019-2023	607,100	-		607,100	151,800		455,300	286,839	168,461
26	Recreation Studies	Parks & Recreation Services	2024-2028	607,100	-		607,100	151,800		455,300	286,839	168,461
27	**Official Plan (Urban and Rural) Review**											
27a	Official Plan (Urban and Rural) Review	Water Services	2019-2021	222,900	-	22,290	200,610	100,300		100,310	63,195	37,115
27b	Official Plan (Urban and Rural) Review	Wastewater Services	2019-2021	442,500	-	44,250	398,250	199,100		199,150	125,465	73,685
27c	Official Plan (Urban and Rural) Review	Stormwater Drainage and Control Services	2019-2021	341,300	-	34,130	307,170	153,600		153,570	96,749	56,821
27d	Official Plan (Urban and Rural) Review	Services Related to a Highway	2019-2021	613,700	-	61,370	552,330	276,200		276,130	173,962	102,168
27e	Official Plan (Urban and Rural) Review	Policing Services	2019-2021	25,200	-	2,520	22,680	11,300		11,380	7,169	4,211
27f	Official Plan (Urban and Rural) Review	Fire Protection Services	2019-2021	22,200	-	2,220	19,980	10,000		9,980	6,287	3,693
27g	Official Plan (Urban and Rural) Review	Ambulance Services	2019-2021	3,800	-	380	3,420	1,700		1,720	1,084	636
27h	Official Plan (Urban and Rural) Review	Transit Services	2019-2021	70,800	-	7,080	63,720	31,900		31,820	20,047	11,773
27i	Official Plan (Urban and Rural) Review	Waste Diversion Services	2019-2021	20,500	-	2,050	18,450	9,200		9,250	5,828	3,422
27j	Official Plan (Urban and Rural) Review	Parks & Recreation Services	2019-2021	184,800	-	18,480	166,320	83,200		83,120	52,366	30,754
27k	Official Plan (Urban and Rural) Review	Library Services	2019-2021	28,100	-	2,810	25,290	12,600		12,690	7,995	4,695
27l	Official Plan (Urban and Rural) Review	Long-Term Care	2019-2021	4,700	-	470	4,230	2,100		2,130	1,342	788
27m	Official Plan (Urban and Rural) Review	Public Health	2019-2021	100	-	10	90	-		90	57	33
27n	Official Plan (Urban and Rural) Review	Child Care and Early Years	2019-2021	400	-	40	360	200		160	101	59
27o	Official Plan (Urban and Rural) Review	Housing Services	2019-2021	17,500	-	1,750	15,750	7,900		7,850	4,946	2,904
27p	Official Plan (Urban and Rural) Review	Provincial Offences Act	2019-2021	1,500	-	150	1,350	700		650	410	240
	Sub-Total			**2,000,000**	**-**	**200,000**	**1,800,000**	**900,000**	**-**	**900,000**	**567,003**	**332,997**
28	**GRIDS/MCR Update**											
28a	GRIDS/MCR Update	Water Services	2019-2020	244,600	-	24,460	220,140	-		220,140	138,688	81,452
28b	GRIDS/MCR Update	Wastewater Services	2019-2020	485,700	-	48,570	437,130	-		437,130	275,392	161,738
28c	GRIDS/MCR Update	Stormwater Drainage and Control Services	2019-2020	374,600	-	37,460	337,140	-		337,140	212,398	124,742
28d	GRIDS/MCR Update	Services Related to a Highway	2019-2020	673,500	-	67,350	606,150	-		606,150	381,875	224,275
28e	GRIDS/MCR Update	Policing Services	2019-2020	27,700	-	2,770	24,930	-		24,930	15,706	9,224
28f	GRIDS/MCR Update	Fire Protection Services	2019-2020	24,400	-	2,440	21,960	-		21,960	13,835	8,125
28g	GRIDS/MCR Update	Ambulance Services	2019-2020	4,200	-	420	3,780	-		3,780	2,381	1,399
28h	GRIDS/MCR Update	Transit Services	2019-2020	77,700	-	7,770	69,930	-		69,930	44,056	25,874
28i	GRIDS/MCR Update	Waste Diversion Services	2019-2020	22,500	-	2,250	20,250	-		20,250	12,758	7,492
28j	GRIDS/MCR Update	Parks & Recreation Services	2019-2020	202,800	-	20,280	182,520	-		182,520	114,988	67,532
28k	GRIDS/MCR Update	Library Services	2019-2020	30,800	-	3,080	27,720	-		27,720	17,464	10,256
28l	GRIDS/MCR Update	Long-Term Care	2019-2020	5,200	-	520	4,680	-		4,680	2,948	1,732
28m	GRIDS/MCR Update	Public Health	2019-2020	100	-	10	90	-		90	57	33
28n	GRIDS/MCR Update	Child Care and Early Years	2019-2020	400	-	40	360	-		360	227	133
28o	GRIDS/MCR Update	Housing Services	2019-2020	19,200	-	1,920	17,280	-		17,280	10,886	6,394
28p	GRIDS/MCR Update	Provincial Offences Act	2019-2020	1,600	-	160	1,440	-		1,440	907	533
	Sub-Total			**2,195,000**	**-**	**219,500**	**1,975,500**	**-**	**-**	**1,975,500**	**1,244,566**	**730,934**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
29	**Residential Intensification Strategy**											
29a	Residential Intensification Strategy	Water Services	2019	18,200	-	1,820	16,380	-		16,380	10,319	6,061
29b	Residential Intensification Strategy	Wastewater Services	2019	36,000	-	3,600	32,400	-		32,400	20,412	11,988
29c	Residential Intensification Strategy	Stormwater Drainage and Control Services	2019	27,700	-	2,770	24,930	-		24,930	15,706	9,224
29d	Residential Intensification Strategy	Services Related to a Highway	2019	50,000	-	5,000	45,000	-		45,000	28,350	16,650
29e	Residential Intensification Strategy	Policing Services	2019	2,100	-	210	1,890	-		1,890	1,191	699
29f	Residential Intensification Strategy	Fire Protection Services	2019	1,800	-	180	1,620	-		1,620	1,021	599
29g	Residential Intensification Strategy	Ambulance Services	2019	300	-	30	270	-		270	170	100
29h	Residential Intensification Strategy	Transit Services	2019	5,800	-	580	5,220	-		5,220	3,289	1,931
29i	Residential Intensification Strategy	Parks & Recreation Services	2019	15,100	-	1,510	13,590	-		13,590	8,562	5,028
	Sub-Total			**157,000**	**-**	**15,700**	**141,300**	**-**	**-**	**141,300**	**89,020**	**52,280**
30	**Digital Planning Application Software/Hardware**											
30a	Digital Planning Application Software/Hardware	Water Services	2019-2022	16,700	-	1,670	15,030	-		15,030	9,469	5,561
30b	Digital Planning Application Software/Hardware	Wastewater Services	2019-2022	33,200	-	3,320	29,880	-		29,880	18,824	11,056
30c	Digital Planning Application Software/Hardware	Stormwater Drainage and Control Services	2019-2022	25,600	-	2,560	23,040	-		23,040	14,515	8,525
30d	Digital Planning Application Software/Hardware	Services Related to a Highway	2019-2022	46,000	-	4,600	41,400	-		41,400	26,082	15,318
30e	Digital Planning Application Software/Hardware	Policing Services	2019-2022	1,900	-	190	1,710	-		1,710	1,077	633
30f	Digital Planning Application Software/Hardware	Fire Protection Services	2019-2022	1,700	-	170	1,530	-		1,530	964	566
30g	Digital Planning Application Software/Hardware	Ambulance Services	2019-2022	300	-	30	270	-		270	170	100
30h	Digital Planning Application Software/Hardware	Transit Services	2019-2022	5,300	-	530	4,770	-		4,770	3,005	1,765
30i	Digital Planning Application Software/Hardware	Waste Diversion Services	2019-2022	1,500	-	150	1,350	-		1,350	851	499
30j	Digital Planning Application Software/Hardware	Parks & Recreation Services	2019-2022	13,900	-	1,390	12,510	-		12,510	7,881	4,629
30k	Digital Planning Application Software/Hardware	Library Services	2019-2022	2,100	-	210	1,890	-		1,890	1,191	699
30l	Digital Planning Application Software/Hardware	Long-Term Care	2019-2022	400	-	40	360	-		360	227	133
30m	Digital Planning Application Software/Hardware	Public Health	2019-2022	-	-	-	-	-		-	-	-
30n	Digital Planning Application Software/Hardware	Child Care and Early Years	2019-2022	-	-	-	-	-		-	-	-
30o	Digital Planning Application Software/Hardware	Housing Services	2019-2022	1,300	-	130	1,170	-		1,170	737	433
30p	Digital Planning Application Software/Hardware	Provincial Offences Act	2019-2022	100	-	10	90	-		90	57	33
	Sub-Total			**150,000**	**-**	**15,000**	**135,000**	**-**	**-**	**135,000**	**85,050**	**49,950**
31	**Planning and Zoning Growth Area**											
31a	Planning and Zoning Growth Area	Water Services	2019-2022	135,500	-	13,550	121,950	-		121,950	76,829	45,121
31b	Planning and Zoning Growth Area	Wastewater Services	2019-2022	268,900	-	26,890	242,010	-		242,010	152,466	89,544
31c	Planning and Zoning Growth Area	Stormwater Drainage and Control Services	2019-2022	207,400	-	20,740	186,660	-		186,660	117,596	69,064
31d	Planning and Zoning Growth Area	Services Related to a Highway	2019-2022	372,800	-	37,280	335,520	-		335,520	211,378	124,142
31e	Planning and Zoning Growth Area	Policing Services	2019-2022	15,300	-	1,530	13,770	-		13,770	8,675	5,095
31f	Planning and Zoning Growth Area	Fire Protection Services	2019-2022	13,500	-	1,350	12,150	-		12,150	7,655	4,495
31g	Planning and Zoning Growth Area	Ambulance Services	2019-2022	2,300	-	230	2,070	-		2,070	1,304	766
31h	Planning and Zoning Growth Area	Transit Services	2019-2022	43,000	-	4,300	38,700	-		38,700	24,381	14,319
31i	Planning and Zoning Growth Area	Waste Diversion Services	2019-2022	12,400	-	1,240	11,160	-		11,160	7,031	4,129
31j	Planning and Zoning Growth Area	Parks & Recreation Services	2019-2022	112,300	-	11,230	101,070	-		101,070	63,674	37,396
31k	Planning and Zoning Growth Area	Library Services	2019-2022	17,000	-	1,700	15,300	-		15,300	9,639	5,661
31l	Planning and Zoning Growth Area	Long-Term Care	2019-2022	2,900	-	290	2,610	-		2,610	1,644	966
31m	Planning and Zoning Growth Area	Public Health	2019-2022	-	-	-	-	-		-	-	-
31n	Planning and Zoning Growth Area	Child Care and Early Years	2019-2022	200	-	20	180	-		180	113	67
31o	Planning and Zoning Growth Area	Housing Services	2019-2022	10,600	-	1,060	9,540	-		9,540	6,010	3,530
31p	Planning and Zoning Growth Area	Provincial Offences Act	2019-2022	900	-	90	810	-		810	510	300
	Sub-Total			**1,215,000**	**-**	**121,500**	**1,093,500**	**-**	**-**	**1,093,500**	**688,905**	**404,595**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
	Secondary Plans and Strategies - Nodes and Corridors:							-				
	Sub-Regional Nodes:											
32	**- Eastgate/Centennial Node**											
32a	- Eastgate/Centennial Node	Water Services	2019-2020	35,700	-	3,570	32,130	21,420		10,710	6,747	3,963
32b	- Eastgate/Centennial Node	Wastewater Services	2019-2020	70,900	-	7,090	63,810	42,540		21,270	13,400	7,870
32c	- Eastgate/Centennial Node	Stormwater Drainage and Control Services	2019-2020	54,700	-	5,470	49,230	32,820		16,410	10,338	6,072
32d	- Eastgate/Centennial Node	Services Related to a Highway	2019-2020	98,300	-	9,830	88,470	58,980		29,490	18,579	10,911
32e	- Eastgate/Centennial Node	Policing Services	2019-2020	4,000	-	400	3,600	2,400		1,200	756	444
32f	- Eastgate/Centennial Node	Fire Protection Services	2019-2020	3,600	-	360	3,240	2,160		1,080	680	400
32g	- Eastgate/Centennial Node	Ambulance Services	2019-2020	600	-	60	540	360		180	113	67
32h	- Eastgate/Centennial Node	Transit Services	2019-2020	11,300	-	1,130	10,170	6,780		3,390	2,136	1,254
32i	- Eastgate/Centennial Node	Waste Diversion Services	2019-2020	3,300	-	330	2,970	1,980		990	624	366
32j	- Eastgate/Centennial Node	Parks & Recreation Services	2019-2020	29,600	-	2,960	26,640	17,760		8,880	5,594	3,286
32k	- Eastgate/Centennial Node	Library Services	2019-2020	4,500	-	450	4,050	2,700		1,350	851	499
32l	- Eastgate/Centennial Node	Long-Term Care	2019-2020	800	-	80	720	480		240	151	89
32m	- Eastgate/Centennial Node	Public Health	2019-2020	-	-	-	-	-		-	-	-
32n	- Eastgate/Centennial Node	Child Care and Early Years	2019-2020	100	-	10	90	60		30	19	11
32o	- Eastgate/Centennial Node	Housing Services	2019-2020	2,800	-	280	2,520	1,680		840	529	311
32p	- Eastgate/Centennial Node	Provincial Offences Act	2019-2020	200	-	20	180	-		180	113	67
	Sub-Total			**320,400**	**-**	**32,040**	**288,360**	**192,200**	**-**	**96,160**	**60,581**	**35,579**
33	**- Limeridge Node**											
33a	- Limeridge Node	Water Services	2019-2020	35,700	-	3,570	32,130	21,420		10,710	6,747	3,963
33b	- Limeridge Node	Wastewater Services	2019-2020	70,900	-	7,090	63,810	42,540		21,270	13,400	7,870
33c	- Limeridge Node	Stormwater Drainage and Control Services	2019-2020	54,700	-	5,470	49,230	32,820		16,410	10,338	6,072
33d	- Limeridge Node	Services Related to a Highway	2019-2020	98,300	-	9,830	88,470	58,980		29,490	18,579	10,911
33e	- Limeridge Node	Policing Services	2019-2020	4,000	-	400	3,600	2,400		1,200	756	444
33f	- Limeridge Node	Fire Protection Services	2019-2020	3,600	-	360	3,240	2,160		1,080	680	400
33g	- Limeridge Node	Ambulance Services	2019-2020	600	-	60	540	360		180	113	67
33h	- Limeridge Node	Transit Services	2019-2020	11,300	-	1,130	10,170	6,780		3,390	2,136	1,254
33i	- Limeridge Node	Waste Diversion Services	2019-2020	3,300	-	330	2,970	1,980		990	624	366
33j	- Limeridge Node	Parks & Recreation Services	2019-2020	29,600	-	2,960	26,640	17,760		8,880	5,594	3,286
33k	- Limeridge Node	Library Services	2019-2020	4,500	-	450	4,050	2,700		1,350	851	499
33l	- Limeridge Node	Long-Term Care	2019-2020	800	-	80	720	480		240	151	89
33m	- Limeridge Node	Public Health	2019-2020	-	-	-	-	-		-	-	-
33n	- Limeridge Node	Child Care and Early Years	2019-2020	100	-	10	90	60		30	19	11
33o	- Limeridge Node	Housing Services	2019-2020	2,800	-	280	2,520	1,680		840	529	311
33p	- Limeridge Node	Provincial Offences Act	2019-2020	200	-	20	180	-		180	113	67
	Sub-Total			**320,400**	**-**	**32,040**	**288,360**	**192,120**	**-**	**96,240**	**60,630**	**35,610**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
	Secondary Plans and Strategies - Nodes and Corridors:							-				
	Sub-Regional Nodes:											
	Corridors:											
34	**- Main/King Corridor (B-Line)**											
34a	- Main/King Corridor (B-Line)	Water Services	2019-2022	33,900	-	3,390	30,510	20,340		10,170	6,407	3,763
34b	- Main/King Corridor (B-Line)	Wastewater Services	2019-2022	67,400	-	6,740	60,660	40,440		20,220	12,739	7,481
34c	- Main/King Corridor (B-Line)	Stormwater Drainage and Control Services	2019-2022	52,000	-	5,200	46,800	31,200		15,600	9,828	5,772
34d	- Main/King Corridor (B-Line)	Services Related to a Highway	2019-2022	93,500	-	9,350	84,150	56,100		28,050	17,672	10,378
34e	- Main/King Corridor (B-Line)	Policing Services	2019-2022	3,800	-	380	3,420	2,280		1,140	718	422
34f	- Main/King Corridor (B-Line)	Fire Protection Services	2019-2022	3,400	-	340	3,060	2,040		1,020	643	377
34g	- Main/King Corridor (B-Line)	Ambulance Services	2019-2022	600	-	60	540	360		180	113	67
34h	- Main/King Corridor (B-Line)	Transit Services	2019-2022	10,800	-	1,080	9,720	6,480		3,240	2,041	1,199
34i	- Main/King Corridor (B-Line)	Waste Diversion Services	2019-2022	3,100	-	310	2,790	1,860		930	586	344
34j	- Main/King Corridor (B-Line)	Parks & Recreation Services	2019-2022	28,200	-	2,820	25,380	16,920		8,460	5,330	3,130
34k	- Main/King Corridor (B-Line)	Library Services	2019-2022	4,300	-	430	3,870	2,580		1,290	813	477
34l	- Main/King Corridor (B-Line)	Long-Term Care	2019-2022	700	-	70	630	420		210	132	78
34m	- Main/King Corridor (B-Line)	Public Health	2019-2022	-	-	-	-	-		-	-	-
34n	- Main/King Corridor (B-Line)	Child Care and Early Years	2019-2022	100	-	10	90	60		30	19	11
34o	- Main/King Corridor (B-Line)	Housing Services	2019-2022	2,700	-	270	2,430	1,620		810	510	300
34p	- Main/King Corridor (B-Line)	Provincial Offences Act	2019-2022	200	-	20	180	-		180	113	67
	Sub-Total			**304,700**	**-**	**30,470**	**274,230**	**182,700**	**-**	**91,530**	**57,664**	**33,866**
35	**- James/Upper James Corridor (A-Line)**											
35a	- James/Upper James Corridor (A-Line)	Water Services	2019-2022	35,700	-	3,570	32,130	21,420		10,710	6,747	3,963
35b	- James/Upper James Corridor (A-Line)	Wastewater Services	2019-2022	70,900	-	7,090	63,810	42,540		21,270	13,400	7,870
35c	- James/Upper James Corridor (A-Line)	Stormwater Drainage and Control Services	2019-2022	54,700	-	5,470	49,230	32,820		16,410	10,338	6,072
35d	- James/Upper James Corridor (A-Line)	Services Related to a Highway	2019-2022	98,300	-	9,830	88,470	58,980		29,490	18,579	10,911
35e	- James/Upper James Corridor (A-Line)	Policing Services	2019-2022	4,000	-	400	3,600	2,400		1,200	756	444
35f	- James/Upper James Corridor (A-Line)	Fire Protection Services	2019-2022	3,600	-	360	3,240	2,160		1,080	680	400
35g	- James/Upper James Corridor (A-Line)	Ambulance Services	2019-2022	600	-	60	540	360		180	113	67
35h	- James/Upper James Corridor (A-Line)	Transit Services	2019-2022	11,300	-	1,130	10,170	6,780		3,390	2,136	1,254
35i	- James/Upper James Corridor (A-Line)	Waste Diversion Services	2019-2022	3,300	-	330	2,970	1,980		990	624	366
35j	- James/Upper James Corridor (A-Line)	Parks & Recreation Services	2019-2022	29,600	-	2,960	26,640	17,760		8,880	5,594	3,286
35k	- James/Upper James Corridor (A-Line)	Library Services	2019-2022	4,500	-	450	4,050	2,700		1,350	851	499
35l	- James/Upper James Corridor (A-Line)	Long-Term Care	2019-2022	800	-	80	720	480		240	151	89
35m	- James/Upper James Corridor (A-Line)	Public Health	2019-2022	-	-	-	-	-		-	-	-
35n	- James/Upper James Corridor (A-Line)	Child Care and Early Years	2019-2022	100	-	10	90	60		30	19	11
35o	- James/Upper James Corridor (A-Line)	Housing Services	2019-2022	2,800	-	280	2,520	1,680		840	529	311
35p	- James/Upper James Corridor (A-Line)	Provincial Offences Act	2019-2022	200	-	20	180	-		180	113	67
	Sub-Total			**320,400**	**-**	**32,040**	**288,360**	**192,120**	**-**	**96,240**	**60,630**	**35,610**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
	Secondary Plans and Strategies - Nodes and Corridors:							-				
	Community Nodes:											
36	**- Waterdown Node**											
36a	- Waterdown Node	Water Services	2019-2021	31,400	-	3,140	28,260	23,550		4,710	2,967	1,743
36b	- Waterdown Node	Wastewater Services	2019-2021	62,300	-	6,230	56,070	46,730		9,340	5,884	3,456
36c	- Waterdown Node	Stormwater Drainage and Control Services	2019-2021	48,200	-	4,820	43,380	36,150		7,230	4,555	2,675
36d	- Waterdown Node	Services Related to a Highway	2019-2021	86,600	-	8,660	77,940	64,950		12,990	8,184	4,806
36e	- Waterdown Node	Policing Services	2019-2021	3,600	-	360	3,240	2,700		540	340	200
36f	- Waterdown Node	Fire Protection Services	2019-2021	3,100	-	310	2,790	2,330		460	290	170
36g	- Waterdown Node	Ambulance Services	2019-2021	500	-	50	450	380		70	44	26
36h	- Waterdown Node	Transit Services	2019-2021	10,000	-	1,000	9,000	7,500		1,500	945	555
36i	- Waterdown Node	Waste Diversion Services	2019-2021	2,900	-	290	2,610	2,180		430	271	159
36j	- Waterdown Node	Parks & Recreation Services	2019-2021	26,100	-	2,610	23,490	19,580		3,910	2,463	1,447
36k	- Waterdown Node	Library Services	2019-2021	4,000	-	400	3,600	3,000		600	378	222
36l	- Waterdown Node	Long-Term Care	2019-2021	700	-	70	630	530		100	63	37
36m	- Waterdown Node	Public Health	2019-2021	-	-	-	-	-		-	-	-
36n	- Waterdown Node	Child Care and Early Years	2019-2021	100	-	10	90	80		10	6	4
36o	- Waterdown Node	Housing Services	2019-2021	2,500	-	250	2,250	1,880		370	233	137
36p	- Waterdown Node	Provincial Offences Act	2019-2021	200	-	20	180	-		180	113	67
	Sub-Total			**282,200**	**-**	**28,220**	**253,980**	**211,540**	**-**	**42,440**	**26,736**	**15,704**
37	**- Centre Mall Node**											
37a	- Centre Mall Node	Water Services	2021-2022	31,400	-	3,140	28,260	21,980		6,280	3,956	2,324
37b	- Centre Mall Node	Wastewater Services	2021-2022	62,300	-	6,230	56,070	43,610		12,460	7,850	4,610
37c	- Centre Mall Node	Stormwater Drainage and Control Services	2021-2022	48,200	-	4,820	43,380	33,740		9,640	6,073	3,567
37d	- Centre Mall Node	Services Related to a Highway	2021-2022	86,600	-	8,660	77,940	60,620		17,320	10,912	6,408
37e	- Centre Mall Node	Policing Services	2021-2022	3,600	-	360	3,240	2,520		720	454	266
37f	- Centre Mall Node	Fire Protection Services	2021-2022	3,100	-	310	2,790	2,170		620	391	229
37g	- Centre Mall Node	Ambulance Services	2021-2022	500	-	50	450	350		100	63	37
37h	- Centre Mall Node	Transit Services	2021-2022	10,000	-	1,000	9,000	7,000		2,000	1,260	740
37i	- Centre Mall Node	Waste Diversion Services	2021-2022	2,900	-	290	2,610	2,030		580	365	215
37j	- Centre Mall Node	Parks & Recreation Services	2021-2022	26,100	-	2,610	23,490	18,270		5,220	3,289	1,931
37k	- Centre Mall Node	Library Services	2021-2022	4,000	-	400	3,600	2,800		800	504	296
37l	- Centre Mall Node	Long-Term Care	2021-2022	700	-	70	630	490		140	88	52
37m	- Centre Mall Node	Public Health	2021-2022	-	-	-	-	-		-	-	-
37n	- Centre Mall Node	Child Care and Early Years	2021-2022	100	-	10	90	70		20	13	7
37o	- Centre Mall Node	Housing Services	2021-2022	2,500	-	250	2,250	1,750		500	315	185
37p	- Centre Mall Node	Provincial Offences Act	2021-2022	200	-	20	180	-		180	113	67
	Sub-Total			**282,200**	**-**	**28,220**	**253,980**	**197,400**	**-**	**56,580**	**35,646**	**20,934**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
38	**- Dundas Node**											
38a	- Dundas Node	Water Services	2019-2020	31,400	-	3,140	28,260	18,840		9,420	5,935	3,485
38b	- Dundas Node	Wastewater Services	2019-2020	62,300	-	6,230	56,070	37,380		18,690	11,775	6,915
38c	- Dundas Node	Stormwater Drainage and Control Services	2019-2020	48,200	-	4,820	43,380	28,920		14,460	9,110	5,350
38d	- Dundas Node	Services Related to a Highway	2019-2020	86,600	-	8,660	77,940	51,960		25,980	16,367	9,613
38e	- Dundas Node	Policing Services	2019-2020	3,600	-	360	3,240	2,160		1,080	680	400
38f	- Dundas Node	Fire Protection Services	2019-2020	3,100	-	310	2,790	1,860		930	586	344
38g	- Dundas Node	Ambulance Services	2019-2020	500	-	50	450	300		150	95	55
38h	- Dundas Node	Transit Services	2019-2020	10,000	-	1,000	9,000	6,000		3,000	1,890	1,110
38i	- Dundas Node	Waste Diversion Services	2019-2020	2,900	-	290	2,610	1,740		870	548	322
38j	- Dundas Node	Parks & Recreation Services	2019-2020	26,100	-	2,610	23,490	15,660		7,830	4,933	2,897
38k	- Dundas Node	Library Services	2019-2020	4,000	-	400	3,600	2,400		1,200	756	444
38l	- Dundas Node	Long-Term Care	2019-2020	700	-	70	630	420		210	132	78
38m	- Dundas Node	Public Health	2019-2020	-	-	-	-	-		-	-	-
38n	- Dundas Node	Child Care and Early Years	2019-2020	100	-	10	90	60		30	19	11
38o	- Dundas Node	Housing Services	2019-2020	2,500	-	250	2,250	1,500		750	473	277
38p	- Dundas Node	Provincial Offences Act	2019-2020	200	-	20	180	-		180	113	67
	Sub-Total			**282,200**	**-**	**28,220**	**253,980**	**169,200**	**-**	**84,780**	**53,412**	**31,368**
39	**- Stoney Creek Node**											
39a	- Stoney Creek Node	Water Services	2020-2021	34,000	-	3,400	30,600	20,400		10,200	6,426	3,774
39b	- Stoney Creek Node	Wastewater Services	2020-2021	67,400	-	6,740	60,660	40,440		20,220	12,739	7,481
39c	- Stoney Creek Node	Stormwater Drainage and Control Services	2020-2021	52,000	-	5,200	46,800	31,200		15,600	9,828	5,772
39d	- Stoney Creek Node	Services Related to a Highway	2020-2021	93,500	-	9,350	84,150	56,100		28,050	17,672	10,378
39e	- Stoney Creek Node	Policing Services	2020-2021	3,800	-	380	3,420	2,280		1,140	718	422
39f	- Stoney Creek Node	Fire Protection Services	2020-2021	3,400	-	340	3,060	2,040		1,020	643	377
39g	- Stoney Creek Node	Ambulance Services	2020-2021	600	-	60	540	360		180	113	67
39h	- Stoney Creek Node	Transit Services	2020-2021	10,800	-	1,080	9,720	6,480		3,240	2,041	1,199
39i	- Stoney Creek Node	Waste Diversion Services	2020-2021	3,100	-	310	2,790	1,860		930	586	344
39j	- Stoney Creek Node	Parks & Recreation Services	2020-2021	28,200	-	2,820	25,380	16,920		8,460	5,330	3,130
39k	- Stoney Creek Node	Library Services	2020-2021	4,300	-	430	3,870	2,580		1,290	813	477
39l	- Stoney Creek Node	Long-Term Care	2020-2021	700	-	70	630	420		210	132	78
39m	- Stoney Creek Node	Public Health	2020-2021	-	-	-	-	-		-	-	-
39n	- Stoney Creek Node	Child Care and Early Years	2020-2021	100	-	10	90	60		30	19	11
39o	- Stoney Creek Node	Housing Services	2020-2021	2,600	-	260	2,340	1,560		780	491	289
39p	- Stoney Creek Node	Provincial Offences Act	2020-2021	200	-	20	180	-		180	113	67
	Sub-Total			**304,700**	**-**	**30,470**	**274,230**	**182,700**	**-**	**91,530**	**57,664**	**33,866**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
40	**Community Planning Studies - Durand Neighbourhood**											
40a	Community Planning Studies - Durand Neighbourhood	Water Services	2019-2021	16,700	-	1,670	15,030	4,180		10,850	6,836	4,014
40b	Community Planning Studies - Durand Neighbourhood	Wastewater Services	2019-2021	33,200	-	3,320	29,880	8,300		21,580	13,595	7,985
40c	Community Planning Studies - Durand Neighbourhood	Stormwater Drainage and Control Services	2019-2021	25,600	-	2,560	23,040	6,400		16,640	10,483	6,157
40d	Community Planning Studies - Durand Neighbourhood	Services Related to a Highway	2019-2021	46,000	-	4,600	41,400	11,500		29,900	18,837	11,063
40e	Community Planning Studies - Durand Neighbourhood	Policing Services	2019-2021	1,900	-	190	1,710	480		1,230	775	455
40f	Community Planning Studies - Durand Neighbourhood	Fire Protection Services	2019-2021	1,700	-	170	1,530	430		1,100	693	407
40g	Community Planning Studies - Durand Neighbourhood	Ambulance Services	2019-2021	300	-	30	270	80		190	120	70
40h	Community Planning Studies - Durand Neighbourhood	Transit Services	2019-2021	5,300	-	530	4,770	1,330		3,440	2,167	1,273
40i	Community Planning Studies - Durand Neighbourhood	Waste Diversion Services	2019-2021	1,500	-	150	1,350	380		970	611	359
40j	Community Planning Studies - Durand Neighbourhood	Parks & Recreation Services	2019-2021	13,900	-	1,390	12,510	3,480		9,030	5,689	3,341
40k	Community Planning Studies - Durand Neighbourhood	Library Services	2019-2021	2,100	-	210	1,890	530		1,360	857	503
40l	Community Planning Studies - Durand Neighbourhood	Long-Term Care	2019-2021	400	-	40	360	100		260	164	96
40m	Community Planning Studies - Durand Neighbourhood	Public Health	2019-2021	-	-	-	-	-		-	-	-
40n	Community Planning Studies - Durand Neighbourhood	Child Care and Early Years	2019-2021	-	-	-	-	-		-	-	-
40o	Community Planning Studies - Durand Neighbourhood	Housing Services	2019-2021	1,300	-	130	1,170	330		840	529	311
40p	Community Planning Studies - Durand Neighbourhood	Provincial Offences Act	2019-2021	100	-	10	90	-		90	57	33
	Sub-Total			**150,000**	**-**	**15,000**	**135,000**	**37,520**	**-**	**97,480**	**61,413**	**36,067**
41	**East of Downtown Secondary Plan**											
41a	East of Downtown Secondary Plan	Water Services	2024-2025	35,700	-	3,570	32,130	-		32,130	20,242	11,888
41b	East of Downtown Secondary Plan	Wastewater Services	2024-2025	70,900	-	7,090	63,810	-		63,810	40,200	23,610
41c	East of Downtown Secondary Plan	Stormwater Drainage and Control Services	2024-2025	54,700	-	5,470	49,230	-		49,230	31,015	18,215
41d	East of Downtown Secondary Plan	Services Related to a Highway	2024-2025	98,300	-	9,830	88,470	-		88,470	55,736	32,734
41e	East of Downtown Secondary Plan	Policing Services	2024-2025	4,000	-	400	3,600	-		3,600	2,268	1,332
41f	East of Downtown Secondary Plan	Fire Protection Services	2024-2025	3,600	-	360	3,240	-		3,240	2,041	1,199
41g	East of Downtown Secondary Plan	Ambulance Services	2024-2025	600	-	60	540	-		540	340	200
41h	East of Downtown Secondary Plan	Transit Services	2024-2025	11,300	-	1,130	10,170	-		10,170	6,407	3,763
41i	East of Downtown Secondary Plan	Waste Diversion Services	2024-2025	3,300	-	330	2,970	-		2,970	1,871	1,099
41j	East of Downtown Secondary Plan	Parks & Recreation Services	2024-2025	29,600	-	2,960	26,640	-		26,640	16,783	9,857
41k	East of Downtown Secondary Plan	Library Services	2024-2025	4,500	-	450	4,050	-		4,050	2,552	1,498
41l	East of Downtown Secondary Plan	Long-Term Care	2024-2025	800	-	80	720	-		720	454	266
41m	East of Downtown Secondary Plan	Public Health	2024-2025	-	-	-	-	-		-	-	-
41n	East of Downtown Secondary Plan	Child Care and Early Years	2024-2025	100	-	10	90	-		90	57	33
41o	East of Downtown Secondary Plan	Housing Services	2024-2025	2,800	-	280	2,520	-		2,520	1,588	932
41p	East of Downtown Secondary Plan	Provincial Offences Act	2024-2025	200	-	20	180	-		180	113	67
	Sub-Total			**320,400**	**-**	**32,040**	**288,360**	**-**	**-**	**288,360**	**181,667**	**106,693**

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
42	**Elfrida Urban Boundary Expansion & Secondary Plan**											
42a	Elfrida Urban Boundary Expansion & Secondary Plan	Water Services	2019-2021	175,900	-	17,590	158,310	-		158,310	99,735	58,575
42b	Elfrida Urban Boundary Expansion & Secondary Plan	Wastewater Services	2019-2021	349,000	-	34,900	314,100	-		314,100	197,883	116,217
42c	Elfrida Urban Boundary Expansion & Secondary Plan	Stormwater Drainage and Control Services	2019-2021	269,100	-	26,910	242,190	-		242,190	152,580	89,610
42d	Elfrida Urban Boundary Expansion & Secondary Plan	Services Related to a Highway	2019-2021	484,000	-	48,400	435,600	-		435,600	274,428	161,172
42e	Elfrida Urban Boundary Expansion & Secondary Plan	Policing Services	2019-2021	19,900	-	1,990	17,910	-		17,910	11,283	6,627
42f	Elfrida Urban Boundary Expansion & Secondary Plan	Fire Protection Services	2019-2021	17,500	-	1,750	15,750	-		15,750	9,923	5,827
42g	Elfrida Urban Boundary Expansion & Secondary Plan	Ambulance Services	2019-2021	3,000	-	300	2,700	-		2,700	1,701	999
42h	Elfrida Urban Boundary Expansion & Secondary Plan	Transit Services	2019-2021	55,900	-	5,590	50,310	-		50,310	31,695	18,615
42i	Elfrida Urban Boundary Expansion & Secondary Plan	Waste Diversion Services	2019-2021	16,200	-	1,620	14,580	-		14,580	9,185	5,395
42j	Elfrida Urban Boundary Expansion & Secondary Plan	Parks & Recreation Services	2019-2021	145,800	-	14,580	131,220	-		131,220	82,669	48,551
42k	Elfrida Urban Boundary Expansion & Secondary Plan	Library Services	2019-2021	22,100	-	2,210	19,890	-		19,890	12,531	7,359
42l	Elfrida Urban Boundary Expansion & Secondary Plan	Long-Term Care	2019-2021	3,700	-	370	3,330	-		3,330	2,098	1,232
42m	Elfrida Urban Boundary Expansion & Secondary Plan	Public Health	2019-2021	100	-	10	90	-		90	57	33
42n	Elfrida Urban Boundary Expansion & Secondary Plan	Child Care and Early Years	2019-2021	300	-	30	270	-		270	170	100
42o	Elfrida Urban Boundary Expansion & Secondary Plan	Housing Services	2019-2021	13,800	-	1,380	12,420	-		12,420	7,825	4,595
42p	Elfrida Urban Boundary Expansion & Secondary Plan	Provincial Offences Act	2019-2021	1,200	-	120	1,080	-		1,080	680	400
	Sub-Total			**1,577,500**	**-**	**157,750**	**1,419,750**	**-**	**-**	**1,419,750**	**894,443**	**525,307**
43	**Community Energy Plan**											
43a	Community Energy Plan	Water Services	2019-2021	11,200	-	1,120	10,080	5,600		4,480	2,822	1,658
43b	Community Energy Plan	Wastewater Services	2019-2021	22,100	-	2,210	19,890	11,100		8,790	5,538	3,252
43c	Community Energy Plan	Stormwater Drainage and Control Services	2019-2021	17,100	-	1,710	15,390	8,600		6,790	4,278	2,512
43d	Community Energy Plan	Services Related to a Highway	2019-2021	30,700	-	3,070	27,630	15,400		12,230	7,705	4,525
43e	Community Energy Plan	Policing Services	2019-2021	1,300	-	130	1,170	700		470	296	174
43f	Community Energy Plan	Fire Protection Services	2019-2021	1,100	-	110	990	600		390	246	144
43g	Community Energy Plan	Ambulance Services	2019-2021	200	-	20	180	100		80	50	30
43h	Community Energy Plan	Transit Services	2019-2021	3,500	-	350	3,150	1,800		1,350	851	499
43i	Community Energy Plan	Waste Diversion Services	2019-2021	1,000	-	100	900	500		400	252	148
43j	Community Energy Plan	Parks & Recreation Services	2019-2021	9,200	-	920	8,280	4,600		3,680	2,318	1,362
43k	Community Energy Plan	Library Services	2019-2021	1,400	-	140	1,260	700		560	353	207
43l	Community Energy Plan	Long-Term Care	2019-2021	200	-	20	180	100		80	50	30
43m	Community Energy Plan	Public Health	2019-2021	-	-	-	-	-		-	-	-
43n	Community Energy Plan	Child Care and Early Years	2019-2021	-	-	-	-	-		-	-	-
43o	Community Energy Plan	Housing Services	2019-2021	900	-	90	810	500		310	195	115
43p	Community Energy Plan	Provincial Offences Act	2019-2021	100	-	10	90	-		90	57	33
	Sub-Total			**100,000**	**-**	**10,000**	**90,000**	**50,300**	**-**	**39,700**	**25,011**	**14,689**
	Community Services:											
44	Long Term Care Services Needs Study	Long-Term Care	2027	242,800	-		242,800	121,400		121,400	76,482	44,918
45	Child Care Service Plan	Child Care and Early Years	2020-2025	84,300	-		84,300	42,200		42,100	26,523	15,577
46	Human Services Plan - Housing Affordability Study	Housing Services	2020-2025	45,000	-		45,000	11,300		33,700	21,231	12,469
47	Affordable Housing - Residential Pre-zoning & Underutilized Site Mapping	Housing Services	2020-2025	89,900	-		89,900	22,500		67,400	42,462	24,938
48	City Housing Hamilton Energy Investment Study	Housing Services	2020-2025	393,500	-		393,500	295,100		98,400	61,992	36,408

Figure 4-6 Continued
City of Hamilton
Growth Studies Capital – Updated

Class of Service: Growth Studies

Prj.No	Increased Service Needs Attributable to Anticipated Development Class of Service 2019-2028	Service to Which Study Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions*	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
	Paramedics:				-							
49	Paramedics - Space Needs Study	Ambulance Services	2023	112,400	-		112,400	28,100		84,300	53,109	31,191
50	Paramedics - Space Needs Study	Ambulance Services	2028	112,400	-		112,400	-		112,400	70,812	41,588
	Outstanding Debt and Reserve Fund Adjustment											
51	Outstanding Debt Principal	N/A	2019-2023	198,550	-		198,550	-		198,550	125,086	73,464
52	Outstanding Debt Interest (Discounted)	N/A	2019-2023	36,884	-		36,884	-		36,884	23,237	13,647
53	Reserve Fund Adjustment	N/A		1,299,988	-		1,299,988	-		1,299,988	818,993	480,995
	Total			**23,613,722**	**-**	**1,660,100**	**21,953,622**	**5,895,320**	**-**	**16,058,302**	**10,116,734**	**5,941,568**

4.6 Ambulance Services

With respect to ambulance services (formerly referred to as paramedic services), adjustments have been made to reflect the removal of the mandatory 10% deduction. Figures 4-7 and 4-8 provides the capital project listing with the removal of the mandatory deduction.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for Ambulance Services provide a D.C. ceiling of approximately $4.59 million. Given that the capital program is $4.12 million, the D.C.-eligible capital amounts are within the level of service ceiling.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 90% residential and 10% non-residential. This is to acknowledge that although ambulance usage is predominantly residential based, there is some use of the facilities by non-residential users.

Figure 4-7
City of Hamilton
Ambulance Services - Facilities Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 90%	Non-Residential Share 10%
1	Additional Facility Space	2019-2028	4,400,000	3,040,000		1,360,000	-		1,360,000	1,224,000	136,000
3	Outstanding Debt on Shared Training Facility - Principal	2019-2027	557,809	-		557,809	-		557,809	502,028	55,781
4	Outstanding Debt on Shared Training Facility - Interest (discounted)	2019-2027	10,540	-		10,540	-		10,540	9,486	1,054
5	Reserve Fund Adjustment		401,884	-		401,884	-		401,884	361,696	40,188
	Total		**5,370,233**	**3,040,000**	**-**	**2,330,233**	**-**	**-**	**2,330,233**	**2,097,210**	**233,023**

Figure 4-8
City of Hamilton
Ambulance Services – Vehicles & Equipment Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 90%	Non-Residential Share 10%
1	Additional Ambulances (5)	2019-2023	1,340,000	-		1,340,000	-		1,340,000	1,206,000	134,000
2	Additional Ambulances (5)	2024-2028	1,340,000	1,279,700		60,300	-		60,300	54,270	6,030
3	Additional Defibrillators (6)	2019-2023	180,600	-		180,600	-		180,600	162,540	18,060
4	Additional Defibrillators (7)	2024-2028	210,700	201,200		9,500	-		9,500	8,550	950
5	Additional Stretchers (6)	2019-2023	134,400	-		134,400	-		134,400	120,960	13,440
6	Additional Stretchers (7)	2024-2028	156,800	149,700		7,100	-		7,100	6,390	710
7	Additional Gear (5)	2019-2023	60,000	-		60,000	-		60,000	54,000	6,000
8	Additional Gear (5)	2024-2028	60,000	57,300		2,700	-		2,700	2,430	270
	Total		**3,482,500**	**1,687,900**	**-**	**1,794,600**	**-**	**-**	**1,794,600**	**1,615,140**	**179,460**

4.7 Waste Diversion Services

With respect to waste diversion services, adjustments have been made to reflect the removal of the mandatory 10% deduction. Figure 4-9 provides the capital project listing with the removal of the mandatory deduction.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for waste diversion provide a D.C. ceiling of approximately $23.38 million. Given that the capital program is $22.05 million, the D.C.-eligible capital amounts are within the level of service ceiling.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 83% residential and 17% non-residential based on the allocation of residential versus non-residential properties collected from.

Figure 4-9
City of Hamilton
Waste Diversion Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Other Deductions*	Gross Capital Cost (2019$) Waste Diversion Related	Post Period Benefit	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 83%	Non-Residential Share 17%
1	CCF Air Handling Upgrades (to provide for capital improvements to the CCF to mitigate the impacts of the Ontario Compost Quality Standards)	2019	1,734,000	-	1,734,000	89,000	1,645,000	1,556,400		88,600	73,538	15,062
2	Diversion Container Replacement and Expansion Program	2019-2023	4,908,750	-	4,908,750	-	4,908,750	4,405,900		502,850	417,366	85,485
3	Diversion Container Replacement and Expansion Program	2024-2028	4,908,750	-	4,908,750	-	4,908,750	4,405,900		502,850	417,366	85,485
4	Public Space & Special Event Containers Replacement & Expansion	2019-2023	1,275,000	1,020,000	255,000	-	255,000	127,500		127,500	105,825	21,675
5	Public Space & Special Event Containers Replacement & Expansion	2024-2028	1,275,000	1,020,000	255,000	-	255,000	127,500		127,500	105,825	21,675
6	Glanbrook Landfill Capital Improvement Program	2019-2023	1,863,550	1,677,195	186,355	-	186,355	18,600		167,755	139,237	28,518
7	Glanbrook Landfill Capital Improvement Program	2024-2028	1,863,550	1,677,195	186,355	-	186,355	18,600		167,755	139,237	28,518
8	Maintenance & Capital Improvements to the Resource Recovery Centre (RRC) Program	2019-2023	1,537,150	-	1,537,150	-	1,537,150	999,100		538,050	446,582	91,469
9	Maintenance & Capital Improvements to the Resource Recovery Centre (RRC) Program	2024-2028	1,537,150	-	1,537,150	-	1,537,150	999,100		538,050	446,582	91,469
8	Leaf & Yard Waste Composing Facility Relocation	2019-2020	3,978,000	-	3,978,000	-	3,978,000	1,989,000		1,989,000	1,650,870	338,130
9	Transfer Station/Community Recycling Centre Expansion & Capital Replacement	2019-2023	10,375,000	6,225,000	4,150,000	-	4,150,000	-		4,150,000	3,444,500	705,500
10	Transfer Station/Community Recycling Centre Expansion & Capital Replacement	2024-2028	10,375,000	6,225,000	4,150,000	3,320,000	830,000	-		830,000	688,900	141,100
11	Material Recycling Facility Lifecycle Replacement & Upgrades	2020-2022	24,150,000	-	24,150,000	2,963,000	21,187,000	12,075,000		9,112,000	7,562,960	1,549,040
12	Provision for additional trucks (2.1 per 4,000 additional low and medium density units)	2019-2023	1,606,500	-	1,606,500	-	1,606,500	-		1,606,500	1,333,395	273,105
13	Provision for additional trucks (2.1 per 4,000 additional low and medium density units)	2024-2028	1,606,500	-	1,606,500	-	1,606,500	-		1,606,500	1,333,395	273,105
	Total		**72,993,900**	**17,844,390**	**55,149,510**	**6,372,000**	**48,777,510**	**26,722,600**	**-**	**22,054,910**	**18,305,575**	**3,749,335**

4.8 Public Health

With respect to Public Health services, adjustments have been made to reflect the removal of the mandatory 10% deduction. Figure 4-10 provides the capital project listing with the removal of the mandatory deduction.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for Public Health provide a D.C. ceiling of approximately $5.28 million. Given that the capital program is $82,598, the D.C.-eligible capital amounts are well within the level of service ceiling.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 90% residential and 10% non-residential. This is to acknowledge that although health service is predominantly residential based, there is some use of the service by non-residential users.

Figure 4-10
City of Hamilton
Public Health Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 90%	Non-Residential Share 10%
1	Provision for Additional Space	2024-2028	583,000	-		583,000	-		583,000	524,700	58,300
2	Reserve Adjustment						500,402		(500,402)	(450,362)	(50,040)
	Total		**583,000**	**-**	**-**	**583,000**	**500,402**	**-**	**82,598**	**74,338**	**8,260**

4.9 Long-Term Care

With respect to Long-Term Care, the City has recently revised its cost estimate for the construction of an expansion to the Macassa Lodge which would provide both additional beds as well as replaced existing beds in another portion of the lodge. In addition, the City applied for grant funding from the Ministry of Long-Term Care to assist in covering the costs of the project. The Ministry has confirmed that subsidy funding will be provided for the project via two "one-time" payment amounts totalling $1.8 million along with a construction funding subsidy to be paid to the City monthly over 25 years totalling $4.4 million in current dollars.

With the announcement of subsidy funding and revised costing for the project being available, the Macassa Lodge the capital costs included in the 2019 D.C. study have been updated to reflect the latest information available for this D.C. update. As such, the 25-year payments to be received have been discounted to $3.13 million in 2019 dollars and added to the one-time grants being received. Therefore, the total grants and subsidies equal $4.414 million, which provides a deduction being made against the revised gross cost of $27.157 million. Further, a benefit to existing deduction of 69% has been made related to 44 beds to be replaced vs. the additional 20 beds to service growth.

In addition to the revisions noted above, adjustments have been made to reflect the removal of the mandatory 10% deduction. Figure 4-11 provides the capital project listing with the removal of the mandatory deduction and the revised grants/subsidy information.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for Long-Term Care provide a D.C. ceiling of approximately $19.59 million. Given that the capital program is $5.05 million, the D.C.-eligible capital amounts are well within the level of service ceiling.

Based on the City's 2019 D.C. Study, as the predominant users long-term care homes tend to be residents of the City, the forecasted growth-related costs have been allocated 90% to residential and 10% to non-residential.

Figure 4-11
City of Hamilton
Long-Term Care Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 90%	Non-Residential Share 10%
1	Macassa-D Wing Expansion	2021-2026	27,157,000	-		27,157,000	15,635,744	4,414,100	7,107,156	6,396,441	710,716
2	Macassa-A Wing / S Wing Renovation/Replacement (69,136 sq ft)	2025-2030	22,143,000	-		22,143,000	22,143,000		-	-	-
3	Reserve Fund Adjustment		-	-		-	2,052,370		(2,052,370)	(1,847,133)	(205,237)
	Total		**49,300,000**	**-**	**-**	**49,300,000**	**39,831,114**	**4,414,100**	**5,054,786**	**4,549,307**	**505,479**

4.10 Child Care and Early Years

The Previous D.C. included Social and Child Care Services as part of the service standard calculations undertaken. With the recent changes to the D.C.A., the only component of social and child services that remain eligible for inclusion in the D.C. calculations relate to Child Care and Early Years. The service standard calculations have been updated to remove all facility space related to other social services facilities that provide non-childcare/early years space. However, the capital costs included in the 2019 D.C. study for future expansion to service growth, pertained specifically to Child Care, therefore, the capital program remains unchanged.

With respect to Child Care and Early Years services, adjustments have been made to reflect the removal of the mandatory 10% deduction. Figure 4-12 provides the capital project listing with the removal of the mandatory deduction.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for only the Child Care and Early Years facility space provides a D.C. ceiling of just over $1.98 million. Given that the capital program is $415,379, the D.C.-eligible capital amounts are within the level of service ceiling.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 90% residential and 10% non-residential. This is to acknowledge that although childcare and early years programs and services are predominantly residential based, there is some use of the service by non-residential users.

Figure 4-12
City of Hamilton
Child Care and Early Years Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 90%	Non-Residential Share 10%
1	Riverdale Community Hub (Child Care Portion)	2019-2022	2,000,000	-		2,000,000	-	2,000,000	-	-	-
2	Reserve Fund Adjustment		415,379	-		415,379	-		415,379	373,841	41,538
	Total		**2,415,379**	**-**	**-**	**2,415,379**	**-**	**2,000,000**	**415,379**	**373,841**	**41,538**

4.11 Housing Services

With respect to Housing Services, adjustments have been made to reflect the removal of the mandatory 10% deduction. Figure 4-13 provides the capital project listing with the removal of the mandatory deduction.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for Housing Services provide a D.C. ceiling of approximately $106.07 million. Given that the capital program is $18.84 million, the D.C.-eligible capital amounts are well below the level of service ceiling.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 100% residential to acknowledge that the service is required because of residential growth.

Figure 4-13
City of Hamilton
Housing Services Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 100%	Non-Residential Share 0%
1	Provision for Additional Social Housing	2019-2023	193,750,000	13,562,500		180,187,500	160,270,000		19,917,500	19,917,500	-
2	Provision for Additional Social Housing	2024-2028	227,660,000	39,157,500		188,502,500	188,320,400		182,100	182,100	-
3	Bay-Cannon (Replace 45 units and expand by 10 units)	2019-2023	16,600,000	-		16,600,000	16,078,400		521,600	521,600	-
4	55 Queenston Phase 1 (41 Units Replacement of Units from other locations)	2019-2023	10,529,000	-		10,529,000	10,529,000		-	-	-
5	Wellington-King William (Replace 14 units and expand by 6 units)	2019-2023	5,743,000	-		5,743,000	5,445,300		297,700	297,700	-
6	Macassa (Replace 45 units and expand by 20 units)	2019-2023	15,554,000	-		15,554,000	14,727,100		826,900	826,900	-
7	MacNab (Rehab 146 units)	2019-2023	16,282,000	-		16,282,000	10,382,000	5,900,000	-	-	-
8	55 Queenston Phase 2 (52 Additional Units)	2019-2023	13,350,000	-		13,350,000	11,043,100		2,306,900	2,306,900	-
9	Riverdale Community Hub (44 units)	2019-2023	11,040,000	-		11,040,000	9,132,300		1,907,700	1,907,700	-
	Reserve Fund Adjustment						7,125,251		(7,125,251)	(7,125,251)	-
	Total		**510,508,000**	**52,720,000**	**-**	**457,788,000**	**433,052,851**	**5,900,000**	**18,835,149**	**18,835,149**	**-**

4.12 Provincial Offences Act (P.O.A.)

With respect to P.O.A. services, adjustments have been made to reflect the removal of the mandatory 10% deduction. Figure 4-14 provides the capital project listing with the removal of the mandatory deduction.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for P.O.A. provide a D.C. ceiling of approximately $1.85 million. Given that the capital program is $1.59 million, the D.C.-eligible capital amounts are within the level of service ceiling.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 63% residential and 37% non-residential based on the incremental growth in population to employment for the 10-year forecast period.

Figure 4-14
City of Hamilton
P.O.A. Services Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2028	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 63%	Non-Residential Share 37%
1	Growth related Debt Principal (Discounted) - New POA Facility	2019-2034	3,173,583	1,477,977		1,695,607			1,695,607	1,068,232	627,374
2	Growth related Debt Interest (Discounted) - New POA Facility	2019-2034	257,693	126,785		130,908			130,908	82,472	48,436
2	Reserve Fund Adjustment						233,372		(233,372)	(147,025)	(86,348)
	Total		**3,431,276**	**1,604,761**	**-**	**1,826,515**	**233,372**	**-**	**1,593,142**	**1,003,680**	**589,463**

4.13 Public Works

Similar to Growth Studies, the changes in the D.C.A. has brought rise to the need for the City to create a Class of Service related to the Public Works Facilities, Vehicles and Equipment that assist throughout the city in providing support to a various D.C. eligible services. These services include water, wastewater, stormwater, services related to a highway, transit, parks & recreation, etc. As such a class of service is being created to ensure the continued recovery of growth funding towards the expansion of space, vehicles and equipment needed to service future growth.

As a result of these changes to the D.C.A., this update study provides for the former "Public Works Facilities, Vehicles & Equipment" as a categorized class of services entitled "Public Works."

Figures 4-15 and 4-16 provides how the costs of capital projects are allocated across the D.C. eligible services that the facilities, vehicles, and equipment service. To allocate costs of facilities, vehicles and equipment various allocations have been made based on the services that the project pertains to. For example when capital pertains to water, wastewater, stormwater, and services related to a highway, the capital projects have each been allocated 25% of the costs when project relate only water and wastewater services have been allocate equal shares of the costs. Further, many of the projects listed pertain only to one service, as indicated.

In updating the list of capital projects, there was a project identified for removal from the capital listing, as it pertained to a vehicle for building department staff, which is not related to a specific eligible service as per the amendments to the D.C.A.

In addition to the classification as a class of service, and allocation of public works facilities, equipment, and vehicles between eligible services, the mandatory 10% deduction has been removed from projects that formerly pertained to discounted services (e.g. parks & recreation services). The total revised growth-related capital costs included in the updated D.C. calculations equal $41.74 million.

The details regarding the updated service standards are provided in Appendix B. The resulting service standards for Public Works provide a D.C. ceiling of approximately $96.23 million, well above the capital program included in the D.C. calculations.

Based on the City's 2019 D.C. study, the growth-related capital costs have been allocated 62% residential and 38% non-residential based on the incremental growth in population to employment for the 10-year forecast period.

Figure 4-15
City of Hamilton
Public Works - Facilities Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2031	Service to Which Project Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 62%	Non-Residential Share 38%
1	Dundas Expansion											
1a	Dundas Expansion	Water Services	2019-2031	360,000	-		360,000	-		360,000	223,200	136,800
1b	Dundas Expansion	Wastewater Services	2019-2031	730,000	-		730,000	-		730,000	452,600	277,400
1c	Dundas Expansion	Stormwater Services	2019-2031	560,000	-		560,000	-		560,000	347,200	212,800
	Sub-Total			**1,650,000**	**-**	**-**	**1,650,000**	**-**	**-**	**1,650,000**	**1,023,000**	**627,000**
2	Lower Stoney Creek Expansion											
2a	Lower Stoney Creek Expansion	Water Services	2019-2031	274,400	-		274,400	-		274,400	170,128	104,272
2b	Lower Stoney Creek Expansion	Wastewater Services	2019-2031	548,800	-		548,800	-		548,800	340,256	208,544
2c	Lower Stoney Creek Expansion	Stormwater Services	2019-2031	411,600	-		411,600	-		411,600	255,192	156,408
2d	Lower Stoney Creek Expansion	Services Related to a Highway	2019-2031	725,200	-		725,200	-		725,200	449,624	275,576
	Sub-Total			**1,960,000**	**-**	**-**	**1,960,000**	**-**	**-**	**1,960,000**	**1,215,200**	**744,800**
3	South Mountain Expansion											
3a	South Mountain Expansion	Water Services	2019-2031	400,400	-		400,400	-		400,400	248,248	152,152
3b	South Mountain Expansion	Wastewater Services	2019-2031	800,800	-		800,800	-		800,800	496,496	304,304
3c	South Mountain Expansion	Stormwater Services	2019-2031	600,600	-		600,600	-		600,600	372,372	228,228
3d	South Mountain Expansion	Services Related to a Highway	2019-2031	1,058,200	-		1,058,200	-		1,058,200	656,084	402,116
	Sub-Total			**2,860,000**	**-**	**-**	**2,860,000**	**-**	**-**	**2,860,000**	**1,773,200**	**1,086,800**
4	Upper Stoney Creek/Binbrook Expansion											
4a	Upper Stoney Creek/Binbrook Expansion	Water Services	2019-2031	229,600	-		229,600	-		229,600	142,352	87,248
4b	Upper Stoney Creek/Binbrook Expansion	Wastewater Services	2019-2031	459,200	-		459,200	-		459,200	284,704	174,496
4c	Upper Stoney Creek/Binbrook Expansion	Stormwater Services	2019-2031	344,400	-		344,400	-		344,400	213,528	130,872
4d	Upper Stoney Creek/Binbrook Expansion	Services Related to a Highway	2019-2031	606,800	-		606,800	-		606,800	376,216	230,584
	Sub-Total			**1,640,000**	**-**	**-**	**1,640,000**	**-**	**-**	**1,640,000**	**1,016,800**	**623,200**
5	Waterdown/Carlisle Expansion											
5a	Waterdown/Carlisle Expansion	Water Services	2019-2031	249,200	-		249,200	-		249,200	154,504	94,696
5b	Waterdown/Carlisle Expansion	Wastewater Services	2019-2031	498,400	-		498,400	-		498,400	309,008	189,392
5c	Waterdown/Carlisle Expansion	Stormwater Services	2019-2031	373,800	-		373,800	-		373,800	231,756	142,044
5d	Waterdown/Carlisle Expansion	Services Related to a Highway	2019-2031	658,600	-		658,600	-		658,600	408,332	250,268
	Sub-Total			**1,780,000**	**-**	**-**	**1,780,000**	**-**	**-**	**1,780,000**	**1,103,600**	**676,400**
6	North District Expansion											
6a	North District Expansion	Water Services	2019-2031	244,800	-		244,800	-		244,800	151,776	93,024
6b	North District Expansion	Wastewater Services	2019-2031	489,600	-		489,600	-		489,600	303,552	186,048
6c	North District Expansion	Parks & Recreation Services	2019-2031	204,000	-		204,000	-		204,000	126,480	77,520
6d	North District Expansion	Transit Services	2019-2031	81,600	-		81,600	-		81,600	50,592	31,008
	Sub-Total			**1,020,000**	**-**	**-**	**1,020,000**	**-**	**-**	**1,020,000**	**632,400**	**387,600**
7	Water & Wastewater Office/Storage Expansion											
7a	Water & Wastewater Office/Storage Expansion	Water Services	2019-2024	5,865,000	-		5,865,000	3,476,700		2,388,300	1,480,746	907,554
7b	Water & Wastewater Office/Storage Expansion	Wastewater Services	2019-2024	11,385,000	-		11,385,000	6,748,800		4,636,200	2,874,444	1,761,756
	Sub-Total			**17,250,000**	**-**	**-**	**17,250,000**	**10,225,500**	**-**	**7,024,500**	**4,355,190**	**2,669,310**
8	Provision for Expansion of Parks Works Yards - Binbrook*	Parks & Recreation Services	2019-2031	573,500	-		573,500	-		573,500	355,570	217,930
9	Streetlighting Facility Expansion (Storage)	Services Related to a Highway	2019-2023	1,200,000	-		1,200,000	318,200		881,800	546,716	335,084
10	Additional Snow Dump (Land)	Services Related to a Highway	2025-2028	5,750,000	-		5,750,000	-		5,750,000	3,565,000	2,185,000
11	Confederation Park - Sports Park Development - Phase 2 (Maintenance Yard & Field House)*	Parks & Recreation Services	2020	4,182,000	-		4,182,000	418,200		3,763,800	2,333,556	1,430,244
12	Public Works Depot - Bayfront Park (Design & Construction)*	Parks & Recreation Services	2019	3,900,000	-		3,900,000	1,950,000		1,950,000	1,209,000	741,000
	Reserve Fund Adjustment											
13	Reserve Fund Adjustment						-	3,763,222		(3,763,222)	(2,333,197)	(1,430,024)
	Total			**43,765,500**	**-**	**-**	**43,765,500**	**16,675,122**	**-**	**27,090,378**	**16,796,035**	**10,294,344**

Figure 4-16
City of Hamilton
Public Works – Vehicles and Equipment Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2031	Service to Which Project Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 62%	Non-Residential Share 38%
	Operations:											
1	1 1/2 Ton Pickup (9)											
1a	1 1/2 Ton Pickup	Water Services	2019-2031	116,000	-		116,000	-		116,000	71,920	44,080
1b	1 1/2 Ton Pickup	Wastewater Services	2019-2031	116,000	-		116,000	-		116,000	71,920	44,080
2	Large Front End Loader (2)											
2a	Large Front End Loader	Services Related to a Highway	2019-2031	101,167	-		101,167	-		101,167	62,723	38,443
2b	Large Front End Loader	Water Services	2019-2031	101,167	-		101,167	-		101,167	62,723	38,443
2c	Large Front End Loader	Wastewater Services	2019-2031	101,167	-		101,167	-		101,167	62,723	38,443
2d	Large Front End Loader	Stormwater Services	2019-2031	101,167	-		101,167	-		101,167	62,723	38,443
3	Tandem Trailer - 12 Ton (1)											
3a	Tandem Trailer - 12 Ton	Services Related to a Highway	2019-2031	5,625	-		5,625	-		5,625	3,488	2,138
3b	Tandem Trailer - 12 Ton	Water Services	2019-2031	5,625	-		5,625	-		5,625	3,488	2,138
3c	Tandem Trailer - 12 Ton	Wastewater Services	2019-2031	5,625	-		5,625	-		5,625	3,488	2,138
3d	Tandem Trailer - 12 Ton	Stormwater Services	2019-2031	5,625	-		5,625	-		5,625	3,488	2,138
4	SUV 2 Wheel Drive (3)											
4a	SUV 2 Wheel Drive	Services Related to a Highway	2019-2031	23,500	-		23,500	-		23,500	14,570	8,930
4b	SUV 2 Wheel Drive	Water Services	2019-2031	23,500	-		23,500	-		23,500	14,570	8,930
4c	SUV 2 Wheel Drive	Wastewater Services	2019-2031	23,500	-		23,500	-		23,500	14,570	8,930
4d	SUV 2 Wheel Drive	Stormwater Services	2019-2031	23,500	-		23,500	-		23,500	14,570	8,930
5	Pickup 1/2 ton (1)											
5a	Pickup 1/2 ton	Services Related to a Highway	2019-2031	7,275	-		7,275	-		7,275	4,511	2,765
5b	Pickup 1/2 ton	Water Services	2019-2031	7,275	-		7,275	-		7,275	4,511	2,765
5c	Pickup 1/2 ton	Wastewater Services	2019-2031	7,275	-		7,275	-		7,275	4,511	2,765
5d	Pickup 1/2 ton	Stormwater Services	2019-2031	7,275	-		7,275	-		7,275	4,511	2,765
6	Snow Blower Attachment (1)											
6a	Snow Blower Attachment	Services Related to a Highway	2019-2031	101,000	-		101,000	-		101,000	62,620	38,380
6b	Snow Blower Attachment	Parks & Recreation Services	2019-2031	101,000	-		101,000	-		101,000	62,620	38,380
7	Large Hopper/Spreader Attachment (1)											
7a	Large Hopper/Spreader Attachment	Services Related to a Highway	2019-2031	9,000	-		9,000	-		9,000	5,580	3,420
7b	Large Hopper/Spreader Attachment	Parks & Recreation Services	2019-2031	9,000	-		9,000	-		9,000	5,580	3,420
8	Aluminum Dump/Crew/Crane/Plow (1)											
8a	Aluminum Dump/Crew/Crane/Plow	Services Related to a Highway	2019-2031	42,250	-		42,250	-		42,250	26,195	16,055
8b	Aluminum Dump/Crew/Crane/Plow	Parks & Recreation Services	2019-2031	42,250	-		42,250	-		42,250	26,195	16,055
9	Aluminum Dump/Crew/Plow (1)											
9a	Aluminum Dump/Crew/Plow	Services Related to a Highway	2019-2031	39,250	-		39,250	-		39,250	24,335	14,915
9b	Aluminum Dump/Crew/Plow	Parks & Recreation Services	2019-2031	39,250	-		39,250	-		39,250	24,335	14,915
10	Steel Dump/Crew (1)											
10a	Steel Dump/Crew	Services Related to a Highway	2019-2031	28,100	-		28,100	-		28,100	17,422	10,678
10b	Steel Dump/Crew	Parks & Recreation Services	2019-2031	28,100	-		28,100	-		28,100	17,422	10,678

Figure 4-16 Continued
City of Hamilton
Public Works – Vehicles and Equipment Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2031	Service to Which Project Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 62%	Non-Residential Share 38%
11	Trackless (1)											
11a	Trackless	Services Related to a Highway	2019-2031	117,500	-		117,500	-		117,500	72,850	44,650
11b	Trackless	Parks & Recreation Services	2019-2031	117,500	-		117,500	-		117,500	72,850	44,650
12	Refuse Rear Load (11)											
12a	Refuse Rear Load	Services Related to a Highway	2019-2028	123,400	-		123,400	-		123,400	76,508	46,892
12b	Refuse Rear Load	Parks & Recreation Services	2019-2028	123,400	-		123,400	-		123,400	76,508	46,892
13	Arrow Boards (3)											
13a	Arrow Boards	Services Related to a Highway	2019-2031	7,725	-		7,725	-		7,725	4,790	2,936
13b	Arrow Boards	Parks & Recreation Services	2019-2031	7,725	-		7,725	-		7,725	4,790	2,936
13c	Arrow Boards	Water Services	2019-2031	7,725	-		7,725	-		7,725	4,790	2,936
13d	Arrow Boards	Wastewater Services	2019-2031	7,725	-		7,725	-		7,725	4,790	2,936
14	Aluminum Sander Prewelded (1)	Services Related to a Highway	2019-2031	225,000	-		225,000	-		225,000	139,500	85,500
15	Grader (1)	Services Related to a Highway	2019-2031	281,000	-		281,000	-		281,000	174,220	106,780
16	Large Mobile Sweeper (4)	Services Related to a Highway	2019-2031	1,304,000	-		1,304,000	-		1,304,000	808,480	495,520
17	Street Flusher (1)	Services Related to a Highway	2019-2031	225,000	-		225,000	-		225,000	139,500	85,500
18	Hotspot Transporter (2)	Services Related to a Highway	2019-2031	63,000	-		63,000	-		63,000	39,060	23,940
19	Steel Dump/Crew/Crane/Plow (1)	Services Related to a Highway	2019-2031	59,600	-		59,600	-		59,600	36,952	22,648
20	Sander Radius Dump with 2 Way Front (1)	Services Related to a Highway	2019-2031	259,000	-		259,000	-		259,000	160,580	98,420
21	Sander Pre-Wel 2 Way with Wing (2)	Services Related to a Highway	2019-2031	562,000	-		562,000	-		562,000	348,440	213,560
22	Gradal (1)	Services Related to a Highway	2019-2031	362,000	-		362,000	-		362,000	224,440	137,560
23	Alum Sander Prew Front & Wing Plow (4)	Services Related to a Highway	2019-2031	876,800	-		876,800	-		876,800	543,616	333,184
24	Sander Tandem Prew Plow (1)	Services Related to a Highway	2019-2031	253,000	-		253,000	-		253,000	156,860	96,140
25	SUV 4 Wheel Drive (11)	Services Related to a Highway	2019-2031	458,000	-		458,000	-		458,000	283,960	174,040
	Parks:											
26	1 1/2 Ton Pick-up Truck (3)	Parks & Recreation Services	2019-2023	77,600	-		77,600	-		77,600	48,112	29,488
27	Small Tractor (2)	Parks & Recreation Services	2019-2023	78,700	-		78,700	-		78,700	48,794	29,906
28	Medium Tractor (1)	Parks & Recreation Services	2019-2023	50,600	-		50,600	-		50,600	31,372	19,228
29	Large Tractor (3)	Parks & Recreation Services	2019-2023	186,000	-		186,000	-		186,000	115,320	70,680
30	Service Body - Utility (2)	Parks & Recreation Services	2019-2023	101,000	-		101,000	-		101,000	62,620	38,380
31	1 Ton Pick-up with Plow (1)	Parks & Recreation Services	2019-2023	56,200	-		56,200	-		56,200	34,844	21,356
32	Tow behind rotary mower (1)	Parks & Recreation Services	2019-2023	2,900	-		2,900	-		2,900	1,798	1,102
33	Utility Turf Vehicle (3)	Parks & Recreation Services	2019-2023	57,300	-		57,300	-		57,300	35,526	21,774
34	Mower Front Mount Riding (10)	Parks & Recreation Services	2019-2023	211,500	-		211,500	-		211,500	131,130	80,370
35	Tandem Axle Trailer (5)	Parks & Recreation Services	2019-2023	42,700	-		42,700	-		42,700	26,474	16,226
36	Overseeder (1)	Parks & Recreation Services	2019-2023	21,400	-		21,400	-		21,400	13,268	8,132
37	Top Dresser (1)	Parks & Recreation Services	2019-2023	18,000	-		18,000	-		18,000	11,160	6,840
38	Small Aerifier (1)	Parks & Recreation Services	2019-2023	10,400	-		10,400	-		10,400	6,448	3,952
39	Aerifier (1)	Parks & Recreation Services	2019-2023	16,900	-		16,900	-		16,900	10,478	6,422

Figure 4-16 Continued
City of Hamilton
Public Works – Vehicles and Equipment Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2031	Service to Which Project Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 62%	Non-Residential Share 38%
40	Drop in Sander (3)	Parks & Recreation Services	2019-2023	30,400	-		30,400	-		30,400	18,848	11,552
41	Aluminum Dump/Crew (1)	Parks & Recreation Services	2019-2023	73,100	-		73,100	-		73,100	45,322	27,778
42	Aluminum Dump/Crew & Plow (1)	Parks & Recreation Services	2019-2023	78,500	-		78,500	-		78,500	48,670	29,830
43	Packer Truck (1)	Parks & Recreation Services	2019-2023	187,000	-		187,000	-		187,000	115,940	71,060
44	Riding Mower (1)	Parks & Recreation Services	2019-2023	73,100	-		73,100	-		73,100	45,322	27,778
45	Rotary Riding Mower (1)	Parks & Recreation Services	2019-2023	337,000	-		337,000	-		337,000	208,940	128,060
46	Steel Dump Crew - 1 Ton	Parks & Recreation Services	2019-2023	56,200	-		56,200	-		56,200	34,844	21,356
47	Aerifier (2)	Parks & Recreation Services	2019-2028	20,400	-		20,400	-		20,400	12,648	7,752
48	Ball Diamond Groomer (1)	Parks & Recreation Services	2019-2028	10,200	-		10,200	-		10,200	6,324	3,876
49	Blower (1)	Parks & Recreation Services	2019-2028	10,200	-		10,200	-		10,200	6,324	3,876
50	Miscellaneous (1)	Parks & Recreation Services	2019-2028	10,200	-		10,200	-		10,200	6,324	3,876
51	Mower (1)	Parks & Recreation Services	2019-2028	20,400	-		20,400	-		20,400	12,648	7,752
52	Over Seeder (1)	Parks & Recreation Services	2019-2028	20,400	-		20,400	-		20,400	12,648	7,752
53	Top Dresser (1)	Parks & Recreation Services	2019-2028	20,400	-		20,400	-		20,400	12,648	7,752
54	Beach Rake (1)	Parks & Recreation Services	2019-2028	93,600	-		93,600	-		93,600	58,032	35,568
55	Golf Cart (4)	Parks & Recreation Services	2019-2028	10,200	-		10,200	-		10,200	6,324	3,876
56	Leaf Blower (1)	Parks & Recreation Services	2019-2028	520	-		520	-		520	322	198
57	Pressure Washer (1)	Parks & Recreation Services	2019-2028	10,400	-		10,400	-		10,400	6,448	3,952
58	Wood Chipper (1)	Parks & Recreation Services	2019-2028	33,700	-		33,700	-		33,700	20,894	12,806
59	Mower Outfront (3)	Parks & Recreation Services	2019-2028	25,500	-		25,500	-		25,500	15,810	9,690
60	Mower Riding (3)	Parks & Recreation Services	2019-2028	140,000	-		140,000	-		140,000	86,800	53,200
61	Mower Walk Behind (1)	Parks & Recreation Services	2019-2028	7,300	-		7,300	-		7,300	4,526	2,774
62	Pickup 1 ton Crew Cab (3)	Parks & Recreation Services	2019-2028	134,000	-		134,000	-		134,000	83,080	50,920
63	Pickup 1 ton Snow Plow (1)	Parks & Recreation Services	2019-2028	52,000	-		52,000	-		52,000	32,240	19,760
64	Refuse Rear Load Mini Packer (1)	Parks & Recreation Services	2019-2028	169,300	-		169,300	-		169,300	104,966	64,334
65	Refuse Side Loader (1)	Parks & Recreation Services	2019-2028	169,300	-		169,300	-		169,300	104,966	64,334
66	Service Body Truck (3/4 ton) (3)	Parks & Recreation Services	2019-2028	66,300	-		66,300	-		66,300	41,106	25,194
67	Sidewalk Sweeper (1)	Parks & Recreation Services	2019-2028	59,200	-		59,200	-		59,200	36,704	22,496
68	Tractor Loader/Backhoe Small (97-182 HP 6.5 cu yards) (1)	Parks & Recreation Services	2019-2028	114,200	-		114,200	-		114,200	70,804	43,396
69	Trailer Float (1)	Parks & Recreation Services	2019-2028	20,400	-		20,400	-		20,400	12,648	7,752
70	Utility Vehicle (5)	Parks & Recreation Services	2019-2028	20,400	-		20,400	-		20,400	12,648	7,752
71	Utility Vehicle - Toolcat (2)	Parks & Recreation Services	2019-2028	102,000	-		102,000	-		102,000	63,240	38,760

Figure 4-16 Continued
City of Hamilton
Public Works – Vehicles and Equipment Capital – Updated

Project Number	Increased Service Needs Attributable to Anticipated Development 2019-2031	Service to Which Project Relates	Timing (year)	Gross Capital Cost Estimate (2019$)	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Potential D.C. Recoverable Cost		
								Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 62%	Non-Residential Share 38%
	Forestry:											
72	Pickup 3/4 Ton											
72a	Pickup 3/4 Ton	Services Related to a Highway	2019-2031	21,350	-		21,350	10,675		10,675	6,619	4,057
72b	Pickup 3/4 Ton	Parks & Recreation Services	2019-2031	21,350	-		21,350	10,675		10,675	6,619	4,057
73	Wood Chipper (2)											
73a	Wood Chipper (2)	Services Related to a Highway	2019-2031	94,000	-		94,000	-		94,000	58,280	35,720
73b	Wood Chipper (2)	Parks & Recreation Services	2019-2031	94,000	-		94,000	-		94,000	58,280	35,720
74	Aerial Truck (1)											
74a	Aerial Truck (1)	Services Related to a Highway	2019-2031	145,500	-		145,500	-		145,500	90,210	55,290
74b	Aerial Truck (1)	Parks & Recreation Services	2019-2031	145,500	-		145,500	-		145,500	90,210	55,290
75	Dump Truck Tandem Axle Chipper Body (1)											
75a	Dump Truck Tandem Axle Chipper Body (1)	Services Related to a Highway	2019-2023	101,000	-		101,000	-		101,000	62,620	38,380
75b	Dump Truck Tandem Axle Chipper Body (1)	Parks & Recreation Services	2019-2023	101,000	-		101,000	-		101,000	62,620	38,380
	Horticulture:											
76	Tandem Axle Trailer (1)	Parks & Recreation Services	2019-2031	12,500	-		12,500	-		12,500	7,750	4,750
77	Aluminum Dump/Crew (2)	Parks & Recreation Services	2019-2023	145,600	-		145,600	-		145,600	90,272	55,328
	Traffic											
78	Signal Bucket Trucks (2)	Services Related to a Highway	2019-2023	573,000	-		573,000	-		573,000	355,260	217,740
79	Signal Tech Van	Services Related to a Highway	2019-2024	80,700	-		80,700	-		80,700	50,034	30,666
80	Foreman's Pickup Truck	Services Related to a Highway	2019-2026	54,600	-		54,600	-		54,600	33,852	20,748
81	Investigator Pickup Truck	Services Related to a Highway	2019-2027	57,300	-		57,300	-		57,300	35,526	21,774
82	Aerial Truck (2)	Services Related to a Highway	2019-2031	630,000	-		630,000	-		630,000	390,600	239,400
83	Line Painter - Walk Behind (2)	Services Related to a Highway	2019-2031	10,200	-		10,200	-		10,200	6,324	3,876
84	Sign Trucks (2)	Services Related to a Highway	2019-2031	1,275,000	-		1,275,000	-		1,275,000	790,500	484,500
	Parks and Recreation											
85	Ice Resurfacer (2)	Parks & Recreation Services	2024-2028	191,000	-		191,000	-		191,000	118,420	72,580
86	Compact Car (3)	Parks & Recreation Services	2024-2028	84,300	-		84,300	-		84,300	52,266	32,034
	P.O.A. including By-law Enforcement											
87	Hybrid Vehicles (6)	P.O.A. including By-law Enforcement	2019-2023	239,000	-		239,000	-		239,000	148,180	90,820
88	SUV 2 Wheel Drive (15)	P.O.A. including By-law Enforcement	2019-2031	468,000	-		468,000	-		468,000	290,160	177,840
89	SUV 4 Wheel Drive (5)	P.O.A. including By-law Enforcement	2019-2031	208,000	-		208,000	-		208,000	128,960	79,040
90	Pickup 1/2 ton (5)	P.O.A. including By-law Enforcement	2019-2031	146,000	-		146,000	-		146,000	90,520	55,480
	Total			**14,668,487**	**-**	**-**	**14,668,487**	**21,350**	**-**	**14,647,137**	**9,081,225**	**5,565,912**

4.14 D.C. By-law Revised Schedule of Charges

4.14.1 Updated D.C. Calculation (2019$)

Figure 4-17 provides the calculations to the proposed D.C. to be imposed on anticipated development in the City for municipal-wide services over the 13-year forecast period to 2031, and Figure 4-18 provides the calculations for municipal-wide services of the 10-year forecast period based on the changes described earlier in this chapter related to Public Works. Figure 4-19 provides for D.C. calculations on a 10-year forecast basis for Municipal Parking and Airport services that will become ineligible as of September 18, 2022.

The calculations provided herein are the same as was provided for in the 2019 D.C. Study. For the residential calculations, the total cost is divided by the "gross" (new resident) population to determine the per capita amount. The eligible D.C. cost calculations set out in Figures 4-17 to 4-19 are based on the net anticipated population increase. The cost per capita is then multiplied by the average occupancy of the new units to calculate the charge. With respect to non-residential development, the total costs allocated to non-residential development (based on need for service) have been divided by the anticipated development over the planning periods to calculate costs per sq.ft. of gross floor area for each service/class of service.

Figure 4-17
City of Hamilton
Municipal-wide D.C. Calculations (2019 – 2031)

SERVICE/CLASS OF SERVICE	2019$ D.C.-Eligible Cost		2019$ D.C.-Eligible Cost	
	Residential	Non-Residential	SDU	per ft²
	$	$	$	$
1 Public Works Facilities, Vehicles & Equipment				
1.1 Public Works Facilities				
1.1.1 Water Services	2,257,374	1,383,552	71	0.04
1.1.2 Wastewater Services	4,443,761	2,723,596	138	0.07
1.1.3 Stormwater Services	1,246,844	764,195	39	0.02
1.1.4 Services Related to a Highway	5,269,910	3,229,945	164	0.08
1.1.5 Transit Services	44,421	27,226	1	0.00
1.1.6 Parks & Recreation Services	3,533,724	2,165,831	110	0.06
1.2 Public Works Vehicles			-	-
1.2.1 Services Related to a Highway	5,311,023	3,255,143	165	0.08
1.2.2 Water Services	162,001	99,291	5	0.00
1.2.3 Wastewater Services	162,001	99,291	5	0.00
1.2.4 Stormwater Services	85,291	52,275	3	0.00
1.2.5 Parks & Recreation Services	2,703,088	1,656,732	84	0.04
1.2.6 P.O.A. including By-law Enforcement	657,820	403,180	20	0.01
	25,877,259	15,860,256	805	0.41
TOTAL	**$25,877,259**	**$15,860,256**	**$805**	**$0.41**
D.C.-Eligible Capital Cost	$25,877,259	$15,860,256		
13-Year Gross Population/GFA Growth (sq,ft,)	109,455	39,111,300		
Cost Per Capita/Non-Residential GFA (sq.ft.)	**$236.42**	**$0.41**		
By Residential Unit Type **P.P.U.**				
Single and Semi-Detached Dwelling 3.41	$805			
Other Multiples 2.44	$576			
Apartments - 2 Bedrooms + 1.99	$471			
Apartments - Bachelor and 1 Bedroom 1.36	$322			
Residential Facility 1.10	$260			

Figure 4-18
City of Hamilton
Municipal-wide D.C. Calculations (2019 – 2028)

SERVICE/CLASS OF SERVICE	2019$ D.C.-Eligible Cost		2019$ D.C.-Eligible Cost	
	Residential	Non-Residential	SDU	per ft²
	$	$	$	$
2. Parks and Recreation Services				
2.1 Outdoor Recreation and Park Development, Amenities, Trails, Vehicles & Equipment	64,983,843	3,420,202	2,593	0.12
2.2 Indoor Recreation Facilities, Vehicles & Equipment	123,677,932	6,509,365	4,935	0.23
	188,661,775	9,929,567	7,528	0.35
3. Library Services				
3.1 Library facilities, vehicles and collection materials	28,700,909	28,700,909	1,145	1.00
4. Growth Studies				
4.1 Water Supply Services	1,200,369	704,981	48	0.02
4.2 Wastewater Services	2,062,143	1,211,099	82	0.04
4.3 Stormwater Drainage and Control Services	1,107,954	650,701	44	0.02
4.4 Services Related to a Highway	1,991,761	1,169,762	79	0.04
4.5 Policing Services	142,706	83,811	6	0.00
4.6 Fire Protection Services	70,740	41,541	3	0.00
4.7 Ambulance Services	151,368	88,902	6	0.00
4.8 Transit Services	500,468	293,926	20	0.01
4.9 Waste Diversion Services	459,972	270,142	18	0.01
4.10 Parks & Recreation Services	1,996,293	1,172,421	80	0.04
4.11 Library Services	114,355	67,151	5	0.00
4.12 Services Related to Long-Term Care	89,737	52,703	4	0.00
4.13 Services Related to Public Health	228	132	-	0.00
4.14 Child Care and Early Years Programs and Services	27,594	16,206	1	0.00
4.15 Housing Services	195,893	115,052	8	0.00
4.16 Services Related to Proceedings under POA	4,740	2,790	-	0.00
	10,116,321	5,941,321	404	0.21
5. Long Term Care				
5.1 Long Term Care Facilities	4,549,307	505,479	182	0.02
	4,549,307	505,479	182	0.02
6. Child Care and Early Years				
6.1 Child Care and Early Year Facilities	373,841	41,538	15	-
	373,841	41,538	15	-
7. Public Health				
7.1 Public Health Facilities	74,338	8,260	3	-
8. Provincial Offences Act				
8.1 P.O.A. facilities	1,003,680	589,463	40	0.02
9. Housing Services				
9.1 Housing Services facilities	18,835,149	-	752	-
10. Ambulance				
10.1 Ambulance facilities	2,099,910	233,323	84	0.01
10.2 Ambulance vehicles & equipment	1,615,140	179,460	64	0.01
	3,715,050	412,783	148	0.02
11. Waste Diversion				
11.1 Waste diversion facilites, vehicles, equipment and other	18,305,575	3,749,335	730	0.13
	18,305,575	3,749,335	730	0.13
TOTAL	**$274,335,945**	**$49,878,654**	**$10,947**	**$1.74**
D.C.-Eligible Capital Cost	$274,335,945	$49,878,654		
10-Year Gross Population/GFA Growth (sq,ft,)	85,329	28,791,900		
Cost Per Capita/Non-Residential GFA (sq.ft.)	**$3,215.04**	**$1.74**		
By Residential Unit Type / P.P.U.				
Single and Semi-Detached Dwelling 3.41	$10,947			
Other Multiples 2.44	$7,835			
Apartments - 2 Bedrooms + 1.99	$6,411			
Apartments - Bachelor and 1 Bedroom 1.36	$4,385			
Residential Facility 1.10	$3,537			

Figure 4-19
City of Hamilton
Municipal-wide D.C. Calculations (2019 – 2028)
Municipal Parking and Airport Services

SERVICE	2019$ D.C.-Eligible Cost		2019$ D.C.-Eligible Cost	
	Residential	Non-Residential	SDU	per ft²
	$	$	$	$
13. Other Transportation Services				
13.1 Municipal Parking services	14,010,084	8,228,144	559	0.30
13.2 Airport lands	11,799,365	6,929,786	471	0.24
	25,809,449	15,157,930	1,030	0.54
TOTAL	**$25,809,449**	**$15,157,930**	**$1,030**	**$0.54**
D.C.-Eligible Capital Cost	$25,809,449	$15,157,930		
10-Year Gross Population/GFA Growth (sq,ft,)	85,329	28,791,900		
Cost Per Capita/Non-Residential GFA (sq.ft.)	**$302.47**	**$0.54**		
By Residential Unit Type P.P.U.				
Single and Semi-Detached Dwelling 3.41	$1,030			
Apartments - 2 Bedrooms + 1.99	$603			
Apartments - Bachelor and 1 Bedroom 1.36	$413			
Other Multiples 2.44	$737			
Residential Facility 1.10	$333			

Figures 4-20 and 4-21 compare the amended and existing single detached dwelling unit and non-residential per square foot D.C.s (2019 $ values)

Figure 4-20
City of Hamilton
Comparison of Existing and Amending Residential (Single Detached Unit) D.C. (2019$)

Service	Current (By-law 19-142) (2019$)	D.C. Update (2019 $)
Municipal Wide Services:		
Services Related to a Highway	10,769	10,769
Police Services	524	524
Fire Protection Services	462	462
Transit Services	1,917	1,917
Ambulance Services	137	148
Public Works	784	805
Waste Diversion	657	730
Parks and Recreation Services	6,782	7,528
Library Services	1,045	1,145
Long Term Care	125	182
Public Health	1	3
Child Care and Early Years	15	15
Housing Services	648	752
Provincial Offences Act	40	40
Growth Studies	496	404
Municipal Parking	490	559
Airport Lands	419	471
Total Municipal Wide Services	**25,311**	**26,454**
Water and Wastewater Urban Area Charges:		
Wastewater Facilities	4,048	4,048
Wastewater Linear Services	5,415	5,415
Water Services	4,767	4,767
Total Water and Wastewater Urban Area Services	**14,230**	**14,230**
Stormwater Charges:		
Stormwater Drainage and Control Services (Combined Sewer System)	3,948	3,948
Stormwater Drainage and Control Services (Separated Sewer System)	10,462	10,462
GRAND TOTAL CITY WIDE	**25,311**	**26,454**
GRAND TOTAL URBAN AREA COMBINED SEWER SYSTEM	**43,489**	**44,632**
GRAND TOTAL URBAN AREA SEPARATED SEWER SYSTEM	**50,003**	**51,146**

Figure 4-21
City of Hamilton
Comparison of Existing and Amending Non-Residential D.C. (2019$)

Service	Current (By-law 19-142) (2019$)	D.C. Update (2019 $)
City Wide Services:		
Services Related to a Highway	8.05	8.05
Police Services	0.26	0.26
Fire Protection Services	0.23	0.23
Transit Services	0.98	0.98
Ambulance Services	0.03	0.02
Public Works	0.41	0.41
Waste Diversion	0.13	0.13
Parks and Recreation Services	0.31	0.35
Library Services	0.05	1.00
Long Term Care	0.01	0.02
Public Health	-	-
Child Care and Early Years	-	-
Housing Services	-	-
Provincial Offences Act	0.02	0.02
Growth Studies	0.25	0.21
Municipal Parking	0.25	0.30
Airport Lands	0.21	0.24
Total City Wide Services	**11.18**	**12.21**
Water and Wastewater Urban Area Charges:		
Wastewater Facilities	1.95	1.95
Wastewater Linear Services	2.61	2.61
Water Services	2.29	2.29
Total Water and Wastewater Urban Area Services	**6.85**	**6.85**
Stormwater Charges:		
Stormwater Drainage and Control Services (Combined Sewer System)	-	0%
Stormwater Drainage and Control Services (Separated Sewer System)	2.16	216%
GRAND TOTAL CITY WIDE	**11.18**	**12.21**
GRAND TOTAL URBAN AREA COMBINED SEWER SYSTEM	**18.03**	**19.06**
GRAND TOTAL URBAN AREA SEPARATED SEWER SYSTEM	**20.19**	**21.22**

4.14.2 Revised D.C. Rates (2019$ and 2020$)

Based on the calculations above, the Municipal-wide D.C. (in 2019$) is calculated to increase from $25,311 to $26,454 per single detached unit and increase from $11.18 to $12.21 per square foot for non-residential development.

Figure 4-22 provides for the updated Municipal-wide D.C.s in 2019 values, as the study was originally completed in 2019. This figure would be included as the amending schedule to the D.C. by-law. Figure 4-23 provides for the indexed 2020 values as the City's current D.C.s have been indexed by 3.92% on July 6, 2020 as per the by-law.

Figure 4-22
City of Hamilton
Updated Development Charge Schedule (2019$)

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single-Detached Dwelling & Semi-Detached Dwelling (per dwelling unit)	Townhouses & Other Multiple Unit Swellings (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes 2-Bedrooms+ (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes Bachelor & 1-Bedrooms+ (per dwelling unit)	Residential Facility Dwelling & Lodging House & Garden Suite (per bedroom)	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Classes:						
Services Related to a Highway	10,769	7,708	6,306	4,314	3,479	8.05
Police Services	524	375	307	210	169	0.26
Fire Protection Services	462	331	271	185	149	0.23
Transit Services	1,917	1,372	1,123	768	619	0.98
Public Works	805	576	471	322	260	0.41
Ambulance Services	148	106	87	59	48	0.02
Waste Diversion	730	522	427	292	236	0.13
Parks and Recreation Services	7,528	5,388	4,408	3,016	2,432	0.35
Library Services	1,145	819	671	459	370	1.00
Long Term Care	182	130	107	73	59	0.02
Public Health	3	2	2	1	1	-
Child Care and Early Years	15	11	9	6	5	-
Housing Services	752	538	440	301	243	-
Provincial Offences Act	40	29	23	16	13	0.02
Growth Studies	404	289	237	162	131	0.21
Municipal Parking	559	400	327	224	181	0.30
Airport Lands	471	337	276	189	152	0.24
Total Municipal Wide Services/Classes	**26,454**	**18,933**	**15,492**	**10,597**	**8,547**	**12.21**
Urban Services						
Wastewater Facilities	4,048	2,897	2,371	1,622	1,308	1.95
Wastewater Linear Services	5,415	3,876	3,171	2,169	1,749	2.61
Water Services	4,767	3,412	2,792	1,910	1,540	2.29
Combined Sewer System						
Stormwater Drainage and Control Services	3,948	2,826	2,312	1,582	1,275	-
Separated Sewer System						
Stormwater Drainage and Control Services	10,462	7,488	6,127	4,191	3,380	2.16
Total Urban Services - Combined Sewer System	**18,178**	**13,011**	**10,646**	**7,283**	**5,872**	**6.85**
Total Urban Services - Separated Sewer System	**24,692**	**17,673**	**14,461**	**9,892**	**7,977**	**9.01**
GRAND TOTAL CITY WIDE	**26,454**	**18,933**	**15,492**	**10,597**	**8,547**	**12.21**
GRAND TOTAL URBAN AREA (COMBINED SEWER SYSTEM)	**44,632**	**31,944**	**26,138**	**17,880**	**14,419**	**19.06**
GRAND TOTAL URBAN AREA (SEPARATED SEWER SYSTEM)	**51,146**	**36,606**	**29,953**	**20,489**	**16,524**	**21.22**

Figure 4-23
City of Hamilton
Updated Development Charge Schedule (2020$)

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single-Detached Dwelling & Semi-Detached Dwelling (per dwelling unit)	Townhouses & Other Multiple Unit Swellings (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes 2-Bedrooms+ (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes Bachelor & 1-Bedrooms+ (per dwelling unit)	Residential Facility Dwelling & Lodging House & Garden Suite (per bedroom)	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Classes:						
Services Related to a Highway	11,191	8,010	6,553	4,483	3,615	8.36
Police Services	545	390	319	218	176	0.27
Fire Protection Services	480	344	282	192	155	0.24
Transit Services	1,992	1,426	1,167	798	643	1.02
Public Works	836	599	489	335	270	0.43
Ambulance Services	154	110	90	61	50	0.02
Waste Diversion	759	542	444	303	245	0.14
Parks and Recreation Services	7,823	5,599	4,581	3,134	2,527	0.36
Library Services	1,190	851	697	477	385	1.04
Long Term Care	189	135	111	76	61	0.02
Public Health	3	2	2	1	1	-
Child Care and Early Years	16	11	9	6	5	-
Housing Services	781	559	457	313	253	-
Provincial Offences Act	42	30	24	17	14	0.02
Growth Studies	420	300	246	168	136	0.21
Municipal Parking	581	416	340	233	188	0.31
Airport Lands	489	350	287	196	158	0.25
Total Municipal Wide Services/Classes	**27,490**	**19,675**	**16,099**	**11,012**	**8,882**	**12.68**
Urban Services						
Wastewater Facilities	4,207	3,011	2,464	1,686	1,359	2.03
Wastewater Linear Services	5,627	4,028	3,295	2,254	1,818	2.71
Water Services	4,954	3,546	2,901	1,985	1,600	2.38
Combined Sewer System						
Stormwater Drainage and Control Services	4,103	2,937	2,403	1,644	1,325	-
Separated Sewer System						
Stormwater Drainage and Control Services	10,872	7,782	6,367	4,355	3,512	2.24
Total Urban Services - Combined Sewer System	**18,891**	**13,521**	**11,063**	**7,568**	**6,102**	**7.12**
Total Urban Services - Separated Sewer System	**25,660**	**18,366**	**15,028**	**10,280**	**8,290**	**9.36**
GRAND TOTAL CITY WIDE	**27,490**	**19,675**	**16,099**	**11,012**	**8,882**	**12.68**
GRAND TOTAL URBAN AREA (COMBINED SEWER SYSTEM)	**46,381**	**33,196**	**27,163**	**18,581**	**14,984**	**19.80**
GRAND TOTAL URBAN AREA (SEPARATED SEWER SYSTEM)	**53,150**	**38,041**	**31,127**	**21,292**	**17,172**	**22.05**

Chapter 5
Updates to the D.C. By-law

5. Updates to the D.C. By-law

As summarized in Chapter 2, the D.C. by-law will require several updates to conform with the D.C.A., as amended.

With respect to the "Time of Calculation and Payment" section of the by-law, the following refinements are to be included:

- Six equal annual D.C. payments commencing at occupancy for Rental Housing and Institutional Developments;
- Non-profit Housing Developments will be allowed to pay their D.C.s in 21 equal annual payments; and
- The D.C. amount for all developments occurring within 2 years of a site plan or zoning by-law amendment planning approval (for applications submitted after January 1, 2020) shall be determined based on the D.C. in effect on the day of the site plan or zoning by-law amendment application.

Instalment payments and payments determined at the time of site plan or zoning by-law amendment application are subject to annual interest charges. The interest rate, at the Bank of Canada Prime rate with semi-annual increments, has been adopted by City Council and is based on the City's D.C. Interest Policy FPAP-DC-002. This policy may be amended from time to time.

For the purposes of administering the by-law, the following definitions are provided as per O. Reg. 454-19:

"Rental housing" means development of a building or structure with four or more dwelling units all of which are intended for use as rented residential premises.

"Institutional development" means development of a building or structure intended for use,

a) as a long-term care home within the meaning of Subsection 2 (1) of the *Long-Term Care Homes Act, 2007*;
b) as a retirement home within the meaning of Subsection 2 (1) of the *Retirement Homes Act, 2010*;
c) by any of the following post-secondary institutions for the objects of the institution:

i. a university in Ontario that receives direct, regular, and ongoing operating funding from the Government of Ontario,
ii. a college or university federated or affiliated with a university described in subclause (i), or
iii. an Indigenous Institute prescribed for the purposes of Section 6 of the *Indigenous Institutes Act, 2017*;

d) as a memorial home, clubhouse, or athletic grounds by an Ontario branch of the Royal Canadian Legion; or
e) as a hospice to provide end of life care.

"Non-profit Housing Development" means development of a building or structure intended for use as residential premises by,

a) a corporation without share capital to which the *Corporations Act* applies, that is in good standing under that Act and whose primary object is to provide housing;
b) a corporation without share capital to which the *Canada Not-for-profit Corporations Act* applies, that is in good standing under that Act and whose primary object is to provide housing; or
c) a non-profit housing co-operative that is in good standing under the *Co-operative Corporations Act,* or any successor legislation.

In addition to the changes provided above, the following definition for "Class" will be provided:

"Class" means a grouping of services combined to create a single service for the purposes of this by-law and as provided in section 7 of the Development Charges Act.

With respect to exemptions, the following will be included as per O. Reg. 454-19:

No development charge shall be payable where the development:

- is limited to the creation of an additional dwelling unit as prescribed, in prescribed classes of new residential buildings as set out in the Regulations to the Development Charges Act, 1997; and

- is limited to the creation of an additional dwelling unit ancillary to a new dwelling unit in prescribed classes of new residential buildings as set out in the Regulations to the Development Charges Act, 1997.

With respect to exemptions, the following will be included as per Bill 213:

Land vested in or leased to a university that receives regular and ongoing operating funds from the government for the purposes of post-secondary education is exempt from development charges imposed under the Development Charges Act, 1997 if the development in respect of which development charges would otherwise be payable is intended to be occupied and used by the university.

Other new definitions have been included in the draft by-law to incorporate language being used in the amended legislation, they include definitions such as Accessory Dwelling; Ancillary Residential Building, Hospice, Rental Housing; etc.

As presented earlier, the D.C. for the Municipal Parking and Airport services will cease to be recoverable as of September 18, 2022. As such, changes to Schedule A have been made to identify the charges to be imposed pre- and post-September 18, 2022.

Chapter 6
Recommendations

6. Recommendations

It is recommended that Council:

"Approve the Development Charges Update Study dated March 5, 2021, as amended (if applicable)";

"Approve the updated capital projects set out in Chapter 4 of the Development Charges Update Study dated March 5, 2021";

"Determine that no further public meeting is required"; and

"Approve the Amending Development Charge By-law as set out in Appendix C".

Appendix A
Existing Policies under By-law 19-142

A-1: Existing Policies under By-law 19-142

The following subsections set out the rules governing the calculation, payment and collection of D.C.s as provided in By-law 19-142, in accordance with the D.C.A.

Approval for Development

The Development of land is subject to Development Charge where the Development requires the following:

a) the passing of a zoning by-law or of an amendment to a zoning by-law under section 34 of the *Planning Act*;

b) the approval of a minor variance under section 45 of the *Planning Act*;

c) a conveyance of land to which a by-law passed under section 50 (7) of the *Planning Act* applies;

d) the approval of a plan of subdivision under section 51 of the *Planning Act*;

e) a consent under section 53 of the *Planning Act*;

f) the approval of a description under section 50 of the *Condominium Act*;

g) the issuing of a building permit under the *Building Code Act* in relation to a building or structure.

Determination of the Amount of the Charge

The calculation for residential development is generated on a per capita basis and is based upon different forms of housing types (single and semi-detached, apartments with two or more bedrooms, one-bedroom apartments and bachelors, other multiples, and residential facilities/lodging houses). The total cost is divided by the “gross” (new resident) population to determine the per capita amount. The eligible D.C. cost calculations are based on the net anticipated population increase (the forecast new unit population less the anticipated decline in existing units). This approach acknowledges that service capacity will be “freed up” by the population decline in existing units. The cost per capita is then multiplied by the average occupancy of the new units to calculate the charges by type of residential dwelling unit.

The non-residential D.C. has been calculated based on a per square foot of gross floor area basis.

Rules with Respect to Redevelopment - Demolitions

In the case of the demolition of all or part of a Building:

a) a credit shall be allowed against the Development Charges otherwise payable pursuant to this By-law, provided that a building permit has been issued for the Redevelopment within five years of the issuance date of the demolition permit on the same land and may be extended by the General Manager of Finance and Corporate Services either for Developments located outside the Urban Area Boundary or for Developments where it has been determined by the General Manager of Planning & Economic Development that significant development delays were not the responsibility of the developer, or may be otherwise extended by Councilor;

b) the credit shall be calculated at the time Development Charges are due for the Redevelopment as follows:

    i. for the portion of the Building used for Residential Uses, by multiplying the applicable Development Charge under Section 9 of this By-law by the number, according to type, of the Dwelling Units have been or will be demolished as supported by a demolition agreement; and

    ii. for the portion of the Building used for Non-residential Uses, by multiplying the applicable Development Charge under Section 9 of this By-law, according to type of Non-residential Use, by the Gross Floor Area that has been or will be demolished as supported by a demolition agreement;

c) without limiting the generality of the foregoing, no credit shall be allowed where the demolished Building or part thereof would have been exempt pursuant to this By-law, including Buildings, or parts thereof, that would have been exempted.

Rules with Respect to Redevelopment – Conversions

Where an existing Building is converted in whole or in part from one use (hereinafter referred to in this Section as the “First Use”) to another use,

a) the amount of Development Charges payable shall be reduced by the amount, calculated pursuant to this By-law at the current Development Charges rates in respect of the First Use;

b) the First Use shall be the use as confirmed through the City's Building Division and related permit records;

c) for greater certainty, and without limiting the generality of the foregoing, no credit shall be allowed where the converted Building or part thereof would have been exempt pursuant to this By-law.

Exemptions (full or partial)

The following are exempted from D.C.s:

- Statutory exemptions
    a) Industrial building additions of up to and including 50% of the existing gross floor area (defined in O. Reg. 82/98, s. 1) of the building; for industrial building additions which exceed 50% of the existing gross floor area, only the portion of the addition in excess of 50% is subject to D.C.s (s. 4 (3)) of the D.C.A;
    b) buildings or structures owned by and used for the purposes of any municipality, local board or Board of Education (s. 3); and
    c) residential development that results only in the enlargement of an existing dwelling unit, or that results only in the creation of up to two additional dwelling units (based on prescribed limits set out in s.2 of O. Reg. 82/98).

- Non-statutory exemptions
    - Building, or part thereof, used for parking but excluding a building or part thereof used for Commercial Parking;
    - Agricultural Use;
    - Place of Worship;
    - Garden Suite;
    - Laneway House;
    - Temporary Building or Structure, subject to Section 32;
    - (g) until such time as the City's Housing Services Division develops and implements a Development Charge Incentive Program, dwelling units

within an affordable housing project that (A) either have been approved to receive construction funding from the Government of Canada or the Province of Ontario (including their Crown corporations) under an affordable housing program or have been approved by the City of Hamilton through an affordable housing program; and (B) such affordable housing dwelling unit is not eligible for funding for development charge liabilities from the Government of Canada or the Province of Ontario (including their Crown corporations); and,

Downtown CIPA Partial Exemption

Notwithstanding any other provision of this By-law, the Development Charges payable under this By-law respecting Class A Office Development within the boundaries of the Downtown CIPA shall be reduced by 70% after all credits are applied under this By-law, for only the portion of the Class A Office Development that is within the height restrictions as shown in Schedule "F.

Notwithstanding any other provision of this By-law, the Development Charges payable under this By-law respecting all Development, other than Class A Office Development, within the boundaries of the Downtown CIPA shall:

a) be reduced by the following percentages, after all other credits are applied, under this By-law for only the portion of the Building that is within the height restrictions as shown in Schedule "F" based on the later of the date on which Development Charges are payable or the date all applicable Development Charges were actually paid:

Table 2: Downtown Hamilton CIPA Partial Exemption

Date	Percentage of reduction (%)	Percentage of development charge payable (%)
June 13, 2019 to July 5, 2019	70	30
July 6, 2019 to July 5, 2020	60	40
July 6, 2020 to July 5, 2021	50	50
July 6, 2021 to July 5, 2022	40	60
July 6, 2022 to July 5, 2023	40	60
July 6, 2023 to July 5, 2024	40	60

Schedule “F” shall not be amended by any decision by the Local Planning Appeal Tribunal relating to the City’s Zoning By-law Amendment 18-114; or by any amendments, including site specific or area specific, to the City’s Zoning By-law 05-200 either through Local Planning Appeal Tribunal decisions or by Council.

For clarity, any Development in excess of the height restrictions as shown in Schedule “F” shall be subject to the full calculated Development Charge and only be reduced if there are any credits or exemptions remaining after applying any and all other credits or exemptions to the portion of the building that is within the height restrictions as shown in Schedule “F”.

b) for each year this By-law is in effect an additional exemption will apply as follows:

   i. a dollar-for-dollar exemption on any remaining Development Charges payable equal to any amount of contribution by the payer of the Development Charges to the Downtown Public Art Reserve in an amount not to exceed ten percent of the Development Charges otherwise payable on the height that is within the height restrictions as shown as Schedule “F”; and

   ii. (the amount of all exemption provided in Subsection 27(b) shall be limited to $250,000 annually and any single exemption shall be reduced by the amount it would exceed the $250,000 limit.

The exemptions in Section 26 and 27 shall not apply in addition to the exemptions in Sections 19, 25 and 29. The exemptions provided in Section 26 and 27 shall only apply if the amount of exemption is greater than that provided under Sections 19, 25 and 29, individually or cumulatively. If the exemptions under Sections 19, 25 and 29 are greater, individually or cumulatively, than that which could be provided under Section 26 and 27, no exemption pursuant to Section 26 and 27 shall apply. For the purpose of this Section, the Residential Use and Non-residential Use portion of a Mixed-Use Development may be viewed as independent of one another and the exemption under this By-law that provides the greatest reduction in Development Charges payable shall be applied to each use.

Other Partial Exemptions

29. Notwithstanding any other provision of this By-law, the Development Charges payable under this By-law respecting the following types of Development will be partially exempt from Development Charges under this By-law in the manner and to the extent set out below:

a) for any Non-industrial Development other than an expansion, within the boundaries of the CIPAs or BIAs, and for any Office Development other than an expansion anywhere in the City, Development Charges shall be imposed as follows:

    i. 50% of the applicable Development Charge on the first 5,000 square feet;

    ii. 75% of the applicable Development Charge for each square foot in excess of 5,000 square feet and under 10,000 square feet;

    iii. 100% of the applicable Development Charge on the amount of Development exceeding 10,000 square feet.

Where Development has been exempted pursuant to this Subsection, the exemption set out in Subsection (b) below does not apply to any subsequent expansion on such Development.

b) the initial 5,000 square feet of Gross Floor Area of an Office Development expansion, whether attached or unattached to an existing Office Development, shall be exempted from the payment of Development Charges provided that:

    i. the office development has not had the exemption in Subsection 29(a) previously applied to it under this By-law;

    ii. the Office Development has not been the subject of any exemptions or partial exemptions from the payment of Development Charges under any other Development Charges By-laws which are no longer in force;

    iii. where unattached to an existing Office Development, the expansion must be situated on the same site as the existing Office Development; and,

iv. where, subsequent to an unattached expansion exempted hereunder, the Lot is further subdivided such that the original existing Office Development and the unattached expansion thereof are no longer situated on the same Lot, further exemptions pursuant to this Section, if any, shall only be calculated on the basis of the Office Development and the Lot as they existed on the date of the first exemption.

c) Until June 30, 2020 Development of a Student Residence is exempt from 50% of the Development Charge otherwise payable pursuant to this By- law according to the type of Residential Development. After June 30, 2020, no exemption shall be provided for Development of a Student Residence and the Development of a Student Residence will be subject to the payment of Development Charges payable pursuant to this By-law.

d) Redevelopment of an existing Residential Development for the purpose of creating Residential Facilities or Lodging Houses within the existing building envelope is exempt from 50% of the Development Charge otherwise payable pursuant to this By-law.

e) Redevelopment of an existing Residential Facility or Lodging House for the purpose of creating additional bedrooms in a Residential facility or Lodging House within the existing building envelope shall be exempt from 50% of the Development Charge payable pursuant to this By-law. Notwithstanding anything else contained in this By-law, save and except Subsection 30(d) and Subsection 31(d), the credit applicable to any such Redevelopment shall be based on 100% of the applicable Residential Facility rate or Lodging House rate in effect at the time of receipt by the Chief Building Official of a complete building permit application for the said redevelopment within the meaning of Section 32 of this By-law.

f) the Adaptive Reuse of the part of a building on a Protected Heritage Property that contains:

i. heritage attributes that are the subject of designation under Part IV of the Ontario Heritage Act;

ii. features subject to a Heritage Easement under Part II of the Ontario Heritage Act;

iii. features subject to a Heritage Easement under Part IV of the Ontario Heritage Act; or

iv. features subject to a covenant or agreement on title held between the property owner and a conservation authority or level of government in the interest of conserving,

is exempted from Development Charges.

Indexing

The D.C.s imposed shall be adjusted annually in accordance with the Statistics Canada Non-Residential Building Construction Price Index, by type of building (non-residential building) for the City of Toronto, for the most recent year over year period, every July 6th, without amendment to the by-law.

By-law Duration

The by-law will expire on June 13, 2024, unless it is repealed by Council at an earlier date.

Timing of D.C. Payments

D.C.s imposed under the by-law are calculated, payable and collected upon issuance of building permit for the development.

Despite the above, Council from time to time, and at any time, may enter into Agreements providing for all or any part of the D.C. to be paid before or after it would otherwise be payable, in accordance with section 27 of the D.C.A.

Appendix B
Service Standards

TABLE B-1
SUMMARY OF SERVICE STANDARDS AS PER DEVELOPMENT CHARGES ACT, 1997, AS AMENDED
FOR SERVICES REVISED IN THIS 2021 UPDATE STUDY

Service Category	Sub-Component	10 Year Average Service Standard					Maximum Ceiling LOS	Utilized**	Remaining
		Cost (per capita)	Quantity (per capita)		Quality (per capita)				
Public Works Facilities, Fleet & Equipment	Facilities	$932.16	1.6461	sq.ft. of building area	566	per sq.ft.	80,336,345	27,090,378	53,245,967
	Vehicles and Equipment	$184.37	0.0023	No. of vehicles and equipment	80,161	per vehicle	15,889,560	14,647,137	1,242,423
Parks and Recreation	Parkland Development	$441.37	0.0113	Acres of Parkland	39,059	per acre	28,709,353		
	Parkland Amenities	$579.54	0.0336	No. of parkland amenities	17,248	per amenity	37,696,759		
	Parkland Amenities - Buildings	$11.98	0.1145	sq.ft. of building area	105	per sq.ft.	779,251	67,552,656	1,085,184
	Parkland Trails	$22.08	0.0001	Linear Kilometres of Paths and Trails	220,800	per lin m.	1,436,216		
	Parks Vehicles and Equipment	$0.25	0.0001	No. of vehicles and equipment	5,000	per vehicle	16,262		
	Indoor Recreation Facilities	$2,957.26	4.2984	sq.ft. of building area	688	per sq.ft.	192,357,934		
	Indoor Recreation Facilities - Buildings Within Parks	$185.77	0.4261	sq.ft. of building area	436	per sq.ft.	12,083,595	127,262,637	77,213,367
	Recreation Vehicles and Equipment	$0.53	0.0001	No. of vehicles and equipment	5,300	per vehicle	34,474		
Library Services	Library Facilities	$388.12	0.7253	sq.ft. of building area	535	per sq.ft.	25,245,654		
	Library Vehicles	$2.36	0.00001	No. of vehicles and equipment	196,667	per vehicle	153,509	28,657,773	981,737
	Library Collection Materials	$65.19	2.0273	No. of library collection items	32	per collection item	4,240,349		
Ambuance	Ambulance Facilities	$40.28	0.1278	sq.ft. of building area	315	per sq.ft.	2,620,053	2,319,693	300,360
	Ambulance Vehicles	$30.26	0.0005	No. of vehicles and equipment	60,520	per vehicle	1,968,292	1,794,600	173,692
Long Term Care	Long-Term Care Facilities	$301.20	0.6301	sq.ft. of building area	478	per sq.ft.	19,591,855	5,054,786	14,537,069
Housing Services	Housing Services Facilties	$1,630.65	10.57	sq.ft. of building area	154.21	per sq.ft.	106,067,260	18,835,149	87,232,111
Provincial Offences Administration	Provincial Offences Act - Administration Facilities	$28.41	0.0557	sq.ft. of building area	510.05	per sq.ft.	1,847,957	1,462,234	385,723
Public Health	Public Health Services - Facilities	$80.35	0.1976	sq.ft. of building area	407	per sq.ft.	5,226,446	82,598	5,197,836
	Public Health Services - Vehicles	$0.83	0.000002	No. of vehicles	406,488	per vehicle	53,988		
Child Care and Early Years	Child Care and Early Years - Facilities	$30.49	0.0717	sq.ft. of building area	425	per sq.ft.	1,983,253	415,379	1,567,873
Waste Diversion	Waste Diversion - Facilities - Stations/Depots	$275.41	0.7018	sq.ft. of building area	392	per sq.ft.	17,914,319		
	Waste Diversion - Vehicles & Equipment	$61.59	0.0004	No. of vehicles and equipment	153,975	per vehicle	4,006,183	22,054,910	1,322,622
	Waste Diversion - Carts & Containers	$22.40	1.5557	No. of items	14	per Item	1,457,030		
Parking Services	Municipal Parking Services - Spaces	$280.98	0.0089	No. of spaces	31,571	per space	18,276,625		
	Municipal Parking Services- Meters	$4.48	0.0050	No. of Meters	896	per meter	291,406	22,088,228	2,058,798
	Municipal Parking Services- Facilities	$85.77	0.0592	sq.ft. of building area	1,449	per sq.ft.	5,578,995		
Airport	Airport Lands	$290.84	0.0029	acres of land	100,290	per sq.ft.	18,917,979	18,729,151	188,828

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Development
Unit Measure: Acres of Parkland

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Acre)
New City of Hamilton (acres)											
City Wide	1,117	1,117	1,148	1,110	1,110	1,110	1,110	1,110	1,098	1,096	$66,000
Neighbourhood	686	688	689	731	734	742.4	749.8	755.8	762	766	$64,000
Parkette	73	74	74	66	66	67	67	67	67	69	$150,000
Community	851	889	889	818	818	818	818	818	820	820	$55,000
Heritage Parkland	409	409	409	404	404	404	404	404	404	404	$34,000
Natural Open Space	2,137	2,137	2,052	1,943	1,943	1,943	1,943	1,943	1,956	1,956	$10,600
General Open Space	185	195	200	217	217	217	217	217	215	215	$34,000
Parks on Utility Lands	72	72	72	78	78	78	78	78	78	78	$10,600
Other Utility Lands	119	119	119	81	81	81	81	81	81	81	$10,600
School Lands	395	381	356	314	314	314	314	314	370	426	$34,000
Non-City-Owned Lands (not including School Lands, Royal Botanical Garden lands or Conservation Authority Lands that the City maintains as parkland)	159	129	130	88	127	127	127	127	128	128	$34,000
Leash-Free Dog Areas	-	2	2	41	41	41	41	41	41	43	$10,600
Total	**6,203**	**6,212**	**6,140**	**5,890**	**5,934**	**5,943**	**5,950**	**5,956**	**6,020**	**6,082**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0119	0.0119	0.0117	0.0111	0.0111	0.0111	0.0110	0.0109	0.0109	0.0109

10 Year Average	2011-2020
Quantity Standard	0.0113
Quality Standard	$39,059
Service Standard	$441

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$441
Eligible Amount	$28,709,353

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities
Unit Measure: No. of parkland amenities

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Tennis Club Lit	46	46	46	48	48	48	48	48	48	48	$77,600
Tennis Public Lit	25	25	25	22	22	22	22	22	22	20	$77,600
Tennis Public Unlit	17	18	23	20	20	20	20	21	20	17	$50,600
Soccer Class A+ (Lit) - Artificial Turf	1	1	1	1	1	1	1	1	1	1	$1,200,000
Soccer Class A+ (Lit)	1	1	1	1	1	1	1	1	1	1	$617,200
Soccer Class A Lit	17	15	15	15	15	15	15	15	15	15	$285,600
Soccer Class B Lit	9	9	9	8	8	8	8	8	8	9	$236,100
Soccer Class B Unlit	6	6	8	11	11	11	11	11	11	12	$199,000
Soccer Class C Unlit	160	161	162	201	201	201	201	201	201	201	$84,300
Lit Football Fields	3	3	3	4	4	4	5	6	6	6	$158,500
Unlit Football Fields	2	2	2	2	2	2	2	2	2	2	$76,400
Hardball Lit (premier diamond)	1	1	1	1	1	1	1	1	1	1	$363,100
Hardball Lit	15	15	15	15	15	15	15	15	15	15	$204,600
Hardball Unlit	22	22	21	21	21	21	21	21	21	21	$88,800
Softball Lit	36	39	40	37	37	37	39	41	41	41	$204,600
Softball Unlit	139	127	126	121	116	111	106	101	101	101	$88,800
Tball	39	43	43	42	41	40	39	38	38	38	$37,100
Batting Cages	12	12	12	12	12	13	16	16	16	16	$20,000
Lit Bocce Courts	32	32	32	35	35	29	29	29	29	29	$14,600
Regulation Bocce Courts Lit (min. 2 lanes)	10	10	10	8	8	8	8	8	8	8	$125,900
Unlit Bocce Courts	7	7	5	2	2	2	2	2	2	2	$7,900
Basketball Full-court	93	93	93	91	90	89	88	87	82	79	$51,700
Basketball Half-court	-	-	-	159	159	159	160	160	162	160	$25,800
Multi-Purpose Court	8	11	13	15	18	21	24	27	36	41	$64,100
Spray Pads - Community/City Wide	17	17	20	20	21	21	22	26	27	27	$330,000
Spray Pads - Neighbourhood/Parkette	35	37	38	38	38	37	39	41	42	42	$250,000
Wading Pools	16	16	15	14	13	11	9	8	8	8	$59,600
Play Structure - Neighbourhood/Parkette Parks	163	187	190	205	213	221	229	237	258	261	$105,000
Play Structure - Community/City-wide Parks	62	67	69	71	74	77	80	83	92	92	$203,400

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities
Unit Measure: No. of parkland amenities

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Play Structure - Other Parks (School, Historical, Open Space)	27	26	27	29	30	31	32	33	34	35	$85,400
Play Equipment - Community Parks/City-wide Parks	157	157	160	158	158	158	158	158	179	180	$24,700
Play Equipment - Neighbourhood Parks	402	420	436	432	427	422	417	412	430	436	$173,100
Play Equipment - Other Parks (School, Historical, Open Space)	81	86	83	72	73	74	75	76	85	87	$11,200
Natural Playground	-	-	-	4	5	6	7	7	7	7	$125,000
Accessible Swing Seats	52	74	80	83	90	95	100	108	115	117	$2,200
Swing Sets, 4 seats	161	163	165	167	169	171	173	175	181	182	$39,200
Swing Sets, 6 seats	54	56	58	60	61	62	63	64	64	65	$51,000
Swing Sets, 8 seats	42	43	44	45	46	47	48	49	50	50	$62,800
Exercise Stations (per fitness station)	33	33	33	33	33	41	46	46	46	46	$9,165
Skateboard Parks	5	5	5	5	5	5	5	6	6	6	$870,000
Lawn bowling Greens	10	10	10	4	4	4	4	4	4	4	$11,200
Horseshoe Pitch	5	3	1	1	1	1	1	1	1	1	$7,900
Volleyball Courts	5	5	5	20	20	20	20	20	20	20	$14,600
Shuffleboard Courts	6	6	6	6	6	6	6	6	6	6	$1,100
Running Tracks	5	6	6	10	10	10	11	11	11	11	$78,700
Public Beaches within Parks/along Trails	3	3	3	5	5	5	5	5	5	5	$2,200
Public Boat Launches within Parks	2	2	2	1	1	1	1	1	1	1	$14,600
Track and Field Amenities:											
High Jump Area	2	2	2	2	2	2	2	2	2	2	$7,900
Discus Area	3	3	3	3	3	3	3	3	3	3	$7,900
Long Jump pits	9	9	9	9	9	9	9	9	9	9	$7,900
Hop Skip Jump area	1	1	1	1	1	1	1	1	1	1	$7,900
Shot-put/discus	1	1	1	1	1	1	1	1	1	1	$7,900
Steeplechase waterpit	1	1	1	1	1	1	1	1	1	1	$11,200
Javelin runway	1	1	1	1	1	1	1	1	1	1	$7,900
Benches	2,550	2,555	2,560	2,610	2,660	2,710	2,760	2,810	2,860	2,910	$1,100
Bleachers	274	274	273	277	281	285	289	293	293	298	$7,900
Display Fountains	7	8	9	11	11	11	11	11	11	11	$18,000
Drinking Fountains	74	71	68	70	72	74	76	78	84	85	$50,000
Trash Receptacles	1,314	1,320	1,327	1,377	1,427	1,477	1,527	1,577	1,602	1,627	$1,100

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities
Unit Measure: No. of parkland amenities

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Lighting Standards	2,250	2,391	2,532	2,557	2,582	2,607	2,632	2,657	2,694	2,700	$4,500
Bridges - Pedestrian	33	38	42	38	38	38	38	38	38	38	$61,800
Bridges - Vehicle	15	17	18	13	13	13	13	13	13	13	$106,800
Gates - Vehicle	113	114	115	117	119	121	123	125	125	127	$10,700
Gates - Pedestrian	163	161	159	162	165	168	171	174	178	178	$8,000
Irrigation Systems	55	58	58	60	62	62	64	64	67	72	$7,900
Band shell (Battlefield Park)	1	1	1	1	1	1	1	1	1	1	$342,900
Cricket Pitch	2	2	2	2	2	2	2	2	2	3	$88,800
Cricket Practice Pitch	1	1	1	1	1	1	1	1	1	1	$45,000
Australian Football Field	1	1	1	1	1	1	1	1	1	1	$76,400
Viewing Platform	1	1	2	8	8	8	8	8	8	8	$351,900
Escarpment Stairs	6	6	6	12	12	12	12	12	12	12	$1,803,300
Outdoor Ice Rink - Naturally Cooled	66	66	66	66	66	66	67	67	67	67	$98,000
Outdoor Ice Rink - Artificially Cooled	2	2	2	3	3	3	3	3	4	4	$908,000
Park Signs - Community	87	87	87	88	89	90	91	92	92	93	$9,500
Park Signs - Internal	609	609	609	614	619	624	629	634	635	637	$9,200
Park Signs - Neighbourhood	239	240	243	245	245	246	250	250	252	253	$6,500
Parking - Asphalt - lit (per stall)	9	9	9	1,533	1,583	1,633	1,683	1,733	1,760	1,900	$5,600
Parking - Asphalt - unlit (per stall)	3,428	3,428	3,428	1,824	1,874	1,924	1,974	2,024	2,024	2,024	$3,200
Parking - Granular - unlit (per stall)	3,932	3,932	3,932	3,194	3,244	3,294	3,344	3,394	3,394	3,394	$1,100
Parking - Pervious Concrete - unlit (per stall)	-	22	22	22	22	22	22	22	22	22	$18,000
Parking - Grasspave - unlit (per stall)		140	140	-	-	-	-	-	-	-	$1,300
Pump Track (BMX/Bike Track) - Gage Park	-	-	-	-	1	1	1	1	1	1	$111,800
Bob Mackenzie Ball Hockey Court (Roxborough ave)	-	-	-	-	1	1	1	1	1	1	$148,400

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities
Unit Measure: No. of parkland amenities

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Pickleball Courts	-	-	-	-	-	6	6	6	6	24	$3,000
Total	**17,294**	**17,693**	**17,892**	**17,297**	**17,609**	**17,922**	**18,249**	**18,563**	**18,823**	**19,095**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.033	0.034	0.034	0.033	0.033	0.033	0.034	0.034	0.034	0.034

10 Year Average	2011-2020
Quantity Standard	0.0336
Quality Standard	$17,248
Service Standard	$580

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$580
Eligible Amount	$37,696,759

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities - Buildings
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Park Amenities (sq.ft.)											
Agro Park - Sun Shelter	-	-	-	-	-	-	400	400	400	400	$190
Agro Park - Trellis	-	-	-	-	-	-	192	192	192	192	$324
Alexander Park - Trellis	-	-	-	-	-	-	-	242	242	242	$485
Allison Neighbourhood Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$176
Beverly Park - Pavilion	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	1,332	$68
Birch Avenue Leash-Free Area - Shelter #1	45	45	45	45	45	45	45	45	45	45	$133
Birch Avenue Leash-Free Area - Shelter #2	45	45	45	45	45	45	45	45	45	45	$133
Bookjans Park	-	-	-	-	-	-	-	-	210	210	$376
Broughton Park West - Sun Shelter	-	360	360	360	360	360	360	360	360	360	$137
Buchanan Park - Sun Shelter	-	-	-	-	522	522	522	522	522	522	$177
Burkholder Park - Sun Shelter	-	400	400	400	400	400	400	400	400	400	$175
Carpenter Park - Sun Shelter	-	-	-	-	-	-	383	383	383	383	$201
Carter Park - Sun Shelter	-	-	-	332	332	332	332	332	332	332	$238
Caterini Park - Sun Shelter	-	-	-	-	-	-	400	400	400	400	$153
Centennial Heights Park - Pavilion	1,313	1,313	1,313	1,313	1,313	1,313	1,313	1,313	1,313	1,313	$68
Chappel Estates Park - Sun Shelter	-	-	388	388	388	388	388	388	388	388	$128
Churchill Park - Sun Shelters	1,308	1,308	1,308	1,308	1,308	1,308	1,308	1,308	1,308	1,308	$39
Confederation Beach Park - Edgewater Pavilion	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	5,756	$68
Confederation Beach Park - Willow Cove Pavilion	2,594	2,594	2,594	2,594	2,594	2,594	2,594	2,594	2,594	2,594	$68
Copetown Lions Park - Pavilion	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304	1,304	$68
Courtcliffe Park - Picnic Shelter	1,485	1,485	1,485	1,485	1,485	1,485	1,485	1,485	1,485	1,485	$68
Cranberry Hill Park - Sun Shelter	-	-	-	-	-	-	282	282	282	282	$253
Creekside Park - Sun Shelter	-	-	-	-	-	488	488	488	488	488	$151
Dundas Driving Park - Pavilion - 159080	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	$147
Dundas Driving Park - Pavilion - 159665	2,058	2,058	2,058	2,058	2,058	2,058	2,058	2,058	2,058	2,058	$147
Dundas Driving Park - Trellis	665	665	665	665	665	665	665	665	665	665	$158
Dundurn Park - Picnic Pavilion	1,336	1,336	1,336	1,336	1,336	1,336	1,336	1,336	1,336	1,336	$68
Durand Park - Sun Shelter	-	-	-	-	366	366	366	366	366	366	$244
Durand Park - Trellis	-	-	-	-	180	180	180	180	180	180	$288
Elmar Park - Sun Shelter	-	-	-	373	373	373	373	373	373	373	$68

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities - Buildings
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Eringate Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$242
Fair Park (Meadowlands Ph IIX & X) - Sun Shelter	-	-	-	-	-	400	400	400	400	400	$118
Fairfield Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$129
Fairgrounds Community Park - Picnic Pavilion	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816	1,816	$226
Fairgrounds Community Park - Sun Shelter	334	334	334	334	334	334	334	334	334	334	$94
Father Sean O'Sullivan Park - Sun Shelter	-	-	-	380	380	380	380	380	380	380	$68
Freelton Community Park - Picnic Pavilion	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	1,220	$68
Gage Park - Archway (Near Main St)	602	602	602	602	602	602	602	602	602	602	$68
Gage Park - Band Shell	980	980	980	980	980	980	980	980	980	980	$199
Gatesbury Sun Shelter	-	-	-	-	-	250	250	4,508	4,508	4,508	$250
Glanbrook Hills Park - Sun Shelter	-	-	-	-	-	-	-	400	400	400	$232
Globe Park - Sun Shelter	380	380	380	380	380	380	380	380	380	380	$68
Hampton Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$118
Heritage Green Dog Park - Sun Shelter	-	-	-	-	-	-	-	-	100	100	$375
Hill Street Dog Park - Sun Shelter	-	-	-	-	-	-	-	-	100	100	$375
Honourable Bob McKenzie Park - Sun Shelter	-	-	-	272	272	272	272	272	272	272	$195
Huntington Park - Sun Shelter	380	380	380	380	380	380	380	380	380	380	$68
Inch Park - Sun Shelter	-	-	-	-	-	-	-	-	780	780	$122
Jackson Heights Neighbourhood Park - Sun Shelter	388	388	388	388	388	388	388	388	388	388	$119
Jerome Neighbourhood Park - Sun Shelter	-	590	590	590	590	590	590	590	590	590	$108
Joe Sam's Leisure Park - Sun Shelter	-	-	-	-	-	-	-	840	840	840	$213
John Rebecca Park - Custom Sun Shelter/Pergola	-	-	-	-	-	-	-	-	800	800	$366
Johnson Tew Park - Sun Shelter	-	-	-	-	-	470	470	470	470	470	$138
Kennedy East Park - Sun Shelter	380	380	380	380	380	380	380	380	380	380	$68
Kings Forest Golf Club - Pavilion A	199	199	199	199	199	199	199	199	199	199	$68
Kings Forest Golf Club - Sun Shelter	315	315	315	315	315	315	315	315	315	315	$68
Kinsmen Park - Picnic Shelter	-	-	-	747	747	747	747	747	747	747	$68
Kopperfield Park - Sun Shelter	-	-	-	-	400	400	400	400	400	400	$185
Laidman Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$138
Lake Pointe Park - Sun Shelter	360	360	360	360	360	360	360	360	360	360	$68
Lake Vista Park - Sun Shelter	360	360	360	360	360	360	360	360	360	360	$200
Lynden Legion Park - Picnic Pavilion	337	337	337	337	337	337	337	337	337	337	$68

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities - Buildings
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Lynden Lions South Park - Picnic Pavilion	-	-	-	864	864	864	864	864	864	864	$68
McClaren Park -Shade Structure	-	-	-	-	-	225	225	225	225	225	$90
Mohawk Sports Park - First Base Dugout	366	366	366	366	366	366	366	366	366	366	$54
Mohawk Sports Park - Third Base Dugout	366	366	366	366	366	366	366	366	366	366	$54
Montgomery Park - Pavilion	381	381	381	381	381	381	381	381	381	381	$68
Montgomery Park - Sun Shelter	260	260	260	260	260	260	260	260	260	260	$68
Moorland Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$175
Mount Hope Park - Sun Shelter	-	-	-	-	-	-	-	724	724	724	$175
Mount Lions Park - Sun Shelter Pavilion	380	380	380	380	380	380	380	380	380	380	$147
Newlands Park - Sun Shelter	274	274	274	274	274	274	274	274	274	274	$275
North Central Community Park - Sun Shelter	416	416	416	416	416	416	416	416	416	416	$116
Peace Memorial Park - Trellis	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	1,314	$78
Perth Park - Sun Shelter	-	-	-	-	232	232	232	232	232	232	$329
Pier 4 Park - Pavilion/Sun Shelter At Water's Edge	-	-	-	795	795	795	795	795	795	795	$68
Pine Ridge Park - Sun Shelter	300	300	300	300	300	300	300	300	300	300	$290
Pipeline (Geraldine Copps) Parkette - Shade Structure	-	-	-	-	-	-	180	180	180	180	$375
Powell Park - Sun Shelter	380	380	380	380	380	380	380	380	380	380	$68
Red Hill Summit East Park - Sun Shelter	-	-	400	400	400	400	400	400	400	400	$143
Richwill Park - Sun Shelter	354	354	354	354	354	354	354	354	354	354	$68
Robert E. Wade Ancaster Community Park - Sun Shelter	784	784	784	784	784	784	784	784	784	784	$130
Sackville Park - Bocce Sun Shelter	105	105	105	105	105	105	105	105	105	105	$68
Sam Lawrence Park - Pavilion	1,675	1,675	1,675	1,675	1,675	1,675	1,675	1,675	1,675	1,675	$68
Sam Manson Park - Sun Shelter	-	-	400	400	400	400	400	400	400	400	$113
Seabreeze Park - Sun Shelter	-	400	400	400	400	400	400	400	400	400	$152
Sheffield Ball Park - Pavilion	580	580	580	580	580	580	580	580	580	580	$68
Southampton Estates Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$168
Southbrook Park - Sun Shelter	340	340	340	340	340	340	340	340	340	340	$258
Strabane Community Park - Pavilion	880	880	880	880	880	880	880	880	880	880	$68
Summerlea West Park - Sun Shelter	-	278	278	278	278	278	278	278	278	278	$190

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Amenities - Buildings
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Summit Park - Sun Shelter	400	400	400	400	400	400	400	400	400	400	$224
Summit Parkette - Sun Shelter	-	-	-	-	-	-	-	-	256	256	$215
Templemead Park - Sun Shelter	560	560	560	560	560	560	560	560	560	560	$68
Tiffany Hills (Ancaster Meadows) Park - Sun Shelter	-	-	-	-	-	-	-	-	256	256	$210
Trenholme Park - Pavilion	394	394	394	394	394	394	394	394	394	394	$68
Valens Park - Picnic Pavilion	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	1,360	$68
Valley Park - Pavilion	1,660	1,660	1,660	1,660	1,660	1,660	1,660	1,660	1,660	1,660	$68
Vincent Massey - Sun Shelter	-	-	-	-	-	400	400	400	400	400	$133
Waterdown Memorial Park - Picnic Pavilion	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	1,342	$68
Westover Community Park - Picnic Pavilion	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	$68
William Connell Park - Trellis	-	-	-	-	-	-	-	660	660	660	$118
William Mcculloch - Pavilion	365	365	365	365	365	365	365	365	365	365	$68
William Schwenger Park - Sun Shelter	-	278	278	278	278	278	278	278	278	278	$201
Winona Park - Picnic Pavilion	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	1,750	$68
Winona Park - Trellis	-	300	300	300	300	300	300	300	300	300	$246
Woolverton Park - Pavilion	-	-	-	366	366	366	366	366	366	366	$68
York Road Parkette (Kaga Corner) - Sun Shelter	270	270	270	270	270	270	270	270	270	270	$68
Total	**49,945**	**52,551**	**53,739**	**57,867**	**59,567**	**61,800**	**63,637**	**70,761**	**73,263**	**73,263**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561	
Per Capita Standard	0.096	0.101	0.102	0.109	0.112	0.115	0.117	0.129	0.132	0.131	

10 Year Average	2011-2020
Quantity Standard	0.1145
Quality Standard	$105
Service Standard	$12

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$12
Eligible Amount	$779,251

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Trails
Unit Measure: Linear Kilometres of Paths and Trails

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/km)
Recreational Trails (km):											
Escarpment Rail Trail (Tar & Chip - unlit)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	$227,200
Cootes Drive Path (asphalt - unlit)	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	2.70	$129,000
Chedoke Radial Trail (part asphalt - part gravel)	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	10.50	$96,700
Red Hill Valley Recreational Trails (tar & chip - unlit)	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	1.30	$89,500
Desjardins Recreational Trail (gravel - unlit)	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40	$242,600
Hamilton Harbour Waterfront Trail (asphalt - lit - extra wide)	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	1.90	$242,600
Hamilton Harbour Waterfront Trail Extension (asphalt - lit - extra wide)	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	$138,600
Escarpment Rail Trail Extension (asphalt - unlit)	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	1.50	$170,400
Waterdown Wetlands Recreational Trial (asphalt & boardwalk - unlit)	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00	$73,300
Waterdown Wetlands Secondary Trails (screenings - until)	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	4.20	$227,200
Hamilton Beach Recreational Trail (asphalt - lit - extra wide)	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	0.35	$242,600
Macassa Bay Walkway (asphalt - lit)	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	1.48	$173,200
Bayfront Park Pathway (asphalt - lit)	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	$242,600
Pier 4 Park Pathway (asphalt - lit)	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	0.70	$119,300
Red Hill Valley Trail, (granular - unlit)	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	$170,400
East Hamilton Trail and Waterfront Link (asphalt - unlit)	3.50	3.50	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	$154,600
East Mountain Trail Loop (asphalt - unlit)	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	9.00	$117,800
Borer's Creek Trail (Initiative 15-1 Recreational Trails Plan)	-	-	-	-	-	-	0.40	0.40	0.40	0.40	$1,062,000
Pine Ridge Trail	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	$185,700
Kay Drage Park Trail	-	-	-	-	-	-	-	0.30	0.30	0.30	$84,300
Confederation Park - Stoney Creek Pond Trail	-	-	-	-	0.36	0.36	0.36	0.36	0.36	0.36	$496,800
Green Millen Shore Estates Shoreline Trail (4m wide limestone screening)	-	-	-	-	0.31	0.31	0.31	0.31	0.31	0.31	$194,400
Green Millen Shore Estates Shoreline Trail (2m wide limestone screening)	-	-	-	-	0.07	0.07	0.07	0.07	0.07	0.07	$78,600

City of Hamilton
Service Standard Calculation Sheet

Service: Parkland Trails
Unit Measure: Linear Kilometres of Paths and Trails

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/km)
Green Millen Shore Estates Shoreline Trail (4m wide asphalt)	-	-	-	-	0.71	0.71	0.71	0.71	0.71	0.71	$229,600
Green Millen Shore Estates Shoreline Trail (3m wide asphalt)	-	-	-	-	0.31	0.31	0.31	0.31	0.31	0.31	$179,100
Green Millen Shore Estates Shoreline Trail (1.8m wide boardwalk)	-	-	-	-	0.04	0.04	0.04	0.04	0.04	0.04	$2,647,700
Heritage Green Trail	-	-	-	-	-	-	-	-	-	0.58	$534,000
Shrewsbury Trail	-	-	-	-	0.09	0.09	0.09	0.09	0.09	0.09	$246,600
Ryckman Parks Trail					0.29	0.29	0.29	0.29	0.29	0.29	$219,100
Olmsted Trail					-	0.37	0.37	0.37	0.37	0.37	$246,600
Shaver Estates Trail	-	-	-	-	-	-	-	0.38	0.38	0.38	$1,194,400
Recreational Multi-Use Pathways (km):											
Park Corridor (asphalt & gravel - unlit)	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	1.70	$171,100
Ancaster Radial Right of Way (gravel - unlit)	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	$170,400
Stoney Creek Multi-Use Path (asphalt - unlit)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50	$47,800
Spencer Creek Trail (natural footpath - unlit)	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	1.20	$104,000
Pipeline Walkway (asphalt - lit)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	$2,372,200
Pier 7 & 8 Boardwalk	-	-	-	-	-	0.18	0.18	0.18	0.18	0.18	$4,655,800
Total	**58.13**	**58.13**	**59.43**	**59.43**	**61.61**	**62.16**	**62.56**	**63.24**	**63.24**	**63.82**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001

10 Year Average	2011-2020
Quantity Standard	0.0001
Quality Standard	$220,800
Service Standard	$22

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$22
Eligible Amount	$1,436,216

City of Hamilton
Service Standard Calculation Sheet

Service: Parks Vehicles and Equipment
Unit Measure: No. of vehicles and equipment

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Vehicle)
Fertilizer Spreader	6	6	6	6	6	6	6	6	6	6	$5,200
Aerator	5	5	5	5	5	5	5	5	5	5	$7,300
Topdresser/box scraper	7	7	7	7	7	7	7	7	7	7	$4,200
Rototiller	9	9	9	9	9	9	9	9	9	9	$4,200
Total	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**27**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005	0.00005

10 Year Average	2011-2020
Quantity Standard	0.00005
Quality Standard	$5,000
Service Standard	$0.25

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$0.25
Eligible Amount	$16,262

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
City of Hamilton												
Simone Hall (Formerly Old Beasley Community Centre) - 133 Wilson St	2,456	2,456	2,456	2,456	2,456	2,456	2,456	2,456	2,456	2,456	$337	$398
Beasley Community Centre - 145 Wilson St. - in partnership w/ HWDSB and retained ownership of old Beasley Community Centre	6,157	6,157	6,157	6,157	6,157	6,157	6,157	6,157	6,157	6,157	$337	$398
Bennetto Recreation Centre - 450 Hughson St. N.	25,836	25,836	25,836	25,836	25,836	25,836	25,836	25,836	25,836	25,836	$433	$504
Central Memorial Recreation Centre - 93 West Ave. S.	22,364	22,364	22,364	22,364	22,364	22,364	22,364	22,364	22,364	22,364	$335	$396
Dalewood Recreation Centre - 1150 Main St. W.	12,946	12,946	12,946	12,946	12,946	12,946	12,946	12,946	12,946	12,946	$428	$498
Kiwanis Boys and Girls Club - 45 Ellis St.	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	18,000	$404	$472
Hill Park Recreation Centre - 465 East 16th St.	16,685	16,685	16,685	16,685	16,685	16,685	16,685	16,685	16,685	16,685	$433	$504
Huntington Park Recreation Centre - 87 Brentwood Dr.	29,681	29,681	29,681	29,681	29,681	29,681	29,681	29,681	29,681	29,681	$388	$454
Norman Pinky Lewis Recreation Centre - 192 Wentworth St. N.	35,333	35,333	35,333	35,333	35,333	35,333	35,333	35,333	35,333	35,333	$506	$584
Ryerson Recreation Centre - 247 Duke St.	27,847	27,847	27,847	27,847	27,847	27,847	27,847	27,847	27,847	27,847	$238	$289
Sir Allan MacNab - 145 Magnolia Dr.	30,597	30,597	30,597	30,597	30,597	30,597	30,597	30,597	30,597	30,597	$385	$451
Sir Wilfrid Laurier Recreation Centre - 60 Albright Rd.	16,617	16,617	16,617	16,617	16,617	16,617	16,617	16,617	16,617	16,617	$467	$541
Sir Winston Churchill Recreation Centre - 1715 Main St. E.	12,414	12,414	12,414	12,414	12,414	12,414	12,414	12,414	12,414	12,414	$436	$507
Westmount Recreation Centre (New) - 35 Lynbrook Dr.	-	51,938	51,938	51,938	51,938	51,938	51,938	51,938	51,938	51,938	$558	$642
Riverdale Community Centre (new) - 150 Violet Dr.	16,401	16,401	16,401	16,401	16,401	16,401	16,401	16,401	16,401	16,401	$351	$413
Jimmy Thompson Pool - 1099 King St. E.	23,129	23,129	23,129	23,129	23,129	23,129	23,129	23,129	23,129	23,129	$411	$480
Eastwood Arena - 111 Burlington St. E.	27,096	27,096	27,096	27,096	27,096	27,096	27,096	27,096	27,096	27,096	$357	$420
Scott Park Arena - 876 Cannon St. E.	23,950	23,950	23,950	23,950	-	-	-	-	-	-	$338	$399
Bill Friday Lawfield Arena - 150 Folkstone Rd. (formerly Lawfield Arena).	31,183	31,183	31,183	31,183	31,183	31,183	31,183	31,183	31,183	31,183	$330	$390
Coronation Arena - 81 Macklin St. N.	27,727	27,727	27,727	27,727	27,727	27,727	27,727	27,727	27,727	27,727	$334	$395
Chedoke Twin Pad - 91 Chedmac Dr.	99,522	99,522	99,522	99,522	99,522	99,522	99,522	99,522	99,522	99,522	$274	$328
Parkdale Arena (Pat Quinn) - 1770 Main St. E.	34,600	34,600	34,600	34,600	34,600	34,600	34,600	34,600	34,600	34,600	$353	$416
Inch Park Arena - 400 Queensdale Ave.	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	34,500	$280	$335
Mountain Arena and Skating Arena (Twin Pad - Dave Anderchck) - 25-55 Hester St.	80,755	80,755	80,755	80,755	80,755	80,755	80,755	80,755	80,755	80,755	$302	$359
Rosedale Arena - 100 Greenhill Ave.	38,072	38,072	38,072	38,072	38,072	38,072	38,072	38,072	38,072	38,072	$354	$417
Mohawk 4 Arena - 710 Mountain Brow Blvd.	136,000	136,000	136,000	136,000	136,000	136,000	136,000	136,000	136,000	136,000	$274	$328
Birge Outdoor Pool - 167 Birge St.	7,061	7,061	7,061	7,061	7,061	1,832	1,832	1,832	1,832	1,832	$378	$443
Parkdale Outdoor Pool - 1770 Main St. E.	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	$241	$292
Rosedale Outdoor Pool - 60 Greenhill Ave.	2,501	2,501	2,501	2,501	2,501	2,501	2,501	2,501	2,501	2,501	$646	$739
Victoria Outdoor Pool - 100 Strathcona	5,897	5,897	5,897	5,897	5,897	5,897	5,897	5,897	5,897	5,897	$251	$303
Chedoke Outdoor Pool - 500 Bendamere	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	2,480	$604	$692
Walker Outdoor Pool - 180 Dicenzo Dr.	3,703	3,703	3,703	3,703	3,703	3,703	3,703	3,703	3,703	3,703	$571	$656
Inch Park Outdoor Pool - 400 Queensdale Ave.	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	$525	$605
Coronation Outdoor Pool - 81 Macklin St. N.	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	4,252	$525	$605

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Chedoke Golf, Club House - 565 Aberdeen Ave.	11,443	11,443	11,443	11,443	11,443	11,443	11,443	11,443	11,443	11,443	$261	$314
Chedoke Golf, Pro Shop - 565 Aberdeen Ave.	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	$368	$432
Kings Forest Golf Clubhouse - 100 Greenhill Ave.	13,454	13,454	13,454	13,454	13,454	13,454	13,454	13,454	13,454	13,454	$332	$392
Ivor Wynne Stadium, Grandstands & Press Box - 75 Balsam Ave. N.	128,675	128,675	-	-	-	-	-	-			$1,585	$1,774
Tim Horton's Field	-	-	-	-	327,148	327,148	327,148	327,148	327,148	327,148	$443	$515
Churchill Fields Lawn Bowling (167 Cline N) - 167 Cline N.	4,568	4,568	4,568	4,568	4,568	4,568	4,568	4,568	4,568	4,568	$225	$274
Hamilton Tennis Club (257 Duke at HAAA Park)	7,064	7,064	7,064	7,064	7,064	7,064	7,064	7,064	7,064	7,064	$380	$445
Rosedale Tennis Club (Within Gage Park)	2,210	2,210	2,210	2,210	2,210	2,210	2,210	2,210	2,210	2,210	$225	$274
Rosedale Lawn Bowling (Within Gage Park) - 1000 Main St. E.	4,018	4,018	4,018	4,018	4,018	4,018	4,018	4,018	4,018	4,018	$225	$274
Gage Park Greenhouse #1/Tropical - 1000 Main St. E.	3,363	3,363	3,363	3,363	3,363	3,363	3,363	14,068	37,868	37,868	$178	$202
Gage Park Horticulture/Staff Bldg. - 1000 Main St. E.	6,271	6,271	6,271	6,271	6,271	6,271	6,271	6,271	6,271	6,271	$235	$733
Sackville Hill Senior Centre (780 Upper Wentworth)	24,452	24,452	24,452	24,452	24,452	24,452	24,452	24,452	24,452	24,452	$357	$420
Turner Park YMCA (Community Centre, Pool)	59,490	59,490	59,490	59,490	59,490	59,490	59,490	59,490	59,490	59,490	$413	$463
YWCA - Hamilton Seniors' Active Living Centre (75 MacNab St. S. - basement level)	7,529	7,529	7,529	7,529	7,529	7,529	7,529	7,529	7,529	7,529	$167	$211
YWCA - Ottawa St. Seniors Leisure Centre - 52 & 66 Ottawa St. N. (In two Buildings)	5,220	5,220	5,220	5,220	5,220	5,220	5,220	5,220	-	-	$167	$211
Main Hess Senior Centre (181 Main St. W. - 3rd Floor)	10,930	10,930	10,930	10,930	10,930	10,930	10,930	10,930	10,930	10,930	$357	$420
Lister Block	16,285	16,285	16,285	16,285	16,285	16,285	16,285	16,285	16,285	16,285	$382	$448
Stoney Creek												
H.G./Brewster Pool - 200 Dewitt Rd.	11,764	11,764	11,764	11,764	11,764	11,764	11,764	11,764	11,764	11,764	$13,226	$14,608
Green Acres Outdoor Pool - 90 Randall Ave	9,451	9,451	9,451	9,451	9,451	9,451	9,451	9,451	9,451	9,451	$10,625	$11,740
Stoney Creek Arena - 37 King St. W.	29,279	29,279	29,279	29,279	29,279	29,279	29,279	29,279	29,279	29,279	$427	$497
Saltfleet Arena - 24 Sherwood Park Rd.	24,977	24,977	24,977	24,977	24,977	24,977	24,977	24,977	24,977	24,977	$397	$464
Optimist Club Community Centre - 890 Queenston	4,772	4,772	4,772	4,772	4,772	4,772	4,772	4,772	4,772	4,772	$160	$203
Stoney Creek Tennis Club (at Little League Park) - 880 Queenston Rd.	2,357	2,357	2,357	2,357	2,357	2,357	2,357	2,357	2,357	2,357	$154	$196
Valley Park Community Centre/Aquatic Centre - 970 Paramount Dr	35,362	35,362	35,362	35,362	35,362	35,362	35,362	35,362	35,362	35,362	$299	$356
Valley Park Tennis Club - 970 Paramount Dr.	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	1,690	$165	$208
Valley Park Arena - 970 Paramount Dr.	35,587	35,587	35,587	35,587	35,587	35,587	35,587	35,587	35,587	35,587	$422	$492
Fruitland Community Centre (Lion's Club) (14 Sherwood Park Rd)	5,047	5,047	5,047	5,047	5,047	5,047	5,047	5,047	5,047	5,047	$234	$284
Winona Scout Hall (Ward 11)	2,142	2,142	2,142	2,142	2,142	2,142	2,142	2,142	2,142	2,142	$378	$443
Winona Public School purchased for temporary community centre (facilities data)	-	-	-	-	-	33,480	33,480	33,480	33,480	33,480	$370	$733
Stoney Creek Recreation Centre (New) - 45 King St. W.	-	28,252	28,252	28,252	28,252	28,252	28,252	28,252	28,252	28,252	$705	$804
Winona Seniors - 1239 Highway 8 (Ward 11)	4,246	4,246	4,246	4,246	4,246	4,246	4,246	4,246	4,246	4,246	$413	$482
Club 60 - 4-6 King St. W.	3,568	3,568	3,568	3,568	3,568	3,568	3,568	3,568	3,568	3,568	$358	$421

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Kiwanis Club (former police building) - 200 Jones Rd. (Also called Fruitland Community Centre)	6,860	6,860	6,860	6,860	6,860	6,860	6,860	6,860	6,860	6,860	$363	$427
Stoney Creek Alliance Church/Community Centre (Saltfleet Community)	28,991	28,991	28,991	28,991	28,991	28,991	28,991	28,991	28,991	28,991	$48	$79
Ancaster												
Ancaster Community Centre (Morgan Firestone Arena) - 385 Jerseyville Rd.	92,958	92,958	92,958	92,958	92,958	92,958	92,958	92,958	92,958	92,958	$456	$529
Ancaster Community & Rotary Centre - 385 Jerseyville Rd.	44,317	44,317	44,317	44,317	44,317	44,317	44,317	44,317	44,317	44,317	$250	$302
Ancaster Senior Achievment Centre - 622 Alberton Rd.	13,858	13,858	13,858	17,335	17,335	17,335	17,335	17,335	17,335	17,335	$310	$368
Lawn Bowling Club House - 291 Lodor St.	847	847	847	1,948	1,948	1,948	1,948	1,948	1,948	1,948	$235	$285
Community Centre (Old Town Hall) - 310 Wilson St.	3,780	3,780	3,780	3,780	3,780	3,780	3,780	3,780	3,780	3,780	$284	$340
Tennis Club House - 291 Lodor St.	1,076	1,076	1,076	791	791	791	791	791	791	791	$160	$203
Carluke Community Centre - Carluke Rd.	2,553	2,553	2,553	2,553	2,553	2,553	-	-	-	-	$278	$333
Optimist Youth Centre - 237 Manitou Way	3,819	3,819	3,819	3,819	3,819	3,819	3,819	3,819	3,819	3,819	$288	$344
Lions (South) Club Building Lynden Park - 4070 Governors Rd.	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,280	$862	$977
Copetown & District Lions Community Centre - 1950 Governors Rd.	8,190	8,190	8,190	8,190	8,190	8,190	8,190	8,190	8,190	8,190	$362	$425
Lions Club Outdoor Pool - 236 Jerseyville Rd.	3,866	3,866	3,866	3,866	3,866	3,866	3,866	3,866	3,866	3,866	$708	$807
Spring Valley Arena - 29 Orchard Drive	25,244	25,244	25,244	25,244	29,621	29,621	29,621	29,621	29,621	29,621	$377	$442
Aquatic Centre - 47 Meadowbrook Dr.	15,959	15,959	15,959	15,959	15,959	15,959	15,959	15,959	15,959	15,959	$17,942	$19,807
Dundas												
Dundas Outdoor Community Pool - 39 Market St. S.	11,457	-	-	-	-	-	-	-	-	-	$207	$255
Dundas Community Pool	10,364	10,364	10,364	10,364	10,364	10,364	10,364	10,364	10,364	10,364	$614	$164
Dundas Market Street Arena - Grightmire - 35 Market St. S.	104,578	104,578	104,578	104,578	104,578	104,578	104,578	104,578	104,578	104,578	$303	$360
Olympic Arena - Westoby - 88 Olympic Dr.	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	27,150	$375	$440
Dundas Memorial Community Centre - 10 Market St. S.	13,600	13,600	13,600	13,600	13,600	13,600	13,600	13,600	13,600	13,600	$518	$597
Valleyfield Community Centre (Nigel Charlong Community Centre) - 287 Old Guelph Rd.	3,780	3,780	3,780	3,780	3,780	3,780	-	-	-	-	$384	$450
Dundas Driving Park Outdoor Rink Building - 71 Cross St. (Concession / Washroom / Ice Plant)	2,399	2,399	2,399	2,399	2,399	2,399	2,399	2,399	2,399	2,399	$707	$806
Tennis Club Building (Cross St.)	1,745	1,745	1,745	1,745	1,745	1,745	1,745	1,745	1,745	1,745	$165	$208
Lawn Bowling Club House (Cross St.)	1,728	1,728	1,728	1,728	1,728	1,728	1,728	1,728	1,728	1,728	$111	$149
Glanbrook												
Mt. Hope Hall - 3027 Homestead	7,492	7,492	7,492	7,492	7,492	7,492	7,492	7,492	7,492	7,492	$190	$217
Glanbrook Auditorium - 4300 Binbrook Rd	4,810	4,810	4,810	4,810	4,810	4,810	4,810	4,810	4,810	4,810	$214	$244
Glanbrook Arena - 4300 Binbrook Road	38,280	38,280	38,280	38,280	38,280	38,280	38,280	38,280	38,280	38,280	$316	$356
Binbrook Memorial Hall - 2600 Hwy 56	7,596	7,596	7,596	7,596	7,596	7,596	7,596	7,596	7,596	7,596	$256	$309
Woodburn Centennial Hall - 1062 Golf Club Road	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	2,974	$334	$395
Lions Youth Centre - 3027 Homestead Dr.	6,035	6,035	6,035	6,035	6,035	6,035	6,035	6,035	6,035	6,035	$340	$383

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Flamborough												
Beverly Arena - 680 Highway 8	32,969	32,969	32,969	32,969	32,969	32,969	32,969	32,969	32,969	32,969	$392	$440
Beverly Community Centre - 680 Highway 8	4,630	4,630	4,630	4,630	4,630	4,630	4,630	4,630	4,630	4,630	$278	$314
Carlisle Arena - 1496 Centre Rd.	33,062	33,062	33,062	33,062	33,062	33,062	33,062	33,062	33,062	33,062	$363	$408
Carlisle Community Centre - 1496 Centre Rd. (Includes Storage / Washroom)	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	4,900	$278	$314
North Wentworth Arena	27,888	-	-	-	-	-	-	-	-	-	$278	$333
Harry Howell Arena (Formerly North Wentworth Twin Pad) - 27 Highway 5 W.	-	92,640	92,640	92,640	92,640	92,640	92,640	92,640	92,640	92,640	$234	$284
Beverly Township Hall - 795 Old Highway 8	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	3,995	$278	$314
Carlisle Memorial Hall - 273 Carlsile Rd.	4,513	4,513	4,513	4,513	4,513	4,513	4,513	4,513	4,513	4,513	$334	$376
Lynden Legion Park - 204 Lynden Rd.	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	8,400	$83	$99
Waterdown Memorial Hall - 317 Dundas St. E.	3,003	3,003	3,003	3,003	3,003	3,003	3,003	3,003	3,003	3,003	$442	$514
Millgrove Community Centre - 855 Millgrove Side. Rd.	4,811	4,811	4,811	4,811	4,811	4,811	4,811	4,811	4,811	4,811	$278	$314
Mountsberg Hall - 2133 Centre Rd.	1,432	1,432	1,432	1,432	1,432	1,432	1,432	1,432	1,432	1,432	$334	$376
Sealy Park Scout Hall - 115 Main St. S.	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	3,016	$382	$448
Sheffield Community Centre - 2339 5th Concession Rd. W.	4,267	4,267	4,267	4,267	4,267	4,267	4,267	4,267	4,267	4,267	$383	$449
Greensville Hall - 283 Brock Rd.	2,867	2,867	2,867	2,867	2,867	2,867	2,867	2,867	2,867	2,867	$411	$461
Valens Community Centre - 1818 Valens Rd.	3,180	3,180	3,180	3,180	3,180	3,180	3,180	3,180	3,180	3,180	$278	$314
Flamborough YMCA (207 Parkside Dr.) (50% City Benefit)	43,000	43,000	43,000	43,000	43,000	43,000	43,000	43,000	43,000	43,000	$167	$211
Flamborough Seniors Centre 163 Dundas St. E.	-	-	-	-	-	5,560	5,560	5,560	5,560	5,560	$400	$450
Bernie Morelli Recreation Centre (& Senior's Centre) & outdoor rink/splashpad	-	-	-	-	-	-	-	54,010	54,010	54,010	$479	$554
Confederation Beach Park & Wild Water Works (10 Facilities)	24,710	24,710	24,710	24,710	24,710	24,710	24,710	24,710	24,710	24,710	$780	$887
Confederation Beach Park & Wild Water Works - Park Sheds (13 Facilities)	9,395	9,395	9,395	9,395	9,395	9,395	9,395	9,395	9,395	9,395	$343	$405
Confederation Beach Park & Wild Water Works - Admin Building & Main Kiosk	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	$312	$370
Confederation Beach Park & Wild Water Works - Workshop	1,290	1,290	1,290	1,290	1,290	1,290	1,290	1,290	1,290	1,290	$401	$468
Chedoke Yard, Storage Bldg., 565 Aberdeen Ave.	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	$101	$242
Barton Community Hall (Formerly Barton Yard, Carpenter's Shop (125 Barton St. W.))									13,453	13,453	$401	$468
Total	**2,068,369**	**2,201,853**	**2,073,178**	**2,077,471**	**2,385,046**	**2,418,858**	**2,412,525**	**2,477,240**	**2,495,819**	**2,495,819**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	3.9780	4.2144	3.9394	3.9269	4.4788	4.5051	4.4476	4.5241	4.5092	4.4603

10 Year Average	2011-2020
Quantity Standard	4.2984
Quality Standard	$688
Service Standard	$2,957

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$2,957
Eligible Amount	$192,357,934

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Park Amenities (sq.ft.)											
Alexander Park - Washroom / Concession / Storage	1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954	1,954	$780
Cathedral Park - Field House / Washrooms / Storage	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	1,475	$780
Highland Gardens Park - Block Storage Hut	124	124	124	124	124	124	124	124	-	-	$1,400
Escarpment Ward 1 - Utility Structure Associated With C.S.O. Tank Above Chedoke	282	282	282	282	282	282	282	282	282	282	$638
Bayfront Park - Concession	693	693	693	693	693	693	693	693	693	693	$147
Bayfront Park - Public Works Storage Building	1,398	1,398	1,398	1,398	1,398	1,398	1,398	1,398	1,398	1,398	$90
Bayfront Park - Storage Building West Of Yacht Club	455	455	455	455	455	455	455	455	455	455	$147
Bayfront Park - Washroom At Parking Lot With Roof Top Lookout	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	2,600	$780
Bayfront Park - Yacht Club Building	3,813	3,813	3,813	3,813	3,813	3,813	3,813	3,813	3,813	3,813	$191
Broughton Park East - Sunshelter With Storage Building	671	671	671	671	671	671	671	671	671	671	$147
Jack C. Beemer Park Washroom & Concession	-	-	-	2,000	2,000	2,000	2,000	2,000	2,000	2,000	$780
Carter Park - Washrooms / Storage	333	333	333	333	333	333	333	333	333	333	$780
Central Park - Block Building With Concession Area & Shelter	695	695	695	695	695	695	695	695	695	695	$147
Corktown Park - Washrooms / Storage	1,546	1,546	1,546	1,546	1,546	1,546	1,546	1,546	1,546	1,546	$780
Eastwood Park- Concession	2,777	2,777	2,777	2,777	2,777	2,777	2,777	2,777	2,777	2,777	$147
Ferguson Ave Shelter - Pavilion	4,205	4,205	4,205	4,205	4,205	4,205	4,205	4,205	4,205	4,205	$147
Jackie Washington Rotary Park - Washrooms / Concession	678	678	678	678	678	678	678	678	678	678	$147
Pier 4 Park - Gartshore - Thomson Building	1,975	1,975	1,975	1,975	1,975	1,975	1,975	1,975	1,975	1,975	$212
Shamrock Park - Storage	156	156	156	156	156	156	156	156	156	156	$147
Belview Park - Utility Building For Spray Pad And Supie	365	365	365	365	365	365	365	365	365	365	$355
Lucy Day Park - Storage/Utility/Washroom	351	351	351	351	351	351	351	351	351	351	$355

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Myrtle Park - Pavilion/Storage	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	$147
Powell Park - Washrooms, Small Meeting Space, Storage	4,305	4,305	4,305	4,305	4,305	4,305	4,305	4,305	4,305	4,305	$147
Woodlands Park - Concession / Washrooms	2,495	2,495	2,495	2,495	2,495	2,495	2,495	2,495	2,495	2,495	$780
Andrew Warburton Memorial Park - Storage/Utility Building With Sun Shelter	688	688	688	688	688	688	688	688	688	688	$147
Globe Park - Storages	424	424	424	424	424	424	424	424	-	-	$90
Globe Park - Washrooms / Changerooms	1,765	1,765	1,765	1,765	1,765	1,765	1,765	1,765	-	-	$780
Mahony Park - Storage For Batting Cage	139	139	139	139	139	139	139	139	-	-	$90
Mahony Park - Washrooms	2,941	2,941	2,941	2,941	2,941	2,941	2,941	2,941	2,941	2,941	$780
Montgomery Park - Washroom / Storage / Concession	2,788	2,788	2,788	2,788	2,788	2,788	3,770	3,770	3,770	3,770	$780
Normanhurst Community Centre	2,885	2,885	2,885	2,885	2,885	2,885	2,885	-	-	-	$459
Roxborough Park - Washroom / Storage / Concession	1,184	1,184	1,184	1,184	1,184	1,184	1,184	1,184	1,184	1,184	$780
St. Christopher's Park - Storage With Sunshelter	652	652	652	652	652	652	652	652	652	652	$147
Woodward Park - Washroom / Sun Shelter	667	667	667	667	667	667	667	667	667	667	$780
Buchanan Park - Storage	125	125	125	125	125	125	125	125	125	125	$147
Buchanan Park - Washroom And Changeroom Facility	1,959	1,959	1,959	1,959	1,959	1,959	1,959	1,959	1,959	1,959	$780
Gilkson Park - Small Storage Next To Playground	274	274	274	274	274	274	274	274	274	274	$90
Gilkson Park - Small Utility Shed Next To Ball Diamond At Street	100	100	100	100	100	100	100	100	100	100	$90
Gilkson Park - Washrooms And Utility For Spray Pad	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	1,234	$780
Gourley Park - Washroom / Storage / Concession	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	1,377	$780
Mountview Park - Storage / Pavilion	557	557	557	557	557	557	557	557	557	557	$147

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Scenic Parkette - Storage	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	$147
Shawinigan Park - Storage And Sunshelter	684	684	684	684	684	684	684	684	684	684	$147
William Mcculloch Park - Change / Washroom	372	372	372	372	372	372	372	372	372	372	$780
William Mcculloch Park - Storage	224	224	224	224	224	224	224	224	224	224	$90
Veevers Park - Sunshelter With Storage Building	671	671	671	671	671	671	671	671	671	671	$147
Sam Manson Park - Washroom / Storage Building	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	3,250	$780
Rosedale Park - Bocce / Small Building / Baseball Storage And Field House	-	-	-	5,699	5,699	5,699	5,699	5,699	5,699	5,699	$139
Rosedale Park - Utility Bldg For Cso Tank	990	990	990	990	990	990	990	990	990	990	$147
Rosedale Park - Utility Bldg For New Cso Tank Behind Arena	-	-	-	879	879	879	879	879	879	879	$147
Father Sean O'Sullivan Park - Bocce Storage Shed	-	-	-	100	100	100	100	100	100	100	$90
Father Sean O'Sullivan Park - Water Chamber Structure	-	-	-	72	72	72	72	72	72	72	$147
Glendale Park - Spray Pad Utility Building / Storage	683	683	683	683	683	683	683	683	683	683	$147
Beach Strip Open Space - Washroom Utility Building For Trail System	1,827	1,827	1,827	1,827	1,827	1,827	1,827	1,827	728	728	$780
Billy Sherring Park - Sunshelter Washroom Building	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	1,405	$780
Bruce Park - Washrooms / Changerooms	1,903	1,903	1,903	1,903	1,903	1,903	1,903	1,903	1,903	1,903	$780
Eastmount Community Centre	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	2,413	$511
Eleanor Park - Washroom / Storage / Utility	688	688	688	688	688	688	688	688	688	688	$780
Elmar Park - Park Water Chamber Bldg	-	-	-	72	72	72	72	72	72	72	$199
Macassa Park - Washroom / Storage	4,075	4,075	4,075	4,075	4,075	4,075	4,075	4,075	4,075	4,075	$780

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Sackville Hill Memorial Park - Bocce Storage Shed	150	150	150	150	150	150	150	150	150	150	$90
Sackville Hill Memorial Park - Changeroom / Washrooms / Parks Staff Area	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	$780
Sackville Hill Memorial Park - Garbage Storage (Associated with Facility & Park Services)	400	400	400	400	400	400	400	400	400	400	$68
Sackville Hill Memorial Park - Storage Garage Used By Parks	500	500	500	500	500	500	500	500	500	500	$147
T.B. Mcquesten Park - Storage / Washroom / Utility	4,336	4,336	4,336	4,336	4,336	4,336	4,336	4,336	4,336	4,336	$780
William Schwenger Washroom	-	-	-	-	-	-	-	800	800	800	$780
Trieste Bocce Club - Bocce Court	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	3,500	$147
Trieste Bocce Club - Clubhouse	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	$147
William Connell Park Buildings (2: 1 public washroom & 1 fieldhouse building with showers & changerooms)	-	-	-	-	-	-	-	7,000	2,860	2,860	$431
Mohawk Sports Park - Bernie Arbour Stadium / Changerooms / Concessions / Washrooms	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	5,095	5,095	$355
Mohawk Sports Park - Building B - Rugby Field House / Changerooms / Washrooms	2,784	2,784	2,784	2,784	2,784	2,784	2,784	2,784	2,784	2,784	$780
Mohawk Sports Park - Building C - Small Parks Utility Building Behind The Soccer Field House	1,711	1,711	1,711	1,711	1,711	1,711	1,711	1,711	1,711	1,711	$355
Mohawk Sports Park - Building D - Track And Field Entrance Building	6,545	6,545	6,545	6,545	6,545	6,545	6,545	6,545	6,545	6,545	$147
Mohawk Sports Park - Small Storage Structure Adjacent To Scorer's Booth	143	143	143	143	143	143	143	143	143	143	$147
Mohawk Sports Park - Small Structure Next To Rugby Building	158	158	158	158	158	158	158	158	158	158	$90

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Mohawk Sports Park - Soccer Field House Building / Storage For Parks	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	8,000	$212
Mohawk Sports Park - Storage - Most Southerly Building Between 2 Ball Diamonds	243	243	243	243	243	243	243	243	243	243	$90
Mohawk Sports Park - Storage / Office Space	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565	1,565	$147
Berrisfield Park - Utility Building For Spray Pad And Supie	688	688	688	688	688	688	688	688	688	688	$251
Bobby Kerr Park - Storage - 3 Structures Side By Side	383	383	383	383	383	383	383	383	383	383	$147
New Bobby Kerr Washroom Building	-	-	-	-	-	-	900	900	900	900	$780
Highview Park - Storage Shed	63	63	63	63	63	63	63	63	63	63	$90
Lisgar Park - Bocce Building	-	-	-	765	765	765	765	765	765	765	$147
Lisgar Park - Sun Shelter / Storage / Utility / Washrooms	690	690	690	690	690	690	690	690	690	690	$147
Mountain Drive Park - Washrooms / Storage	2,152	2,152	2,152	2,152	2,152	2,152	2,152	2,152	2,152	2,152	$780
Templemead Park - Storage	138	138	138	138	138	138	138	138	138	138	$90
Trenholme - Splashpad Equipment Building	-	50	50	50	50	50	50	50	50	50	$251
Trenholme Park - Bocce Storage Shed	302	302	302	302	302	302	302	302	302	302	$90
Trenholme Park - Public Washrooms	-	-	-	-	-	-	852	852	852	852	$780
Victoria Park - Washroom / Concession At South End Of Park (Also secondary storage building near baseball diamond)	1,982	1,982	1,982	1,982	1,982	1,982	1,982	1,982	1,982	1,982	$780
Chedoke Golf - Golf Shelter - 113753	198	198	198	198	198	198	198	198	198	198	$68
Chedoke Golf - Storage - 110526	1,217	1,217	1,217	1,217	1,217	1,217	1,217	1,217	1,217	1,217	$90
Chedoke Golf - Storage - 111373	130	130	130	130	130	130	130	130	130	130	$147
Chedoke Golf - Storage - 111427	771	771	771	771	771	771	771	771	771	771	$147
Chedoke Golf - Storage - 121640	195	195	195	195	195	195	195	195	195	195	$147
Chedoke Golf - Storage - 124650	435	435	435	435	435	435	435	435	435	435	$147
Chedoke Golf - Washrooms - 114305	548	548	548	548	548	548	548	548	548	548	$780

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Chedoke Golf - Washrooms - 126793	724	724	724	724	724	724	724	724	724	724	$780
Chedoke Golf - Washrooms / Storage - 125141	396	396	396	396	396	396	396	396	396	396	$780
Kings Forest Golf Club - Maintenance Building	6,474	6,474	6,474	6,474	6,474	6,474	6,474	6,474	6,474	6,474	$296
Kings Forest Golf Club - Storage / Office	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	1,211	$90
Kings Forest Golf Club - Storage Quonset	2,084	2,084	2,084	2,084	2,084	2,084	2,084	2,084	2,084	2,084	$90
Churchill Park - Cricket Club's Storage Buildings (2)	271	271	271	271	271	271	271	271	271	271	$147
Churchill Park - Garden Shed	138	138	138	138	138	138	138	138	138	138	$147
Churchill Park - Small Storage Shed To East Of Main Building	182	182	182	182	182	182	182	182	182	182	$147
Churchill Park - Storage Shed	110	110	110	110	110	110	110	110	-	-	$147
Churchill Park - Washroom / Changeroom	857	857	857	857	857	857	857	857	857	857	$780
HAAA - Field House/Changeroom/Washrooms	5,356	5,356	5,356	5,356	5,356	5,356	5,356	5,356	5,356	5,356	$780
HAAA - Shelter For Tennis Court Area	265	265	265	265	265	265	265	265	265	265	$276
Rosedale Tennis - Small Entrance Structure Attached To Tennis Bubble	205	205	205	205	205	205	205	205	-	-	$276
Rosedale Tennis Club Bubble Structure	23,065	23,065	23,065	23,065	23,065	23,065	23,065	23,065	23,065	23,065	$75
Gage Park - 2 Storage Bldgs, 1 Concrete Stucco And 1 Block	202	202	202	202	202	202	202	202	202	202	$147
Gage Park - New Baseball Changeroom Building By Parking Lot	867	867	867	867	867	867	867	867	867	867	$147
Gage Park - Small Building South Of Baseball Change Rooms	158	158	158	158	158	158	158	158	158	158	$90
Gage Park - Small Storage Shed Next To Lawn Bowling Club House	194	194	194	194	194	194	194	194	194	194	$90
Gage Park - Small Structure North Of Tennis Courts	342	342	342	342	342	342	342	342	342	342	$147
Gage Park - Washroom, Utility Building For Wading Pool And Spray Pad	480	480	480	480	480	480	480	480	480	480	$780
Gage Park - Band Shell Washrooms / Storage	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	$780
Turner Park - Washrooms	-	-	900	900	900	900	900	1,800	2,250	2,250	$780
Sam Manson Park - Bocce Storage Building	-	-	-	-	-	-	100	100	100	100	$91

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Sam Manson Park - Bocce Club House Building	-	-	-	-	-	-	1,350	1,350	1,350	1,350	$780
Riverdale East Park Bocce Storage Building - 135 Vittorito Ave. (St. Agnes Bocce Storage Bldg)	312	312	312	312	312	312	312	312	310	310	$91
Glen Castle Park Bocce Storage Building - 30 Glen Castle Dr.	100	100	100	100	100	100	100	100	126	126	$91
Dave Andreychuk Mountain Arena Bocce Storage Building - 25 Hester St.	190	190	190	190	190	190	190	190	190	190	$91
Winona Park - Picnic Pavilion In Woods Area (Ward 11)	1,723	1,723	1,723	1,723	1,723	1,723	1,723	1,723	1,723	1,723	$68
Winona Park - Storage	630	630	630	630	630	630	630	630	630	630	$147
Battlefield Park - Washroom / Concession	3,350	3,350	3,350	3,350	3,350	3,350	3,350	3,350	3,350	3,350	$780
Eastdale Park - Bocce / Washroom / Storage	-	-	-	580	580	580	580	580	580	580	$780
Ferris Park - Bocce Club Bldg	-	-	-	592	592	592	592	592	592	592	$780
Heritage Green Community Sports Park - Parks Works Building	396	396	396	396	396	396	396	396	396	396	$251
Heritage Green Community Sports Park - Washrooms / Storage / Utilities	-	-	-	5,213	5,213	5,213	5,213	5,213	5,213	5,213	$780
Little League Park - Storage	499	499	499	499	499	499	499	499	499	499	$147
Little League Park - Tennis Club House (Stoney Creek) Stoney Creek Tennis Club House	2,274	2,274	2,274	2,274	2,274	2,274	2,274	2,274	2,274	2,274	$147
Maplewood Park - Storage/Washroom	141	141	141	141	141	141	141	141	355	355	$147
Memorial Park - Bocce Building (87 Glen Cannon Dr.)	-	-	-	560	560	560	560	560	560	560	$147
Stoney Creek Storage Building & Workshop (77 King St. West at Battlefield Park)	875	875	875	875	875	875	875	875	875	875	$296
Valley Park - Washroom / Changeroom	1,075	1,075	1,075	1,075	1,075	1,075	1,075	1,075	1,075	1,075	$780
Ancaster Little League Park Fieldhouse (Washroom / Storage / Concession)	1,099	1,099	1,099	1,099	1,099	1,099	1,099	1,099	1,099	1,099	$780
Ancaster Community Centre Park Fieldhouse (Washroom / Maintenance / Storage / Concession)	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	1,112	$780

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Small Storage (Village Green) - 291 Lodor St.	118	118	118	118	118	118	118	118	118	118	$91
Dundas Driving Park - Baseball Washroom/Concession	1,279	1,279	1,279	1,279	1,279	1,279	1,279	1,279	1,279	1,279	$780
Dundas Driving Park - Pavilion - 160003	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	1,225	$147
Dundas Driving Park - Splash Pad Utility	-	206	206	206	206	206	206	206	206	206	$147
Dundas Driving Park - Washroom Small Storage Structure	105	105	105	105	105	105	105	105	105	105	$780
Edwards Park - Storage / Concession	809	809	809	809	809	809	809	809	809	809	$199
Martino Memorial Park - Washrooms And Changerooms	930	930	930	930	930	930	930	930	930	930	$780
Martino Memorial Park - Washrooms And Concession Booth	1,832	1,832	1,832	1,832	1,832	1,832	1,832	1,832	1,832	1,832	$780
Sanctuary Park - Washrooms (may possibly be closed most seasons)	700	700	700	700	700	700	700	700	700	700	$780
Veterans Park - Storage / Concession	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205	$199
Binbrook Park - Ball Park Washroom	250	250	250	250	250	250	250	250	250	250	$780
Glanbrook Sports Park - Concession / Washrooms	505	505	505	505	505	505	505	505	505	505	$780
Woodburn Ball Park - Concession / Washroom	1,120	1,120	1,120	1,120	1,120	1,120	1,120	1,120	1,120	1,120	$780
Flamborough Centre Park - Garage / Washroom / Concession	436	436	436	436	436	436	436	436	-	-	$780
Freelton Community Park - Outdoor rink / Washrooms	-	-	-	-	-	3,240	3,240	3,240	3,240	3,240	$1,147
Freelton Community Park - Storage	120	120	120	120	120	120	120	120	120	120	$90
Freelton Community Park - Storage Building #2	120	120	120	120	120	120	120	120	120	120	$147
Gatesbury Park - Washrooms (operationally closed)	700	700	700	700	700	700	700	700	700	700	$780
Joe Sam's Leisure Park - Washroom And Storage / Snack Bar	1,795	1,795	1,795	1,795	1,795	1,795	1,795	1,795	1,795	1,795	$780
Lynden Lions South Park - Lions Community Hall	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,280	2,280	$417

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Lynden Lions South Park - Washroom/Concession North End Of Park	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	1,167	$780
Millgrove Park - Pavilion / Concession	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	1,680	$120
Millgrove Park - Small Storage / Washroom Between The Diamonds	280	280	280	280	280	280	280	280	280	280	$780
Millgrove Park - Washrooms	436	436	436	436	436	436	436	436	436	436	$780
Sheffield Ball Park - Concession / Shelter	1,161	1,161	1,161	1,161	1,161	1,161	1,161	1,161	1,161	1,161	$199
Strabane Community Park - Washroom / Concession / Storage	900	900	900	900	900	900	900	900	900	900	$780
Tower Park - Storage	140	140	140	140	140	140	140	140	140	140	$147
Waterdown Memorial Park - Storage Shed	88	88	88	88	88	88	88	88	88	88	$90
Waterdown Memorial Park & Ice Loop- Washroom / Storage / Utility For Ice Plant and Spraypad	-	-	-	1,610	1,610	1,610	1,610	1,610	1,610	1,610	$1,938
Carlisle Memorial Park - Storage For Grass Cutting Equipment	632	632	632	632	632	632	632	632	632	632	$147
Carlisle Memorial Park - Washroom Building East Of The Storage Garage	155	155	155	155	155	155	155	155	155	155	$780
Centennial Heights Park - 2nd. Flr Concession Booth / Lower Level Washrooms / Utility Room	528	528	528	528	528	528	528	528	528	528	$780
Bullocks Corner Park - Storage / Concession	280	280	280	280	280	280	280	280	280	280	$120
Bullocks Corner Park - Washroom / Storage And Utility Building	1,367	1,367	1,367	1,367	1,367	1,367	1,367	1,367	1,367	1,367	$780
Beverly Park - Concession - Located South West Corner Of Parking Lot	600	600	600	600	600	600	600	600	600	600	$199
Beverly Park - Football Portable Changeroom North Building	817	817	817	817	817	817	817	817	-	-	$199

City of Hamilton
Service Standard Calculation Sheet

Service: Indoor Recreation Facilities - Buildings Within Parks
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Beverly Park - Football Portable Changeroom South Building	831	831	831	831	831	831	831	831	-	-	$199
Beverly Park - Storage Garage At Entrance To Park	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,663	2,663	$199
Beverly Park - Tennis Clubhouse	605	605	605	605	605	605	605	605	-	-	$142
Beverly Park - Washrooms - Located North West Corner Of Parking Lot	300	300	300	300	300	300	300	300	300	300	$780
Total	**211,823**	**212,079**	**212,979**	**231,121**	**231,121**	**234,361**	**238,545**	**244,360**	**236,447**	**236,447**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.407	0.406	0.405	0.437	0.434	0.437	0.440	0.446	0.427	0.423

10 Year Average	2011-2020
Quantity Standard	0.4261
Quality Standard	$436
Service Standard	$186

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$186
Eligible Amount	$12,083,595

City of Hamilton
Service Standard Calculation Sheet

Service: Recreation Vehicles and Equipment
Unit Measure: No. of vehicles and equipment

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Vehicle)
140A - Ice Edger	15	17	19	20	20	21	21	21	23	23	$3,700
Snow Blower	13	13	15	15	15	16	18	18	18	18	$1,200
Clark Focus 11	2	2	3	3	3	3	3	3	3	3	$8,400
Clark Focus L20	-	-	-	1	1	3	3	3	3	3	$8,400
Micro Mag 20-D	1	1	2	2	2	2	2	2	2	2	$8,400
Magnum 34-D Scrubber	-	1	1	1	1	1	1	1	2	2	$8,400
Magnum 26-D Scrubber	-	1	1	1	1	1	1	1	1	1	$8,400
Nobles	-	-	-	1	1	1	1	1	1	1	$8,400
Nobles Speed Scrub	-	-	1	2	2	3	3	3	3	3	$8,400
Nobles SS3	-	-	-	1	1	1	1	1	1	1	$8,400
Numatic International	-	-	-	1	1	1	1	1	1	1	$8,400
Speed Scrubber 1701 Plus	1	1	1	1	1	1	1	1	1	1	$8,400
Tomcat 2000	2	2	2	2	2	2	2	2	2	2	$8,400
Tomcat 2300 Version 3.0	1	1	1	1	1	1	1	1	1	1	$8,400
Tomcat 20-D	1	1	1	1	1	1	1	1	1	1	$8,400
Tomcat 26-D	1	1	1	1	1	1	1	1	1	1	$8,400
Tomcat Mini Mag 21-2500	1	1	1	1	1	1	1	1	1	1	$8,400
Tomcat Mini Mag 26-D	2	2	2	2	2	2	2	2	1	1	$8,400
Tomcat Magnum 34D	-	1	1	1	1	1	1	1	1	1	$8,400
Viper	-	-	-	1	1	1	1	1	1	1	$8,400
Total	**40**	**45**	**52**	**59**	**59**	**64**	**66**	**66**	**68**	**68**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010	0.00010

10 Year Average	2011-2020
Quantity Standard	0.0001
Quality Standard	$5,300
Service Standard	$0.53

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$0.53
Eligible Amount	$34,474

City of Hamilton
Service Standard Calculation Sheet

Service: Library Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
Hamilton											
Central - 55 York Blvd.	185,978	185,978	185,978	185,978	185,978	185,978	185,978	185,978	185,978	185,978	$316
Barton - 571 Barton St. E.	7,612	7,612	7,612	7,612	7,612	7,612	7,612	7,612	7,612	7,612	$426
Concession - 565 Concession St.	8,316	8,316	8,316	8,316	8,316	8,316	8,316	8,316	8,316	8,316	$426
Kenilworth - 103 Kenilworth Ave.	7,960	7,960	7,960	7,960	7,960	7,960	7,960	7,960	7,960	7,960	$426
Locke - 285 Locke St. S.	1,486	1,486	1,486	1,486	1,486	1,486	1,486	1,486	1,486	1,486	$426
Red Hill - 695 Queenston Rd.	11,760	11,760	11,760	11,760	11,760	11,760	11,760	11,760	11,760	11,760	$316
Sherwood - 467 Upper Ottawa	20,400	20,400	20,400	20,400	20,400	20,400	20,400	20,400	20,400	20,400	$316
Terryberry - 100 Mohawk Rd. E.	28,109	28,109	28,109	28,109	28,109	28,109	28,109	28,109	28,109	28,109	$316
Westdale - 955 King St. W.	10,277	10,277	10,277	10,277	10,277	10,277	10,277	10,277	10,277	10,277	$316
Turner Park Library - 352 Rymal Rd. E.	24,116	24,116	24,116	24,116	24,116	24,116	24,116	24,116	24,116	24,116	$316
Stoney Creek											
Stoney Creek Town Hall Library - 777 Highway 8	15,739	11,365	11,365	11,365	11,365	11,365	11,365	11,365	11,365	11,365	$316
Saltfleet Library - 131 Gray Rd.	15,645	15,645	11,573	11,573	11,573	11,573	11,573	11,573	11,573	11,573	$316
Valley Park Library - 970 Paramount Dr.	2,976	2,976	2,976	2,976	2,976	2,976	2,976	2,976	2,976	2,976	$426
Ancaster											
Library (300 Wilson St. East)	13,153	13,153	13,153	13,153	13,153	13,153	13,153	13,153	13,153	13,153	$316
Dundas											
Dundas Public Library (Ogilvie St.)	13,712	13,712	13,712	13,712	13,712	13,712	13,712	13,712	13,712	13,712	$316
Glanbrook											
Mount Hope - 3027 Homestead Dr.	2,631	2,631	2,631	2,631	2,631	2,631	2,631	2,631	2,631	2,631	$426
Binbrook - 2641 Highway 56	2,958	2,958	2,958	2,958	2,958	2,958	2,958	5,977	5,977	5,977	$426

City of Hamilton
Service Standard Calculation Sheet

Service: Library Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Flamborough												
Waterdown - 25 Mill St. N.	3,637	3,637	3,637	3,637	-	-	-	-	-	-	$426	$674
Waterdown - 163 Dundas St E	-	-	-	-	17,813	17,813	17,813	17,813	17,813	17,813	$316	$517
Greensville - 59 Kirby Ave.	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	$426	$655
Freelton - 1803 Brock Rd.	1,946	1,946	1,946	1,946	1,946	1,946	1,946	1,946	1,946	1,946	$426	$655
Carlisle - 1496 Centre Rd.	2,379	2,379	2,379	2,379	2,379	2,379	2,379	2,379	2,379	2,379	$426	$655
Rockton - 795 Old Highway 8	778	778	-	-	-	-	-	-	-	-	$426	$655
Millgrove - 857 Millgrove Side Rd.	1,672	1,672	1,672	1,672	-	-	-	-	-	-	$426	$655
Lynden - 79 Lynden Rd.	900	900	900	-	-	-	-	-	-	-	$426	$655
Lynden - 110 Lynden Rd.	-	-	-	4,000	4,000	4,000	4,000	4,000	4,000	4,000	$426	$655
Total	**386,639**	**382,265**	**377,415**	**380,515**	**393,019**	**393,019**	**393,019**	**396,038**	**396,038**	**396,038**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.7436	0.7317	0.7172	0.7193	0.7380	0.7320	0.7246	0.7233	0.7155	0.7078

10 Year Average	2011-2020
Quantity Standard	0.7253
Quality Standard	$535
Service Standard	$388

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$388
Eligible Amount	$25,245,654

City of Hamilton
Service Standard Calculation Sheet

Service: Library Vehicles
Unit Measure: No. of library collection items

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Bookmobile	2	2	2	2	2	2	2	2	2	2	$550,000
022-VAN 1/2 T	2	2	2	2	2	2	2	2	2	2	$41,800
023-VAN 3/4 T	1	1	1	1	1	1	1	-	-	-	$41,800
Ford E-450 Style Truck & Body	-	-	-	-	-	-	-	2	2	2	$55,000
Genie Boom	-	-	-	-	-	1	1	1	1	1	$20,400
Skyjack	-	-	-	-	-	1	1	1	1	1	$20,400
Total	**5**	**5**	**5**	**5**	**5**	**7**	**7**	**8**	**8**	**8**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00001	0.00002	0.00001	0.00001

10 Year Average	2011-2020
Quantity Standard	0.00001
Quality Standard	$196,667
Service Standard	$2

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$2
Eligible Amount	$153,509

City of Hamilton
Service Standard Calculation Sheet

Service: Library Collection Materials
Unit Measure: No. of library collection items

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Books - Adult	478,540	441,166	440,537	399,516	409,508	370,450	389,122	407,794	408,066	427,528	$34
Books - Teen	41,992	38,728	41,458	29,140	22,201	19,147	20,770	22,393	35,821	37,215	$23
Books - Children	141,740	258,520	254,288	238,459	234,284	213,686	154,283	213,686	246,235	252,936	$24
Audio Books - Adult	10,953	8,084	7,606	17,348	10,133	12,949	15,765	18,581	18,515	18,759	$49
Audio Books - Children	2,328	3,289	3,493	817	814	616	551	486	3,605	3,592	$34
Accessible Materials	6,249	15,482	12,405	19,729	19,231	20,211	15,459	17,835	19,707	21,113	$34
Periodicals	74,517	72,706	78,389	83,696	83,735	67,651	61,948	56,245	66,125	65,187	$9
CDs	53,012	55,817	58,621	57,455	71,204	64,666	63,104	61,542	46,120	46,440	$16
DVDs	110,511	134,895	143,434	134,335	133,975	124,457	130,293	136,129	137,995	132,933	$24
Blurays	4,368	8,888	12,806	15,336	15,349	16,175	17,779	19,383	19,341	18,639	$33
Video Game - Adult & Teen	1,023	1,968	2,413	2,266	2,179	2,344	1,909	1,474	1,177	1,047	$74
Video Game - Children	455	1,566	2,143	2,308	2,245	2,284	2,169	2,054	1,703	1,605	$72
eBooks	6,254	18,342	60,316	63,636	96,733	102,128	102,790	103,452	109,268	115,889	$64
eAudiobook	4,116	5,871	6,621	10,066	15,301	16,154	16,259	16,364	20,231	29,265	$133
eMagazines	-	-	5,733	19,535	20,568	21,601	22,454	23,307	25,203	26,999	$25
Databases	27	21	51	50	45	24	24	24	23	23	$32,353
Total	**936,085**	**1,065,343**	**1,130,314**	**1,093,692**	**1,137,505**	**1,054,543**	**1,014,679**	**1,100,749**	**1,159,135**	**1,199,170**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	1.80	2.04	2.15	2.07	2.14	1.96	1.87	2.01	2.09	2.14

10 Year Average	2011-2020
Quantity Standard	2.0273
Quality Standard	$32
Service Standard	$65

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$65
Eligible Amount	$4,240,349

City of Hamilton
Service Standard Calculation Sheet

Service: Ambulance Services - Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Station #1 - 35 - 43 John Street North	1,700	1,700	1,700	1,700	3,787	3,787	3,787	3,787	3,787	3,787	$221	$270
Station #3 Ambulance, 965 Garth St.	1,887	1,887	1,887	1,887	1,887	1,887	1,887	1,887	1,887	1,887	$287	$343
Station #4 Ambulance, 729 Upper Sherman	3,867	3,867	3,867	3,867	3,867	3,867	3,867	3,867	3,867	3,867	$256	$309
Station #7 Ambulance, 225 Quigley Rd.	1,038	1,038	1,038	1,038	1,038	1,038	1,038	1,038	1,038	1,038	$297	$354
Station #9 Ambulance, 125 Kenilworth Ave. N.	1,435	1,435	1,435	1,435	1,435	1,435	1,435	1,435	1,435	1,435	$256	$309
Station #10 Ambulance, Norfolk Ave.	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	1,364	$282	$337
Station #12 Ambulance, 199 Highway 8 Stoney Creek	2,983	2,983	2,983	2,983	2,983	2,983	2,983	2,983	2,983	2,983	$234	$284
Station #15 Ambulance, 415 Arvin Ave.	2,519	2,519	2,519	2,519	2,519	2,519	2,519	2,519	2,519	2,519	$284	$340
Station #17 Ambulance, 363 Isaac Brock St.	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	1,140	$284	$340
Station #18 Ambulance, 2636 (2640) Highway 56 Binbrook	2,737	2,737	2,737	2,737	2,737	2,737	2,737	2,737	803	803	$247	$299
Station #19 Ambulance, 3302 Homestead Rd.	1,483	1,483	1,483	1,483	1,483	1,483	1,483	1,483	1,483	1,483	$307	$346
Station #20 Ambulance, 365 Wilson St. W.	1,996	1,996	1,996	1,996	1,996	1,996	1,996	1,996	1,996	1,996	$323	$383
Station #21 Ambulance, Garner Rd., Ancaster	3,124	3,124	3,124	3,124	3,124	3,124	3,124	3,124	3,124	3,124	$256	$309
Station #23 Ambulance, Memorial Square	2,836	2,836	2,836	2,836	2,836	2,836	2,836	2,836	2,836	2,836	$250	$302
Station #24 Ambulance, 265 Parkside Dr.	2,098	2,098	2,098	2,098	2,098	2,098	2,098	2,098	2,098	2,098	$422	$492
Station #25 Ambulance, 361 Old Brock Rd.	878	878	878	878	878	878	878	878	2,020	2,020	$254	$306
Station #26 Ambulance, Lynden	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204	1,204	$254	$288
Station #30 Ambulance, 489 Victoria Ave. N.	18,558	18,558	18,558	18,558	18,558	18,558	18,558	18,558	18,558	18,558	$226	$276
Station #32 Ambulance, 1000 Limeridge Rd.	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	7,060	$260	$313
Stoney Creek Mountain Training Facility (Shared Building B)	8,091	8,091	8,091	8,091	7,280	7,280	7,280	7,280	7,280	7,280	$316	$364
Total	**67,996**	**67,996**	**67,996**	**67,996**	**69,272**	**69,272**	**69,272**	**69,272**	**68,481**	**68,481**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.1308	0.1301	0.1292	0.1285	0.1301	0.1290	0.1277	0.1265	0.1237	0.1224

10 Year Average	2011-2020
Quantity Standard	0.1278
Quality Standard	$315
Service Standard	$40

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$40
Eligible Amount	$2,620,053

City of Hamilton
Service Standard Calculation Sheet

Service: Ambulance Services - Vehicles & Equipment
Unit Measure: No. of vehicles and equipment

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Vehicle)
Emergency Support Unit	2	2	2	2	2	2	2	2	2	1	$88,200
Emergency Support Unit 2	-	-	-	-	-	-	-	-	-	1	$196,100
Defibrillators	52	52	65	65	65	65	65	65	66	67	$34,300
Vehicle Equipment	93	93	93	93	93	93	93	93	93	94	$6,100
Ambulances	31	31	32	36	37	41	41	41	41	42	$268,000
Stryker Power Stretchers	-	-	-	-	2	50	50	50	51	52	$22,400
Emergency Response Vehicles	16	17	19	19	16	17	17	17	17	17	$112,700
Transport Van	-	-	-	-	3	3	3	3	3	3	$63,700
Stryker Power Load Systems	-	-	-	-	2	40	40	40	41	42	$26,500
Specialized Training Simulator Equipment	2	2	2	2	2	2	2	2	2	2	$98,000
Paramedic Gear	12	18	21	30	34	13	21	37	50	55	$1,500
Total	**208**	**215**	**234**	**247**	**256**	**326**	**334**	**350**	**366**	**376**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0004	0.0004	0.0004	0.0005	0.0005	0.0006	0.0006	0.0006	0.0007	0.0007

10 Year Average	2011-2020
Quantity Standard	0.0005
Quality Standard	$60,520
Service Standard	$30

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$30
Eligible Amount	$1,968,292

City of Hamilton
Service Standard Calculation Sheet

Service: Long-Term Care Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Wentworth Lodge	122,000	122,000	122,000	122,000	122,000	122,000	122,000	122,000	122,000	122,000	$410	$478
Macassa Lodge	214,570	214,570	214,570	214,570	214,570	214,570	218,760	218,760	218,760	218,760	$410	$478
Total	**336,570**	**336,570**	**336,570**	**336,570**	**336,570**	**336,570**	**340,760**	**340,760**	**340,760**	**340,760**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.6473	0.6442	0.6395	0.6362	0.6320	0.6269	0.6282	0.6223	0.6156	0.6090

10 Year Average	2011-2020
Quantity Standard	0.6301
Quality Standard	$478
Service Standard	$301

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$301
Eligible Amount	$19,591,855

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
15, 17 Quinlan Court	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	2,700	$143
192, 218, 242, 277 & 292 Queen Victoria Drive	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	7,000	$138
86 & 88 Lockton Crescent	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514	$157
39, 62 Lawnhurst Drive	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514	2,514	$157
104, 140, 193, 212 & 232 Lawnhurst Drive	5,750	5,750	5,750	5,750	5,750	5,750	5,750	5,750	5,750	5,750	$188
12 Garrow Drive	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	$188
17 Glen Eden Court	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	$188
367, 369, 383, 385, 389, 391, 399, 405, & 407 Franklin Road	8,993	8,993	8,993	8,993	8,993	8,993	8,993	8,993	8,993	8,993	$217
388, 394, 396, 405 & 407 East 22nd Street	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	$217
371-374, 377, & 379-383 East 22nd Street	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	$193
392, 396, 398, 404 & 406 East 21st Street	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	$217
369, 371, 372, 376, 377, 378, 379, 381, 382 & 384 East 21st Street (10 units)	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	$193
374 East 21st Street (1 units)	1,000	1,000	1,000	1,000	1,000	1,000	1,000	-	-	-	$193
392, 402, 404, 408 & 412 East 23rd Street	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	4,996	$217
374, 375, 378, 379, 380, & 384-387 East 23rd Street	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	$193
373 & 381 East 23rd Street	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	-	$0
51 & 64 Berrisfield Crescent	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	$215
663 & 665 Upper Wentworth Street	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	1,998	$217
637, 639, 641, 643, 647 & 649 Upper Wentworth Street	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	$193
25 Brewster Street	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,200	$215
8 & 10 Cleveland Place	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	$189
71, 73, 94, 115 & 125 Rand Street	5,643	5,643	5,643	5,643	5,643	5,643	5,643	5,643	5,643	5,643	$188
12 & 14 Bogart Court	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
13, 15, 29 & 31 Markham Crescent	4,640	4,640	4,640	4,640	4,640	4,640	4,640	4,640	4,640	4,640	$189
14 & 16 Arbutus Crescent	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	$189
18 & 20 Joncaire Place	2,257	2,257	2,257	2,257	2,257	2,257	2,257	2,257	2,257	2,257	$188

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
2 Lemoyne Place	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	1,129	$188
18 & 20 Brendan Court	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
24, 48, 80 & 103 Boston Crescent	5,365	5,365	5,365	5,365	5,365	5,365	5,365	5,365	5,365	5,365	$146
25, 27, 35, 37 & 48 Yorkdale Crescent	5,643	5,643	5,643	5,643	5,643	5,643	5,643	5,643	5,643	5,643	$188
28 & 48 Odessa Street	2,257	2,257	2,257	2,257	2,257	2,257	2,257	2,257	2,257	2,257	$187
30, 40 & 58 John Murray Street	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386	$125
32, 56, 172, 214, 248 & 280 Birchcliffe Crescent	8,047	8,047	8,047	8,047	8,047	8,047	8,047	8,047	8,047	8,047	$146
33, 52 & 54 William Johnson Street	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386	3,386	$188
4 & 6 Boon Court	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
7 & 9 Electra Court	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	$189
9 Fuller Court	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	1,160	$189
111 & 113 Birchview Drive	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
31, 66 & 227 Larch Street	4,024	4,024	4,024	4,024	4,024	4,024	4,024	4,024	4,024	4,024	$146
395 Mohawk Road East, 169 Units, 6 Floors - Building	109,850	109,850	109,850	109,850	109,850	109,850	109,850	109,850	109,850	109,850	$133
20 Congress Crescent, 110 Units, 10 Floors - Building	107,254	107,254	107,254	107,254	107,254	107,254	107,254	107,254	107,254	107,254	$135
470 Stone Church Road East, Blocks 1-70, 70 Units	63,000	63,000	63,000	63,000	63,000	63,000	63,000	63,000	63,000	63,000	$133
772 Upper Paradise Road - Blocks 1-47, 47 Units	49,117	49,117	49,117	49,117	49,117	49,117	49,117	49,117	49,117	49,117	$112
580 Limeridge Road, East - Blocks 1-65, 65 Units	68,800	68,800	68,800	68,800	68,800	68,800	68,800	68,800	68,800	68,800	$129
1100 Limeridge Road East, 57 Units,4 Floors - Building	41,500	41,500	41,500	41,500	41,500	41,500	41,500	41,500	41,500	41,500	$239
1150 Limeridge Road, East, Blocks 1-66, 66 Units	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000	$109
350 Limeridge Road West, Block 350-362, 7 Units	6,675	6,675	6,675	6,675	6,675	6,675	6,675	6,675	6,675	6,675	$169
#5 (A-G) Kendale Court (7 Units)	6,675	6,675	6,675	6,675	6,675	6,675	6,675	6,675	6,675	6,675	$169
97 (a-g), 87 (A-C), 107, 109, 111,113,115,117 Elgar Court (16 Units)	15,257	15,257	15,257	15,257	15,257	15,257	15,257	15,257	15,257	15,257	$169
89-93 Century Street 96-110 Ashley Street - 10 Units	11,228	11,228	11,228	11,228	11,228	11,228	11,228	11,228	11,228	11,228	$147

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
10 & 32 Airdrie Avenue	3,483	3,483	3,483	3,483	3,483	3,483	3,483	1,742	1,742	1,742	$250
11, 30, & 42 Austin Drive	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	$169
69 Austin Drive	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	-	$169
21, 27, 32, 35, 37 & 59 Bernard Street	5,482	5,482	5,482	5,482	5,482	5,482	5,482	5,482	5,482	5,482	$238
11, 13, & 20 Bernard Street	2,742	2,742	2,742	2,742	2,742	2,742	2,742	2,742	-	-	$238
70 Bingham Road	6,966	870	870	870	870	870	870	870	870	870	$250
4, 34, 42, 59, 61, & 65 Bingham Road	6,096	6,096	6,096	6,096	6,096	6,096	6,096	6,096	-	-	$250
29 Bingham Road - Block 29-41, 7 Units	6,505	6,505	6,505	6,505	6,505	6,505	6,505	6,505	6,505	6,505	$160
10, 12, 13, 34, 45, 49, 57 & 65 Eastvale Place	6,966	6,966	6,966	6,966	6,966	6,966	6,966	6,966	6,966	6,966	$250
25, 38, & 47, Eastvale Place	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	871	-	$250
12, 14, 16, 20, 25, 27, 45, 54, 62, 64, 66 & 68 Eaton Place	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	$250
10, 41, 48, Eaton Place	4,097	4,097	4,097	4,097	4,097	4,097	4,097	2,458	819	-	$250
12, 14, 22, 33, 41, 45, 47, 51, 54, 58, 62 Glengrove Avenue	9,578	9,578	9,578	9,578	9,578	9,578	9,578	9,578	9,578	9,578	$250
7, 18, & 35, Glengrove Avenue	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	871	-	$250
10 & 12 Jutland Court	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	$189
59 & 63 Kirkland Drive	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	$169
10 St. Andrews Drive - Block 74-80, (96 units)	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	$162
4, 6, 7, 9, 10, 11, & 15-25 Thorley Drive (17 units)	23,800	23,800	23,800	23,800	23,800	23,800	23,800	23,800	23,800	23,800	$169
14, 26, 45, 46, 66, 81, 82, 85, 106 & 169 Bellingham Drive	13,808	13,808	13,808	13,808	13,808	13,808	13,808	13,808	13,808	13,808	$170
30, & 102 Bellingham Drive	4,143	4,143	4,143	4,143	4,143	4,143	4,143	2,762	1,381	-	$170
102 & 118 Reid Avenue North	871	871	871	871	871	871	871	871	871	871	$250
41 Reid Street North, - Block 1-16 (16 units)	11,340	11,340	11,340	11,340	11,340	11,340	11,340	11,340	11,340	11,340	$182
11 Reid Avenue South - Block 11-17, 4 Units	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	$139
103 & 105 Chilton Drive (2 Units)	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	$189
104 Osler Drive, 29 Units, 2 Floors (29 Units)	15,160	15,160	15,160	15,160	15,160	15,160	15,160	15,160	15,160	15,160	$179
109 Fiddlers Green Road, 45 Units, 2 Floors	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	$198

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
10 & 32 Airdrie Avenue	3,483	3,483	3,483	3,483	3,483	3,483	3,483	1,742	1,742	1,742	$250
11, 30, & 42 Austin Drive	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	$169
69 Austin Drive	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	-	$169
21, 27, 32, 35, 37 & 59 Bernard Street	5,482	5,482	5,482	5,482	5,482	5,482	5,482	5,482	5,482	5,482	$238
11, 13, & 20 Bernard Street	2,742	2,742	2,742	2,742	2,742	2,742	2,742	2,742	-	-	$238
70 Bingham Road	6,966	870	870	870	870	870	870	870	870	870	$250
4, 34, 42, 59, 61, & 65 Bingham Road	6,096	6,096	6,096	6,096	6,096	6,096	6,096	6,096	-	-	$250
29 Bingham Road - Block 29-41, 7 Units	6,505	6,505	6,505	6,505	6,505	6,505	6,505	6,505	6,505	6,505	$160
10, 12, 13, 34, 45, 49, 57 & 65 Eastvale Place	6,966	6,966	6,966	6,966	6,966	6,966	6,966	6,966	6,966	6,966	$250
25, 38, & 47, Eastvale Place	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	871	-	$250
12, 14, 16, 20, 25, 27, 45, 54, 62, 64, 66 & 68 Eaton Place	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	9,834	$250
10, 41, 48, Eaton Place	4,097	4,097	4,097	4,097	4,097	4,097	4,097	2,458	819	-	$250
12, 14, 22, 33, 41, 45, 47, 51, 54, 58, 62 Glengrove Avenue	9,578	9,578	9,578	9,578	9,578	9,578	9,578	9,578	9,578	9,578	$250
7, 18, & 35, Glengrove Avenue	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	871	-	$250
10 & 12 Jutland Court	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	$189
59 & 63 Kirkland Drive	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	$169
10 St. Andrews Drive - Block 74-80, (96 units)	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	94,000	$162
4, 6, 7, 9, 10, 11, & 15-25 Thorley Drive (17 units)	23,800	23,800	23,800	23,800	23,800	23,800	23,800	23,800	23,800	23,800	$169
14, 26, 45, 46, 66, 81, 82, 85, 106 & 169 Bellingham Drive	13,808	13,808	13,808	13,808	13,808	13,808	13,808	13,808	13,808	13,808	$170
30, & 102 Bellingham Drive	4,143	4,143	4,143	4,143	4,143	4,143	4,143	2,762	1,381	-	
102 & 118 Reid Avenue North	871	871	871	871	871	871	871	871	871	871	$250
41 Reid Street North, - Block 1-16 (16 units)	11,340	11,340	11,340	11,340	11,340	11,340	11,340	11,340	11,340	11,340	$182
11 Reid Avenue South - Block 11-17, 4 Units	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	$139
103 & 105 Chilton Drive (2 Units)	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	2,320	$189
104 Osler Drive, 29 Units, 2 Floors (29 Units)	15,160	15,160	15,160	15,160	15,160	15,160	15,160	15,160	15,160	15,160	$179
109 Fiddlers Green Road, 45 Units, 2 Floors	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	21,600	$198

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
280 Fiddlers Green Road - Block 1-16 (16 Units)	6,125	6,125	6,125	6,125	6,125	6,125	6,125	6,125	6,125	6,125	$130
11 & 19 Grimsby Avenue (2 Units)	1,741	1,741	1,741	1,741	1,741	1,741	1,741	1,741	1,741	1,741	$250
9, 27 & 30 Grimsby Avenue (3 Units)	3,483	3,483	3,483	3,483	3,483	3,483	3,483	2,612	1,741	-	$250
11 Holton Avenue N. (1 Unit)	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	$220
11 & 83 Locheed Drive (2 Units)	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
16, 18, 20, 22, 24, 26, 28, 30A, 30B, 30C, 30D, 30E, 30F, 32A, 32B, 32C, 32D, 32E, 32F, 32G, 32H, 34, 36, 38, 40,42, 44 Locheed Drive - (27 Units)	25,700	25,700	25,700	25,700	25,700	25,700	25,700	25,700	25,700	25,700	$128
1111(A-G), 1115, 1117, 1119, 1121, 1123, 1125, 1127, 1129, 1133, 1137, 1139, 1141, 1143, 1145, 1147, 1151A, 1151B, 1151C & 1151D Limeridge Road (27 Units)	25,700	25,700	25,700	25,700	25,700	25,700	25,700	25,700	25,700	25,700	$128
3, 4, 7, 8, 11, 12 & 14, 15, 16, 17 Michael Avenue (10 Units)	15,400	15,400	15,400	15,400	15,400	15,400	15,400	14,000	11,200	9,800	$169
11 & 28 Rainham Street	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	$138
148 & 150 Moxley Court (2 Units)	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
99 & 112 Moxley Court (2 Units)	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
4, 12, 48 Blair Avenue (3 Units)	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	871	871	$250
12 Lisa Court	1,257	1,257	1,257	1,257	1,257	1,257	1,257	1,257	1,257	1,257	$155
120 Strathcona Avenue N, 259 Units, 14 Floors	161,173	161,173	161,173	161,173	161,173	161,173	161,173	161,173	161,173	161,173	$119
27, 29, 46,126, 128 & 141 Gledhill Crescent (7 Units)	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	$188
14 Brett Court	1,341	1,341	1,341	1,341	1,341	1,341	1,341	1,341	1,341	1,341	$146
7, 14 & 59 Lesterwood Street (3 Units)	3,450	3,450	3,450	3,450	3,450	3,450	3,450	3,450	3,450	3,450	$188
15, 22, & 187 Folkstone Avenue (3 Units)	3,664	3,664	3,664	3,664	3,664	3,664	3,664	3,664	3,664	3,664	$166
15, 161 & 163 Golden Orchard Drive	3,450	3,450	3,450	3,450	3,450	3,450	3,450	3,450	3,450	3,450	$188
15 &17 Granby Court	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	$188
19, 20, 26, & 30 Sumach Street (4 Units)	3,483	3,483	3,483	3,483	3,483	3,483	3,483	3,483	3,483	3,483	$250
15, 24, & 34 Sumach Street (3 Units)	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	1,741	-	$250
155 Park Street S, 375 Units, 23 Floors	214,532	214,532	214,532	214,532	214,532	214,532	214,532	214,532	214,532	214,532	$139
16 Heatherdale Place	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	$188

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
17 & 19 Banff Drive (2 Units)	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	$169
21, 23,& 42 Maclaren Avenue (3 Units)	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	2,612	$250
17 & 27 Maclaren Avenue (2 Units)	1,741	1,741	1,741	1,741	1,741	1,741	1,741	1,741	-	-	$250
175 Brucedale Avenue East	-	-	-	-	-	-	-	-	-	-	$145
18, 43 & 47 Dartford Place (3 Units)	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	$169
34 Dartford Place (1 Unit)	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	-	-	$169
18, 41, 72 & 250 Duncairn Crescent (4 Units)	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	4,600	$188
180 Tragina Avenue	1,100	1,100	1,100	1,100	1,100	1,100	1,100	-	-	-	$220
181 Jackson Street W, 265 Units, 20 Floors	172,250	172,250	172,250	172,250	172,250	172,250	172,250	172,250	172,250	172,250	$58
185, 206-210 Jackson Street East (80 Units)	69,421	69,421	69,421	69,421	69,421	69,421	69,421	69,421	69,421	69,421	$145
19, 20, 27, 29, 58 Berko Avenue (5 Untis)	8,400	8,400	8,400	8,400	8,400	8,400	8,400	7,000	7,000	7,000	$169
19, 23 & 47 Camelot Drive (3 Units)	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	$169
19 East 12th Street	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	$220
19, 29, 31, 35 & 37 Eastwood Street (5 Units)	4,353	4,353	4,353	4,353	4,353	4,353	4,353	4,353	4,353	4,353	$250
209, 211, 230 & 232 Rexford Drive (4 Untis)	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	$227
226 Rebecca Street, 199 Units, 10 Floors - Building	129,350	129,350	129,350	129,350	129,350	129,350	129,350	129,350	129,350	129,350	$92
24 Leduc Street	-	-	-	-	-	-	-	-	-	-	$148
245 Kenora Avenue - 168 Units	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	168,000	$108
249 Governor's Road - Block 1-4, (25 Units)	26,100	26,100	26,100	26,100	26,100	26,100	26,100	26,100	26,100	26,100	$141
25 Glamis Court	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	$177
25 Lynden Avenue, Block 1-18 (40 Units)	23,680	23,680	23,680	23,680	23,680	23,680	23,680	23,680	23,680	23,680	$200
122-132 Hatt Street (34 Units)	34,800	34,800	34,800	34,800	34,800	34,800	34,800	34,800	34,800	34,800	$174
27 Ling Street	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	$188
30 Sanford Avenue South, 350 Units, 17 Floors	197,040	197,040	197,040	197,040	197,040	197,040	197,040	197,040	197,040	197,040	$134
440 Melvin Avenue	871	871	871	871	871	871	871	871	871	871	$250
362 Melvin Avenue	871	871	871	871	871	871	871	871	-	-	$250

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
36 & 60 Laird Drive	3,682	3,682	3,682	3,682	3,682	3,682	3,682	3,682	3,682	3,682	$107
36 Queenslea Drive	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	$138
37 & 95 Edwina Place	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
36, 38 & 63 Raleigh Court	4,125	4,125	4,125	4,125	4,125	4,125	4,125	4,125	4,125	4,125	$141
4 & 6 Galloway Court	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	$188
4, 6, 8,10,12,14,16,18,20,22,24,26,28,30,32,34, 36,38,40,42,44,46,48 Millwood Place (23 Units)	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	$166
101,103,105,107,109,111,113,115,117,119, 121,123,125,127,129,131,133,135,137,139, 141,143,145 Bobolink Road (23 Units)	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	20,350	$166
403, 447, 481, 558, 559, 575 & 609 Brigadoon Drive (7 Units)	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	8,050	$188
Ferrie Street W - Units 15, 17, 19, 21, 23, 25, 27, 29 (8 Units)	8,281	8,281	8,281	8,281	8,281	8,281	8,281	8,281	8,281	8,281	$159
Strachan St W - Units 2,4, 6, 8, 10, 12, 14, 16,18, 20, 22, 24, 26, 28, 30, 32, 34, 36 (18 Units)	18,633	18,633	18,633	18,633	18,633	18,633	18,633	18,633	18,633	18,633	$159
MacNab St North - Units 312,314,316,318,320,322,324,326,328,330, 332,334,336,338, 340,342,344,346, 348, 350, 352, 354, 356, 358,360,362,364, 366,368,370,372 (31 Units)	32,090	32,090	32,090	32,090	32,090	32,090	32,090	32,090	32,090	32,090	$159
405 James Street N - Block 405-411, (34 Units)	35,196	35,196	35,196	35,196	35,196	35,196	35,196	35,196	35,196	35,196	$159
499 James Street N - Block 499-525, 13 Units	13,856	13,856	13,856	13,856	13,856	13,856	13,856	13,856	13,856	13,856	$138
4, 6, 8, 10 Picton Street West (4 Units)	4,264	4,264	4,264	4,264	4,264	4,264	4,264	4,264	4,264	4,264	$138
45 & 72 Glenview Place	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	$188
45 Montcalm Drive - Block 76 Units	72,860	72,860	72,860	72,860	72,860	72,860	72,860	72,860	72,860	72,860	$157
478 Mackenzie Road	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,400	$173

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
49 Grenoble Road	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	$188
5 Maple Avenue, 43 Units, 5 Floors - Building	33,225	33,225	33,225	33,225	33,225	33,225	33,225	33,225	33,225	33,225	$225
500 Macnab Street N, 146 Units, 18 Floors - Building	77,059	77,059	77,059	77,059	77,059	77,059	77,059	77,059	77,059	77,059	$225
555 Queenston Road, 200 Units, 9 Floors - Building	109,120	109,120	109,120	109,120	109,120	109,120	109,120	109,120	109,120	109,120	$146
5, 16, 37, 42, 44, 54, 56, 82 & 96 Armstrong Avenue (9 units)	6,914	6,914	6,914	6,914	6,914	6,914	6,914	6,914	6,914	6,914	$250
8, 20, 59, 76, 90, 92, & 98 Armstrong Avenue (7 units)	6,146	6,146	6,146	6,146	6,146	6,146	6,146	5,378	2,305	-	$250
2, 8, 56, 58, 75, 85, 64, 69, & 89 Martha Street (9 Units)	8,439	8,439	8,439	8,439	8,439	8,439	8,439	8,439	8,439	8,439	$161
4, 5 & 6 Martha Street (3 Units)	3,751	3,751	3,751	3,751	3,751	3,751	3,751	2,813	2,813	-	$161
44 Martha Street - Block 14-21, 36 Units	33,457	33,457	33,457	33,457	33,457	33,457	33,457	33,457	33,457	33,457	$160
34 Martha Street - Block 34-36, 2 Units	1,859	1,859	1,859	1,859	1,859	1,859	1,859	1,859	1,859	1,859	$160
6 & 7 Admiral Place (2 Units)	1,741	1,741	1,741	1,741	1,741	1,741	1,741	1,741	1,741	1,741	$250
60 & 61 Carson Drive (2 Units)	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	2,682	$146
46,48, 50, 52, 54, 56, 58, 60, 66 (1-31), 70, 72,74,76,78,88, 90,92, 94,96, 98, 100, 102 Greendale Drive - Block 13-18, (52 Units)	53,388	53,388	53,388	53,388	53,388	53,388	53,388	53,388	53,388	53,388	$128
149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175 Cranbrook Drive (14 Units)	14,102	14,102	14,102	14,102	14,102	14,102	14,102	14,102	14,102	14,102	$130
68 Macassa Avenue, 45 Units	26,850	26,850	26,850	26,850	26,850	26,850	26,850	26,850	26,850	26,850	$645
60 Macassa Avenue, 2 floors (20 Units)	10,100	10,100	10,100	10,100	10,100	10,100	10,100	10,100	10,100	10,100	$118
92 Macassa Avenue, 20 Units, 2 Floors - Building	10,100	10,100	10,100	10,100	10,100	10,100	10,100	10,100	10,100	10,100	$118
689, 690, 691, 693, 695, 699, 708, 719, 726, 727, 735, 739, 740 & 746 Britannia Avenue\ (14 Units)	12,761	12,761	12,761	12,761	12,761	12,761	12,761	12,761	12,761	12,761	$237
685, 725, 752 & 772 Britannia Avenue\ (4 Units)	4,558	4,558	4,558	4,558	4,558	4,558	4,558	3,646	2,735	-	$237

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
7 Galt Street	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	$188
7 Lambert Street	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	1,150	$188
727 Upper Sherman Avenue (16 units)	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	8,800	$169
77 Alpine Avenue	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	$220
77 Purnell Drive - Block (131 Units)	131,980	131,980	131,980	131,980	131,980	131,980	131,980	131,980	131,980	131,980	$157
797, 799, 801, 803, 805, 807, 809, 811, 815, 817, 819, 821, 823, 825, 827, 829, 833, 835, 837, 839, 841, 843, 845, 847 Roxborough Avenue (24 Units)	22,304	22,304	22,304	22,304	22,304	22,304	22,304	22,304	22,304	22,304	$160
84, 90 & 92 Palmer Road (3 Units)	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	$169
80, Palmer Road (1 Unit)	4,200	4,200	4,200	4,200	4,200	4,200	4,200	1,400	-	-	$169
893 Fennell Avenue East	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	1,100	$220
95 Hess Street S, 290 Units, 17 Floors	256,500	256,500	256,500	256,500	256,500	256,500	256,500	256,500	256,500	256,500	$146
55 Hess Street (23rd Floor)	11,960	11,960	11,960	11,960	11,960	11,960	11,960	11,960	11,960	11,960	$217
980 Upper Ottawa Street - Block 23-27 (57 Units)	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000	57,000	$156
2, 5, 6, 7, 8, 11, 12, 14, 15 & 17, 18, 20 Seeley Avenue (12 Units)	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	$193
4 & 19 Seeley Avenue (2 Units)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	-	$193
302, 304, 307, 308, 309, 310, 315, 316 & 317 East 24th Street (9 Units)	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	9,000	$193
305, 311 & 314, East 24th Street (3 Units)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	-	$193
405 Catharine Street N (1 Unit)	4,200	4,200	4,200	4,200	4,200	4,200	4,200	1,400	1,400	-	$184
42, 44, 48, 50, 52 & 54 Gildea Street (6 Units)	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	6,000	$193
470, 472, 473, 477, 479, 481, 483, 485, 493, 495, 497 East 25th Street (11 Units)	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	$193
487 & 491 East 25th Street (2 Units)	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	2,000	-	$193
170 East Avenue South (Villa San Miguel) 46 Units	48,646	48,646	48,646	48,646	48,646	48,646	48,646	48,646	48,646	48,646	$190
680 Stone Church Road West 65 Units	63,562	63,562	63,562	63,562	63,562	63,562	63,562	63,562	63,562	63,562	$139
690 Stone Church Road West (Villa Santa Maria) 30 Units	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	30,000	$192

City of Hamilton
Service Standard Calculation Sheet

Service: Housing Services
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)
7,9,11,13,15,17,21,22,23,24,26,27,28,29,32,33,34,35,36,37,38,39,40,41,43,44,46,48,50,52,54,57,58,59,60,51,62,63,64,68,70,72,74,75,76,77,78,79,80,81,82,83,85,86,88,90,92,94,96,100,102,104,106,109,110,111,112,114,115,116,117 Lang Street (71 Units)	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	75,000	$132
2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32 Hayes Ave(16 Units)	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	12,000	$186
30 Congress Crescent (110 Units)	106,740	106,740	106,740	106,740	106,740	106,740	106,740	106,740	106,740	106,740	$136
50 Congress Crescent (53 Units)	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	61,000	$143
7-23 Gurnett Drive (Villa Corvo) 5 units	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	5,500	$173
87-89 King Street East (16 Units)	21,206	21,206	21,206	21,206	21,206	21,206	21,206	21,206	21,206	21,206	$199
350-360 King Street (545 Units)	501,509	501,509	501,509	501,509	501,509	501,509	501,509	501,509	501,509	501,509	$125
405 York Street (54 Units)	41,994	41,994	41,994	41,994	41,994	41,994	41,994	41,994	41,994	41,994	$150
4 Bridgewater (62 Units)	53,776	53,776	74,440	74,440	74,440	74,440	74,440	74,440	74,440	74,440	$139
95 King Street East (12 Units)	-	-	14,800	14,800	14,800	14,800	14,800	14,800	14,800	14,800	$245
690 Stone Church Rd West (50 Units)	-	-	-	-	-	48,545	48,545	48,545	48,545	48,545	$163
557 Queenston Road (34 Units)	29,400	29,400	29,400	29,400	29,400	29,400	29,400	29,400	29,400	29,400	$146
Total	**5,641,893**	**5,635,797**	**5,671,261**	**5,671,261**	**5,671,261**	**5,719,806**	**5,721,512**	**5,704,312**	**5,673,293**	**5,643,946**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	10.8509	10.7871	10.7764	10.7200	10.6498	10.6531	10.5479	10.4177	10.2499	10.0864

10 Year Average	2011-2020
Quantity Standard	10.5739
Quality Standard	$154
Service Standard	$1,631

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$1,631
Eligible Amount	$106,067,260

City of Hamilton
Service Standard Calculation Sheet

Service: Provincial Offences Act - Administration Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
45 Main Street East - Dedicated Space	16,034	16,034	16,034	16,034	16,034	16,034	16,034	-	-	-	$460	$534
45 Main Street East - Shared Space	2,375	2,375	2,375	2,375	2,375	2,375	2,375	-	-	-	$460	$534
50 Main Street East -Dedicated Space	-	-	-	-	-	-	-	53,287	53,287	53,287	$460	$534
50 Main Street East - Shared Space	-	-	-	-	-	-	-	4,628	4,628	4,628	$460	$534
Total	**18,409**	**18,409**	**18,409**	**18,409**	**18,409**	**18,409**	**18,409**	**57,915**	**57,915**	**57,915**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0354	0.0352	0.0350	0.0348	0.0346	0.0343	0.0339	0.1058	0.1046	0.1035

10 Year Average	2011-2020
Quantity Standard	0.0557
Quality Standard	$510
Service Standard	$28

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$28
Eligible Amount	$1,847,957

City of Hamilton
Service Standard Calculation Sheet

Service: Public Health Services - Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
100 Main St. E., suite 220	11,392	11,392	11,392	11,392	11,392	11,392	11,392	11,392	11,392	11,392	$281	$336
2255 Barton St - Unit 3/4	6,773	6,773	6,773	-	-	-	-	-	-	-	$281	$336
1447 Upper Ottawa (owned)	15,143	15,143	15,143	15,143	15,143	15,143	-	-	-	-	$337	$398
2 King St W., (DUN)	10,825	10,825	10,825	10,825	3,635	-	-	-	-	-	$281	$336
21 Hunter St. E.	5,324	5,324	5,324	5,324	5,324	5,324	5,324	5,324	5,324	5,324	$281	$336
1 Hughson St. N.	33,015	33,015	33,015	33,015	-	-	-	-			$281	$336
1439 Upper Ottawa	1,227	1,227	1,227	1,227	-	-	-	-			$281	$336
1447 Upper Ottawa (leased)	4,892	4,892	4,892	4,892	4,892	-	-	-			$309	$367
125 Barton - West Nile	892	892	892	892	-	-	-	-			$144	$185
1 James St.	5,626	5,626	5,626	5,626	-	-	-	-			$309	$367
247 Centennial Unit 8	2,114	2,114	2,114	2,114	2,114	2,114	2,114	2,114	2,114	2,114	$281	$336
100 Main St. West	-	-	-	-	24,122	24,122	24,122	24,122	24,122	24,122	$469	$543
110 King Street West (Robert Thompson)	-	-	-	52,300	52,300	52,300	52,300	52,300	52,300	52,300	$378	$443
891 Upper James (leased)	-	-	-	2,159	2,159	2,159	2,159	2,159	2,159	2,159	$279	$334
Total	**97,223**	**97,223**	**97,223**	**144,909**	**121,081**	**112,554**	**97,411**	**97,411**	**97,411**	**97,411**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.1870	0.1861	0.1847	0.2739	0.2274	0.2096	0.1796	0.1779	0.1760	0.1741

10 Year Average	2011-2020
Quantity Standard	0.1976
Quality Standard	$407
Service Standard	$80

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$80
Eligible Amount	$5,226,446

City of Hamilton
Service Standard Calculation Sheet

Service: Public Health Services - Vehicles
Unit Measure: No. of vehicles

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Health Bus	1	1	1	1	1	1	1	1	1	1	$392,000
Dental Bus	-	-	-	-	-	-	-	-	-	1	$539,000
Total	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**2**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000002	0.000004

10 Year Average	2011-2020
Quantity Standard	0.000002
Quality Standard	$406,488
Service Standard	$1

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$1
Eligible Amount	$53,988

City of Hamilton
Service Standard Calculation Sheet

Service: Child Care and Early Years Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Red Hill Day Care Centre	14,265	14,265	14,265	14,265	14,265	14,265	14,265	14,265	14,265	14,265	$327	$387
Lister Block	24,200	24,200	24,200	24,200	24,200	24,200	24,200	24,200	24,200	24,200	$382	$448
Total	**38,465**	**38,465**	**38,465**	**38,465**	**38,465**	**38,465**	**38,465**	**38,465**	**38,465**	**38,465**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0740	0.0736	0.0731	0.0727	0.0722	0.0716	0.0709	0.0702	0.0695	0.0687

10 Year Average	2011-2020
Quantity Standard	0.0717
Quality Standard	$425
Service Standard	$30

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$30
Eligible Amount	$1,983,253

City of Hamilton
Service Standard Calculation Sheet

Service: Waste Diversion - Facilities - Stations/Depots
Unit Measure: sq.ft. of building area

Description	Percentage Attributable to Diversion	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
77 James St.	100%	1,526	1,526	1,526	1,526	1,526	1,526	1,526	1,526	1,526	1,526	$299	$356
Transfer Stations / Community Recycling Centres:													
Dundas - Olympic Drive - Main Building	15%	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	1,473	$680	$776
- HHW Trailer	100%	930	930	930	930	930	930	930	930	930	930	$364	$428
- HHW Office (portable)	100%	140	140	140	140	140	140	140	140	140	140	$289	$345
- TS Scalehouse	15%	21	21	21	21	21	21	21	21	21	21	$142	$183
Kenora - Kenora Avenue - Main Building	15%	2,726	2,726	2,726	2,726	2,726	2,726	2,726	2,726	2,726	2,726	$680	$776
- HHW Trailer	100%	731	731	731	731	731	731	731	731	731	731	$463	$537
- HHW Office	100%	97	97	97	97	97	97	97	97	97	97	$416	$485
- TS Scalehouse	15%	21	21	21	21	21	21	21	21	21	21	$167	$211
Kilbride Yard, 37 Kilbride Rd. - Reuse Store	100%	3,561	3,561	3,561	3,561	3,561	3,561	3,561	3,561	3,561	3,561	$401	$468
Mountain - 37 Kilbride Road - Main Building	100%	12,692	12,692	12,692	12,692	12,692	12,692	12,692	12,692	12,692	12,692	$680	$776
- TS Scalehouse	15%	21	21	21	21	21	21	21	21	21	21	$142	$183
Glanbrook Landfill Site (Diversion portion only)	2%	129	129	129	129	129	129	129	129	129	129	$680	$776
Hamilton Materials Recycling Facility	81%	221,288	221,288	221,288	221,288	221,288	221,288	221,288	221,288	221,288	221,288	$247	$299
Hamilton Central Composting Facility - main processing facility & curing building (YRD076)	100%	106,504	105,734	102,894	102,196	102,058	102,288	89,465	89,465	149,109	149,109	$395	$462
Mountain Community Recycling Centre - Reuse Store & HHW Depot (YRD032)	100%	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	12,419	$680	$776
Contracted Local Yard - 560 Seaman St. Stoney Creek	61%	-	-	11,162	11,162	11,162	11,162	11,162	11,162	11,162	11,162	$289	$529
Contracted Local Yard	61%	1,937	1,937	-	-	-	-	-	-	-	-	$289	$934
Total		**366,216**	**365,446**	**371,831**	**371,133**	**370,995**	**371,225**	**358,403**	**358,403**	**418,046**	**418,046**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.7043	0.6995	0.7065	0.7015	0.6967	0.6914	0.6607	0.6545	0.7553	0.7471

10 Year Average	2011-2020
Quantity Standard	0.7018
Quality Standard	$392
Service Standard	$275

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$275.41
Eligible Amount	$17,914,319

City of Hamilton
Service Standard Calculation Sheet

Service: Waste Diversion - Vehicles & Equipment
Unit Measure: No. of vehicles and equipment

Description	Percentage Attributable to Diversion	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Vehicle)
City Owned												
20 cyd single stream rear packer	48%	1.44	1.44	-	-	-	-	-	-	-	-	$255,000
32 cyd single stream rear packer	48%	1.44	1.44	-	-	-	-	-	-	-	-	$306,000
Compact pickup	48%	1.44	-	-	-	-	-	-	-	-	-	$35,700
Compact pickup	48%									0.48	0.48	$25,500
SUV 2wd	48%	-	-	0.48	0.48	1.44	1.44	1.44	1.44	0.96	0.96	$35,700
Pick up 2wd	48%	3.84	4.32	3.84	4.80	4.80	4.80	4.80	4.80	4.80	4.80	$34,700
Pickup 4x4	48%	0	0	0.48	0.48	1.44	1.44	1.44	1.44	1.92	1.92	$51,000
Pickup 3/4 ton	48%	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	$58,100
Dump truck 5 ton	48%	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	-	-	$114,200
25 cyd single stream rear packer	48%	2.88	2.40	8.16	8.16	7.68	7.68	7.68	7.68	7.68	7.68	$153,000
25 cyd dual stream rear packer	48%	8.64	8.64	5.28	5.28	5.28	5.28	5.28	5.28	4.32	4.32	$287,600
31 cyd single stream sideloader	48%	0.96	0.96	0.96	0.96	0.48	0.48	0.48	0.48	0.48	0.48	$306,000
31 cyd dual stream side loader	48%	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	4.80	$306,000
Contracted (GFL)												
Curbside/Roadside												
Recycling												
Mack with UHE Body - 32 yd rear packer dual stream - diesel	100%	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	6.00	$255,000
Freightliner with Heil Body - 25 yd rear packer dual stream - CNG	100%	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	33.00	$413,100
Peterbuilt with McNeilus Body - 32yd dual stream - diesel	100%	1	1	1	1	1	1	1	1	-	-	$306,000
Organics/Garbage												$0
Freightliner with UHE Body - 32 yd rear packer dual stream CNG	48%	10	10	10	10	10	10	10	10	10.08	10.08	$413,100
Leaf & Yard Waste/ Bulk												$0
Peterbilt with McNeilus Body - 25 yd rear packer ss diesel	48%	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.88	2.40	2.40	$246,800
Peterbuilt with McNeilus Body - 30yd dual stream - diesel	48%	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	$255,000
Freightliner with UHE Body - 32 yd ss rear packer - diesel	48%	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	$246,800
Frieghtliner with Labrie McNeilus Body - 37 25 yd ss sideloader - diesel	48%	0	0	0	0	0	0	0	0	0.96	0.96	$306,000

City of Hamilton
Service Standard Calculation Sheet

Service: Waste Diversion - Vehicles & Equipment
Unit Measure: No. of vehicles and equipment

Description	Percentage Attributable to Diversion	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Vehicle)
Front Load Bin Waste and Fibre Collection												
Mack with McNeilus Body - 40 yd single stream	48%	5.28	5.28	5.28	5.28	5.28	5.28	5.28	5.28	4.80	4.80	$306,000
Mack with Labrie Body - 40 yd single stream	48%	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	$306,000
Mack with Fanotech Body - 40 yd single stream	48%	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	$306,000
Mack with Capital Body - 40 yd single stream	48%	0	0	0	0	0	0	0	0	0.48	0.48	$306,000
Side-loader Fully Automated Recycling Cart Collection												
Freightliner with Labrie Body - 33 yd dual stream	100%	4	4	4	4	4	4	4	4	4.00	4.00	$413,100
Fork Truck (front load bin)												
Freightliner Spike Truck (Pull Out Truck)	48%	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	$76,500
Pickup Trucks	48%	2	2	2	2	2	2	2	2	2.88	2.88	$45,900
RECYCLING & WASTE DISPOSAL												
CENTRAL COMPOSTING FACILITY												
City Owned												
Main fans	100%	2	2	2	2	2	2	2	2	2.00	2.00	$46,900
Curing Building Fan	100%	1	1	1	1	1	1	1	1	1.00	1.00	$40,800
Tunnel Fans	100%	16	16	16	16	16	16	16	16	16.00	16.00	$276,500
Make Up Air Units	100%	2	2	2	2	2	2	2	2	2.00	2.00	$61,200
Grinder	100%	1	1	1	1	1	1	1	1	1.00	1.00	$714,000
Shredder	100%	1	1	1	1	1	1	1	1	1.00	1.00	$853,700
Stationary Screening Plant	100%	1	1	1	1	1	1	1	1	1.00	1.00	$20,700
PLC Units	100%	5	5	5	5	5	5	5	5	5.00	5.00	$102,000
SCADA System	100%	1	1	1	1	1	1	1	1	1.00	1.00	$510,000
Tube Conveyor	100%	1	1	1	1	1	1	1	1	1.00	1.00	$102,000
Fixed Conveyors	100%	4	4	4	4	4	4	4	4	4.00	4.00	$61,200
Stack Jet Fans	100%	2	2	2	2	2	2	2	2	2.00	2.00	$40,800
Loaders Volvo L150 or Equavalent	100%	2	2	2	2	2	2	2	2	2.00	2.00	$408,000
CAT 242 Skidsteer	100%	1	1	1	1	1	1	1	1	1.00	1.00	$38,300

City of Hamilton
Service Standard Calculation Sheet

Service: Waste Diversion - Vehicles & Equipment
Unit Measure: No. of vehicles and equipment

Description	Percentage Attributable to Diversion	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Vehicle)
Ramrod Mini Skidsteer	100%	1	1	1	1	1	1	1	1	1.00	1.00	$16,200
Genie Boom 40ft Manlift	100%	1	1	1	1	1	1	1	1	1.00	1.00	$42,100
Grove 54ft Manlift	100%	1	1	1	1	1	1	1	1	1.00	1.00	$12,200
Generator	100%	1	1	1	1	1	1	1	1	1.00	1.00	$102,000
Overhead Filling Cassette	100%	1	1	1	1	1	1	1	1	1.00	1.00	$369,200
Central Exhaust Fans	100%	2	2	2	2	2	2	2	2	2.00	2.00	$120,400
Mag Conveyor	100%	1	1	1	1	1	1	1	1	1.00	1.00	$49,000
Hydraulic Door Wagon	100%	1	1	1	1	1	1	1	1	1.00	1.00	$5,100
Contracted												
Volvo L110 Loader	100%	-	1	1	1	1	1	1	1	1.00	1.00	$408,000
TRANSFER STATIONS / COMMUNITY RECYCLING CENTRES												
Contracted (Waste Connections)												
Transfer Trailers	11%	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.74	$127,500
Transfer Trucks	11%	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	$137,700
Roll-off Bins												
- 20 yard	100%	12	12	12	12	12	12	12	12	12.00	12.00	$8,200
- 30 yard	100%	15	15	15	15	15	15	15	15	15.00	15.00	$10,200
- 40 yard	100%	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	28.00	$12,200
Roll-off Trucks	15%	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	$178,500
Scales												
- 80' above ground	15%	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	$100,000
- 80' pit scale	15%	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	$62,200
Front End Loaders	15%	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	0.60	$408,000
LEAF & YARD COMPOSTING FACILITY												
Contracted (Waste Management Canada)												
Screener	100%	1	1	1	1	1	1	1	1	1.00	1.00	$255,000
Tub Grinder	100%	1	1	1	1	1	1	1	1	1.00	1.00	$816,000
Excavator	100%	1	1	1	1	1	1	1	1	1.00	1.00	$255,000
Conveyor	100%	-	-	-	-	-	-	-	-	-	1.00	$98,000

City of Hamilton
Service Standard Calculation Sheet

Service: Waste Diversion - Vehicles & Equipment
Unit Measure: No. of vehicles and equipment

Description	Percentage Attributable to Diversion	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Vehicle)
MATERIAL RECYCLING FACILITY												
City Owned												
Forklift	100%	1	1	1	1	1	1	1	1	1.00	1.00	$51,000
Contracted (Canada Fibers Ltd)												
Forklift	100%	1	1	1	1	1	1	1	1	1.00	1.00	$51,000
Total		**206**	**205**	**205**	**206**	**207**	**207**	**207**	**207**	**206**	**207**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004

10 Year Average	2011-2020
Quantity Standard	0.0004
Quality Standard	$153,975
Service Standard	$62

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$62
Eligible Amount	$4,006,183

City of Hamilton
Service Standard Calculation Sheet

Service: Waste Diversion - Carts & Containers
Unit Measure: No. of items

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Blue Boxes	108,000	139,000	183,000	228,000	271,000	319,000	362,000	403,472	416,432	452,720	$5
Blue Carts	2,400	3,200	3,600	4,000	4,400	5,800	6,300	6,885	7,479	9,243	$63
Small Green Carts	18,000	18,000	18,000	18,000	18,000	20,100	23,100	28,482	37,842	42,834	$13
Large Green Carts	169,800	177,300	186,300	198,300	211,300	220,300	229,300	240,068	242,067	247,607	$43
Mini Bins/Kitchen Organics Containers	214,000	230,000	233,000	237,200	244,200	250,200	256,200	262,536	262,536	266,496	$2
Blue Bags	36,000	46,000	50,000	56,000	62,000	68,000	74,000	74,000	74,000	80,000	$2
Gold Boxes	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	3,592	$5
Blue Barrells	50	50	50	50	50	50	50	50	50	50	$26
Public Space Litter Container - Jubilees	-	-	-	-	-	200	200	200	200	200	$765
Public Space Litter Container - Fluted	50	50	50	50	50	50	50	50	50	50	$102
Total	**549,300**	**614,600**	**675,000**	**742,600**	**812,000**	**884,700**	**952,200**	**1,016,743**	**1,041,656**	**1,102,792**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	1.06	1.18	1.28	1.40	1.52	1.65	1.76	1.86	1.88	1.97

10 Year Average	2011-2020
Quantity Standard	1.5557
Quality Standard	$14
Service Standard	$22

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$22
Eligible Amount	$1,457,030

City of Hamilton
Service Standard Calculation Sheet

Service: Municipal Parking Services - Spaces
Unit Measure: No. of spaces

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/space) Including Land
Carpark #1 (John and Rebecca)	169	169	169	169	169	169	169	169	169	169	$556,300
Carpark #2 (Ottawa St)	358	358	358	358	358	358	358	358	358	358	$658,500
Carpark #3 (Mountain Ave)	137	137	137	137	137	137	137	137	137	137	$640,200
Carpark #4 (Kenilworth Ave)	35	35	35	35	35	35	35	35	35	35	$180,300
Carpark #5 (King William/Mary)	127	127	127	127	127	127	127	127	127	127	$403,000
Carpark #6 (Rosedale Dr)	7	7	7	7	7	7	7	7	7	7	$48,900
Carpark #7 (Main and Ferguson)	60	60	60	60	60	60	60	60	60	60	$184,000
Carpark #8 (King and Jarvis)	47	47	47	47	47	47	47	47	47	47	$169,400
Carpark #9 (Upper Wellington)	15	15	15	15	15	15	15	15	15	15	$67,200
Carpark #11 (Main and Garside)	9	9	9	9	9	9	9	9	9	9	$38,000
Carpark #13 (Wilson and James)	16	16	16	16	16	16	16	16	16	16	$67,200
Carpark #16 (Main and Balmoral	20	20	20	20	20	20	20	20	20	20	$63,500
Carpark #17 (Main and Huxley)	19	19	19	19	19	19	19	19	19	19	$70,800
Carpark #19 (Main and Ottawa)	26	26	26	26	26	26	26	26	26	26	$111,000
Carpark #20 (Up James/Brantdale)	25	25	25	25	25	25	25	25	25	25	$103,700
Carpark #21 (Main and Tuxedo)	23	23	23	23	23	23	23	23	23	23	$78,100
Carpark #22 (King and Locke)	14	14	14	14	14	14	14	14	14	14	$63,500
Carpark #32 (East and Barton)	26	26	26	26	26	26	26	26	26	26	$74,500
Carpark #33 (Up James/Genesse)	45	45	45	45	45	45	45	45	45	45	$158,400
Carpark #34 (Main and Cope)	9	9	9	9	9	9	9	9	9	9	$48,900
Carpark #35 (Concession and E21st)	24	24	24	24	24	24	24	24	24	24	$89,100
Carpark #36 (Mulberry)	49	49	49	49	49	49	49	49	49	49	$202,200
Carpark #37 (Convention Centre)	849	849	849	849	849	849	849	849	849	849	$1,345,000
Carpark #39 (Barton and Grosvenor)	31	31	31	31	31	31	31	31	31	31	$111,000
Carpark #40 (City Hall)	418	418	418	418	418	418	418	418	418	418	$1,472,400
Carpark #42 (Barton and Birch)	41	41	41	41	41	41	41	-	41	-	$246,000
Carpark #43 (Kenilworth/Newlands)	20	20	20	20	20	20	20	20	20	20	$63,500
Carpark #44 (Barton and Emerald)	13	13	13	13	13	13	13	13	13	13	$52,600
Carpark #45 (540 Barton East)	20	20	20	20	20	20	20	20	20	20	$59,900
Carpark #46 (Barton and William)	15	15	15	15	15	15	15	15	15	15	$67,200

City of Hamilton
Service Standard Calculation Sheet

Service: Municipal Parking Services - Spaces
Unit Measure: No. of spaces

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/space) Including Land
Carpark #47 (Barton and Barnesdale)	21	21	21	21	21	21	21	21	21	21	$74,500
Carpark #49 (Barton and Caroline)	41	41	41	41	41	41	41	41	41	41	$180,300
Carpark #50 (Cannon and Birch)	30	30	30	30	30	30	30	-	30	-	$96,400
Carpark #56 (Main and Emerald)	18	18	18	18	18	18	18	18	18	18	$70,800
Carpark #58 (Barton and Harmony)	34	34	34	34	34	34	34	34	34	34	$63,500
Carpark #62 (Vine St)	137	137	137	137	137	137	137	137	137	137	$359,200
Carpark #64 (Sherman Ave N)	18	18	18	18	18	18	18	18	18	18	$78,100
Carpark #66 (Bay and Cannon)	91	91	91	91	91	91	91	91	91	91	$282,500
Carpark #68 (York Parkade)	813	813	813	813	813	813	813	813	813	813	$462,800
Carpark #69 (York Blvd)	17	17	17	17	17	17	17	17	17	17	$59,900
Carpark #70 (Hughson St)	24	24	24	24	24	24	24	24	24	24	$74,500
Carpark #72 (King and East)	21	21	21	21	21	21	21	21	21	21	$78,100
Carpark #73 (King William/Wellington)	36	36	36	36	36	36	36	36	36	36	$121,900
Carpark #74 (King and Hess)	11	11	11	11	11	11	11	11	11	11	$56,200
Carpark #76 (Catharine and Hunter)	55	55	55	55	55	55	55	55	55	55	$158,400
Carpark #79 (402 Barton St)	24	24	24	24	24	24	24	24	24	24	$81,800
Carpark #80 (King and Bay)	205	205	205	205	205	205	205	205	205	205	$596,400
Carpark #81 (Ferguson Ave)	14	14	14	14	14	14	14	14	14	14	$78,100
Carpark #82 (Victoria and Barton)	39	39	39	39	39	39	39	39	39	39	$136,500
Carpark #84 (Kenilworth and Albany)	29	29	29	29	29	29	29	29	29	29	$111,000
Carpark #1DU (Booth St)	40	40	40	40	40	40	40	40	40	40	$169,400
Carpark #2DU (Post Office)	18	18	18	18	18	18	18	18	18	18	$111,000
Carpark #3DU (Canada Trust)	43	43	43	43	43	43	43	43	43	43	$136,500
Carpark #4DU (Royal Bank)	83	83	83	83	83	83	83	83	83	83	$278,900
Carpark #5DU (Golden Valley)	41	41	41	41	41	41	41	41	41	41	$151,100
Carpark #6DU (Coach House)	42	42	42	42	42	42	42	42	42	42	$180,300
Carpark #7DU (Hatt St)	94	94	94	94	94	94	94	94	94	94	$395,700

City of Hamilton
Service Standard Calculation Sheet

Service: Municipal Parking Services - Spaces
Unit Measure: No. of spaces

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/space) Including Land
Carpark #9DU (Bank of Montreal)	7	7	7	7	7	7	7	7	7	7	$41,600
Carpark #10A (Wilson St/Ancaster)	38	38	38	38	38	38	38	38	38	38	$220,500
Dundas St./Flamborough	16	16	16	16	16	16	16	16	16	16	$63,500
Total	**4,767**	**4,767**	**4,767**	**4,767**	**4,767**	**4,767**	**4,767**	**4,696**	**4,767**	**4,696**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0092	0.0091	0.0091	0.0090	0.0090	0.0089	0.0088	0.0086	0.0086	0.0084

10 Year Average	2011-2020
Quantity Standard	0.0089
Quality Standard	$31,571
Service Standard	$281

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$281
Eligible Amount	$18,276,625

City of Hamilton
Service Standard Calculation Sheet

Service: Municipal Parking Services- Meters
Unit Measure: No. of Meters

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/item)
Parking Meters (On-Street)	2,674	2,574	2,515	2,702	2,714	2,426	2,426	2,426	2,426	2,426	$600
Parking Meters (Off-Street)	-	-	77	77	77	77	57	-	57	-	$600
Pay and Display Machine Spaces (On-Street)	14	18	16	16	16	16	16	16	16	16	$5,300
Pay and Display Machine Spaces (Off-Streets)	-	-	72	72	72	72	72	72	72	72	$5,300
Pay on foot Pay Stations	4	4	7	7	7	7	7	7	7	7	$45,000
Pay on foot exit/entry terminals	13	13	13	13	13	13	13	13	13	13	$7,900
Coin Sorter Machine	1	1	1	1	1	1	1	1	1	1	$13,000
Coin Wrapper Machines	2	2	2	2	2	2	2	2	2	2	$27,000
Electric Vehicles Charging Stations	-	-	2	2	2	2	2	2	2	2	$10,000
Total	**2,708**	**2,612**	**2,705**	**2,892**	**2,904**	**2,616**	**2,596**	**2,539**	**2,596**	**2,539**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0052	0.0050	0.0051	0.0055	0.0055	0.0049	0.0048	0.0046	0.0047	0.0045

10 Year Average	2011-2020
Quantity Standard	0.0050
Quality Standard	$896
Service Standard	$4

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$4
Eligible Amount	$291,406

City of Hamilton
Service Standard Calculation Sheet

Service: Municipal Parking Services- Facilities
Unit Measure: sq.ft. of building area

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Building Value ($/sq.ft.)	Value/ft² with land, site works, etc.
Hamilton Place & Convention Centre Parking Garage:												
Main Office	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000	$225	$274
Middle Office	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400	$225	$274
Squad Room	800	800	800	800	800	800	800	800	800	800	$225	$274
Workshop	23,000	23,000	23,000	23,871	23,871	23,871	23,871	23,871	23,871	23,871	$147	$188
Total	**31,200**	**31,200**	**31,200**	**32,071**	**32,071**	**32,071**	**32,071**	**32,071**	**32,071**	**32,071**		

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0600	0.0597	0.0593	0.0606	0.0602	0.0597	0.0591	0.0586	0.0579	0.0573

10 Year Average	2011-2020
Quantity Standard	0.0592
Quality Standard	$1,449
Service Standard	$86

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$86
Eligible Amount	$5,578,995

City of Hamilton
Service Standard Calculation Sheet

Service: Airport Lands
Unit Measure: acres of land

Description	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2019 Value ($/Acre)
Airport Land	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	1,561	$100,000
Total	**1,561**	**1,561**	**1,561**	**1,561**	**1,561**	**1,561**	**1,561**	**1,561**	**1,561**	**1,561**	

Population	519,949	522,456	526,269	529,038	532,521	536,917	542,430	547,562	553,499	559,561
Per Capita Standard	0.0030	0.0030	0.0030	0.0030	0.0029	0.0029	0.0029	0.0029	0.0028	0.0028

10 Year Average	2011-2020
Quantity Standard	0.0029
Quality Standard	$100,290
Service Standard	$291

D.C. Amount (before deductions)	10 Year
Forecast Population	65,046
$ per Capita	$291
Eligible Amount	$18,917,979

Appendix C
Draft Amending Development Charge By-law

City of Hamilton

By-law Number 21-__

Being a By-Law of the City of Hamilton To Amend By-Law 19-142, Respecting Development Charges

Whereas the City of Hamilton (the "City") enacted By-law 19-142 pursuant to the *Development Charges Act, 1997*, S.O. 1997, c. 27, as amended (the "Act"), which Act authorizes Council to pass By-laws for the imposition of development charges against land;

And Whereas the City has undertaken a study pursuant to the Act which has provided updated Schedule A (Table A2) to By-law 19-142;

And Whereas the Council of the City of Hamilton ("Council") has before it a report entitled "City of Hamilton 2021 Development Charge Update Study" prepared by Watson & Associates Economists Ltd., dated March 5, 2021 (the "update study");

And Whereas the update study and proposed amending By-law were made available to the public on March 5, 2021 and Council gave notice to the public pursuant to Section 12 of the Act.

And Whereas Council, on April 22, 2021 held a meeting open to the public, pursuant to Section 12 of the Act, at which Council considered the study, and written and oral submissions from the public;

NOW THEREFORE Council hereby enacts as follows:

1. By-law 19-142 is hereby amended as follows:

    A. Addition of Accessory Dwelling to the definitions in Section 1 as follows:

    "Accessory Dwelling" means a self-contained residential unit that is subordinate in purpose to another residential dwelling unit upon the same lot and includes a garden suite and a mobile home.

    B. Addition of Ancillary Residential Building to the definitions in Section 1 as follows:

"Ancillary Residential Building" means a residential building that would be ancillary to a detached dwelling, semi-detached dwelling, or row dwelling and includes an accessory dwelling.

C. Addition of Class to the definitions in Section 1 as follows:

"Class" means a grouping of services combined to create a single service for the purposes of this By-law and as provided in Section 7 of the Development Charges Act.

D. Addition of Hospice to the definitions in Section 1 as follows:

"Hospice" means a building or portion of a mixed-use building designed and intended to provide palliative care and emotional support to the terminally ill in a home or homelike setting so that quality of life is maintained, and family members may be active participants in care.

E. Addition of Institutional Development to definitions in Section 1 as follows:

"Institutional Development" means development of a building or structure intended for use:

(i) as a long-term care home within the meaning of Subsection 2 (1) of the *Long-Term Care Homes Act,* 2007;

(ii) as a retirement home within the meaning of Subsection 2 (1) of the *Retirement Homes Act,* 2010;

(iii) by any of the following post-secondary institutions for the objects of the institution:

1. a university in Ontario that receives direct, regular, and ongoing operating funding from the Government of Ontario,

2. a college or university federated or affiliated with a university described in subclause (1), or

3. an Indigenous Institute prescribed for the purposes of Section 6 of the *Indigenous Institutes Act*, 2017;

(iv) as a memorial home, clubhouse, or athletic grounds by an Ontario branch of the Royal Canadian Legion; or

(v) as a hospice to provide end of life care.

F. Addition of Interest Rate to the definitions in Section 1 as follows:

"Interest Rate" means the annual rate of interest calculated as per the City's D.C. Interest Policy (FPAP-DC-002), as may be revised from time to time.

G. Addition of Non-profit Housing Development to the definitions in Section 1 as follows:

"Non-profit Housing Development" means development of a building or structure intended for use as residential premises by,

(i) a corporation without share capital to which the Corporations Act applies, that is in good standing under that Act and whose primary object is to provide housing;

(ii) a corporation without share capital to which the Canada Not-for-profit Corporations Act applies, that is in good standing under that Act and whose primary object is to provide housing; or

(iii) a non-profit housing co-operative that is in good standing under the Co-operative Corporations Act, or any successor legislation.

H. Addition of Rental Housing to the definitions in Section 1 as follows:

"Rental Housing" means development of a building or structure with four or more dwelling units all of which are intended for use as rented residential premises;

I. Addition of Site to the definitions in Section 1 as follows:

"Site" means a parcel of land which can be legally conveyed pursuant to Section 50 of the Planning Act and includes a development having two or more lots consolidated under on identical ownership.

J. Addition of Zoning By-law to the definitions in Section 1 as follows:

"Zoning By-law" means the Zoning By-law No. 05-200, 87-57, 3581-86, 90-145-Z, 464, 6593, 3692-92, as appropriate based on development type and location, of the City, or any successor thereof.

K. Replace Section titled “Designation of Services,” inclusive of and Sections 10 and 11, with the following:

Designation of Services/Class of Services

10. All Development of land within the area to which this By-law applies will increase the need for Services/Class of Services.

11. The Development Charges applicable to a Development as determined pursuant to this By-law shall apply without regard to the Services/Class of Services required or used by an individual Development.

L. Replace Section 19 for “Exemptions for Intensification of Existing Housing or New Housing” with the following:

19.

(a) No Development Charge shall be imposed where the only effect of an action referred to in Section 12 of this By-law is to:

(i) permit an enlargement to an existing residential Dwelling Unit;

(ii) permit the creation of one or two additional Dwelling Units in an existing single detached dwelling or a prescribed ancillary residential dwelling structure to the existing residential building;

(iii) permit the creation of additional dwelling units equal to the greater of one Dwelling Unit or one percent of the existing Dwelling Units in existing Rental Housing or a prescribed ancillary residential dwelling structure to the existing residential building;

(iv) permit the creation of one additional dwelling unit in any other existing residential building already containing at least one Dwelling Unit or prescribed ancillary residential dwelling structure to the existing residential building; or

(v) permit the creation of a second dwelling unit in prescribed classes of proposed new residential buildings, including residential dwelling structures ancillary to dwellings, subject to the following restrictions:

Item	Name of Class of Proposed New Residential Buildings	Description of Class of Proposed New Residential Buildings	Restrictions
1	Proposed new detached dwellings	Proposed new residential buildings that would not be attached to other buildings and that are permitted to contain a second dwelling unit, that being either of the two dwelling units, if the units have the same gross floor area, or the smaller of the dwelling units.	The proposed new detached dwelling must only contain two dwelling units. The proposed new detached dwelling must be located on a parcel of land on which no other detached dwelling, semi-detached dwelling or row dwelling would be located.
2	Proposed new semi-detached dwellings or row dwellings	Proposed new residential buildings that would have one or two vertical walls, but no other parts, attached to other buildings and that are permitted to contain a second dwelling unit, that being either of the two dwelling units, if the units have the same gross floor area, or the smaller of the dwelling units.	The proposed new semi-detached dwelling or row dwelling must only contain two dwelling units. The proposed new semi-detached dwelling or row dwelling must be located on a parcel of land on which no other detached dwelling, semi-detached dwelling or row dwelling would be located.
3	Proposed new residential buildings that would be ancillary to a proposed new detached dwelling, semi-detached dwelling or row dwelling	Proposed new residential buildings that would be ancillary to a proposed new detached dwelling, semi-detached dwelling or row dwelling and that are permitted to contain a single dwelling unit.	The proposed new detached dwelling, semi-detached dwelling or row dwelling, to which the proposed new residential building would be ancillary, must only contain one dwelling unit. The gross floor area of the dwelling unit in the proposed new residential building must be equal to or less than the gross floor area of the detached dwelling, semi-detached dwelling or row dwelling to which the proposed new residential building is ancillary.

(b) Notwithstanding (a) above, Development Charges shall be imposed if the total Gross Floor Area of the additional one or two units exceeds the Gross Floor Area of the existing Dwelling Unit.

(c) Notwithstanding (a) above, Development Charges shall be imposed if the additional Dwelling Unit(s) has a Gross Floor Area greater than:

(vi) in the case of a Semi-detached Dwelling Unit or Townhouse Dwelling Unit, the Gross Floor Area of the existing Dwelling Unit; and

(vii) in the case of any other Residential Building, the Gross Floor Area of the smallest Dwelling Unit contained in the said residential Building.

(d) The exemption to Development Charges in (a) above shall only apply to the first instance of intensification in an existing or new dwelling.

(e) Subject to (b), (c) and (d) above, any exemption under (a) above shall apply to the smallest Dwelling Unit, as determined by applicable rates under this By-law.

M. Reference in Section 33 is changed to reflect renumbering:

Subject to the provisions of Sections 34 and 35, Development Charges are payable at the time a building permit is issued with respect to a Development.

N. Addition of policies related to the timing of development charges payments. These will be included after Section 33 of the development charges by-law:

   New Sections:

   34. Notwithstanding Section 33, Development Charges for Rental Housing and Institutional Developments are due and payable in six equal annual instalment payments commencing with the first instalment payable on the date of occupancy, and each subsequent instalment, including interest as per the City's D.C. Interest Policy (FPAP-DC-002), as may be revised from time to time.

   35. Notwithstanding Section 33, Development Charges for Non-profit Housing Developments are due and payable in 21 equal annual instalment payments commencing with the first instalment payable on the date of occupancy, and each subsequent instalment, including interest as per the City's Interest policy (FPAP-DC-002), as may be revised from time to time.

O. Sections 34 to 50 of the By-law are renumbered to 36 to 52, respectively.

P. Replace Section 39 (renumbered to 41) "**Reserve Fund Report"** with the following:

   The General Manager of Finance and Corporate Services shall, in each year prior to June 30 thereof, commencing June 30, 2020 for the 2019 year, furnish to Council a statement in respect of the reserve funds required by the Act for the Services/Classes of Services to which this By-law relates, for the prior year, containing the information set out in Section 43 of the Act and Section 12 of the Regulation.

Q. Schedule "A" is deleted, and the attached Schedule "A" is substituted, therefore.

2. This By-law shall come into force and effect at 12:01AM on July 6, 2021.

3. Except as amended by this By-law, all provisions of By-law 19-142, as amended, are and shall remain in full force and effect.

By-law read a first and second time this 6th day of June, 2021.

By-law read a third time and finally passed this 6th day of June, 2021.

Mayor: _____

Clerk: _____

SCHEDULE A, TO BY-LAW 19-142
MUNICIPAL WIDE DEVELOPMENT CHARGES – EFFECTIVE JULY 6, 2021
(2019 $)

Table A2:

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single-Detached Dwelling & Semi-Detached Dwelling (per dwelling unit)	Townhouses & Other Multiple Unit Swellings (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes 2-Bedrooms+ (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes Bachelor & 1-Bedrooms+ (per dwelling unit)	Residential Facility Dwelling & Lodging House & Garden Suite (per bedroom)	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Classes:						
Services Related to a Highway	10,769	7,708	6,306	4,314	3,479	8.05
Police Services	524	375	307	210	169	0.26
Fire Protection Services	462	331	271	185	149	0.23
Transit Services	1,917	1,372	1,123	768	619	0.98
Public Works	805	576	471	322	260	0.41
Ambualnce Services	148	106	87	59	48	0.02
Waste Diversion	730	522	427	292	236	0.13
Parks and Recreation Services	7,528	5,388	4,408	3,016	2,432	0.35
Library Services	1,145	819	671	459	370	1.00
Long Term Care	182	130	107	73	59	0.02
Public Health	3	2	2	1	1	-
Child Care and Early Years	15	11	9	6	5	-
Housing Services	752	538	440	301	243	-
Provincial Offences Act	40	29	23	16	13	0.02
Growth Studies	404	289	237	162	131	0.21
Total Municipal Wide Services/Classes	**25,424**	**18,196**	**14,889**	**10,184**	**8,214**	**11.67**

SCHEDULE A, TO BY-LAW 19-142
MUNICIPAL WIDE DEVELOPMENT CHARGES
EFFECTIVE JULY 6, 2021 TO SEPTEMBER 18, 2022
(2019 $)

Table A3:

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single-Detached Dwelling & Semi-Detached Dwelling (per dwelling unit)	Townhouses & Other Multiple Unit Swellings (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes 2-Bedrooms+ (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes Bachelor & 1-Bedrooms+ (per dwelling unit)	Residential Facility Dwelling & Lodging House & Garden Suite (per bedroom)	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Classes:						
Municipal Parking	559	400	327	224	181	0.29
Airport Lands	471	337	276	189	152	0.24
Total Municipal Wide Services/Classes	**1,030**	**737**	**603**	**413**	**333**	**0.53**

EMERGENCY & COMMUNITY SERVICES COMMITTEE REPORT 21-006

1:30 p.m.
Thursday, June 3, 2021
Council Chambers
Hamilton City Hall
71 Main Street West

Present: Councillors N. Nann (Chair), B. Clark, T. Jackson, S. Merulla, and E. Pauls

Also Present: Councillor C. Collins

Regrets: Councillor T. Whitehead – Leave of Absence

THE EMERGENCY & COMMUNITY SERVICES COMMITTEE PRESENTS REPORT 21-006 AND RESPECTFULLY RECOMMENDS:

1. Adaptation and Transformation Update 3 (HSC20020(c)) (Item 8.1)

(a) That Council approve the authority of the General Manager of the Healthy and Safe Communities Department or his designate to continue to enter into contracts necessary to secure access and purchase of service for continued enhancement of supports for Hamilton's homeless-serving system during COVID-19 including:

(i) Continued operation of 378 Main Street East (the former Cathedral Boys School) as a temporary shelter for men at an approximate cost of $1.5 M for the period of July 1, 2021 to no later than December 31, 2021;

(ii) The rental of hotel rooms for expanded temporary housing, staffing and additional supports, cleaning, food and associated services in the approximate amount of $7.1 M for the period of July 1, 2021 to December 31, 2021 and in the approximate amount of $3.6 M from January 1, 2022 to no later than March 31, 2022 from vendors and providers satisfactory to the General Manager of the Healthy and Safe Communities Department or his designate;

(iii) Continuation of COVID-19 related supports for the homeless-serving system, including but not limited to security services, enhanced cleaning, food and associated services in the approximate amount of $2 M for the period of July 1, 2021 to December 31, 2021 and in the approximate amount of $1 M from January 1, 2022 to no later than March 31, 2022 from vendors and providers satisfactory to the General Manager of the Healthy and Safe Communities Department or his designate;

(iv) Continuation of operation of COVID-19 isolation services for people experiencing homelessness in the approximate amount of $1.1 M for the period of July 1, 2021 to December 31, 2021 and in the approximate amount of $540 K from January 1, 2022 to no later than March 31, 2022;

(v) Continuation of enhanced drop-in services including but not limited to The Living Rock Ministries, Mission Services of Hamilton Inc., Wesley Urban Ministries Inc. and The Hamilton Young Women's Christian Association (YWCA) in the approximate amount of $1.5 M for the period of July 1, 2021 to December 31, 2021 and in the approximate amount of $740 K from January 1, 2022 to no later than March 31, 2022;

(b) That an evidence-based transition plan for Hamilton's emergency shelter system through post-COVID recovery be approved, with full costing and implementation details to be brought forward for review and approval by Committee and Council at a future date. The transition plan includes the following items for approval:

(i) Temporarily increase the women's emergency shelter system capacity by up to 70 beds over and above the two existing women's emergency shelters (26 beds at current reduced capacity), by:

1. Opening Emma's Place for up to two years (15 beds) at an approximate cost of $1.45 M allocated as follows; one-time renovation cost of approximately $400 K, and operating cost of $310 K for a total of $710 K in 2021 and operating cost of $744 K in 2022; and,

2. Continue to temporarily extend hotel and case management operations for up to 55 beds up to March 31, 2022, funded as per recommendation (a)(ii), while completing a further needs assessment for alternative solutions for ongoing support;

(ii) Further investigate transitional adaptations to the emergency shelter system through COVID-19 recovery, including: temporarily increasing the men's emergency shelter system capacity for up to two years through hotels while conducting a Request for Proposals

(RFP) process to identify alternative solutions for ongoing support; investigate increasing the family emergency shelter system capacity; and completing a further needs assessment for ongoing support for couples in the emergency shelter system.

(c) That all such purchases and grants outlined in Recommendations (a) and (b) pertaining to Budget Year ending December 31, 2021 be funded from any available source jointly deemed appropriate by the General Manager of the Healthy and Safe Communities Department and the General Manager of the Finance and Corporate Services Department including, but not limited to, one or more of the following sources: Reaching Home, Community Homelessness Prevention Initiative, any available provincial or federal funding, or in year program and/or department/corporate surplus;

(d) That all such purchases and grants outlined in Recommendations (a) and (b) pertaining to Budget Year ending December 31, 2022 be included in the 2022 Operating Budget for Council deliberation through the 2022 Budget process;

(e) One-time investment of $2 M for housing allowances for clients of City funded Intensive Case Management (ICM) programs as well as additional staffing support to assist in the administration of the new allowances that will serve up to 93 individuals or households over 4 years;

(i) That one additional temporary staff be included in the Housing Services Division complement at an approximate annual cost of $70 K to support the administration services required to deliver the program as outlined in Recommendation (e) and within the funding as stipulated in Recommendation (e);

(ii) That Recommendation (e) and (e) (i) be funded annually over the 4 years, from the Housing Supplement/Housing Allowance Reserve, #112252, and if necessary, from in-year surpluses of the division and or department;

(iii) That any in-year Housing Services Division surplus not required to fund Recommendations (a), (b) and (e) be transferred into the Housing Supplement/Housing Allowance Reserve, #112252 to a maximum of $2.28 M.

(f) That the General Manager of the Healthy and Safe Communities Department or his designate be directed and authorized, on behalf of the City of Hamilton, to enter into, execute and administer all agreements and documents necessary to implement the purchases and grants outlined above on terms and conditions satisfactory to the General Manager of the Healthy and Safe Communities Department or his designate and in a form satisfactory to the City Solicitor.

2. Service Manager Consent for CityHousing Hamilton to Sell Jamesville Property (HSC21011) (Ward 2) (Item 10.1)

(a) That Service Manager consent be provided for CityHousing Hamilton to sell the site bounded by James St. N., Ferrie St. W., MacNab St. N. and Strachan St. W for the purpose of redevelopment resulting in 46 units of community housing on the site;

(b) That the General Manager of the Healthy and Safe Communities Department or designate, be authorized and directed to enter into, execute and administer an operating agreement with CityHousing Hamilton for their affordable housing project at 450 James St. N. to reflect the rent subsidy in accordance with the terms and conditions contained in the Term Sheet (attached as Appendix “A” to Emergency and Community Services Committee Report 21-006), in a form satisfactory to the City Solicitor; and,

(c) That the rent subsidy funding provided to the new Jamesville building starting in 2023 be increased annually by the allowable rent increase guideline set by the Ministry of Municipal Affairs and Housing.

3. Emergency Shelter Services Team Staffing (HSC21017) (City Wide) (Item 14.1)

(a) That the direction within Report HSC21017, Emergency Shelter Services Team Staffing, be approved; and,

(b) That Report HSC21017, respecting Emergency Shelter Services Team Staffing, remain confidential.

4. Status Change of the Housing Programs Officer Position (HSC21019) (City Wide) (Item 14.2)

(a) That the directions within Report HSC21019, Status Change of the Housing Programs Officer Position, be approved; and,

(b) That Report HSC21019, respecting the Status Change of the Housing Programs Officer Position remain confidential.

FOR INFORMATION:

(a) APPROVAL OF AGENDA (Item 2)

That the agenda for the June 3, 2021 Emergency and Community Services Committee meeting be approved, as presented.

(b) DECLARATIONS OF INTEREST (Item 3)

There were no declarations of interest.

(c) APPROVAL OF MINUTES OF PREVIOUS MEETING (Item 4)

(i) May 6, 2021 (Item 4.1)

That the Minutes of the May 6, 2021 meeting of the Emergency and Community Services Committee be approved, as presented.

(d) CONSENT ITEMS (Item 7)

(i) Hamilton Veteran Committee Minutes (Item 7.1)

That the following Hamilton Veterans Committee Minutes, be received:

1. March 23, 2021 – No Quorum Report (Item 7.1 (a))

(e) STAFF PRESENTATIONS (Item 8)

(i) Adaptation and Transformation Update 3 (HSC20020(c)) (City Wide) (Item 8.1)

That the presentation from Edward John, Director, Housing Services, respecting Adaptation and Transformation update 3, be received.

For disposition of this matter, please refer to Item 1.

(f) PRIVATE AND CONFIDENTIAL (Item 14)

The Emergency and Community Services Committee determined that it was not necessary to move into Closed Session respecting Items 14.1 and 14.2.

For disposition of these matters, please refer to Item 3 and 4, respectively.

(g) ADJOURNMENT (Item 15)

That there being no further business, the Emergency and Community Services Committee be adjourned at 2:34 p.m.

Respectfully submitted,

Councillor N. Nann
Chair, Emergency and Community Services Committee

Tamara Bates
Legislative Coordinator
Office of the City Clerk

Term Sheet for Community Housing Operating Agreement
450 James St. N

Landlord: CityHousing Hamilton ("CHH")

Operating Agreement ("OA") Terms and Conditions

1. The agreement commences the date it is signed.

2. Permission shall be required from the City of Hamilton, as Service Manager, to encumber this property.

3. Permission shall be required from the City of Hamilton, as Service Manager, to sell or otherwise dispose of this property.

4. The agreement shall have a duration of 40 years.

5. A minimum of 46 rent-geared-to-income (RGI) units will be provided in this building.

6. Households moving into rent-geared-to-income units will be selected from the centralized waiting list (Access to Housing) maintained by the City of Hamilton.

7. CHH shall be responsible for calculating and collecting rent.

8. CHH will provide reports to the City in a manner outlined by the City regarding compliance with RGI targets in a form and content satisfactory to the GM or designate, in his sole discretion.

9. Assignment of the OA will not be permitted unless the GM or designate, in his sole discretion, consents and only in the following circumstances:

    (a) the property is sold to another provider of "non-profit housing" who enters into an assignment agreement with the City and City Housing Hamilton agreeing to be subject to all of the terms and conditions of the RSA for the remainder of the term of those agreements and such other terms and conditions as the GM or designate and City Solicitor in their sole discretion deem appropriate.

10. Maximum rents shall be no more than 110% Median Market Rent for the CMHC Zone in which the building is located.

11. Units subject to this agreement may increase rents annually within a tenancy by the Provincial Guideline amount as specified annually by the Ontario Ministry of Municipal Affairs and Housing. Higher increases, if allowed by Ontario law, may be permitted at the sole discretion of the GM or designate following submission of a business case justifying the increase.

12. Such additional terms and conditions as determined by the General Manager of Healthy and Safe Communities or designate and required by the City Solicitor in their sole discretion.

CITY OF HAMILTON
MOTION

City Council: June 9, 2021

MOVED BY MAYOR F. EISENBERGER …….…….……

SECONDED BY COUNCILLOR……...…..……..……

Absence – Councillor Terry Whitehead

WHEREAS Section 259(1)(c) of the *Municipal Act*, *2001* stipulates that the office of a Member of Council becomes vacant if the member is absent from meetings of the Council for three successive months without being authorized to do so by a resolution of Council.

THEREFORE BE IT RESOLVED:

That Councillor Terry Whitehead, due to sick leave, be authorized to be absent from meetings of the Council of the City of Hamilton until September 30, 2021 or his return to work, whichever comes first.

CITY OF HAMILTON
MOTION

Council: June 9, 2021

MOVED BY COUNCILLOR B. CLARK……..……..……..…….

SECONDED BY COUNCILLOR ……..……

Amendment to Item 4.6 of the April 28, 2021 Council Minutes, respecting the correspondence from the Paul Dube, Ombudsman of Ontario respecting an investigation into a complaint about a meeting held by the Lesbian, Gay, Bisexual, Transgender and Queer Advisory Committee for the City of Hamilton on October 20, 2020

WHEREAS, Council has received a subsequent letter from the Paul Dube, Ombudsman of Ontario respecting a investigation into a complaint about a meeting held by the Lesbian, Gay, Bisexual, Transgender and Queer Advisory Committee for the City of Hamilton on October 20, 2020 (Item 4.11, June 9, 2021 Council Agenda), requesting that the City pass a resolution stating how it intends to address the following recommendations within the Ombudsman's report when the Ombudsman has determined that a meeting or part of a meeting was held contrary to the open meeting rules, in accordance with s. 239(12) of the *Municipal Act, 2001*:

Recommendation 1

> All members of the LGBTQ Advisory Committee for the City of Hamilton should be vigilant in adhering to their individual and collective obligation to ensure that the committee complies with its responsibilities under the *Municipal Act, 2001* and the procedure by-law.

Recommendation 2

> The City of Hamilton should review its policy for the conduct of virtual meetings and ensure that staff members and advisory committee members receive training on the policy's content, especially the steps to be taken if technical issues prevent public attendance during a meeting.

THEREFORE, BE IT RESOLVED:

That Item 4.6 of the April 28, 2021 Council Minutes, respecting the correspondence from the Paul Dube, Ombudsman of Ontario respecting an investigation into a complaint about a meeting held by the Lesbian, Gay, Bisexual, Transgender and Queer Advisory Committee for the City of Hamilton on October 20, 2020, be ***amended***, to read as follows:

4.6 Correspondence from the Paul Dube, Ombudsman of Ontario respecting a investigation into a complaint about a meeting held by the Lesbian, Gay, Bisexual, Transgender and Queer Advisory Committee for the City of Hamilton on October 20, 2020.

Recommendation: Be received ***and referred to the City Clerk to implement the Ombudsman's recommendations.***

COUNCIL COMMUNICATION UPDATES

May 21, 2021 to June 3, 2021

Council received the following Communication Updates during the time period listed above, the Information Updates are also available to the public at the following link: https://www.hamilton.ca/government-information/information-updates/information-updates-listing, as per Section 5.18 of By-law 21-021 (A By-Law To Govern the Proceedings of Council and Committees of Council) a member of Council may refer any of the items listed below, to a Standing Committee by contacting the Clerk and it will be placed on the next available agenda of the respective Standing Committee.

Date	Department	Subject	Link
May 26, 2021	Public Works	PRESTO Cards for DARTS Clients (TRN2107) (City Wide)	https://www.hamilton.ca/sites/default/files/media/browser/2021-05-27/communication-update-hfs-presto-card-distribution-trn2107.pdf
May 28, 2021	Planning and Economic Development	Imperial Oil Leave to Construct Application to the Ontario Energy Board for the Waterdown to Finch Pipeline Project (Ward 15)	https://www.hamilton.ca/sites/default/files/media/browser/2021-06-01/communication-update-imperial_oil-waterdown-to-finch-pipeline-project.pdf
June 2, 2021	Healthy and Safe Communities	Extreme Heat Weather Protocol and COVID-19 (City Wide)	https://www.hamilton.ca/sites/default/files/media/browser/2021-06-02/communication-update-extreme-heat-weather-protocol-and-covid-19-2.pdf

Authority: Item 9, Public Works Committee
Report 07-016 (PW07153)
CM: December 12, 2007
Ward: 6, 13
Bill No. 096

CITY OF HAMILTON

BY-LAW NO. 21-

To Amend By-law No. 01-215
Being a By-law To Regulate Traffic

WHEREAS sections 8, 9 and 10 of the Municipal Act, 2001, S.O. 2001, c. 25, authorize the City of Hamilton to pass by-laws as necessary or desirable for the public and municipal purposes, and in particular paragraphs 4 through 8 of subsection 10(2) authorize by-laws respecting: assets of the municipality, the economic, social and environmental well-being of the municipality; health, safety and well-being of persons; the provision of any service or thing that it considers necessary or desirable for the public; and the protection of persons and property;

AND WHEREAS on the 18th day of September, 2001, the Council of the City of Hamilton enacted By-law No. 01-215 to regulate traffic;

AND WHEREAS it is necessary to amend By-law No. 01-215.

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. Schedule 5 (Stop Control) of By-law No. 01-215, as amended, is hereby further amended by adding to Section “E” (Hamilton) thereof the following item, namely;

Rexford Drive	Northbound/Southbound	Ashcroft Drive

2. Schedule 18 (Bicycle Lanes) of By-law No. 01-215, as amended, is hereby further amended by adding to Section "B" (Dundas) thereof the following item, namely:

Creighton Road	Governors Road to Mill Street	East curb lane	Anytime	Northerly
Creighton Road	Governors Road to Mill Street	West curb lane	Anytime	Southerly
Market Street South	Mill Street to MacNab Street	East curb lane	Anytime	Northerly
Market Street South	Mill Street to MacNab Street	West curb lane	Anytime	Southerly

3. Subject to the amendments made in this By-law, in all other respects, By-law No. 01-215, including all Schedules thereto, as amended, is hereby confirmed unchanged.

4. This By-law shall come into force and take effect on the date of its passing and enactment.

PASSED this 9th day of June, 2021.

F. Eisenberger
Mayor

A. Holland
City Clerk

Authority: Item 2, Public Works Committee
Report 21-008 (PED20168(a))
CM: June 9, 2021
Ward: City Wide
Bill No. 097

CITY OF HAMILTON

BY-LAW NO. 21-

To Amend By-law No 01-218, as amended, being a By-law to Regulate On-Street Parking Respecting Free-Floating Carshare Vehicles

WHEREAS *Section 11(1)1 of the Municipal Act, S.O. 2001, Chapter 25*, as amended, confers upon the councils of all municipalities the power to enact by-laws for regulating parking and traffic on highways subject to the *Highway Traffic Act*;

WHEREAS on the 18th day of September, 2001, the Council of the City of Hamilton enacted By-law No. 01-218 to regulate on-street parking;

WHEREAS this By-law amends By-law No. 01-218 with respect to free-floating carshare vehicles;

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. The amendments in this By-law include any necessary grammatical, numbering and letter changes.

2. That By-law No. 01-218 is hereby amended by adding the following:

Free-floating Carshare Permit Regulations

11.1 (1) In this section:

(a) "free-floating carshare vehicle" means a vehicle owned by a free-floating carshare operator which is shared among the operator's members and has no fixed or dedicated public parking space.

(b) "free-floating carshare operator" means an organization that provides a model of mobility in which its members can pick up and drop off a free-floating carshare vehicle in any authorized on-street parking space within Wards 1, 2 and 3 of the City of Hamilton.

(c) "free-floating carshare permit" means a permit issued by Hamilton Municipal Parking System to a free-floating carshare operator for a

free-floating carshare vehicle, allowing that vehicle to end its trip by using on-street parking spaces within Wards 1, 2 and 3 in accordance with the provisions of this By-law.

(d) "HMPS" means Hamilton Municipal Parking System.

(e) "end of trip" means the user has ended their trip and has returned the vehicle keys. The vehicle is now released to be booked by the next user.

(2) HMPS may issue a free-floating carshare permit to a free-floating carshare operator for a free-floating carshare vehicle for a fee.

(3) Except where the free-floating carshare permit is not in force, every free-floating carshare permit shall commence on the day on which the permit is issued and shall expire on the last day of the term for which the permit was issued.

(4) The fee for each free-floating carshare permit shall be an amount approved by Council from time to time and as set out in the City of Hamilton's User Fees and Charges By-law. The fee shall be payable in advance and shall be pro-rated for the balance of the first year, and thereafter shall be renewable on a calendar year basis, on or before the first day of January of each year but not earlier than November 1 of the current year.

(5) HMPS shall not issue more than one (1) free-floating carshare permit per free-floating carshare vehicle.

(6) An application for a free-floating carshare permit shall provide the following information:

(a) Name, phone number, address and email address of the free-floating carshare operator;

(b) Name, phone number and email address for referring complaints related to free-floating carshare vehicle parking;

(c) Licence number, make and colour of the vehicle for which the application is being made;

(d) Proof of insurance and registration for the vehicle for which the application is being made; and

(e) Such further and other information as HMPS may require for the purpose of the application.

(7) No free-floating carshare operator shall operate a free-floating carshare vehicle within the City of Hamilton without a valid free-floating carshare permit in the form of a mirror hang tag, facing the exterior of the vehicle, such that the permit is entirely and clearly in view from the exterior of the subject vehicle.

(8) Every free-floating carshare operator shall equip each free-floating carshare vehicle for which a permit under this section is sought, with geofencing technology to prevent it from ending a trip:

(a) Outside of Wards 1, 2 and 3; and

(b) Within a Municipal Car Park.

(9) Subject to the restrictions set out in Section 11.1(10) herein, a free-floating carshare vehicle displaying a current and valid free-floating carshare permit, may park in a space on an unregulated highway or time limited street so designated by Council and set out in Schedule 6 to this By-law within Wards 1, 2 or 3 for up to a maximum of 72 hours at a time at the end of trip.

(10) Notwithstanding Section 11.1 (9) above, and for greater certainty, a free-floating carshare vehicle shall not park in any of the following locations at the end of trip:

(a) Through highways;

(b) Metered parking spaces;

(c) Parking by Permit Only Areas;

(d) Municipal Car Parks; or

(e) Outside of Wards 1, 2 or 3 of the City of Hamilton.

(11) Notwithstanding Section 11.1 (9) above, a free-floating carshare vehicle shall not be parked contrary to:

(a) The direction of a Police Officer, a member of the Hamilton Fire Department; or an agent of the City; or

(b) The direction of the operator of an authorized emergency vehicle.

(12) Notwithstanding Section 11.1(9) above, a free-floating carshare operator shall, within 24 hours of receiving notice of a complaint relating to a free-floating carshare vehicle from the City of Hamilton or the public, relocate the free-floating carshare vehicle out of the zone to another permitted location.

(13) Notwithstanding all other provisions of this By-law and notwithstanding the display of authorized signs to the contrary, a free-floating carshare vehicle properly displaying a current and valid free-floating carshare permit, is exempt from the following provisions of said By-law:

(a) Section 9(1);

however, nothing in this section shall be deemed to annul or waive any other provision of this By-law.

(14) Free-floating carshare permits remain the property of the City of Hamilton and the HMPS may, with 24 hours notice, and at their absolute discretion, recall, void, cancel or otherwise revoke any free-floating carshare permit, and the unexpended portion of the fee paid by the permit holder shall be refunded at the convenience of the City.

(15) Notwithstanding that an application has been made for a free-floating carshare permit, or that a free-floating carshare permit has been issued and is in force or is not in force, no provision of this by-law shall oblige HMPS to issue, renew or reinstate a free-floating carshare permit and no person shall enjoy a vested right in the issuance or continuance of a free-floating carshare permit.

(16) Each free-floating carshare operator shall, on a monthly basis, provide to HMPS anonymous trip-related data including:

(a) number of vehicles;
(b) number of active members;
(c) number of free-floating vehicle trips;
(d) average trip duration;
(e) average trip length;
(f) percentage of trips after which the vehicle was parked for greater than 72 hours;
(g) average length of time between two usages; and
(h) other key information to aid in assessing the success of the program and future expansion opportunities.

3. That in all other respects By-law 01-218 is confirmed.

4. That the provisions of this by-law shall become effective when ratified by Council.

PASSED this 9th day of June, 2021.

_____	_____
F. Eisenberger	A. Holland
Mayor	City Clerk

Authority: Item 2, Public Works Committee
Report 21-008 (PED20168(a))
CM: June 9, 2021
Ward: City Wide
Bill No. 098

CITY OF HAMILTON

BY-LAW NO. 21-

To Amend By-law No. 17-225, as amended, being a By-law to Establish a System of Administrative Penalties

WHEREAS Council enacted a By-law to Establish a System of Administrative Penalties, being By-law 17-225;

AND WHEREAS this amending by-law amends By-law 17-225 to add infractions relating to free-floating carshare permits;

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. The amendments in this By-law include any necessary grammatical, numbering and letter changes.

2. Table 3 is amended by adding the following items:

Item	Column 1 Designated By-law & Section		Column 2 Short Form Wording	Column 3 Set Penalty
92	01-218	11.1(7)	Free-floating carshare vehicle- operate no valid permit	$100.00
93	01-218	11.1(9)	Free-floating carshare vehicle- parked over 72-hour parking time limit	$30.00
94	01-218	11.1(10)(a)	Free-floating carshare vehicle- end trip on through highway	$35.00
95	01-218	11.1(10)(b)	Free-floating carshare vehicle- end trip in metered parking space	$25.00
96	01-218	11.1(10)(c)	Free-floating carshare vehicle- end trip in parking by permit only areas	$35.00

97	01-218	11.1(10)(d)	Free-floating carshare vehicle- end trip in Municipal Car Park	$25.00
98	01-218	11.1(10)(e)	Free-floating carshare vehicle- end trip outside of Wards 1, 2, or 3.	$100.00

3. That in all other respects By-law 17-225 is confirmed.

4. That the provisions of this by-law shall become effective when ratified by Council.

PASSED this 9th day of June, 2021.

_____ _____

F. Eisenberger
Mayor

A. Holland
City Clerk

Authority: Item 31, Economic Development and Planning Committee
Report: 06-005
CM: April 12, 2006
Ward: 3

Bill No. 099

CITY OF HAMILTON

BY-LAW NO. 21-

To Amend Zoning By-law No. 6593, as amended by By-law No. 16-041, respecting Lands Located at 149 ½ Sherman Avenue North, Hamilton

WHEREAS the City of Hamilton Act, 1999, Statutes of Ontario, 1999 Chap. 14, Sch. C. did incorporate, as of January 1, 2001, the municipality "City of Hamilton";

WHEREAS the City of Hamilton is the successor to certain area municipalities, including the former municipality known as the "The Corporation of the City of Hamilton" and is the successor to the former regional municipality, namely, "The Regional Municipality of Hamilton-Wentworth";

WHEREAS the *City of Hamilton Act*, *1999* provides that the Zoning By-laws of the former area municipalities continue in force in the City of Hamilton until subsequently amended or repealed by the Council of the City of Hamilton;

WHEREAS the Council of The Corporation of the City of Hamilton passed Zoning By-law No. 6593 (Hamilton) on the 25th day of July 1950, which by-law was approved by the Ontario Municipal Board by Order dated the 7th day of December 1951, (File No. P.F.C. 3821);

WHEREAS the Council of the City of Hamilton, in adopting Section 31 of Report 06-005 of the Planning and Economic Development Committee at its meeting held on the 12th day of April, 2006, recommended that the Director of Development and Real Estate be authorized to give notice and prepare by-laws for presentation to Council, to remove the "H" Holding provision from By-laws where the conditions have been met;

AND WHEREAS this By-law is in conformity with the Urban Hamilton Official Plan

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. That Sheet No. E21 of the District Maps, appended to and forming part of By-law No. 6593 (Hamilton), is amended by changing the zoning from "RT-30/S-1728-H" (Street Townhouse) District, Holding, Modified, to "RT-30/S-1728" (Street Townhouse) District, Modified, on the lands the extent and boundaries of which are shown on Schedule "A" annexed hereto and forming part of this by-law.

2. That no building or structure shall be erected, altered, extended, or enlarged, nor shall any building or structure or part thereof be used, nor shall any land be used, except in accordance with the “RT-30/S-1728” (Street Townhouse) District, Modified, provisions.

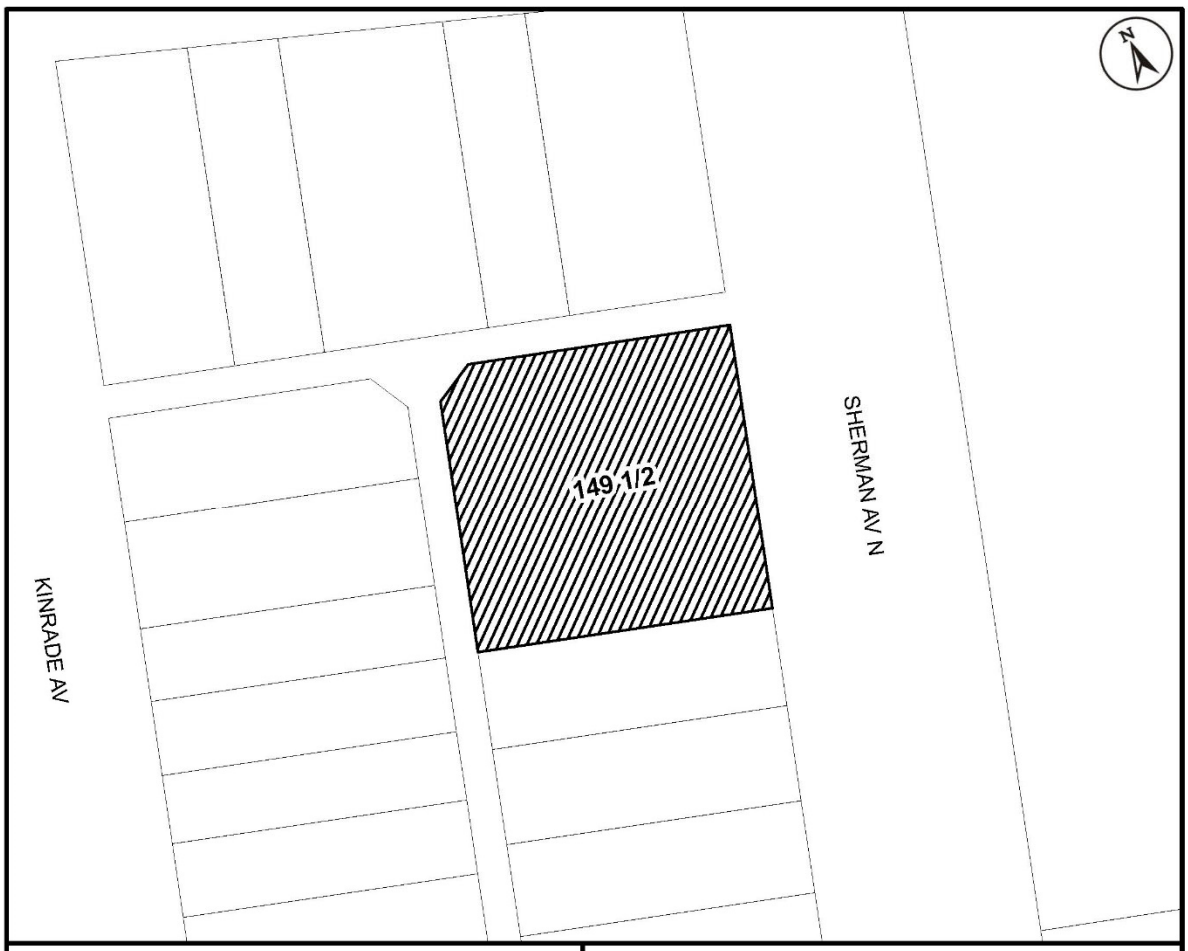
3. The Clerk is hereby authorized and directed to proceed with the giving of notice of the passing of this By-law, in accordance with the *Planning Act*.

PASSED this 9th day of June, 2021.

F. Eisenberger
Mayor

A. Holland
City Clerk

ZAH-21-005



This is Schedule "A" to By-law No. 21-

Passed the ..... day of ....., 2021

Mayor

Clerk

Schedule "A"

Map forming Part of By-law No. 21-_____

to Amend By-law No. 6593

Scale: N.T.S	File Name/Number: ZAH-21-005
Date: May 10, 2021	Planner/Technician: MK/VS

PLANNING AND ECONOMIC DEVELOPMENT DEPARTMENT

Hamilton

Subject Property

149 1/2 Sherman Avenue North

"RT-30/S-1728-H" (Street Townhouse) District, Holding, Modified to "RT-30/S-1728" (Street Townhouse) District, Modified

Authority: Item 6, Planning Committee
Report: 21-008 (PED20073)
CM: May 26, 2021
Ward: 12

Bill No. 100

CITY OF HAMILTON

BY-LAW NO. 21-

To Adopt:

Official Plan Amendment No. 28 to the

Rural Hamilton Official Plan

Respecting:

435 Carluke Road West

(Ancaster)

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. Amendment No. 28 to the Rural Hamilton Official Plan consisting of Schedule "1", hereto annexed and forming part of this by-law, is hereby adopted.

PASSED this 9th day of June, 2021.

F. Eisenberger
Mayor

A. Holland
City Clerk

Schedule "1"

Rural Hamilton Official Plan
Amendment No. 28

The following text, together with:

Appendix "A"	Volume 1, Schedule D – Rural Land Use Designations
Appendix "B"	Volume 1, Appendix A – Parks Classification

attached hereto, constitutes Official Plan Amendment No. 28 to the Rural Hamilton Official Plan.

1.0 Purpose and Effect:

The purpose and effect of this Amendment is to redesignate the lands from the "Open Space" designation to the "Agriculture" designation because the lands are no longer required for open space uses.

2.0 Location:

The lands affected by this Amendment are known municipally as 435 Carluke Road West, in the former Town of Ancaster.

3.0 Basis:

The basis for permitting this Amendment is:

- The City no longer requires the property for open space uses;
- The proposed designation will allow for the adaptive reuse of the existing heritage building; and,
- The proposed Amendment is consistent with the Provincial Policy Statement, 2020 and conforms to the Greenbelt Plan, 2017.

4.0 Actual Changes:

4.1 Volume 1 – Parent Plan

Schedules and Appendices

4.1.1 Schedule

a. That Volume 1, Schedule D – Rural Land Use Designations be amended by redesignating the subject lands from "Open Space" to "Agriculture", as shown on Appendix "A", attached to this Amendment.

4.1.2 Appendix

a. That Volume 1, Appendix A – Parks Classification be amended by removing the Neighbourhood Park Classification, as shown on Appendix "B", attached to this Amendment.

5.0 Implementation:

An implementing Zoning By-Law Amendment will give effect to the intended uses on the subject lands.

This Official Plan Amendment is Schedule "1" to By-law No. 21-100 passed on the 9th day of June, 2021.

The
City of Hamilton

F. Eisenberger
Mayor

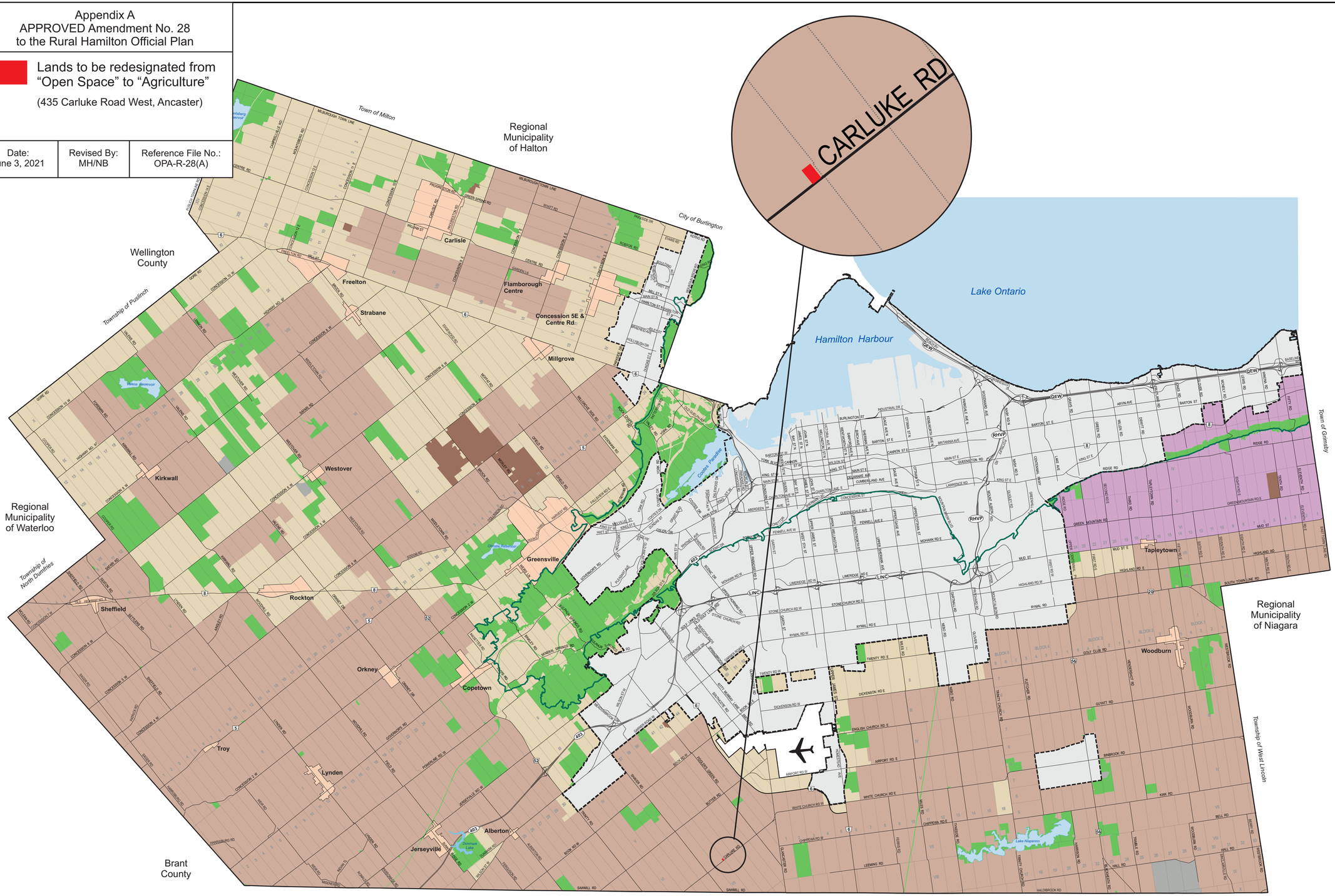
A. Holland
City Clerk

Appendix A
APPROVED Amendment No. 28
to the Rural Hamilton Official Plan

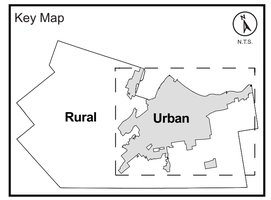
Lands to be redesignated from "Open Space" to "Agriculture"

(435 Carluke Road West, Ancaster)

Date:	Revised By:	Reference File No.:
June 3, 2021	MH/NB	OPA-R-28(A)



Key Map



Note: For Urban Land Use Designations, refer to Schedule E-1 of the Urban Hamilton Official Plan.

Legend

- Rural Settlement Areas

Rural Land Use Designations

- Agriculture
- Specialty Crop
- Rural
- Mineral Aggregate Resource Extraction Areas
- Open Space
- Utility

Other Features

- Urban Area
- John C. Munro Hamilton International Airport
- Niagara Escarpment
- Urban Boundary
- Municipal Boundary

Council Adoption: September 27, 2006
Ministerial Approval: December 24, 2008
Effective Date: March 7, 2012

Rural Hamilton Official Plan Schedule D
Rural Land Use Designations

Not To Scale

Date: Sept. 2019

Hamilton

PLANNING & ECONOMIC DEVELOPMENT DEPARTMENT

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Appendix B
APPROVED Amendment No. 28
to the Rural Hamilton Official Plan

Remove "Neighbourhood Park" identification

(435 Carluke Road West, Ancaster)

Date:	Revised By:	Reference File No.:
June 3, 2021	EM/NB	OPA-R-28(A)

Key Map

N.T.S.

Rural

Urban

Note: For Urban Parks Classification Designations, refer to Appendix A of the Urban Hamilton Official Plan.

CARLUKE RD

Town of Milton

Regional Municipality of Halton

City of Burlington

Wellington County

Township of Puslinch

Regional Municipality of Waterloo

Township of North Dumfries

Brant County

Haldimand County

Regional Municipality of Niagara

Township of West Lincoln

Town of Grimsby

Lake Ontario

Hamilton Harbour

Mountsberg Reservoir

Valens Reservoir

Christie Reserve

Dunmark Lake

Cootes Paradise

Lake Niapenco

Freelton

Strabane

Carlisle

Flamborough Centre

Concession 5E & Centre Rd

Millgrove

Kirkwall

Westover

Greensville

Rockton

Sheffield

Orkney

Copetown

Troy

Lynden

Jerseyville

Alberton

Tapleytown

Woodburn

Legend

- Rural Settlement Areas

Parks Classification

- Parkette
- General Open Space
- Natural Open Space
- City Wide
- Community
- Neighbourhood

Other Features

- Urban Area
- John C. Munro Hamilton International Airport
- Niagara Escarpment
- Urban Boundary
- Municipal Boundary

Council Adoption: September 27, 2006
Ministerial Approval: December 24, 2008
Effective Date: March 7, 2012

Rural Hamilton Official Plan
Appendix A
Parks Classification

Not To Scale

Date: Sept. 2019

Hamilton

PLANNING & ECONOMIC DEVELOPMENT DEPARTMENT

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Authority: Item 6, Planning Committee
Report 21-008 (PED20073)
CM: May 26, 2021
Ward: 12

Bill No. 101

CITY OF HAMILTON

BY-LAW NO. 21-

To Amend Zoning By-law No. 05-200 with respect to lands located at 435 Carluke Road West, Ancaster

AND WHEREAS this By-law conforms with the Rural Hamilton Official Plan upon the adoption of Rural Hamilton Official Plan Amendment No. 28;

NOW THEREFORE Council of the City of Hamilton amends Zoning By-law No. 05-200 as follows:

1. That Map RU188 of Schedule "A"- Zoning Maps, of Zoning By-law No. 05-200, be amended by changing the zoning from the Open Space (P4) Zone to the Agriculture (A1,743) Zone, for the lands identified in the Location Map attached as Schedule "A" to this By-law.

2. That Schedule C - Special Exceptions, of By-law No. 05-200 is amended by adding a special exception as follows:

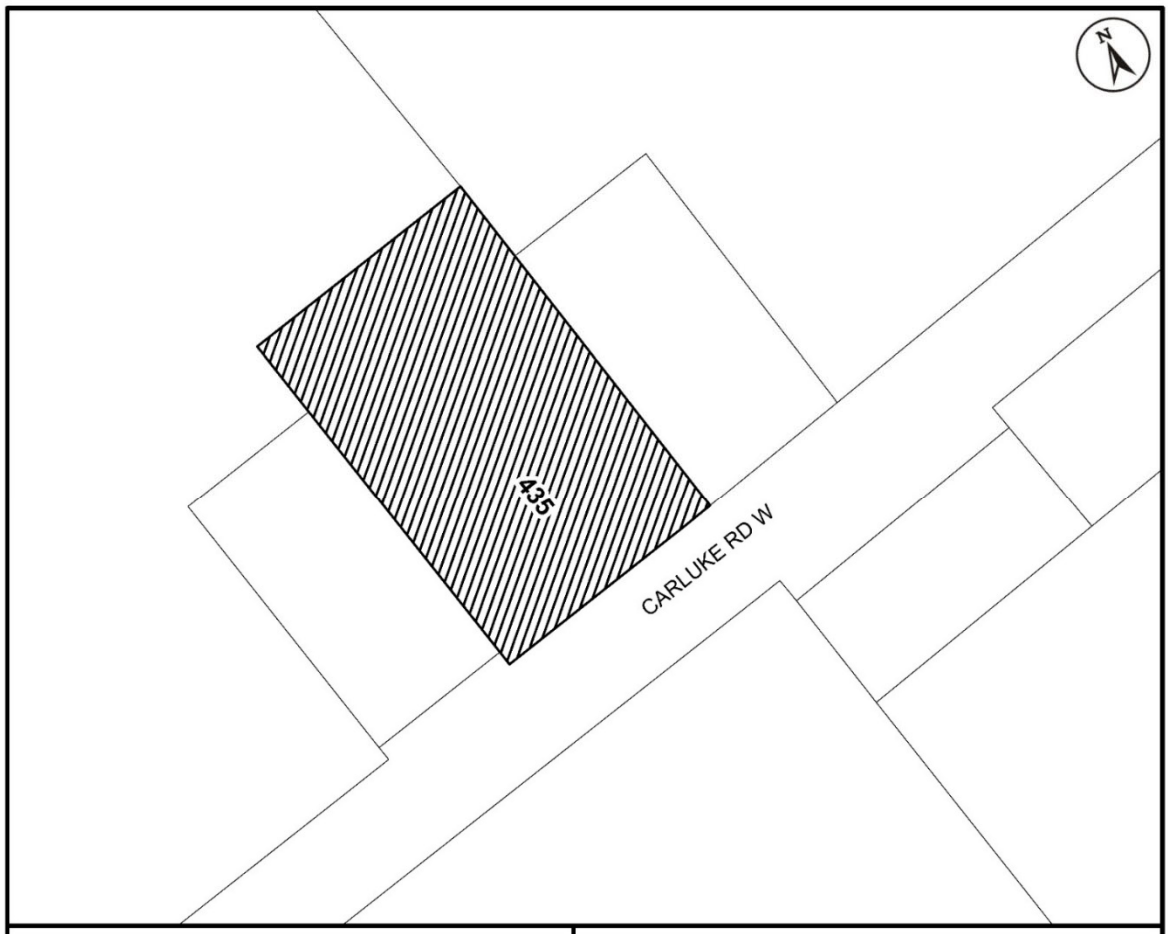
    743. Within the lands zoned Agriculture (A1) Zone, identified on Map RU188 of Schedule "A" – Zoning Maps and described as 435 Carluke Road West, the following special provisions shall apply:

        i) In addition to Subsection 12.1.3.3, residential uses shall be limited to the building existing at the date of the passing of the by-law (date).

PASSED this 9th day of June, 2021.

F. Eisenberger	A. Holland
Mayor	City Clerk

CI-20-C



This is Schedule "A" to By-law No. 21-

Passed the ..... day of ....., 2021

Mayor

Clerk

Schedule "A"

Map forming Part of
By-law No. 21-_____

to Amend By-law No. 05-200
Map 188

Scale: N.T.S	File Name/Number: CI-20-C
Date: April 21, 2021	Planner/Technician: MH/NB

PLANNING AND ECONOMIC DEVELOPMENT DEPARTMENT

Hamilton

Subject Property

435 Carluke Road West, Ancaster

Change in zoning from the Open Space (P4) Zone to the Agriculture (A1, 743) Zone

Authority: Item 6, Audit, Finance & Administration Committee Report: 21-009 ((FCS21048)
CM: June 9, 2021
Ward: City Wide

Bill No. 102

CITY OF HAMILTON
BY-LAW NO. 21-

Being a By-Law to Amend By-Law No. 19-142 "City of Hamilton Development Charges By-law, 2019"

WHEREAS the City of Hamilton (herein referred to as the "City") enacted By-law 19-142 pursuant to the *Development Charges Act, 1997*, S.O. 1997, c. 27, as amended (herein referred to as the "Act"), which Act authorizes the Council of the City of Hamilton (herein referred to as "Council") to pass By-laws for the imposition of development charges against land;

WHEREAS Council has determined that certain amendments should be made to the City of Hamilton Development Charges By-law, 2019 (By-law 19-142);

WHEREAS section 19 of the Act provides for amendments to be made to development charges By-laws;

WHEREAS the City, as required by section 10 of the Act, has undertaken and completed a development charge background study;

WHEREAS as required by section 11 of the Act, this By-law is being enacted within one year of the completion of the said development charge background study, titled "Development Charges Update Study, City of Hamilton" prepared by Watson & Associates Economists Ltd., dated March 5, 2021;

WHEREAS in advance of passing this By-law, Council has given notice and held a public meeting on April 22, 2021 in accordance with section 12 of the Act regarding its proposal for this development charges By-law; and,

WHEREAS Council, at its meeting of the Audit, Finance and Administration Committee on March 25, 2021, has adopted and approved the said background study and the development charges and policies recommended by the General Manager of the Finance and Corporate Services Department to be included in this By-law and determined that no further public meetings are required under section 12 of the Act.

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. Section 1 of By-law 19-142 is hereby amended by adding the following definitions in the appropriate alphabetical order and re-lettering the subsections in accordingly:

"Accessory Dwelling" means a self-contained Dwelling Unit that is subordinate in purpose to another Dwelling Unit upon the same Lot.

"Ancillary Residential Building" means an Accessory Dwelling that is detached from the Dwelling Unit which it is subordinate to and includes a Garden Suite and Laneway House.

"Class of Services" means a grouping of services combined to create a single service for the purposes of this By-law and as provided in section 7 of the Act.
"Hospice" means a building or portion of a mixed-use building designed and intended to provide palliative care and emotional support to the terminally ill in a home or homelike setting so that quality of life is maintained, and family members may be active participants in care.

"Institutional Development" means development of a building or structure intended for use:

(a) as a long-term care home within the meaning of subsection 2 (1) of the *Long-Term Care Homes Act,* 2007;

(b) as a retirement home within the meaning of subsection 2 (1) of the *Retirement Homes Act,* 2010;

(c) by any of the following post-secondary institutions for the objects of the institution:

(i) a university in Ontario that receives direct, regular, and ongoing operating funding from the Government of Ontario,

(ii) a college or university federated or affiliated with a university described in subsection 1(c)(i), or

(iii) an Indigenous Institute prescribed for the purposes of section 6 of the *Indigenous Institutes Act*, 2017;

(d) as a memorial home, clubhouse, or athletic grounds by an Ontario branch of the Royal Canadian Legion; or

(e) as a hospice to provide end of life care.

"Interest Rate" means the annual rate of interest calculated as per the City's D.C. Interest Policy (FPAP-DC-002), as may be revised from time to time.

"Non-profit Housing Development" means development of a building or structure intended for use as residential premises by,

(a) a corporation without share capital to which the Corporations Act applies, that is in good standing under that Act and whose primary object is to provide housing;

(b) a corporation without share capital to which the Canada Not-for-profit Corporations Act applies, that is in good standing under that Act and whose primary object is to provide housing; or

(c) a non-profit housing co-operative that is in good standing under the Co-operative Corporations Act, or any successor legislation.

"Rental Housing" means development of a building or structure with four or more dwelling units all of which are intended for use as rented residential premises;

"Zoning By-law" means Zoning By-laws Nos. 05-200, 87-57, 3581-86, 90-145-Z, 464, 6593, 3692-92 as amended and any subsequent City zoning by-law as applicable based on development type and development location within the City.

2. Sections 10 and 11 of By-law 19-142 are hereby deleted and replaced with the following:

Designation of Services/Class of Services

10. All Development of land within the area to which this By-law applies will increase the need for Services/Class of Services.

11. The Development Charges applicable to a Development as determined pursuant to this By-law shall apply without regard to the Services/Class of Services required or used by an individual Development.

3. Section 19 of By-law 19-142 is hereby deleted and replaced with the following:

Exemptions for Intensification of Residential Use

19.

(a) No Development Charge shall be imposed where the only effect of an action referred to in section 12 of this By-law is to:

(i) permit the enlargement to an existing Dwelling Unit;

(ii) permit the creation of Accessory Dwellings to an existing Residential Development, subject to the following restrictions:

Item	Name of Class of Existing Residential Development	Description of Class of Existing Residential Development	Maximum Number of Additional Dwelling Units	Restrictions
1.	Existing Single Detached Dwellings	Existing Residential Developments, each of which contains a single Dwelling Unit, that are not attached to other Buildings.	Two	The total Gross Floor Area of the additional Dwelling Unit or units must be less than or equal to the Gross Floor Area of the Dwelling Unit already in the Building.
2.	Existing Semi-detached Dwelling Units or Townhouse Dwelling Units	Existing Residential Developments, each of which contains a single Dwelling Unit, that have one or two vertical walls, but no other parts, attached to other Buildings.	Two	The total Gross Floor Area of the additional Dwelling Unit or units must be less than or equal to the Gross Floor Area of the Dwelling Unit already in the Building.
3.	Existing Rental Housing	Existing Rental Housing, each of which contains four or more Dwelling Units.	Greater of one and 1% of the existing Dwelling Units in the Building	None

4.	Other existing Residential Developments	An existing Residential Development not in another class of Residential Development described in this table.	One	The total Gross Floor Area of the additional Dwelling Unit or units must be less than or equal to the Gross Floor Area of the smallest Dwelling Unit already in the Building.

(iii) permit the creation of an Accessory Dwelling in or ancillary to a proposed new Residential Development, subject to the following restrictions:

Item	Name of Class of Proposed New Residential Developments	Description of Class of Proposed New Residential Developments	Restrictions
1.	Proposed new Single Detached Dwellings	Proposed new Building containing one Dwelling Unit that would not be attached to other Buildings and that are permitted to contain a second Dwelling Unit, that being either of the two Dwelling Units, if the units have the same Gross Floor Area, or the smaller of the Dwelling Units.	The proposed new Single Detached Dwelling must only contain two Dwelling Units. The proposed new Single Detached Dwelling must be located on a parcel of land on which no other Single Detached Dwelling, Semi-detached Dwelling or Townhouse Dwelling would be located.

2.	Proposed new Semi-detached Dwellings or Townhouse Dwellings	Proposed new Residential Developments that would have one or two vertical walls, but no other parts, attached to other Buildings and each Dwelling Unit is permitted to contain a second Dwelling Unit, that being either of the two Dwelling Units, if the units have the same Gross Floor Area, or the smaller of the Dwelling Units.	Each Dwelling Unit in the proposed new Semi-detached Dwelling or Townhouse Dwelling must only contain two Dwelling Units. The proposed new Semi-detached Dwelling or Townhouse Dwelling must be located on a parcel of land on which no other Single Detached Dwelling, Semi-detached Dwelling or Townhouse Dwelling would be located.
3.	Proposed new Ancillary Residential Building to a proposed new Single Detached Dwelling, Semi-detached Dwelling or Townhouse Dwelling	Proposed new Ancillary Residential Building to a proposed new Single Detached Dwelling, Semi-detached Dwelling or Townhouse Dwelling and that are permitted to contain a single Dwelling Unit.	The proposed new Single Detached Dwelling, Semi-detached Dwelling or Townhouse Dwelling, to which the proposed new Ancillary Residential Building would be ancillary, must only contain one Dwelling Unit. The Gross Floor Area of the Dwelling Unit in the proposed new Ancillary Residential Building must be equal to or less than the Gross Floor Area of the Single Detached Dwelling, Semi-detached Dwelling or Townhouse Dwelling to which the proposed new Ancillary Residential Building is ancillary.

(b) The exemption in subsection 19(a) shall only apply to the first instance of intensification in an existing or new dwelling.

(c) Subject to the Gross Floor Area restrictions in subsection 19(a) and subject to subsection 19(b), any exemption under subsection 19(a) above shall apply to the smallest Dwelling Unit, as determined by applicable rates under this By-law.

4. Section 25 subsections (d) and (e) of By-law 19-142 are hereby deleted, with the remaining subsections being re-lettered accordingly.

5. Section 27 of By-law 19-142 is hereby deleted and by replaced with the following:

   Notwithstanding any other provision of this By-law, the Development Charges payable under this By-law respecting all Development, other than Class A Office Development, within the boundaries of the Downtown CIPA shall be reduced:

   (a) by the percentages;

   (b) for the time periods;

   (c) for the types of applications; and;

   (d) as of the date, identified in the following Table 2 below:

Table 2: Downtown Hamilton CIPA Partial Exemption

	Date of complete application of a Site Plan or a Site-specific Zoning Amendment (in accordance with subsection 41(b) and (c))	Date of building permit issuance (if application of a Site Plan or a Site-specific Zoning Amendment not applicable, made prior to Jan 1, 2020, or if more than two years have passed since approval of said application)
Date	Percentage of reduction (%)	Percentage of reduction (%)
June 13, 2019 to July 5, 2019	70	70
July 6, 2019 to July 5, 2020	60	60
July 6, 2020 to July 5, 2021	50	50
July 6, 2021 to July 5, 2022	40	40

July 6, 2022 to July 5, 2023	40	40
July 6, 2023 to June 12, 2024	40	40

The development charges payable under this By-law respecting all Development, other than Class A Office Development, within the boundaries of the Downtown CIPA shall be reduced after all other credits are applied, under this By-law for only the portion of the Building that is within the height restrictions as shown in Schedule "F." Any Development in excess of the height restrictions as shown in Schedule "F" shall be subject to the full calculated Development Charge

Schedule "F" shall not be amended by any decision by the Local Planning Appeal Tribunal relating to the City's Zoning By-law Amendment 18-114; or by any amendments, including site specific or area specific, to the City's Zoning By-law 05-200 either through Local Planning Appeal Tribunal decisions or by Council.

(e) for each year this By-law is in effect an additional exemption will apply as follows:

(i) a dollar for dollar exemption on any remaining Development Charges payable equal to any amount of contribution by the payer of the Development Charges to the Downtown Public Art Reserve in an amount not to exceed ten percent of the Development Charges otherwise payable on the height that is within the height restrictions as shown as Schedule "F"; and

(ii) the amount of all exemption provided in Subsection 27(b) shall be limited to $250,000 annually and any single exemption shall be reduced by the amount it would exceed the $250,000 limit.

6. Section 33 of By-law 19-142 is hereby deleted and replaced with the following:

33.

(a) Subject to the provisions of section 34, Development Charges are payable at the time a building permit is issued with respect to a Development.

(b) Despite subsection 33(a), a Development Charge in respect of any part of a Development that consists of a type of Development set out in section 26.1(2) of the Act, is payable in accordance with section 26.1 of the Act, including interest as per the City’s D.C. Interest Policy, FPAP-DC-002, as may be revised from time to time, for so long as section 26.1 of the Act remains in force and effect.

7. Section 39 of By-law 19-142 is hereby deleted and replaced with the following:

39. The General Manager of Finance and Corporate Services shall, in each year prior to June 30 thereof, commencing June 30, 2020 for the 2019 year, furnish to Council a statement in respect of the reserve funds required by the Act for the Services/Classes of Services to which this By-law relates, for the prior year, containing the information set out in section 43 of the Act and section 12 of the Regulation.

8. Section 41 of By-law 19-142 is hereby deleted and replaced with the following:

41.

(a) The Development Charge rates payable are the rates in effect on the date a complete building permit application is received and accepted by the City’s Chief Building Official, provided that the permit is issued within 6 months of the effective date of the first Development Charge rate increase following said building permit application. Where the said building permit is lawfully revoked by the Chief Building Official on or after the date of the said Development Charge rate increase, any subsequent application for a building permit on the lands or site will be subject to the Development Charge rate in effect on the date of building permit issuance. For the purposes of this section, a “complete application” shall mean an application with all information and plans required as per the Ontario Building Code.

(b) Nothwithstanding subsection 41(a), the total amount of a Development Charge is the amount of the Development Charge that would be determined under the by-law on,

(i) the day an application for an approval of Development in a site plan control area under subsection 41 (4) of the Planning Act was made in respect of the Development that is the subject of the Development Charge; or

(i) if subsection 41(b)(i) does not apply, the day an application for an amendment to a by-law passed under section 34 of the Planning Act was made in respect of the Development that is the subject of the Development Charge;

(iii) If a Development was the subject of more than one application referred to in subsections 41(1)(b) (i) or (ii), the later one is deemed to be the applicable application for the purposes of this section.

(c) interest on the total amount of Development Charge determined pursuant to subsection 41(b) shall be charged to the date of building permit issuance as per the City's Development Charge Interest Policy (FPAP-DC-002), as may be revised from time to time.

(d) subsection 41(b) shall not apply if more than two years has passed since the approval of the related application

9. Schedule "A" of By-law 19-142 is hereby deleted and replaced with Schedule "A" attached to this By-law.

10. The City Clerk is hereby authorized and directed to consolidate this and any other duly enacted amendments to By-law 19-142 into the main body of the said By-law, and to make any necessary and incidental changes to numbering and nomenclature thereof arising from the said consolidation.

11. This By-law shall come into force and take effect at 12.01 a.m. on July 6, 2021.

12. Except as amended by this By-law, all provisions of By-law 19-142, as amended, are and shall remain in full force and effect.

PASSED this 9th day of June , 2021.

F. Eisenberger
Mayor

A. Holland
City Clerk

SCHEDULE A, TO BY-LAW 19-142
MUNICIPAL WIDE DEVELOPMENT CHARGES – EFFECTIVE JULY 6, 2021
(2019 $)

Table A2:

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single-Detached Dwelling & Semi-Detached Dwelling (per dwelling unit)	Townhouses & Other Multiple Unit Dwellings (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes 2-Bedrooms+ (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes Bachelor & 1-Bedrooms+ (per dwelling unit)	Residential Facility Dwelling & Lodging House & Garden Suite (per bedroom)	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Classes:						
Services Related to a Highway	10,769	7,708	6,306	4,314	3,479	8.05
Police Services	524	375	307	210	169	0.26
Fire Protection Services	462	331	271	185	149	0.23
Transit Services	1,917	1,372	1,123	768	619	0.98
Public Works	805	576	471	322	260	0.41
Ambualnce Services	148	106	87	59	48	0.02
Waste Diversion	730	522	427	292	236	0.13
Parks and Recreation Services	7,528	5,388	4,408	3,016	2,432	0.35
Library Services	1,145	819	671	459	370	1.00
Long Term Care	182	130	107	73	59	0.02
Public Health	3	2	2	1	1	-
Child Care and Early Years	15	11	9	6	5	-
Housing Services	752	538	440	301	243	-
Provincial Offences Act	40	29	23	16	13	0.02
Growth Studies	404	289	237	162	131	0.21
Total Municipal Wide Services/Classes	**25,424**	**18,196**	**14,889**	**10,184**	**8,214**	**11.67**

SCHEDULE A, TO BY-LAW 19-142
MUNICIPAL WIDE DEVELOPMENT CHARGES
EFFECTIVE JULY 6, 2021 TO SEPTEMBER 18, 2022
(2019 $)

Table A3:

Service/Class of Service	RESIDENTIAL					NON-RESIDENTIAL
	Single-Detached Dwelling & Semi-Detached Dwelling (per dwelling unit)	Townhouses & Other Multiple Unit Dwellings (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes 2-Bedrooms+ (per dwelling unit)	Apartments & Stacked Townhouses & Mobile Homes Bachelor & 1-Bedrooms+ (per dwelling unit)	Residential Facility Dwelling & Lodging House & Garden Suite (per bedroom)	(per sq.ft. of Gross Floor Area)
Municipal Wide Services/Classes:						
Municipal Parking	559	400	327	224	181	0.30
Airport Lands	471	337	276	189	152	0.24
Total Municipal Wide Services/Classes	**1,030**	**737**	**603**	**413**	**333**	**0.54**

Authority: Item 31, Economic Development and Planning Committee
Report 06-005
CM: April 12, 2006
Ward: 10

Bill No. 103

CITY OF HAMILTON

BY-LAW NO. 21-

To Amend Zoning By-law No. 05-200, respecting lands located at 967-977 Arvin Avenue, Stoney Creek

WHEREAS the first stage of the new Zoning By-law, being By-law No. 05-200, came into force on the 25th day of May, 2005; and,

WHEREAS the Council of the City of Hamilton, in adopting Section 31 of Report 06-005 of the Planning and Economic Development Committee at its meeting held on the 12th day of April, 2006, recommended that the Director of Development and Real Estate be authorized to give notice and prepare by-laws for presentation to Council, to remove the "H" Holding provision from By-laws where the conditions have been met.

AND WHEREAS the conditions of Holding Provision 26 for the lands located at 967 Arvin Avenue, Stoney Creek have been satisfied;

NOW THEREFORE the Council of the City of Hamilton amends Zoning By-law No. 05-200 as follows:

1. That Map 1256 of Schedule "A" – Zoning Maps is amended by changing the zoning from the General Business Park (M2, 405, H26) Zone to the General Business Park (M2, 405) Zone for the lands identified in the Location Map attached as Schedule "A" to this By-law.

2. That Schedule "D" – Holding Provisions is amended by deleting Holding Provision H26 from the lands identified in the Location Map attached as Schedule "A" to this By-law.

3. That the Clerk is hereby authorized and directed to proceed with the giving of notice of the passing of this By-law in accordance with the *Planning Act*.

PASSED this 9th day of June, 2021.

F. Eisenberger Mayor	A. Holland City Clerk

ZAH-20-023

This is Schedule "A" to By-law No. 21-

Passed the ..... day of ....., 2021

Mayor

Clerk

Schedule "A"

Map forming Part of By-law No. 21-_____

to Amend By-law No. 05-200
Map 1256

Scale: N.T.S	File Name/Number: ZAH-20-023
Date: January 11, 2021	Planner/Technician: MS/VS

PLANNING AND ECONOMIC DEVELOPMENT DEPARTMENT

Hamilton

Subject Property

967 - 977 Arvin Avenue, Stoney Creek

Change in Zoning from General Business Park (M2, 405, H26) Zone to General Business Park (M2, 405) Zone

Authority: Item 12, Committee of the Whole
Report 01-033 (PD01184)
CM: October 16, 2001
Ward: 14

Bill No. 104

CITY OF HAMILTON

BY-LAW NO. 21-104

Respecting Removal of Part Lot Control, Lands located at 20 Southridge Court, 533 and 555 Sanatorium Road, Hamilton, Part of Block 1, Registered Plan No. 62M-1191

WHEREAS the sub-section 50(5) of the *Planning Act*, (R.S.O. 1990, Chapter P.13, as amended, establishes part-lot control on land within registered plans of subdivision;

AND WHEREAS sub-section 50(7) of the *Planning Act*, provides as follows:

"(7) **Designation of lands not subject to part lot control. --** Despite subsection (5), the council of a local municipality may by by-law provide that subsection (5) does not apply to land that is within such registered plan or plans of subdivision or parts of them as are designated in the by-law."

AND WHEREAS the Council of the City of Hamilton is desirous of enacting such a by-law with respect to the lands hereinafter described;

NOW THEREFORE the Council of the City of Hamilton enacts as follows:

1. Sub-section 5 of Section 50 of the *Planning Act*, for the purpose of creating 211 lots for street townhouse dwellings (Parts 1 – 366, 393, 416, 420, and 422 inclusive), maintenance and access easements (Parts 278– 366 inclusive), storm servicing easements (Parts 212 – 253, 296 – 309, 416, 420, and 422 inclusive), sanitary sewer easements (Parts 254 – 277 and 393 inclusive), one lot for a multiple dwelling (Part 367), and a condominium common element including road network, visitor parking, amenities and easements (Parts 368 – 392, 394 – 415 and 417-419 inclusive) as shown on deposited Reference Plan 62R-21683, shall not apply to the portion of the registered plan of subdivision that is designated as follows, namely:

   Part of Block 1, Registered Plan No. 62M-1191, in the City of Hamilton

2. This by-law shall be registered on title to the said designated land and shall come into force and effect on the date of such registration.

3. This by-law shall expire and cease to be of any force or effect on the 9th day of June, 2023.

PASSED this 9th day of June.

F. Eisenberger
Mayor

A. Holland
City Clerk

PLC-20-012

Bill No. 105

CITY OF HAMILTON

BY-LAW NO. 21-

To Confirm the Proceedings of City Council at its meeting held on June 9th, 2021.

THE COUNCIL OF THE
CITY OF HAMILTON
ENACTS AS FOLLOWS:

1. The Action of City Council at its meeting held on the 9th day of June 2021, in respect of each recommendation contained in

   Public Works Committee Report 21-008 – May 31, 2021,
   Planning Committee Report 21-009 – June 1, 2021,
   General Issues Committee Report 21-012 – June 2, 2021,
   Audit, Finance & Administration Committee Report 21-009 – June 3, 2021,
   and,
   Emergency & Community Services Committee Report 21-006 – June 3, 2021

   considered by City of Hamilton Council at the said meeting, and in respect of each motion, resolution and other action passed and taken by the City Council at its said meeting is hereby adopted, ratified and confirmed.

2. The Mayor of the City of Hamilton and the proper officials of the City of Hamilton are hereby authorized and directed to do all things necessary to give effect to the said action or to obtain approvals where required, and except where otherwise provided, the Mayor and the City Clerk are hereby directed to execute all documents necessary in that behalf, and the City Clerk is hereby authorized and directed to affix the Corporate Seal of the Corporation to all such documents.

PASSED this 26th day of May, 2021.

F. Eisenberger
Mayor

A. Holland
City Clerk