ADDENDUM TO CITY OF HAMILTON

2011 DEVELOPMENT CHARGE BACKGROUND STUDY FOR WATER, WASTEWATER, STORM WATER AND GO TRANSIT SERVICES

FOR PUBLIC CIRCULATION

JUNE 21, 2011

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Planning for growth

ADDENDUM REPORT

1. BACKGROUND

Commensurate with the provisions of the Development Charges Act, 1997, the City undertook, a Background Study in May 2011, for water, wastewater, stormwater and GO Transit services. The public meeting was subsequently held on June 9, 2011 and the anticipated date for by-law adoption was June 23, 2011. Based upon submissions received prior to the public meeting and, as a result of presentations made at the public meeting, staff indicated at the end of the public meeting that these issues would be discussed in detail and potential further meetings with the development community may be held. As well, it was noted at the public meeting that these matters may have the effect of increasing the proposed charges.

The purpose of this Addendum Report is to provide refinements to the May 20, 2011 Background Study. The refinements relate to the capital works for Water, Wastewater and Stormwater Services and correspondingly are discussed herein. The proposed changes will require adjustments to the draft By-laws presented with the Background Study as well as to the Local Service Policy previously provided. These changes will form part of the presentation being made to Committee at the June 23, 2011 meeting.

2. DISCUSSION

Based on discussions with the stakeholders, refinements to the project listings for Stormwater Management, Water Services and Wastewater Services have been made.

The changes required to the Background Study Update are as follows:

- Stormwater Management – additional costs and projects provided for stormwater works, studies, growth related debt, recoveries and stormwater credits. These adjustments provide for an additional gross cost of $29.7 million and a net growth related amount of $28.3 million. The adjusted total growth related cost for this service is $293,454,960.
- Water Services – Amendments have been made to the city-wide water distribution systems to reflect changes resulting from discussions with the development stakeholders (note that the corresponding growth related debt has also been refined to

reflect the changes in the city wide systems as well). These changes increase the total gross costs by $8,109,915. This amount is 100% recoverable from development charges. The DC Calculations are based upon an updated total net DC recoverable costs of $ 248,020,287.

- Wastewater Services – Amend the amount of funding to be recovered from development charges in the Waterdown and Lower Stoney Creek areas for linear works. The growth related debt to be recovered has also been refined to reflect the changes in costs in the Waterdown and Lower Stoney Creek areas. The changes increase the gross total by $3,015,206 with an increase in the net cost recoverable from DCs of $1,420,273. These changes increase the total amount funded from development charges to $654,735,428.

The above changes have been incorporated into the calculations. The following summarizes the charges presented in the May 20, 2011 Background Study and the charges under this addendum based on a residential single detached unit and per square foot for non-residential.

Service	2011 DC Background Study (May 20, 2011)		2011 DC Addendum (June 21, 2011)		Difference	
	Residential Single & Semi Detached	Non-Residential (per sq.ft. of Gross Floor Area)	Residential Single & Semi Detached	Non-Residential (per sq.ft. of Gross Floor	Residential Single & Semi Detached	Non-Residential (per sq.ft. of Gross Floor Area)
Service Componet						
Urban Area Charges:						
Water Services	3,186	1.88	3,294	1.94	108	0.06
Wastewater Services	8,674	5.11	8,693	5.12	19	0.01
Stormwater Drainage and Control Services	4,669	0.57	5,123	0.69	454	0.12
Total Urban Area Charges	**16,529**	**7.56**	**17,110**	**7.75**	**581**	**0.19**
Municipal Wide Charges:						
Services Related to a Highway	5,950	6.37	5,950	6.37	-	-
Airport	80	0.09	80	0.09	-	-
Transit	218	0.24	218	0.24	-	-
Fire Protection Services	289	0.19	289	0.19	-	-
Police Services	252	0.17	252	0.17	-	-
Outdoor Recreation Services	800	0.05	800	0.05	-	-
Indoor Recreation Services	1,030	0.06	1,030	0.06	-	-
Library Services	367	0.02	367	0.02	-	-
Administration	278	0.28	278	0.28	-	-
Ambulance	16	0.01	16	0.01	-	-
Homes for the Aged	4	-	4	-	-	-
Health Services	38	-	38	-	-	-
Social & Child Care Services	46	0.01	46	0.01	-	-
Social Housing	455	-	455	-	-	-
Total Municipal Wide Charges	**9,823**	**7.49**	**9,823**	**7.49**	**-**	**-**
GO Transit (City Wide)	215	-	215	-	-	-
Total Urban Area Charges	**26,567**	**15.05**	**27,148**	**15.24**	**581**	**0.19**

Services Recalculated within the 2011 Background Study

Note: Special Area Charges are in addition to the rates presented above

The Proposed By-laws have been amended to include the changes described above.

Based upon the above, the following revisions are made to the pages within the May 20, 2011 Background Study (new pages are attached with this report):

- Page (iii) – textual changes to reflect revisions to the proposed development charges and to the costs to be recovered over the life of the by-laws;
- Page (v) and (vi) – development charge summaries updated to reflect proposed DC's;
- Page 1-3 – textual changes to reflect the inclusion of the "addendum report" in Figure 1-1, correction to dates for Council adoption of Background Study and By-laws, and change to Stakeholders Meeting No. 3;
- Pages 5-3 & 5-4 – textual changes to reflect revisions to Stormwater Management for the additional works identified and update of summary table;
- Pages 5-5 to 5-7 – update to capital estimates for Stormwater Management;
- Pages 5-8 & 5-9 - textual changes to reflect revisions to the total cost and costs attributable to development charges for Water and Wastewater services and update of summary table;
- Pages 5-10 & 5-11 - update to capital estimates for Water and Wastewater Services;
- Tables 6-1, 6-2, & 6-3 – recalculation of the charges to reflect refinements to Water, Wastewater and Stormwater Management;
- Table 6-4 – recalculation of the gross expenditure and sources of revenue summary to reflect refinements to Water, Wastewater and Stormwater Management Services;
- Appendix B – Table B-1 – revised to identify the refinements to Water, Wastewater and Stormwater Services;
- Appendix C – revised Local Service Policy for Water, Wastewater and Stormwater Services;
- Appendix E – revised pages to Appendix E, Water and Wastewater Servicing Needs – AECOM, including revised project listings for City Wide water distribution, Waterdown & Lower Stoney Creek wastewater collection systems, revised maps and revised textural refinements; and
- Appendix F – revised pages to Appendix F, Stormwater Management Servicing Needs – AMEC, including revised project listings, maps and textural refinements.

3. PROCESS FOR THE ADOPTION OF THE DEVELOPMENT CHARGES BY-LAWS

The changes herein form the basis for the by-laws to be presented to Committee on June 23, 2011. If Council is subsequently satisfied with the above changes to the Background Study, and based on the public submissions made at that meeting, this addendum report and the proposed by-laws must be considered and approved by Council.

AMENDED PAGES

8. This report has undertaken a recalculation of the development charge based on future identified needs (presented in Schedule ES-1 for Residential and Non-Residential) on a City-wide basis for GO Transit services. This report has also undertaken a recalculation of the urban area development charge for water, wastewater and stormwater services. The calculated city-wide development charge for GO Transit service for a single-detached unit charge is $215. The calculated urban area charges for water, wastewater and storm water drainage and control services for a single-detached unit charge is $17,110. The calculated non-residential development charges for urban area water, wastewater and stormwater services are $7.75 per ft² of gross floor area. These rates will be set before Council for their consideration. Table ES-2 provides for the calculated full DC charges, including the recalculation of the development charges for water, wastewater, stormwater and GO Transit.

9. The *Development Charges Act* requires a summary to be provided relative to the gross capital costs and the net costs to be recovered over the life of the by-law. This calculation is provided by service and is presented in Table 6-4. A summary of these costs is provided below:

Total gross expenditures planned over the next five years	$	572,365,910
Less:		
Benefit to existing development	$	70,164,897
Post planning period benefit	$	235,000
Mandatory 10% deduction for GO Transit services	$	238,783
Grants, subsidies and other contributions	$	76,499,153
Net Costs to be recovered from development charges	**$**	**425,228,077**

Hence, $147.37 million (or an annual amount of $29.47 million) will need to be contributed from taxes and rates, or other sources and $235,000 will be included in subsequent DC Study updates.

Based on the above capital listing, the City plans to spend $572.37 million over the next five years of which $425.23 million (74%) is recoverable from development charges. Of this net amount, $304.37 million is recoverable from residential development and $120.86 million from non-residential development. It is noted also that any exemptions or reductions in the charges would reduce this recovery further.

10. Considerations by Council – The background update study represents the service needs arising from residential and non-residential growth over the forecast periods. Services related to water, wastewater and stormwater are calculated based on a 21 year forecast. GO Transit service development charges are calculated based on a 10 year forecast. Council will consider the findings and recommendations provided for in the report and, in conjunction with public input, approve such policies and rates it deems appropriate.

TABLE ES-1

SCHEDULE OF DEVELOPMENT CHARGES

Service	RESIDENTIAL					NON-RESIDENTIAL
	Single and Semi-Detached Dwelling	Apartments - 2 Bedrooms +	Apartments - Bachelor and 1 Bedroom	Other Multiples	Residential Facility Dwelling	(per ft² of Gross Floor Area)
Municipal Wide Services:						
GO Transit	215	133	89	154	70	0.00
Total Municipal Wide Services	**215**	**133**	**89**	**154**	**70**	**0.00**
Urban Services						
Stormwater Drainage and Control Services	5,123	3,174	2,116	3,672	1,662	0.69
Wastewater Services	8,693	5,385	3,590	6,231	2,821	5.12
Water Services	3,294	2,040	1,360	2,361	1,069	1.94
Total Urban Services	**17,110**	**10,599**	**7,066**	**12,264**	**5,552**	**7.75**

TABLE ES-2

CITY OF HAMILTON

2011 CALCULATED DEVELOPMENT CHARGES

Service	Residential					Non-Residential (per ft².)
	Single & Semi Detached	Multiples	Apartments with >= 2 Bedrooms	Apartments with < 2 Bedrooms	Residential Facility Dwelling (per bedroom)	
Service Componet						
Urban Area Charges:						
Water Services	3,294	2,040	1,360	2,361	1,069	1.94
Wastewater Services	8,693	5,385	3,590	6,231	2,821	5.12
Stormwater Drainage and Control Services	5,123	3,174	2,116	3,672	1,662	0.69
Total Urban Area Charges	**17,110**	**10,599**	**7,066**	**12,264**	**5,552**	**7.75**
Municipal Wide Charges:						
Services Related to a Highway	5,950	4,264	3,650	2,440	1,755	6.37
Airport	80	78	68	45	32	0.09
Transit	218	134	116	77	56	0.24
Fire Protection Services	289	207	178	119	85	0.19
Police Services	252	181	155	103	75	0.17
Outdoor Recreation Services	800	574	491	329	236	0.05
Indoor Recreation Services	1,030	739	632	423	304	0.06
Library Services	367	263	225	150	108	0.02
Administration	278	199	171	114	81	0.28
Ambulance	16	11	10	7	5	0.01
Homes for the Aged	4	3	2	2	1	-
Health Services	38	27	24	16	12	-
Social & Child Care Services	46	33	28	19	14	0.01
Social Housing	455	327	280	186	134	-
Total Municipal Wide Charges	**9,823**	**7,040**	**6,030**	**4,030**	**2,898**	**7.49**
GO Transit (City Wide)	215	133	89	154	70	-
Total Urban Area Charges	**27,148**	**17,772**	**13,185**	**16,448**	**8,520**	**15.24**

Services Recalculated within the 2011 Background Study

Note: Special Area Charges are in addition to the rates presented above

(vi)

FIGURE 1-1
SCHEDULE OF KEY DEVELOPMENT CHARGE PROCESS DATES FOR THE CITY OF HAMILTON

1. Data collection	2010 – Mid 2011
2. City Staff/Consultant Team Review	January – March, 2011
3. Stakeholders Committee Meeting No. 1 – Water, Wastewater & Stormwater DC	April 18, 2011
4. Preparation of Draft Study	May, 2011
5. Review of draft study with Staff	May, 2011
6. Stakeholders Committee Meeting No. 2 – Water, Wastewater & Stormwater DC	May 13, 2011
7. Public Meeting Ad placed in newspaper(s)	May 19, 2011 & May 20, 2011
8. Background Study and proposed by-law available to public	May 20, 2011
9. Public meeting of Council	June 9, 2011
10. Deadline for comments and submissions from the public	June 9, 2011
11. Discussions with Stakeholders	June 10, 2011 to June 17, 2011
12. Addendum No. 1 to DC Background Study	June 21, 2011
13. Council considers adoption of Background Study and passage of new by-law and amendment of current by-law (for stormwater only)	June 23, 2011
14. Effective Date of DC By-law passage	July 6, 2011
15. Newspaper notice given of by-law passage	By 20 days after passage
16. Last day for by-law appeal	40 days after passage
17. City makes available pamphlet (where by-law not appealed)	By 60 days after inforce date

5.3 Service Levels and Twenty One-Year Capital Costs for City DC Calculation

This section evaluates the development-related capital requirements for those services with twenty one year capital costs.

5.3.1 Stormwater Services

AMEC Earth & Environmental (formerly Philips Engineering) undertook an assessment of the needs for stormwater management within the serviced areas of the City. Appendix F provides the detailed assessment and allocation of works between existing benefit and growth. In total, AMEC has identified $496.63 million in works required. Of this amount, $22.36 million has been identified as benefiting existing development within the City, $218.03 million identified as a direct developer contribution, leaving a net amount of $256.24 attributable to growth over the 21 year forecast period.

In addition to the works identified by AMEC, adjustments have been made to recognize outstanding debt obligations, the balance in the existing reserve fund, credits and agreement obligations (including best efforts clauses against works preformed by developers prior to this DC calculation), provisions for the residential portion of non-residential ponds/non-residential portion of residential ponds and growth related stormwater studies required. These total $43.51 million of which $37.23 million is attributable to growth over the forecast period. Therefore, the total to be included in the DC calculation for all of the above is $293,454,960.

The following is a summary of the gross and net DC recoverable costs based on the AMEC assessment and all other adjustments:

Item	Gross Estimated Cost	Less Non-DC Eligible Growth Cost	DC Eligible Growth Cost
Stormwater Works Identified by AMEC (Appendix F)			
Category A Watercourses	15,439,710	3,745,430	11,694,279
Category B Off-Site Erosion	15,831,450	10,092,999	5,738,451
Category C SWM	254,782,576	114,396,923	140,385,653
Category D Sewer Oversizing	11,975,630	-	11,975,630
Category E Culverts/Bridges	15,450,000	-	15,450,000
GRIDS SWM	173,613,284	112,154,266	61,459,018
GRIDS Watercourses	9,532,974	-	9,532,974
Sub-Total Works Identified by AMEC	**496,625,623**	**240,389,618**	**256,236,005**
Other Works, Credits & Adjustments:			
Provision for Residential Portion of Non-Residential Ponds	580,612	-	580,612
Provision for Non-Residential Portion of Residential Ponds	(841,960)	-	(841,960)
Stormwater Studies	12,086,000	1,230,000	10,856,000
Provision for Best Efforts Agreeemnts	952,693	-	952,693
Provision for Stormwater Credits	11,393,864	-	11,393,864
Existing Growth Related Debt	197,037	-	197,037
New Growth Related Financing (Discounted)	19,145,627	-	19,145,627
Reserve Fund Adjustment	-	5,064,918	(5,064,918)
Sub-Total Other Works, Credits & Adjustments	**43,513,873**	**6,294,918**	**37,218,954**
Total	**540,139,496**	**246,684,536**	**293,454,960**

For Stormwater Facilities (only), a new policy has been recommended which would require the non-residential facilities be installed directly by the non-residential development. This would result in the allocation between residential and non-residential development for stormwater ponds to be 100%/0% as the non-residential ponds will be considered a local service under the City's policy (see Appendix C). For all other stormwater works the allocation between residential and non-residential development is 58%/42% based on the benefiting lands associated with the stormwater management works.

INFRASTRUCTURE COSTS COVERED IN THE DC CALCULATION

City of Hamilton
Service: Stormwater Works & Studies (excluding Facilities)

Prj.No	Increased Service Needs Attributable to Anticipated Development 2011-Urban Build Out	Timing (year)	Gross Capital Cost Estimate	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Total		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 58%	Non-Residential Share 42%
1	Open Watercourses - Erosion Control and Channel Systems Improvements	2011-2015	392,626	0		392,826	0		392,826	229,018	163,808
2	Open Watercourses - Erosion Control and Channel Systems Improvements	2016-2020	278,600	0		278,600	139,300		139,300	81,212	58,088
3	Open Watercourses - Erosion Control and Channel Systems Improvements	2021-2031	14,768,284	0		14,768,284	3,606,130		11,162,153	6,507,557	4,654,597
4	Off Site Erosion Works	2011-2031	15,831,450	0		15,831,450	10,092,999		5,738,451	3,345,528	2,392,923
5	Oversizing of trunk sewers and culverts	2011-2015	4,328,376	0		4,328,376	0		4,328,376	2,523,451	1,804,925
6	Oversizing of trunk sewers and culverts	2016-2020	7,647,254	0		7,647,254	0		7,647,254	4,458,363	3,188,890
7	Culverts and Bridges not previously identified	2011-2031	15,450,000	0		15,450,000	0		15,450,000	9,007,379	6,442,621
8	GRIDS Related Water courses	2016-2031	9,532,974	0		9,532,974	0		9,532,974	5,557,742	3,975,232
9	Reserve Fund Adjustment		0	0		(5,064,918)	0		(5,064,918)	(2,952,857)	(2,112,061)
	Stormwater Studies:										
10	Upper Davis Creek Subwatershed Study	2011	200,000	0		200,000	0		200,000	116,600	83,400
11	Upper Ottawa Subwatershed Study	2011	100,000	0		100,000	0		100,000	58,300	41,700
12	Stoney Creek Urban Boundary Exapnsion (Storm)	2012	60,000	0		60,000	0		60,000	34,980	25,020
13	Greensville Settlement Servicing Study	2013	33,000	0		33,000	0		33,000	19,239	13,761
14	Stormwater Management Monitoring	2011-2031	460,000	0		460,000	0		460,000	268,181	191,819
15	Specific Area Water Shed Master Plans	2011-2013	600,000	0		600,000	0		600,000	349,801	250,199
16	Specific Area Water Shed Master Plans	2014-2019	1,200,000	0		1,200,000	0		1,200,000	699,602	500,398
17	Ainslie Wood Westdale Stormwater Drainage Master Plan	2018	200,000	0		200,000	0		200,000	116,600	83,400
18	Ainsliewood/Westdale Neighbourhoods Class EA	2011	200,000	0		200,000	0		200,000	116,600	83,400
19	Airport	2011	500,000	0		500,000	0		500,000	291,501	208,499
20	Ancaster Industrial Park Municipal Class EA	2011	200,000	0		200,000	0		200,000	116,600	83,400
21	Binbrook Urban Settlement & Southbrook SWM	2011	200,000	0		200,000	0		200,000	116,600	83,400
22	Cherry Beach EA & Preliminary Design Study	2011	200,000	0		200,000	0		200,000	116,600	83,400
23	Davis Creek Subwatershed Study	2011	200,000	0		200,000	0		200,000	116,600	83,400
24	Delsey Creek Storm Drainage Master Plan	2019	200,000	0		200,000	0		200,000	116,600	83,400
25	Falkirk East Storm Drainage Class EA	2011	200,000	0		200,000	0		200,000	116,600	83,400
26	Garner Neighbourhood Master Drainage Plan	2011	200,000	0		200,000	0		200,000	116,600	83,400
27	Meadowlands Neighbourhood 3, 4, and 5. Class EA Master Plan	2011	200,000	0		200,000	0		200,000	116,600	83,400
28	North Waterdown OPA 28 Master Drainage Plan	2011	200,000	0		200,000	0		200,000	116,600	83,400
29	Stoney Creek Master Drainage Plan Industrial Corridor Area 5, 6 & 7	2011	200,000	0		200,000	0		200,000	116,600	83,400
30	Mewburn & Sheldon Neighbourhodds Master Servicing Plan Class EA	2011	200,000	0		200,000	0		200,000	116,600	83,400
31	Montgomery Creek SWM Class EA	2011	200,000	0		200,000	0		200,000	116,600	83,400
32	Mountain Brow Boulevard Crossing and Central Mountain SWM	2011	200,000	0		200,000	0		200,000	116,600	83,400

INFRASTRUCTURE COSTS COVERED IN THE DC CALCULATION

City of Hamilton
Service: Stormwater Works & Studies (excluding Facilities)

Prj.No	Increased Service Needs Attributable to Anticipated Development 2011-Urban Build Out	Timing (year)	Gross Capital Cost Estimate	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Total		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 58%	Non-Residential Share 42%
33	Watercourse 5 & 6 Class EA Study	2019	200,000	0		200,000	0		200,000	116,600	83,400
34	Watercourse 7 Creek System Improvements EA	2012	200,000	0		200,000	0		200,000	116,600	83,400
35	Watercourse 10/11 - SCUBE	2020	200,000	0		200,000	0		200,000	116,600	83,400
36	Waterdown	2011	500,000	0		500,000	0		500,000	291,501	208,499
37	Stormwater Master Plan	2011	1,333,000	0		1,333,000	1,230,000		103,000	60,049	42,951
38	Unidentified Studies	2011-2031	3,500,000	0		3,500,000	0		3,500,000	2,040,507	1,459,493
39	Outstanding Debt - Principal	2011-2012	181,441	0		181,441	0		181,441	105,780	75,660
40	Outstanding Debt - Interest (Discounted)	2011-2012	15,596	0		15,596	0		15,596	9,093	6,504
41	New Growth Related Financing (Discounted)		4,920,079	0		4,920,079	0		4,920,079	2,868,416	2,051,664
	Total		**85,432,880**	**0**	**0**	**80,367,962**	**15,068,429**	**0**	**65,299,532**	**38,069,751**	**27,229,782**

INFRASTRUCTURE COSTS COVERED IN THE DC CALCULATION

City of Hamilton
Service: Stormwater Facilities

Prj.No	Increased Service Needs Attributable to Anticipated Development 2011-Urban Build Out	Timing (year)	Gross Capital Cost Estimate	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Total		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 100%	Non-Residential Share 0%
1	Stormwater Management Quality/Quantity Facilities	2011-2015	43,839,806	0		43,839,806	0	14,899,275	28,940,531	28,940,531	0
2	Stormwater Management Quality/Quantity Facilities	2016-2020	3,176,894	0		3,176,894	0	3,176,894	0	0	0
3	Stormwater Management Quality/Quantity Facilities	2021-2031	207,765,876	0		207,765,876	8,517,452	87,803,301	111,445,122	111,445,122	0
4	Provision for Residential Portion of Non-Residential Ponds	2011-2031	580,612	0		580,612	0		580,612	580,612	0
5	Provision for Non-Residential Portion of Residential Ponds	2011-2031	(841,960)	0		(841,960)	0		(841,960)	(841,960)	0
6	GRIDS Related SWM Projects	2011-2031	173,613,284	0		173,613,284	0	112,154,266	61,459,018	61,459,018	0
7	Provision for Best Efforts Agreeemnts	2011-2031	952,693	0		952,693	0		952,693	952,693	0
8	Provision for Stormwater Credits	2011-2031	11,393,864	0		11,393,864	0		11,393,864	11,393,864	0
9	New Growth Related Financing (Discounted)		14,225,548	0		14,225,548	0		14,225,548	14,225,548	0
	Total		**454,706,616**	**0**	**0**	**454,706,616**	**8,517,452**	**218,033,736**	**228,155,428**	**228,155,428**	**0**

5.3.2 *Water and Wastewater Services*

Provided in Appendix E is the detailed review of the water and wastewater services undertaken by AECOM. In total, $1.52 billion in capital works have been identified including financing costs, existing debt obligations and an estimate of additional growth related financing costs associated with these works for the forecast period. Adjustments to recognize portions of the works that will benefit existing development within the city, totalling $340.92 million, portions benefiting growth beyond 2031, totalling $688,000 and portions of the works that are the direct responsibility of the development community, totalling $204.52 million, have been made resulting in a net recoverable amount of $902,755,716 to be recovered by development charges over the 21 year forecast period.

The allocation between residential and non-residential development is 69%/31% based on flow requirements (as discussed in Appendix E).

The following is a summary of the gross and net recoverable costs based on the AECOM Engineering assessment and all other adjustments:

Item	Gross Estimated Cost	Less Non-DC Eligible Growth Cost	DC Eligible Growth Cost
Water:			
Ancaster Water Distribution System	15,308,000	3,712,000	11,596,000
Waterdown Water Distribution System	33,101,000	6,572,500	26,528,500
Binbrook Water Distribution System	12,907,000	2,342,000	10,565,000
Mount Hope Water Distribution System	13,728,000	2,174,000	11,554,000
Hamilton Mountain Water Distribution System	26,470,389	7,963,076	18,507,313
Stoney Creek Upper Water Distribution System	106,095,000	11,888,000	94,207,000
Stoney Creek Lower Water Distribution System	11,659,000	866,000	10,793,000
Flamborough (excluding Waterdown) Water Distribution System	3,405,000	592,000	2,813,000
City Wide Water Distribution System	49,565,807	7,395,535	42,170,272
Existing Debt	301,597	-	301,597
New Growth Related Financing (Discounted)	48,994,372	-	48,994,372
Reserve Fund Adjustment	-	30,009,766	(30,009,766)
Total Water	**321,535,165**	**73,514,877**	**248,020,287**
Wastewater:			
Linear:			
Ancaster Sanitary Sewage System	4,322,000	1,097,000	3,225,000
Waterdown Sanitary Sewage System	13,303,000	10,910,000	2,393,000
Binbrook Sanitary Sewage System	8,343,000	498,000	7,845,000
Mount Hope Sanitary Sewage System	33,258,000	4,904,500	28,353,500
Hamilton Mountain Sanitary Sewage System	47,253,983	799,500	46,454,483
Stoney Creek Upper Sanitary Sewage System	124,819,000	7,804,000	117,015,000
Stoney Creek Lower Sanitary Sewage System	22,026,637	1,352,370	20,674,267
City Wide Sanitary System	51,988,241	7,706,875	44,281,366
Existing Debt	1,130,414	-	1,130,414
New Growth Related Financing (Discounted)	69,149,380	-	69,149,380
Reserve Fund Adjustment	-	20,486,958	(20,486,958)
Total Wastewater Linear	**375,593,655**	**55,559,203**	**320,034,452**
WWTP:			
Raw Wastewater Pumping	54,100,000	27,591,000	26,509,000
Primary Treatment	68,742,218	54,749,538	13,992,680
New Secondary/Tertiary Treatment Plant	378,048,060	241,804,511	136,243,549
Secondary/Tertiary Chlorine contact Tank, Outfall and Red Hill Creek Upgrades	36,644,400	18,688,644	17,955,756
Engineering (Projects 1, 4a, 4b, 5, 13)	43,570,793	22,221,104	21,349,689
Biogas Digester	49,500,000	35,045,000	14,455,000
Biosolids Thermal Reduction Disposal Facility	73,000,000	37,230,000	35,770,000
New Electrical and power systems	59,241,780	30,213,308	29,028,472
New Growth Related Financing (Discounted)	61,336,943	-	61,336,943
Reserve Fund Adjustment	-	21,940,113	(21,940,113)
Total Wastewater WWTP	**824,184,194**	**489,483,218**	**334,700,976**
Total Wastewater	**1,199,777,849**	**545,042,420**	**654,735,428**
Total Water & Wastewater	**1,521,313,013**	**618,557,297**	**902,755,716**

INFRASTRUCTURE COSTS COVERED IN THE DC CALCULATION

City of Hamilton
Service: Water Services

Prj.No	Increased Service Needs Attributable to Anticipated Development 2011-Urban Build Out	Timing (year)	Gross Capital Cost Estimate	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Total		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 69%	Non-Residential Share 31%
1	Ancaster Water Distribution System	2011-2015	14,538,000	0		14,538,000	3,134,000		11,404,000	7,868,760	3,535,240
2	Ancaster Water Distribution System	2016-2031	770,000	0		770,000	578,000		192,000	132,480	59,520
3	Waterdown Water Distribution System	2011-2015	15,415,000	0		15,415,000	851,000	2,327,000	12,237,000	8,443,530	3,793,470
4	Waterdown Water Distribution System	2016-2031	17,686,000	0		17,686,000	3,320,000	74,500	14,291,500	9,861,135	4,430,365
5	Binbrook Water Distribution System	2011-2015	11,414,000	0		11,414,000	0	1,819,000	9,595,000	6,620,550	2,974,450
6	Binbrook Water Distribution System	2016-2031	1,493,000	0		1,493,000	0	523,000	970,000	669,300	300,700
7	Mount Hope Water Distribution System	2011-2015	1,027,000	0		1,027,000	0	169,000	858,000	592,020	265,980
8	Mount Hope Water Distribution System	2016-2031	1,121,000	0		1,121,000	0	208,000	913,000	629,970	283,030
9	Mount Hope Water Distribution System	2021-2031	11,580,000	453,000		11,127,000	0	1,344,000	9,783,000	6,750,270	3,032,730
10	Hamilton Mountain Water Distribution System	2011-2015	7,570,389	0		7,570,389	217,000	992,076	6,361,313	4,389,306	1,972,007
11	Hamilton Mountain Water Distribution System	2016-2031	18,296,000	0		18,296,000	0	6,754,000	11,542,000	7,963,980	3,578,020
12	Hamilton Mountain Water Distribution System	2021-2031	604,000	0		604,000	0	0	604,000	416,760	187,240
13	Stoney Creek Upper Water Distribution System	2011-2015	49,754,000	0		49,754,000	0	1,592,000	48,162,000	33,231,780	14,930,220
14	Stoney Creek Upper Water Distribution System	2016-2031	7,404,000	0		7,404,000	1,596,000	896,000	4,912,000	3,389,280	1,522,720
15	Stoney Creek Upper Water Distribution System	2021-2031	48,937,000	0		48,937,000	0	7,804,000	41,133,000	28,381,770	12,751,230
16	Stoney Creek Lower Water Distribution System	2011-2015	4,309,000	0		4,309,000	0	866,000	3,443,000	2,375,670	1,067,330
17	Stoney Creek Lower Water Distribution System	2016-2031	7,350,000	0		7,350,000	0	0	7,350,000	5,071,500	2,278,500
18	Flamborough (excluding Waterdown) Water Distribution System	2011-2015	3,405,000	0		3,405,000	0	592,000	2,813,000	1,940,970	872,030
19	Flamborough (excluding Waterdown) Water Distribution System	2016-2031	0	0		0	0	0	0	0	0
20	City Wide Water Distribution System	2011-2015	38,550,504	0		38,550,504	2,215,535	0	36,334,969	25,071,129	11,263,840
21	City Wide Water Distribution System	2016-2031	11,015,303	0		11,015,303	5,180,000	0	5,835,303	4,026,359	1,808,944
22	Existing Debt Principal	2011-2023	230,033	0		230,033			230,033	158,723	71,310
23	Existing Debt Interest (Discounted)	2011-2023	71,564	0		71,564			71,564	49,379	22,185
24	Growth Related Financing Costs (Discounted)	2011-UBBO	48,994,372	0		48,994,372			48,994,372	33,806,116	15,188,255
25	Reserve Fund Adjustment					(30,009,766)			(30,009,766)	(20,706,739)	(9,303,027)
	Total		**321,535,165**	**453,000**	**0**	**291,072,398**	**17,091,535**	**25,960,576**	**248,020,287**	**171,133,998**	**76,886,289**

INFRASTRUCTURE COSTS COVERED IN THE DC CALCULATION

City of Hamilton
Service: Wastewater - Sewers (Linear)

Prj.No	Increased Service Needs Attributable to Anticipated Development 2011-Urban Build Out	Timing (year)	Gross Capital Cost Estimate	Post Period Benefit	Other Deductions	Net Capital Cost	Less:		Total		
							Benefit to Existing Development	Grants, Subsidies and Other Contributions Attributable to New Development	Total	Residential Share 69%	Non-Residential Share 31%
1	Ancaster Sanitary Sewage System	2011-2015	3,696,000	235,000		3,461,000	106,000	445,000	2,910,000	2,007,900	902,100
2	Ancaster Sanitary Sewage System	2016-2031	626,000	0		626,000	0	311,000	315,000	217,350	97,650
3	Waterdown Sanitary Sewage System	2011-2015	13,303,000	0		13,303,000	8,654,000	2,256,000	2,393,000	1,651,170	741,830
4	Waterdown Sanitary Sewage System	2016-2031	0	0		0	0	0	0	0	0
5	Binbrook Sanitary Sewage System	2011-2015	7,812,000	0		7,812,000	0	0	7,812,000	5,390,280	2,421,720
6	Binbrook Sanitary Sewage System	2016-2031	531,000	0		531,000	0	498,000	33,000	22,770	10,230
7	Mount Hope Sanitary Sewage System	2011-2015	7,353,000	0		7,353,000	0	309,000	7,044,000	4,860,360	2,183,640
8	Mount Hope Sanitary Sewage System	2016-2031	25,905,000	0		25,905,000	0	4,595,500	21,309,500	14,703,555	6,605,945
9	Hamilton Mountain Sanitary Sewage System	2011-2015	3,215,983	0		3,215,983	0	475,500	2,740,483	1,890,933	849,550
10	Hamilton Mountain Sanitary Sewage System	2016-2020	1,423,000	0		1,423,000	0	324,000	1,099,000	758,310	340,690
11	Hamilton Mountain Sanitary Sewage System	2021-2031	42,615,000	0		42,615,000	0	0	42,615,000	29,404,350	13,210,650
12	Stoney Creek Upper Sanitary Sewage System	2011-2015	101,172,000	0		101,172,000	0	0	101,172,000	69,808,680	31,363,320
13	Stoney Creek Upper Sanitary Sewage System	2021-2031	23,647,000	0		23,647,000	0	7,804,000	15,843,000	10,931,670	4,911,330
14	Stoney Creek Lower Sanitary Sewage System	2011-2015	21,062,637	0		21,062,637	0	870,370	20,192,267	13,932,664	6,259,603
15	Stoney Creek Lower Sanitary Sewage System	2016-2031	964,000	0		964,000	0	482,000	482,000	332,580	149,420
16	City Wide Sanitary System	2011-2015	36,855,280	0		36,855,280	3,526,875	0	33,328,405	22,996,599	10,331,806
17	City Wide Sanitary System	2016-2031	15,132,961	0		15,132,961	4,180,000	0	10,952,961	7,557,543	3,395,418
18	Existing Debt Principal	2011-2023	862,185	0		862,185			862,185	594,908	267,277
19	Existing Debt Interest (Discounted)	2011-2023	268,229	0		268,229			268,229	185,078	83,151
20	Financing (Linear) (Interest Discounted)	2011-UBBO	69,149,380	0		69,149,380			69,149,380	47,713,072	21,436,308
21	Reserve Fund Adjustment					(20,486,958)			(20,486,958)	(14,136,001)	(6,350,957)
	Total		**375,593,655**	**235,000**	**0**	**354,871,697**	**16,466,875**	**18,370,370**	**320,034,452**	**220,823,772**	**99,210,680**

TABLE 6-1
CITY OF HAMILTON
DEVELOPMENT CHARGE CALCULATION
Municipal-wide Services
2011-Urban Build Out

SERVICE	2011 $ DC Eligible Cost		2011 $ DC Eligible Cost	
	Residential	Non-Residential	SDU	per ft²
	$	$	$	$
1. Stormwater Drainage and Control Services				
1.1 Channels, drainage and studies	38,069,751	27,229,782	733	0.69
1.2 Residenital Ponds	228,155,428	0	4,390	0.00
	266,225,178	27,229,782	5,123	0.69
2. Wastewater Services				
2.1 Treatment plants	230,943,674	103,757,303	4,444	2.62
2.2 Sewers	220,823,772	99,210,680	4,249	2.50
	451,767,446	202,967,983	8,693	5.12
3. Water Services				
3.1 Distribution systems	171,133,998	76,886,289	3,294	1.94
	171,133,998	76,886,289	3,294	1.94
TOTAL	$889,126,622	$307,084,054	$17,110	7.75
DC ELIGIBLE CAPITAL COST	$889,126,622	$307,084,054		
Build out Gross Population / GFA Growth (ft².)	176,165	39,621,300		
Cost Per Capita / Non-Residential GFA (ft².)	$5,047.12	$7.75		

By Residential Unit Type	p.p.u	
Single and Semi-Detached Dwelling	3.39	$17,110
Apartments - 2 Bedrooms +	2.10	$10,599
Apartments - Bachelor and 1 Bedroom	1.40	$7,066
Other Multiples	2.43	$12,265
Residential Facility Dwelling	1.10	$5,552

TABLE 6-2
CITY OF HAMILTON
DEVELOPMENT CHARGE CALCULATION
Ten Year Forecast
2011-2020

SERVICE	2011 $ DC Eligible Cost		2011 $ DC Eligible Cost	
	Residential	Non-Residential	SDU	per ft²
	$	$	$	$
4. GO Transit				
4.1 *Transit vehicles*	4,298,096	0	215	0.00
	4,298,096	0	215	0.00
TOTAL	$4,298,096	$0	$215	$0.00
DC ELIGIBLE CAPITAL COST	$4,298,096	$0		
10 Year Gross Population / GFA Growth (ft².)	67,619	18,194,600		
Cost Per Capita / Non-Residential GFA (ft².)	$63.56	$0.00		

By Residential Unit Type	p.p.u	
Single and Semi-Detached Dwelling	3.39	$215
Apartments - 2 Bedrooms +	2.10	$133
Apartments - Bachelor and 1 Bedroom	1.40	$89
Other Multiples	2.43	$154
Residential Facility Dwelling	1.10	$70

TABLE 6-3
CITY OF HAMILTON
DEVELOPMENT CHARGE CALCULATION
TOTAL ALL SERVICES

	2011 $ DC Eligible Cost		2011 $ DC Eligible Cost	
	Residential	Non-Residential	SDU	per ft²
	$	$	$	$
Urban-wide Services Build out	$889,126,622	$307,084,054	$17,110	$7.75
Municipal-wide GO Transit Service (10 Year)	4,298,096	0	215	0.00
TOTAL	893,424,718	307,084,054	17,325	7.75

Table 6-4
CITY OF HAMILTON
GROSS EXPENDITURE AND SOURCES OF REVENUE SUMMARY
FOR COSTS TO BE INCURRED OVER THE LIFE OF THE BY-LAW

Service	Total Gross Cost	SOURCES OF FINANCING TAX BASE OR OTHER NON-DC SOURCE			Total Gross Cost Attributable to City of Hamilton	SOURCES OF FINANCING TAX BASE OR OTHER NON-DC SOURCE			Post DC Period Benefit	DC RESERVE FUND	
		GO Transit Costs which do not require GTA/H Funding & Benefit beyond the GTA	Other Municipal Funding (GTA Municipalities)	GO Transit Funding - 2/3 Funding from other levels of Government		Benefit to Existing	Other Funding	Legislated Reduction		Residential	Non-Residential
1. Stormwater Drainage and Control Services											
1.1 Channels, drainage and studies	33,504,690	0	0		33,504,690	3,633,095	0	0	0	17,415,196	12,456,399
1.2 Residenital Ponds	85,114,076	0	0		85,114,076	0	41,602,672	0	0	43,511,405	0
2. Wastewater Services											
2.1 Treatment plants	105,643,928	0	0		105,643,928	42,564,800	22,183,536	0	0	28,217,958	12,677,634
2.2 Sewers	194,469,900	0	0		194,469,900	12,286,875	4,355,870	0	235,000	122,538,587	55,053,568
3. Water Services											
3.1 Distribution systems	145,982,893	0	0		145,982,893	6,417,535	8,357,076	0	0	90,533,715	40,674,567
4. GO Transit											
4.1 Transit vehicles	964,622,000	144,933,775	265,578,985	546,458,817	7,650,423	5,262,592	0	238,783	0	2,149,048	0
TOTAL EXPENDITURES & REVENUES	$1,529,337,487	$144,933,775	$265,578,985	$546,458,817	$572,365,910	$70,164,897	$76,499,153	$238,783	$235,000	$304,365,909	$120,862,168

Table B-1
CITY OF HAMILTON
OPERATING AND CAPITAL EXPENDITURE IMPACTS
FOR FUTURE CAPITAL EXPENDITURES

SERVICE	NET GROWTH RELATED EXPENDITURES	ANNUAL LIFECYCLE EXPENDITURES	ANNUAL OPERATING EXPENDITURES	TOTAL ANNUAL EXPENDITURES
1. Stormwater Drainage and Control Services				
1.1 Channels, drainage and studies	65,299,532	337,000	74,303	411,303
1.2 Residenital Ponds	228,155,428	1,177,400	259,615	1,437,015
2. Wastewater Services				
2.1 Treatment plants	334,700,976	1,727,300	5,512,745	7,240,045
2.2 Sewers	320,034,452	1,651,600	5,271,177	6,922,777
3. Water Services				
3.1 Distribution systems	248,020,287	1,280,000	7,480,931	8,760,931

APPENDIX C - LOCAL SERVICE POLICY FOR WATER, WASTEWATER AND STORMWATER SERVICES

Storm Sewer Oversizing (Residential and Non-Residential)

- Oversizing will be applied only to a storm sewer system that provides for the drainage and conveyance of runoff resulting from a design storm event having a 5 year return period (minor system).
- Development Charge contribution for storm sewer oversizing is applicable for sewers in excess of 1200mm diameter.
- Storm sewers conveying a 1 in 100 year design (major system) will not be eligible for "oversizing".
- DC contribution for "oversizing" is on a flat rate basis as outlined in the City's Financial Policies, per Council-approved Reports PED03060 and FCS03073 and related appendices/amendments.
- "Oversizing" will not be applied to temporary works.

Stormwater Management Facilities

Residential:

- Centralized stormwater management facilities identified in the City's Stormwater Master Plan, Master Drainage Plan or Watershed/Subwatershed Study will be considered for inclusion as development charges projects.
- Development charge contributions for facilities will be limited based on the total cost (land and capital costs) as outlined in the DC Background Study. Included in the capital cost is engineering design and soft costs for each facility.
- Storm sewer conveyance system to the SWM facility is considered local service and not eligible for DC contribution. Piping and headwall for the conveyance system into the SWM facility is developer responsibility.
- Residential land cost for SWM facilities have been set at $360,000/Ac, except for Ancaster and Waterdown which has been set at $450,000/Ac. Facilities located in open space lands, the value of the land will be based on open space value, not developable land, and will be established by an independent appraisal, provided by the developer. The value of compensation for land will be based on the appraisal up to the maximum

value of land in the DC background study. Storm-ponds located in open space or outside the urban boundary will be considered non-developable for purposes of the appraisal.

- Developer will be responsible to acquire lands for facilities located outside a plan of subdivision. The City will not act as a third party agent in the negotiation and acquisition of lands for stormwater management facilities on behalf of private interest, unless otherwise directed by Council. The value of compensation for land will be determined by an independent appraisal, provided by the developer up to the maximum value of land in the DC background study.
- Where a developer has constructed a facility as a condition of development, at his own cost and the facility is considered to be permanent and part of an ultimate solution, credit for the related stormwater component will be applied for the un-built units within the subdivision if captured in the 2011 DC Background Study.
- Capital cost may include items as follows:
- Siltation control
- Excavation (excludes costs to haul surplus material off site and/or placement and compaction of surplus material within subdivision)
- Fine grading
- Decanting area
- Forebay structures, pond liner, cooling trenches, etc.
- SWMP outlet structures (ditch inlet, manhole, pipe, etc.) within pond block and including outlet headwall if located outside of the pond block.
- Emergency overland flow route
- Maintenance access road
- Landscaping/Shading
- Pond signage
- Temporary outlet works including the acquisition of easements are developer responsibility
- Studies required to facilitate orderly development are developer responsibility
- Costs associated with construction monitoring during and post construction, including siltation/erosion remedial works is developer responsibility
- On-site open watercourse improvements are to be the responsibility of the individual developments.

Non-Residential

- Non-residential developers provide their stormwater management facilities directly.
- On-site open watercourse improvements are to be the responsibility of the individual developments.

Low Impact Residential Development

- City is supportive of the implementation of LID however; these measures are only effective through regular maintenance. Developments under Site Plan Control that incorporate LID measures, and only in the absence of an identified existing centralized stormwater management facility to contribute to, may be eligible for a cost recovery of an amount equal to up to 75% of the stormwater Development Charge component Payable. The details of this policy will be provided within a staff report which will accompany the DC Background study and draft DC by-law in June, 2011. The intent is to reduce the centralized pond footprint but provide for residual treatment capacity.

Sanitary and Watermain Oversizing (Residential and Non-Residential)

- Development Charge contribution for sanitary sewer oversizing is applicable for sewers in excess of 450mm diameter in residential and non-residential developments.
- Development Charge contribution for watermain oversizing is applicable for watermains in excess of 300mm diameter in residential and non-residential developments.
- DC contribution for "oversizing" is on a flat rate basis as outlined in the City's Financial Policies, per Council-approved Reports PED03060 and FCS03073 and related appendices/amendments.
- "Oversizing" will not be applied to temporary works.
- At intersections, the number of valves required is one less than the number of intersecting watermains (i.e. minimum 2 valves on a 3 way tee). Where a valve is required on an existing main that is greater than 300mm as a result of a connection of a main to service a development, "oversizing" for the valve will be limited to the oversizing value established for the 400mm size.

AMENDED PAGES – APPENDIX E

ADDENDUM 1

JUNE 2011

1. Replace Table of Contents as follows:

Table of Contents

Tables

Attachments

Addendum 1 – June 2011

2. Add Section 3.2.7 as follows:

3.2.7 Co-ordinated Projects with Transportation Requirements

Water and wastewater projects external to proposed development lands (ie. existing road allowances and/or existing roads) and initiated as a result of identified transportation requirements will be 100% funded from Development Charges. Service connections (water and/or wastewater connections - public portion) will be constructed to each land parcel, when an existing dwelling unit exists. Property owners that require more than one service connection will be required to pay for the cost of the additional service connections prior to construction. Benefiting property owners shall contribute towards the cost to install the infrastructure on a "flat rate" basis. The "flat rate" will be established at the beginning of each year.

3. Replace Section 6 as follows:

As noted, the details of the full infrastructure program are provided in the Attachments. The following tables provide a summary of this information.

Table E1 Summary of Linear Infrastructure Costs (Total - $2011)

Total Costs

Area	Sanitary	Water	Total
Ancaster	$ 4,322,000	$ 15,308,000	$ 19,630,000
Waterdown	$ 13,303,000	$ 33,101,000	$ 46,404,000
Binbrook	$ 8,343,000	$ 12,907,000	$ 21,250,000
AEGD/Mt. Hope	$ 33,258,000	$ 13,728,000	$ 46,986,000
Hamilton Mountain	$ 47,253,983	$ 26,470,389	$ 73,724,372
Stoney Creek Upper	$ 124,819,000	$ 106,095,000	$ 230,914,000
Stoney Creek Lower	$ 22,026,637	$ 11,659,000	$ 33,685,637
Flamborough excluding Waterdown	$ -	$ 3,405,000	$ 3,405,000
City Wide Projects	$ 51,988,242	$ 49,565,807	$ 101,554,048
Total ($2011) excluding non-rebateable HST	**$ 305,313,861**	**$ 272,239,196**	**$ 577,553,057**

Non-Growth Related Costs (City Costs)

Area	Sanitary	Water	Total
Ancaster	$ 106,000	$ 3,712,000	$ 3,818,000
Waterdown	$ 8,654,000	$ 4,171,000	$ 12,825,000
Binbrook	$ -	$ -	$ -
AEGD/Mt. Hope	$ -	$ -	$ -
Hamilton Mountain	$ -	$ 217,000	$ 217,000
Stoney Creek Upper	$ -	$ 1,596,000	$ 1,596,000
Stoney Creek Lower	$ -	$ -	$ -
Flamborough excluding Waterdown	$ -	$ -	$ -
City Wide Projects	$ 7,706,875	$ 7,395,535	$ 15,102,410
Total ($2011) excluding non-rebateable HST	**$ 16,466,875**	**$ 17,091,535**	**$ 33,558,410**

Growth Related Costs - Development Charges

Area	Sanitary	Water	Total
Ancaster	$ 3,225,000	$ 11,596,000	$ 14,821,000
Waterdown	$ 2,393,000	$ 26,528,500	$ 28,921,500
Binbrook	$ 7,845,000	$ 10,565,000	$ 18,410,000
AEGD/Mt. Hope	$ 28,353,500	$ 11,554,000	$ 39,907,500
Hamilton Mountain	$ 46,454,483	$ 18,507,313	$ 64,961,796
Stoney Creek Upper	$ 117,015,000	$ 94,207,000	$ 211,222,000
Stoney Creek Lower	$ 20,674,267	$ 10,793,000	$ 31,467,267
Flamborough excluding Waterdown	$ -	$ 2,813,000	$ 2,813,000
City Wide Projects	$ 44,281,367	$ 42,170,271	$ 86,451,638
Total ($2011) excluding non-rebateable HST	**$ 270,241,617**	**$ 228,734,084**	**$ 498,975,701**

Direct Developer's Costs

Area	Sanitary	Water	Total
Ancaster	$ 756,000	$ -	$ 756,000
Waterdown	$ 2,256,000	$ 2,401,500	$ 4,657,500
Binbrook	$ 498,000	$ 2,342,000	$ 2,840,000
AEGD/Mt. Hope	$ 4,904,500	$ 1,721,000	$ 6,625,500
Hamilton Mountain	$ 799,500	$ 7,746,076	$ 8,545,576
Stoney Creek Upper	$ 7,804,000	$ 10,292,000	$ 18,096,000
Stoney Creek Lower	$ 1,352,370	$ 866,000	$ 2,218,370
Flamborough excluding Waterdown	$ -	$ 592,000	$ 592,000
City Wide Projects	$ -	$ -	$ -
Total ($2011) excluding non-rebateable HST	**$ 18,370,370**	**$ 25,960,576**	**$ 44,330,946**

Post Period Benefit Costs

Area	Sanitary	Water	Total
Ancaster	$ 235,000	$ -	$ 235,000
Waterdown	$ -	$ -	$ -
Binbrook	$ -	$ -	$ -
AEGD/Mt. Hope	$ -	$ 453,000	$ 453,000
Hamilton Mountain	$ -	$ -	$ -
Stoney Creek Upper	$ -	$ -	$ -
Stoney Creek Lower	$ -	$ -	$ -
Flamborough excluding Waterdown	$ -	$ -	$ -
City Wide Projects	$ -	$ -	$ -
Total ($2011) excluding non-rebateable HST	**$ 235,000**	**$ 453,000**	**$ 688,000**

Note: Woodward WTP and WWTP not included in Linear Infrastructure Costs

4. Replace Table E2.1a Waterdown Sanitary Sewage System Development Charges Works (Planning Period 0 – 5 years) as follows:

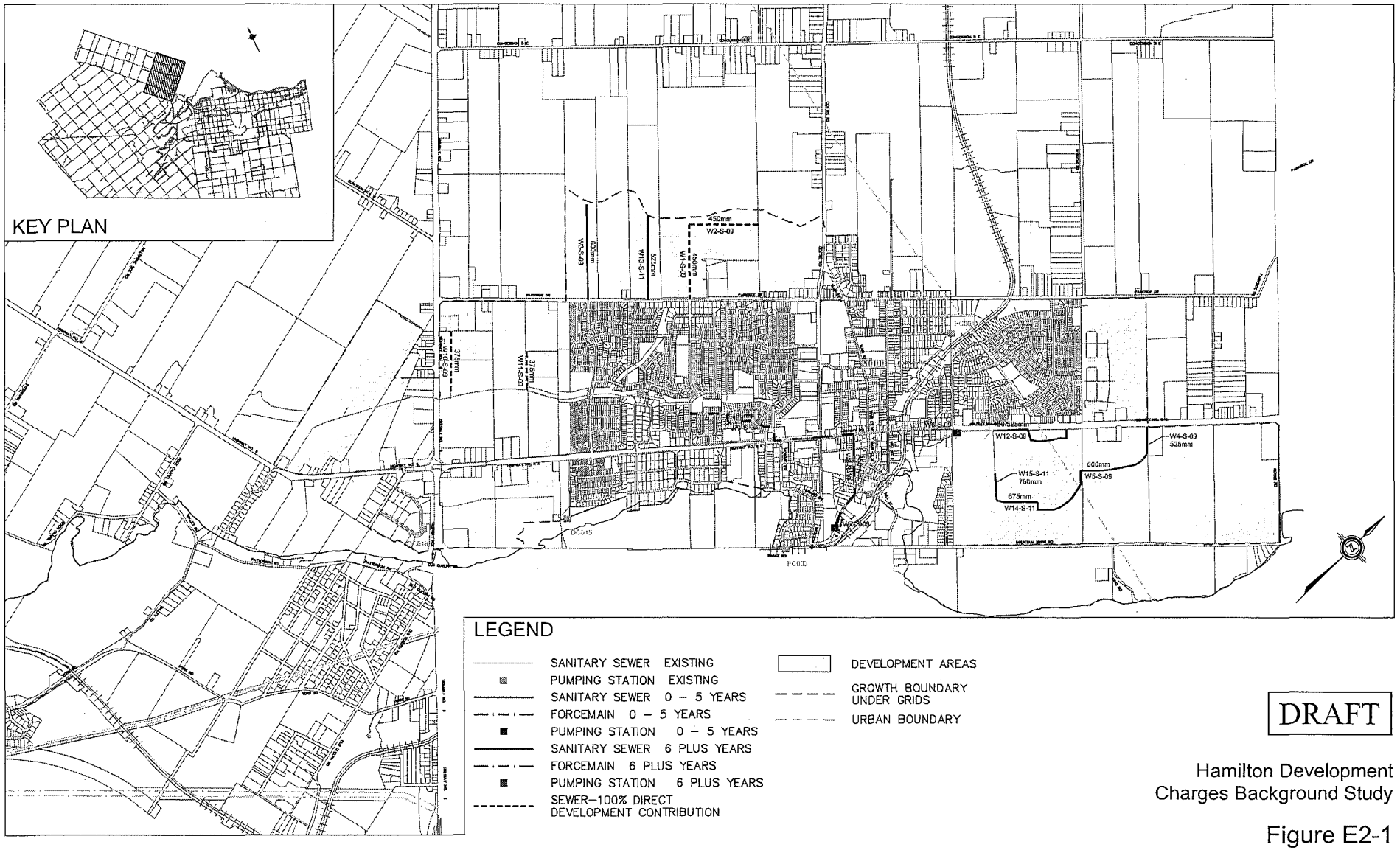
Table E2.1a Waterdown Sanitary Sewage System Development Charges Works (Planning Period - 0 to 5 Years)

Project ID	Project/Street	From	To	Length (m)	Size (mm)	Estimated Total Cost ($2011)	Benefit to Existing	Oversizing	Direct Developer Contribution ($2011)	Development Charges ($2011)	Post Period Benefit ($2011)	Benefit to Existing ($2011)	Amount already funded from DC Reserve	City of Hamilton Timing Estimate	Updated Budget Cost/ Actual	Engineering Benchmarks Adjustments	Scope Change	Project Added
W3-S-08	Waterdown North Area	700m north of Parkside Rd.	Parkside Drive	700	600	$511,000			$436,000	$75,000	$0	$0		0-5		X		
W4-S-09	Waterdown South Sewer	Dundas St and Evans Ave	152 m south	152	525	$101,000			$95,000	$6,000	$0	$0		0-5	X		X	
W5-S-09	Waterdown South Sewer	W4-S-09	1180 m west	1180	600	$861,000			$734,000	$127,000	$0	$0		0-5	X		X	
W6-S-08	DC014- Existing Pump Capacity & Wet Well upgrade at 1st St./ Hwy 5				200 L/S	$473,000			$0	$473,000	$0	$0		0-5		X		
W7-S-09	WWTP Decommissioning, New Waterdown SPS					$6,793,000	90%		$0	$679,000	$0	$6,114,000		0-5		X		
W8-S-09	New Forcemain on Flamboro St	SPS	Hwy 5	600	450	$941,000	90%		$0	$94,000	$0	$847,000		constructed - PW-08-36		X		
W9-S-09	New Forcemain on Hwy 5	Flamboro St	Borers Trunk	1250	450	$1,881,000	90%		$0	$188,000	$0	$1,693,000		constructed - PW-09-16		X		
W12-S-09	Dundas St	Spring Creek Dr	Burke St	898	450/525	$410,000			$0	$410,000	$0	$0		0-5	X		X	
W13-S-11	Internal North Waterdown Road	600 m north of Parkside Dr	Parkside Drive	600	525	$399,000			$373,000	$26,000	$0	$0		0-5				X
W14-S-11	Waterdown South Sewer	W5-S-09	W15-S-09	734	675	$670,000			$457,000	$213,000	$0	$0		0-5	X		X	
W15-S-11	Waterdown South Sewer	W14-S-09	Existing 750mm sewer south of Dundas St	259	750	$263,000			$161,000	$102,000	$0	$0		0-5	X		X	
Total Waterdown (0 to 5 Years)						**$13,303,000**			**$2,256,000**	**$2,383,000**	**$0**	**$8,654,000**						

Table E2.1b Waterdown Sanitary Sewage System Development Charges Works (Planning Period - 6 Years to UBBO)

Project ID	Project/Street	From	To	Length (m)	Size (mm)	Estimated Total Cost ($2011)	Benefit to Existing	Oversizing	Direct Developer Contribution ($2011)	Development Charges ($2011)	Post Period Benefit ($2011)	Benefit to Existing ($2011)	Amount already funded from DC Reserve	City of Hamilton Timing Estimate	Updated Budget Cost/ Actual	Engineering Benchmarks Adjustments	Scope Change	Project Added
Total Waterdown (6 Years to UBBO)																		

5. Replace Figure E2-1 Waterdown Sanitary Sewer as follows:



AECOM

DRAFT

Hamilton Development Charges Background Study

Figure E2-1
Waterdown Sanitary Sewer

DATE: MARCH 2011
FILE: 0712-001-00_00-G-P203_RX.dwg

6. Replace Table E2.7a Stoney Creek Lower Sanitary Sewage System Development Charges Works (Planning Period 0 – 5 years) as follows:

Table E2.7a Stoney Creek Lower Sanitary Sewage System Development Charges Works (Planning Period - 0 to 5 Years)

Project ID	Project/Street	From	To	Length (m)	Size (mm)	Estimated Total Cost ($2011)	Benefit to Existing	Oversizing	Direct Developer Contribution ($2011)	Development Charges ($2011)	Post Period Benefit ($2011)	Benefit to Existing ($2011)	Amount already funded from DC Reserve	City of Hamilton Timing Estimate	Updated Budget Cost/ Actual	Engineering Benchmarks Adjustments	Scope Change	Project Added
SCL1-S-09	South Service Rd	Fifty Road	Oriole Ave	700	600	$1,630,223			$739,663	$890,560	$0	$0		0-5	X		X	
SCL2-S-09	Forcemain- South Service Rd.	P. S.	Fifty Rd.	450	150	$350,000			$0	$350,000	$0	$0		0-5	X		X	
SCL3-S-09	New Sewage Pumping Station at South Service Rd./Fifty Rd.					$300,000			$0	$300,000	$0	$0		0-5	X			
SCL12-S-09	HC056 - Green Rd Upgrades - Install 3 new pumps (100 L/s each)					$948,000			$0	$948,000	$0	$0		0-5		X		
SCL13-S-09	HC056 - Green Rd FM Twinning	Green Rd SPS	SF03A011	10	300	$118,000			$0	$118,000	$0	$0		0-5		X		
SCL14-S-09	South Service Rd	Fifty Road	627 m east	382	375	$261,414			$130,707	$130,707	$0	$0		0-5	X		X	
SCL15-S-09	South Service Rd	Winona Rd	Service Rd, 200 m east of Winona Rd			$0			$0	$0	$0	$0		Project Consolidated with SCL1-S-09	X		X	
SCL11-S-09	Centennial Trunk Sewer	King St	ESI @ Kenora Ave	3510	1500	$15,457,000			$0	$15,457,000	$0	$0		0-5		X		
SCL16-S-11	SCUBE Additional Internal Servicing					$2,000,000			$0	$2,000,000	$0	$0		0-5				X
Total Stoney Creek Lower (0 to 5 Years)						**$21,062,637**			**$870,370**	**$20,192,267**	**$0**	**$0**						

Table E2.7b Stoney Creek Lower Sanitary Sewage System Development Charges Works (Planning Period - 6 Years to UBBO)

Project ID	Project/Street	From	To	Length (m)	Size (mm)	Estimated Total Cost ($2011)	Benefit to Existing	Oversizing	Direct Developer Contribution ($2011)	Development Charges ($2011)	Post Period Benefit ($2011)	Benefit to Existing ($2011)	Amount already funded from DC Reserve	City of Hamilton Timing Estimate	Updated Budget Cost/ Actual	Engineering Benchmarks Adjustments	Scope Change	Project Added
SCL10-S-09	North Service Road	Millen Rd.	Dewitt Rd.	900	250	$964,000			$482,000	$482,000	$0	$0		6-10		X		
Total Stoney Creek Lower (6 Years to UBBO)						**$964,000**			**$482,000**	**$482,000**	**$0**	**$0**						

7. Replace Table E3a City Wide Water/Wastewater System (Planning Period 0 – 5 years) as follows:

Table E3a City Wide Water/Wastewater System (Planning Period - 0 to 5 Years)

Project ID	Project	Location	Description	Estimated Total Cost ($2011)	City Cost			Direct Developer Contribution	Development Charges			Post Period Benefit	Updated Budget Cost/ Actual	Engineering Benchmarks Adjustments	Scope Change	Project Added
					Sanitary	Water	Total		Sanitary	Water	Total					
CW1-W-09	Oversizing of Infrastructure-Watermains	City Wide	Oversizing of servicing infrastructure within subdivisions	$261,250	$0	$0	$0	$0	$0	$261,250	$261,250			X		
CW2-W-09	Regional Subdivider's Share for Local Improvements	City Wide		$6,291,332	$0	$0	$0	$0	$5,300,447	$990,885	$6,291,332			X		
CW3-W-09	Intensification Infrastructure Upgrades - Water (0-5 years)	City Wide	Upgrades to existing infrastructure to accommodate intensification	$2,090,000	$0	$1,045,000	$1,045,000	$0	$0	$1,045,000	$1,045,000			X		
CW5-W-09	HD12A Governor's Rd Pumping Station Upgrades	City Wide	Additional pumping capacity new pump and new standby power (3ML/d)	$2,482,954	$0	$0	$0	$0	$0	$2,482,954	$2,482,954			X		
CW6-W-09	Governor's Rd PD 11 Watermain Extension	City Wide	Twin Watermain feeding HD12A (220 m 400mm)	$236,472	$0	$0	$0	$0	$0	$236,472	$236,472			X		
CW7-W-09	Governor's Rd PD 22 Watermain Extension	City Wide	New watermain from HD12A to PD22 on Governor's Rd and Moss Blvd (1000m 300 mm)	$827,651	$0	$0	$0	$0	$0	$827,651	$827,651			X		
CW8-W-09	HD002 Ferguson Pumping Station Upgrades (Standby Power)	City Wide	New Standby Power (1000kW)	$1,773,538	$0	$1,170,535	$1,170,535	$0	$0	$603,003	$603,003			X		
CW10-W-09	HD012 Lynden Ave Pumping Station Upgrades	City Wide	Additional pumping capacity and standby power (3 Mld)	$2,482,954	$0	$0	$0	$0	$0	$2,482,954	$2,482,954			X		
CW12-W-11	Woodward WTP	City Wide	Sedimentation Tank and Pre-Chlorination Upgrades (MP W-17 & W-18)	$21,004,800			$0			$21,004,800	$21,004,800					X
CW14-W-11	Oversizing of Infrastructure-Watermains	City Wide	Oversizing of servicing infrastructure for subdivisions not identified on draft plans	$6,200,000	$0	$0	$0	$0	$0	$6,200,000	$6,200,000					X
CW15-W-11	Large diameter valves on existing watermains	City Wide	Large diameter valves on existing watermains	$200,000	$0	$0	$0	$0	$0	$200,000	$200,000					X
CW1-S-09	Flow Monitoring	City Wide	Total cost over a period of 2 - 2.5 years. Study being undertaken to know various flow characteristics to calibrate the Sanitary Sewer Model to assist the Master Planning Study	$2,090,000	$1,045,000	$0	$1,045,000	$0	$1,045,000	$0	$1,045,000			X		
CW2-S-09	I/I Reduction Program	City Wide	Program to free up extra capacity within the existing sewers - costs over five years	$2,612,500	$1,306,250	$0	$1,306,250	$0	$1,306,250	$0	$1,306,250			X		
CW3-S-09	Annual Operational Improvements Outstations, 5180067052	City Wide	Operational improvements to wastewater outstations to increase capacities.	$522,500	$130,625	$0	$130,625	$0	$391,875	$0	$391,875			X		
CW4-S-09	Oversizing of Infrastructure-Sanitary	City Wide	Oversizing of servicing infrastructure within subdivisions	$522,500	$0	$0	$0	$0	$522,500	$0	$522,500			X		
CW5-S-09	Land requirement for new sewage pumping stations and easements	City Wide	Areas for SPS footprints and easements- 5 Ha	$522,500	$0	$0	$0	$0	$522,500	$0	$522,500			X		
CW6-S-09	Intensification Infrastructure Upgrades - Wastewater (0-5 years)	City Wide	Upgrades to existing infrastructure to accommodate intensification	$2,090,000	$1,045,000	$0	$1,045,000	$0	$1,045,000	$0	$1,045,000			X		
CW8-S-09	Ancaster Fennell Trunk Sewer Twinning	City Wide	900mm 400m	$945,887	$0	$0	$0	$0	$945,887	$0	$945,887			X		
CW9-S-09	Ancaster Fennell Trunk Sewer Twinning	City Wide	1050mm 500m	$1,418,831	$0	$0	$0	$0	$1,418,831	$0	$1,418,831			X		
CW10-S-09	Ancaster Fennell Trunk Sewer Twinning	City Wide	1200mm 1500m	$4,611,200	$0	$0	$0	$0	$4,611,200	$0	$4,611,200			X		
CW11-S-09	Ancaster Fennell Trunk Sewer Twinning	City Wide	1350mm 300m	$1,064,123	$0	$0	$0	$0	$1,064,123	$0	$1,064,123			X		
CW12-S-09	West 16th St Sewer Twinning	City Wide	525mm 2000m	$3,901,785	$0	$0	$0	$0	$3,901,785	$0	$3,901,785			X		
CW13-S-09	Scenic Dr sewer twinning	City Wide	750mm 500m	$1,537,067	$0	$0	$0	$0	$1,537,067	$0	$1,537,067			X		
CW14-S-09	Bowman St sewer twinning	City Wide	900mm 500m	$1,182,359	$0	$0	$0	$0	$1,182,359	$0	$1,182,359			X		
CW15-S-09	Hwy 403 Trunk sewer twinning - Phase 1	City Wide	MIP to Main-King	$7,533,582	$0	$0	$0	$0	$7,533,582	$0	$7,533,582			X		
CW16-S-11	Oversizing of Infrastructure-Sanitary	City Wide	Oversizing of servicing infrastructure for subdivisions not identified on draft plans	$1,000,000	$0	$0	$0	$0	$1,000,000	$0	$1,000,000					X
Total City Wide Projects (0 to 5 Years)				**$75,406,784**	**$3,526,875**	**$2,215,535**	**$5,742,410**	**$0**	**$33,328,405**	**$36,334,969**	**$69,663,374**	**$0**				

Table E3b City Wide Water/Wastewater System (Planning Period - 6 Years to UBBO)

Project ID	Project	Location	Description	Estimated Total Cost ($2011)	City Cost			Direct Developer Contribution	Development Charges			Post Period Benefit	Updated Budget Cost/ Actual	Engineering Benchmarks Adjustments	Scope Change	Project Added
					Sanitary	Water	Total		Sanitary	Water	Total					
CW4-W-09	Intensification Infrastructure Upgrades - Water	City Wide	Upgrades to existing infrastructure to accommodate intensification	$8,360,000	$0	$4,180,000	$4,180,000	$0	$0	$4,180,000	$4,180,000			X		
CW7-S-09	Intensification Infrastructure Upgrades - Wastewater	City Wide	Upgrades to existing infrastructure to accommodate intensification	$8,360,000	$4,180,000	$0	$4,180,000	$0	$4,180,000	$0	$4,180,000			X		
CW11-W-09	Locke St Watermain	City Wide	Locke St from Barton St to Main St (1500 m 400mm)	$1,655,303	$0	$0	$0	$0	$0	$1,655,303	$1,655,303			X		
CW13-W-11	Cut in Valves on trunk Watermains	City Wide		$1,000,000	$0	$1,000,000	$1,000,000	$0	$0	$0	$0					X
CW16-S-09	Hwy 403 Trunk sewer twinning - Phase 2	City Wide	Royal CSO to MIP	$6,536,490	$0	$0	$0	$0	$6,536,490	$0	$6,536,490			X		
CW17-S-09	HD002 Scenic Dr SPS Upgrades	City Wide	Install third pump (57 L/s)	$236,472	$0	$0	$0	$0	$236,472	$0	$236,472			X		
Total City Wide Projects (6 Years to UBBO)				**$26,148,264**	**$4,180,000**	**$5,180,000**	**$9,360,000**	**$0**	**$10,952,961**	**$5,835,303**	**$16,788,264**	**$0**				

AMENDED APPENDIX F

CITY OF HAMILTON
DEVELOPMENT CHARGES UPDATE

STORMWATER

June 21, 2011

AMEC EARTH & ENVIRONMENTAL
3215 NORTH SERVICE ROAD
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APPENDICES

1. INTRODUCTION

This Background Study forms part of the overall study to carry out a review of Water and Wastewater, GO Transit, and Stormwater Development Charges in the City of Hamilton. This 2-year review includes changes and updates affecting the determination process for the stormwater component of the Development Charges that have occurred in the 2009-2011 period. The changes and updates can be summarized as follows:

- New projects have been identified and added
- New stormwater-related studies, and associated project and costs estimates, have been completed and adopted by the City (either superseding older studies, or where no earlier studies existed)
- New land requirement calculations for stormwater management facilities, where no studies exist, have been developed by the City, based on recent actual facility land requirements
- Projects have been updated/modified
- Projects have been removed due to changing requirements
- Projects have been constructed and financed through the Development Charges
- Projects have been deleted from the planning timeframe of 2031 as a result of the updates to the City's growth forecasts.
- Removal of non-residential stormwater facility growth costs from the Development Charge and have non-residential developers provide their stormwater management facilities directly.
- On-site open watercourse improvements are to be the responsibility of the individual developments.
- In instances where both residential and non-residential growth lands are proposed to contribute to a stormwater management facility, the areally-estimated component shares have been separated for costing purposes.

In addition to the above, unit rates for land costs have increased, and have been provided by the City Real Estate Department; however recent (2009-2011) actual construction contracts within the City have been reviewed and capital costs for the materials for construction of stormwater infrastructure have not appreciably changed 2009-2011.

1.1 Study Area

For the 2011 Development Charges Update, development in the former member municipalities of the City of Hamilton has been combined for financial purposes, however a column in the stormwater costing tables has been included for reference purposes (and to assist in locating the project on the overall drawing), in which the City has been divided into the following seven (7) areas:

- Ancaster,
- Binbrook/Mount Hope,
- Hamilton Mountain,
- Stoney Creek (Lower),

- Stoney Creek (Mountain),
- Waterdown,
- Other (Hamilton Downtown, Dundas, Greensville, Carlisle, Freelton, and other outlying areas).

1.2 Background and Purpose

This background report provides information for the portion of the Development Charges relating to stormwater including: channel system improvements, off-site erosion control, stormwater management works, oversizing of stormwater related infrastructure, and culverts and bridges related to identified road projects. Projects included in this report are future growth related, which include both planned and unplanned projects. Future growth related information has been collected from the City and City-approved studies and, where no information was available, appropriate assumptions and calculations have been made.

This report provides a summary of the approach used in establishing and summarizing of the stormwater-related Development Charges for both residential and non-residential development. The report consists of the following sections: Introduction, Municipal Stormwater Drainage Policies and Criteria, Methodology, Development Charges Summaries, and Conclusions.

1.3 Development Charges Act: Storm Services

According to the Development Charges Act (S.O. 1997, Chapter 27), the "council of a municipality may by by-law impose development charges against land to pay for increased capital costs required because of increased needs for services arising from development of the area to which the by-law applies".

The services referred to include stormwater drainage and control. Costs to acquire land may be included, as well as costs to undertake studies in connection with any of the services, as well as the cost of the development charge background study (1997, c.27, s.3, 5).

The Development Charges are based on a projection of the costs to service new development to "build-out" over the next 20 years (i.e. to 2031).

All components of drainage works that have been considered to require development funding have been included. Storm drainage infrastructure has been classified into five categories: open watercourses (channel system improvements), off-site erosion control (not previously identified), stormwater management facilities (quality and quantity), storm sewer oversizing, and culverts/bridges (not previously identified, and associated with new or widened roads).

1.4 City of Hamilton Development Charge – Local Service Policy

Within a development charge policy, there are certain works which are deemed "local services" which remain the responsibility of the developing landowner. The following providers for the City of Hamilton's local service for stormwater service:

Storm Sewer Oversizing

- Oversizing will be applied only to a storm sewer system that provides for the drainage and conveyance of runoff resulting from a design storm event having a 5 year return period (minor system).
- Development Charge contribution for storm sewer oversizing is applicable for sewers in excess of 1200mm diameter.
- Storm sewers conveying a 1 in 100 year design (major system) will not be eligible for "oversizing".
- DC contribution for "oversizing" is on a flat rate basis as outlined in the City's Financial Policies.
- "Oversizing" will not be applied to temporary works.

Stormwater Management Facilities

- Centralized stormwater management facilities identified in the City's Stormwater Master Plan, Master Drainage Plan or Watershed/Subwatershed Study will be considered for inclusion as development charges projects.
- Development charge contributions for facilities will be limited based on the total cost (land and capital costs) as outlined in the DC Background Study. Included in the capital cost is engineering design and soft costs for each facility.
- Storm sewer conveyance system to the SWM facility is considered local service and not eligible for DC contribution. Piping and headwall for the conveyance system into the SWM facility is developer responsibility.
- Residential land cost for SWM facilities have been set at $360,000/Ac, except for Ancaster and Waterdown which has been set at $450,000/Ac. Facilities located in open space lands, the value of the land will be established by an independent appraisal, provided by the developer. The value of compensation for land will be based on the appraisal up to the maximum value of land in the DC background study.
- Developer will be responsible to acquire lands for facilities located outside a plan of subdivision. The City will not act as a third party agent in the negotiation and acquisition of lands for stormwater management facilities on behalf of private interest, unless otherwise directed by Council. The value of compensation for land will be determined by an independent appraisal, provided by the developer up to the maximum value of land in the DC background study.
- Where a developer has constructed a facility as a condition of development, at his own cost and the facility is considered to be permanent and part of an ultimate solution, credit for the related stormwater component will be applied for the un-built units within the subdivision.
- Capital cost may include items as follows:
  a) Siltation control
  b) Excavation (excludes costs to haul surplus material off site and/or placement and compaction of surplus material within subdivision)
  c) Fine grading
  d) Decanting area
  e) Forebay structures, pond liner, cooling trenches, etc.
  f) SWMP outlet structures (ditch inlet, manhole, pipe, etc.) within pond block and including outlet headwall if located outside of pond block.
  g) Emergency overland flow route
  h) Maintenance access road
  i) Landscaping/Shading

j) Pond signage

- Temporary outlet works including the acquisition of easements are developer responsibility
- Studies required to facilitate orderly development are developer responsibility
- Costs associated with construction monitoring during and post construction, including siltation/erosion remedial works is developer responsibility
- Non-residential developers provide their stormwater management facilities directly.
- On-site open watercourse improvements are to be the responsibility of the individual developments.

Low Impact Development

- City is supportive of the implementation of LID however; these measures are only effective through regular maintenance. Developments under Site Plan Control that incorporate LID measures, and only in the absence of an identified existing stormwater management facility to contribute to, will be eligible for a further credit of 75% of the stormwater credit identified in Section 2.7.

1.5 Background Information Collected

City staff, through the Technical Committee noted in Section 1.5, has supplied the following background information:

- Applicable background reports
- Summary of stormwater management facility construction costs and land areas
- Digital topographic mapping
- Digital growth-related land use fabric (GRIDS)
- Digital DRAFT Staging of Development Plan land use fabric (January 2011)
- Stormwater policy/philosophy related to Development Charges
- Reviews and comments on overall map of growth areas and identified projects
- Culvert and bridge database
- Subdivision-related storm sewer oversizing database.

1.6 Administration

Many City of Hamilton staff have assisted in collecting the background information for this study, as well as meeting with Amec Earth and Environmental staff to review the various stormwater projects, cost estimates, financially committed projects, and underlying philosophy and assumptions; these have included:

Tony Sergi, Director of Development Engineering
Sally Yong-Lee, Acting Manager of Infrastructure Planning
John Morgante, Development Engineering
Monir Moniruzziman, Development Engineering
Wayne Thompson, Sr Financial Analyst, Capital Budgets & Development Finance

2. MUNICIPAL STORMWATER POLICY AND CRITERIA

2.1 Overview

The costs to provide stormwater servicing are, in accordance with the Development Charges Act, related to the level of service to be provided.

The City of Hamilton's Storm Drainage Criteria and level of service has been summarized in this Section. The City's standards have been developed to provide this level of service, and to recognize other Provincial and Federal criteria for flooding, erosion, stormwater quality, and fisheries habitat protection and enhancement.

2.2 Storm Sewer System

The storm sewer system provides for the drainage and conveyance of the runoff resulting from a design storm event having a 5 year return period. In the former municipalities of the City of Hamilton, the storm sewers were designed to have the capacity for storm events ranging between a 1 in 2 year event and approximately a 1 in 50 year event (ref. Table F1):

TABLE F.1
COMPARISON OF FORMER AREA MUNICIPALITIES
STORM DRAINAGE SYSTEM CRITERIA AND POLICY

Former Municipality	Minor System Criteria	Foundation Drainage Requirements [2]	Combined Sewers	Roof Leader Policy	Major System Criteria
Hamilton	18 – 50 yr [1]	Gravity	Yes	Direct to Sewer	100 yr
Ancaster	2 yr	Sump Pumps	No	Surface	100 yr
Dundas	2 – 5 yr	N/A	No [3]	N/A	100 yr
Flamborough	2 – 5 yr	Gravity/ Sump Pumps	No	Surface	100 yr/Regional [4]
Glanbrook	5 yr	Sump Pumps	No	Surface	100 yr
Stoney Creek	5 yr	Gravity	No	Surface	100 yr

[1] 1942 - 1992 (inclusive) used an 18 year storm event; post 1992 used 50 year. Both design storms uses in Modified Rational Area Method
[2] Foundation drainage requirement exceptions are currently permitted upon receipt of a SWM report.
[3] The Pleasant Valley neighbourhood (Dundas) only has a combined sewer system permitted by By-Law.
[4] Regional event is Hurricane Hazel

New storm sewers will have to be designed to the new criteria, but new development must also reflect both the external upstream drainage and the existing storm sewer system (potentially none) downstream of the site.

The City of Hamilton Criteria and Guidelines for Stormwater Infrastructure Design (September 2007) outlines the criteria for the storm sewer system as follows:

Approved Master Drainage Plans (MDP's), which have established storm sewer sizing criteria other than 1 in 5 year standard will govern. In the absence of approved MDP's, storm sewers shall be designed to a minimum 1 in 5 year, unsurcharged standard (i.e. 85% of pipe capacity).

For any storm sewer to be assumed by the City the minimum allowable pipe diameter is 300 mm.

Interfacing between new storm sewers designed to the minimum 1 in 5 year, unsurcharged standard and existing storm sewers of variable sizing standard shall require hydraulic analysis of the existing and proposed storm sewers. Flow capacity of the proposed storm sewer shall be determined based on the receiving existing sewer remaining unsurcharged. The proposed storm sewer flow capacity would either be the 1 in 5 year standard or designed to allow the existing storm sewer to remain unsurcharged. Should the proposed storm sewer flow capacity be required to be less than the 1 in 5 year standard, to prevent downstream surcharging, inlet capacity for the storm sewer should be designed accordingly. Should the existing downstream system be already surcharged, the proposed upstream storm sewer should not increase the level of surcharging downstream.

Hydraulic analysis of the proposed and existing storm sewer system shall provide hydraulic grade lines for the inlet capacity and/or 1 in 5 year standard and 1 in 100 year standard. Hydraulic analysis should demonstrate that no negative impact on the receiving storm sewer system results from the proposed storm sewer. The extent of the downstream off-site analysis needs to be verified with City staff prior to initiation, to ensure that downstream conditions are adequately accounted for in the analysis. The City shall provide the consultant with the 100 year hydraulic grade line for the existing storm infrastructure system when available. Should downstream storm sewer surcharging be a concern under existing conditions, the proponent may be required to restrict inlet capacity to ensure no negative impact on the receiving system. In addition, the proponent is to ensure that adequate overland flow capacity is available in the development and in the receiving major system, incorporating the influence of the restricted inlet capacity of the storm sewer system.

Storm Sewer Oversizing

The Development Charges are applicable primarily to oversizing of existing or new storm sewers, to allow for the conveyance of runoff from new development. Current City financial policy provides for relief for storm sewers in excess of 1200 mm in diameter. Oversizing is common when a development has a large upstream drainage area that has been proposed to also be developed. When the stormwater peak flows from ultimate land use must be conveyed through a downstream development, the Development Charges provides a method for collecting funds for the net difference between the storm sewer system required solely for the one development, and the oversized system required for the multiple developments.

In some areas, a storm sewer system may not be viable, and the major overland system may not be able to safely convey the runoff resulting from a 1 in 100 year design storm event. In this case a relief sewer or conveyance mechanism may provide the additional capacity required, and be funded through Development Charges.

2.3 Road Crossings

Waterway openings for culverts and bridge crossings shall be designed in accordance with the Ministry of Transportation Ontario (MTO) policies and guidelines.

Notwithstanding the MTO's drainage policy and guidelines, it is required that new roadway culverts and bridges have sufficient conveyance capacity to pass the Regulatory flood (larger of Hurricane Hazel or 100 year event), in order to avoid adverse backwater effects (ref. MTO Directive B-100). If, due to economics or other mitigating circumstances, this is not feasible, a backwater analysis must be undertaken to determine the limits of upstream flooding and provide necessary mitigating design modifications.

Arterial and collector roadways in new developments should be, where possible, the only road classifications permitted to cross a watercourse having a drainage area in excess of 125 ha. Spacing and location of roadway crossings other than arterial or collector roads may be considered by the City when documented within the Stormwater Management Plan.

Freeboard and clearance (as defined in the governing MTO manuals and the Ontario Bridge Code) requirements for watercourse crossings should be based on current MTO criteria.

Where a permit is required from a Conservation Authority, watercourse crossings will not be permitted to increase upstream flooding on private lands, unless appropriate waivers can be secured.

Culvert replacements may require a Class Environmental Assessment as outlined within the City's Storm Drainage Policy.

Allowable Regional storm event (Hurricane Hazel) flooding depths on roadways should be determined based on the standards within the Ontario Ministry of Natural Resources Natural Hazards Technical Guides, latest revision.

2.4 Natural Watercourse Systems

The City of Hamilton Criteria and Guidelines for Stormwater Infrastructure Design (September 2007) outlines the criteria for the open watercourses as follows:

Where watercourse alterations are proposed as part of a development, the design of such alterations shall incorporate and consider the following:

Design Approach and Principles

- Channel design is to be based on natural channel forming processes to achieve a dynamically stable system. The channel evaluation methodology and design approach is to be consistent with the most current Provincial guidelines (ref. Ontario Ministry of Natural Resources Natural Hazards Technical Guides, March 2003 and "Adaptive Management of Stream Corridors in Ontario", MNR, 2001).

- Alteration to a regulated watercourse will require a permit from the respective Conservation Authority (Development, Interference with Wetlands and Alterations to Shorelines and Watercourses) and potentially clearance/authorization from the Federal Department of

Fisheries and Oceans (Fisheries Act) and Ontario Ministry of Natural Resources (Lakes and Rivers Improvement Act).

- Remedial works shall incorporate fish habitat protection/mitigation or compensation in accordance with the requirements of the Federal Department of Fisheries and Oceans (DFO) and Ontario Ministry of Natural Resources (MNR), related to stream type and significance.

- Remedial works shall incorporate the requirements of the governing Official Plan, as well as the requirements of provincial Ministries and other public agencies for protection of associated natural features such as:

  Environmentally Significant Areas (E.S.A.)
  - City of Hamilton
  - Conservation Authorities

  Niagara Escarpment
  - Niagara Escarpment Commission (NEC)

  Heritage Sites
  - Ontario Ministry of Tourism, Culture and Recreation

Setbacks

Conservation Authorities have established various watercourse setback policies which regulate development boundaries. The proponent should always verify that the most current Conservation Authority's setback policies are being adhered to. Each of the four Conservation Authorities, Hamilton Conservation Authority (HCA), Niagara Peninsula Conservation Authority (NPCA), Grand River Conservation Authority (GRCA), and Conservation Halton (CH), requires development to adhere to their specific setback policies. The most current policies were adopted in 2004, with each Conservation Authority creating a specific version of the Generic Regulations for development in or adjacent to hazardous lands and other regulated areas, i.e. "Development, Interference with Wetlands and Alteration to Shorelines and Watercourses".

The size of setbacks from the watercourse edge to developable lands is typically a function of the significance of the valley form, the sensitivity of the watercourse and the type of development (building or other).

The Conservation Authorities may establish setbacks using "Understanding Natural Hazards", MNR, 2001 to define the erosion hazard limit using stable slope allowances. Development Proponents should be aware that watercourse setbacks will typically be established by a Conservation Authority using the greater of the fisheries, valley and floodplain setbacks.

Access/Maintenance

- Creek block dedications adjacent to private land in new developments shall be fenced to prevent human access and encroachment. Fencing shall be on public property, 150 mm from the property line. Private access gates to creek block areas are not allowed.

- Natural channel design shall consider channel and utility maintenance requirements by incorporating access routes. Access routes may be located within the appropriate top of bank setback limit or adjacent to the low flow area in appropriately designated areas.

2.5 Stormwater Management Facilities

The City of Hamilton Stormwater Policy (March 2004) outlines the criteria for stormwater management quality, quantity and erosion control as follows:

Quality Control

Urbanization typically increases the contaminant load (i.e. sediment, metals, nutrients, bacteria) to natural stream systems. To mitigate this effect, stormwater quality treatment is required for all new development and redevelopment (including reconstruction of roadways with additional lanes, widening and cross-section revisions as required by review on an individual case basis by the Ministry of Environment) within the City of Hamilton, except for areas draining directly to a combined sewer system.

Stormwater quality treatment should provide a comprehensive approach to both surface runoff and groundwater. Thus, as a general consideration, maintenance of the natural hydrologic cycle including infiltration is encouraged and the use of stormwater management practices (SWMP) which enhance or maintain infiltration should be considered for each development.

Generally, active infiltration measures, such as soakaway pits and rear yard ponding, will be most applicable in permeable soils areas and their use will require supporting soils property documentation. Passive measures such as disconnection of roof leaders have been historically applied in many areas and shall be implemented in all areas unless specific constraints (such as in the former City of Hamilton and Town of Dundas where zero lot line construction on narrow width lots is permitted, or in the older City of Hamilton downtown areas where there is insufficient pervious area) preclude these measures. In all cases, the potential for groundwater contamination shall be considered where infiltration of road runoff is contemplated. In areas where hydrogeologic concerns are identified, particularly in areas where groundwater is used for human consumption and/or critical linkages to fisheries habitat are present, additional study and analysis may be required to determine the appropriate level of mitigation.

Stormwater quality treatment measures shall adhere to the specific guidelines for stormwater management practices that have been developed by the Province (ref. Stormwater Management Planning and Design Manual, Ministry of Environment, March 2003, or subsequent updates).

The design of stormwater quality facilities shall conform to existing Provincial requirements (ref. Stormwater Management Planning and Design Manual, MOE, March 2003, Water Management Policies, Guidelines Provincial Water Quality Objectives (Blue Book), MOEE, 1994), as well as current policies within the City of Hamilton (i.e. Hamilton Harbour Remedial Action Plan, Vision 2020), or subsequent updates of the foregoing.

All new development shall implement a stormwater quality management strategy, which considers surface runoff and groundwater in compliance with the existing provincial and municipal policies.

In areas of existing development where re-development is proposed, requirements for stormwater quality measures will be evaluated on a site-specific basis, with regard to the feasibility of implementation. Where on-site measures are considered infeasible, or in areas serviced by combined sewers, the City of Hamilton's Planning and Development Department may consider the potential for contributions to off-site improvements in the form of a cash-in-lieu policy, as in the current Provincial Stormwater Management Planning and Design Manual, March 2003, or subsequent updates. In order to appropriately direct these resources, a Master Storm Water Quality Plan (a regional assessment to identify retrofit locations and costs) is being contemplated by the City's Public Works Department. A 'pilot' study has been prepared for the former community of Stoney Creek.

Quantity Control and Flood Protection

Urbanization causes increases in runoff volumes and rates, due to an increase in impervious area and changes in conveyance systems. Without proper stormwater management, these increases may result in flooding and erosion.

The specified level of control for subject lands in the City of Hamilton is designated by a Watershed/Subwatershed or Master Drainage Plan where they exist. Such plans account for additional constraints (i.e. economic and physical limitations) which may limit the capacity of proposed stormwater management systems. Such plans may also demonstrate that the existing downstream capacities are sufficient to accommodate local increases in post-development peak flows (i.e. oversized sewers or watercourse reaches with adequate capacity and resistance to flow increases).

Local Conservation Authorities, through their mandate to control flooding and limit flood damage, have developed criteria for runoff control. Hence, application of these criteria through a co-ordinated approach to drainage planning on a watershed and subwatershed basis is required to ensure effective runoff control and minimization of flood damages.

Several Municipal jurisdictions have implemented a ***"zero increase in peak runoff rate"*** *policy for controlling post-development runoff. While this type of policy provides simple and clear direction regarding stormwater management flood control, a uniform application of this type of policy does not consider the potentially negative effects on watercourses from extended periods of controlled peak discharge (i.e. increased erosion).*

In cases where no Master Drainage Plan (MDP) or Watershed/Subwatershed Planning has been completed or development lands are considered as external drainage areas to a MDP, watershed/subwatershed planning areas, consultation with the City shall determine if runoff peak flows shall be controlled to pre-development levels or alternative stormwater management is required. Discussion with the City's Planning and Development Department shall be required to determine the scope of assessment based on the potential impact on the receiving storm system (ref. Conditions for Practice). Should the proponent establish, to the satisfaction of the City's Planning and Development Department, that the potential impact of the proposed development would be minimal, the City's Planning and Development Department could decide that detailed modelling and analysis may not be required, as per the Conditions of Practice within the Criteria and Guidelines for Stormwater Infrastructure Design Manual. Should the City's Planning and Development Department deem a more detailed assessment appropriate, the proponent would need to demonstrate through appropriate modelling and analysis, that uncontrolled flow will not cause detrimental impacts on downstream properties and watercourse systems as per the Criteria and Guidelines for Stormwater Infrastructure Design Manual. At the development application stage, before the City's Planning and Development Department will accept an increase in runoff rates, the proponent must also receive endorsement from the agencies having jurisdiction. Over-control of runoff (i.e. less than pre-development runoff), may also be required as it relates to downstream constraints. .

2.6 Erosion Control

The rate that uncontrolled runoff, due to urbanization, can accelerate the natural evolutionary processes of a watercourse depends upon topography and soil conditions. When erosion and/or bank instability is probable (e.g. from outlets from future development areas), the proponent shall either provide effective on-site or system controls (e.g. end-of-pipe controls), stabilize the receiving watercourse by appropriate remedial measures, or contribute to a fund designated towards future watercourse improvements, typically identified in Watershed and Subwatershed Plans. Should on-site or system controls not adequately control flows below the receiving system's erosion threshold, either off-site watercourse remedial measures or contribution to a fund shall be required.

Requirements for erosion control will generally be determined through upper level studies such as Watershed/Subwatershed/Master Drainage Plans. In these cases, the proponent(s) will be required to provide mitigation in accordance with the Watershed or Subwatershed Plans or with the Master Drainage Plans, as well as policies of the local Conservation Authority.

In areas where no Watershed, Subwatershed Plan or Master Drainage Plan exists, it shall be the responsibility of the development proponent to mitigate potential erosion impacts in accordance with Provincial Guidelines, unless it can be demonstrated through appropriate modelling and/or analysis that erosion processes will not be adversely affected by the proposed development.

In areas where the downstream receiving watercourse is determined to be unstable, or where control/over control of flow rates is either not possible or not feasible, design of watercourse alterations would be considered subject to design in accordance with Natural Channel Design principles.

The City of Hamilton supports Natural Channel Design Principles, as specified by the Province in Natural Channel Systems, An Approach to Management and Design, MNR, 1994 (or most recent update) and "Adaptive Management of Stream Corridors in Ontario", MNR 2002 (or most recent update) Implementation of Natural Channel Design principles on area watercourses shall follow the guidance within the Criteria and Guidelines for Stormwater Infrastructure Design Manual. Any watercourse alteration shall be designed to the future flow regime with stormwater management controls in-place.

Storm sewer outfalls in natural channels should be provided with proper protection against erosion, which includes appropriate bank scouring protection on either side of the outfall and creek. When storm sewer outfalls outlet to steep and/or deep valleys, drop structures shall be designed in such a manner as to ensure bank stability. Such local erosion protection measures shall be designed so as not to interfere with the natural channel forming processes of the receiving watercourse system. Natural channels shall be designed to accommodate various flow regimes resulting from phased stormwater management measures.

Although both swales and ditches only provide a flow conveyance function and not the natural channel form, swales and ditches should be designed with appropriate erosion protection. Erosion protection measures shall be provided at storm outfalls and for the swale/ditch according to erosion thresholds.

3. METHODOLOGY

3.1 Overview

All components of drainage works that have been considered to require development funding have been included in this assessment/calculation. Storm drainage infrastructure has been classified into three major groups: open watercourses, storm sewers, and stormwater management facilities. For the purposes of this assessment, the charges have been separated into five categories of work as follows:

A. Open Watercourses: Channel System Improvements (identified projects)

- Erosion control and conveyance works, including channelization and major culverts, identified along watercourses to address the impacts of growth, such as increased peak flows, volumes, and durations of erosive flows, as identified in currently approved studies

B. Open Watercourses: Erosion Control – Anticipated Future Works

- Off-site (immediately downstream of new development) erosion control and conveyance works not yet identified in any approved studies along watercourses to mitigate impacts of growth (i.e. areas not covered in current Master Drainage Plans, Subwatershed Studies, etc.).

C. Stormwater Management (Quality and/or Quantity Facilities)

- Stormwater quantity and quality control infrastructure required to manage runoff from future growth areas, to mitigate impacts on downstream systems.
- Retrofit facilities for managing runoff from future growth included
- Includes end-of-pipe infrastructure such as wetlands, wet ponds, dry ponds, oil and grit separators
- Includes certain qualifying source controls, such as Best Management Practices, and Low Impact Development

D. Oversizing of Trunk Storm Sewers

- Includes the oversizing of storm sewers to accommodate the new growth, or where multiple new growth areas combine to generate sufficient additional runoff that a sewer in excess of 1200 mm in diameter is required; the cost of the oversizing would be considered a Development Charge. Local storm sewers to service new growth, less than the 1200 mm diameter threshold, are considered a local Developer Contribution, and are not included in the Development Charge.

E. Culverts and Bridges: Anticipated Future Works

- Future works (i.e. those not identified in previous studies as part of Category A) which require an upgrade (either in length or capacity) normally associated with new road construction to support growth.

A further two sub-categories have been included, to specifically capture the infrastructure required for the newly identified growth areas:

- GRIDS stormwater management facilities
- GRIDS watercourses

GRIDS is the City's Growth Related Integrated Development Strategy, which includes the areas identified as Potential New Business Park, in the existing Airport Business Park Special Policy Area, new employment lands adjacent to the Airport SPA lands, and a proposed urban boundary expansion/employment lands to the south and east of Highway 20 and Highway 53/Elfrida.

This growth area includes the lands which are the subject of the recently completed study: Airport Employment Growth District – Phase 2, Dillon et al 2009.

3.2 Future Development (Residential /Non-Residential growth area)

Figures F1-F7 show the City of Hamilton, along with the bounded development areas from previous Development Charge Background Studies. For this 2011 update study, the City has provided a draft (January 2011) development staging plan, which identifies the parcels of residential and non-residential growth, and where possible, the status of the lands with respect to anticipated timing of development. The City Development Engineering staff has also reviewed the proposed time frame of all of the stormwater projects, and grouped them into three time periods: 0-5 years, 6-10 years, and 11+ years. This time period classification has also been correlated with the 2011 budget allocation.

It should be noted that for the purpose of calculating the development charge, there is no distinction between the three time frames. There has been a column left in the costing tables for reference purposes only.

Figures F1-F7 show the approximately forty (40) different subwatersheds that cover the City study area. These subwatersheds form part of four Conservation Authorities, namely: Conservation Halton, Hamilton Conservation Authority, Grand River Conservation Authority, and the Niagara Peninsula Conservation Authority. A complete list of all distinct development areas and the creek into which they discharge, is included in Appendix F1.

3.3 Costing Assumptions

The estimates of the costs are based on the best available information for future projects. A complete listing of all the projects is in Appendix F3. All assumptions used to derive the costs

are listed in this section. The costs are based on estimated construction costs plus a 15 % allowance for engineering, design, legal, and survey. Estimated land costs have also been included in the totals. Residential land costs have been tracked by the City, and currently have been set at $360,000/ac ($889,560/ha), except for Ancaster and Waterdown, which has been set at $450,000/ac. ($1,111,950/ha).

The costs have either been calculated using formulas based on 2009-2011 construction prices from projects completed in the City, and neighbouring Municipalities in the GTAA, where no cost estimates are available in the background reports, or where construction estimates were available, the unit rates used in those estimates are considered to be valid in 2011 (i.e. are the same as rates from current contract bids).

The Development Charge component cost of the project (i.e. the portion attributable to new development) has been determined by examining the percentage of existing development that would benefit from the infrastructure.

3.3.1 Specific Costing Assumptions By Category

A complete summary listing of all projects is in Appendix F2, with the Residential listing first followed by the Non-Residential, and both sorted by geographic area, then category of project.

Costs for Category A [Open Watercourses: Channel System Improvements (identified projects)] have been calculated using the existing studies provided by the City (ref. list of references at the end of the report), and adjusted as per Section 3.3.

Costs for Category B (Open Watercourses: Erosion Control – Estimated Future Works not identified in previous studies) have been calculated as follows:

- for existing open watercourses downstream of new development, the length has been abstracted from the topographic mapping provided by the City,

- The applicable length for erosion protection has been defined by the distances to a receiving water body (i.e. lake), or to a point downstream where erosion is deemed to no longer occur as a result of the subject development. This point has been estimated as the point where the total tributary drainage area exceeds 2 times the area tributary to the development discharge point (i.e. immediately downstream of the new development). This approach is intended to reflect the diminished erosion impact of developed discharge, as the size of the drainage area and flow in the watercourse increases downstream from the point of discharge.

- The percentage of the total length of channel to require erosion works has been established at between 5 and 20 %, depending on the relationship of total development area related to upstream drainage area. The greater the fraction of developed area, tributary to the subject watercourse, the greater the percentage of watercourse assumed to require erosion control. The maximum of 20 % reflects the anticipated benefits from on-site stormwater management which would greatly reduce downstream erosion potential. However, since volume control is not

considered practical in most parts of Hamilton, erosion potential would not be eliminated entirely with on-site controls in place.

- The cost per metre of works has been established as either $750 or $1500 depending on the upstream drainage area (see B1)

- The cost for land (easement) has been assumed to be the same as for stormwater management facilities, i.e. assuming highest and best use for the land. The land required for an easement has been estimated as either 10 m or 20 m width depending on the size of the creek (i.e. drainage area under or over 500 ha), multiplied by the length of creek to be treated. This estimate does not allow for connections between easements on separate sections of the creek.

Costs for Category C (SWM facilities) have either been based on previous studies or, if no estimate was available, the cost has been based on a formula relating the drainage area, required volume, and the required land to accommodate the facility footprint. The cost of land has been set at either $360,000 per acre, or $450,000 per acre in accordance with the City's calculated costs.

Target volumes for stormwater quality, erosion control and flood control vary widely, each being specific to the location and watershed. Ranges have been estimated to be between 100 and 200 m^3/impervious hectare for quality only; between 100 and 400 m^3/impervious hectare for extended detention erosion control, and between 300 to 500 m^3/impervious hectare for flood control. These are based on recent experience in developing urban environments in the Greater Golden Horseshoe. The specific targets will be directly related to the type of receiving watercourse. For sizing facilities in the absence of previous reporting, an average target volume of 475 m^3/impervious hectare has been used, with an approximate impervious fraction of 40 %, therefore an average volume of 190 m^3 /hectare has been used for DC calculation purposes for quality control facilities. An estimated volume of 720 m^3 /hectare has been used for DC calculation purposes for combined quantity/quality control facilities.

The erosion control and flood control volumes are typically placed above the water quality control volumes, hence there may be economies in terms of land requirements when multiple functions are required at a facility. The construction costs have been based on the total volumes.

The land costs have been developed to take into account the required footprint of the facilities and have been based on the following rule:

- If the footprint has been established through a City-approved study, this area is to be used;
- If no study exists, a quality (only) facility or quantity (only) facility will require 4 % of the contributing drainage area; or
- If no study exists, a combined quality/quantity facility (and those combined facilities that include an erosion control volume) will require 6 % of the contributing drainage area.

The general construction cost relationship has been developed from both estimates and actual construction costs of a range of SWM facilities constructed in Southern Ontario over the past five years.

Unidentified Projects

The City has included an item entry under Category C for stormwater management facilities that are currently not identified in the list of projects. The City has had several occasions over the preceding years where development has occurred in such a manner as to require temporary or additional stormwater management works. These works may, in some cases, be determined by the City to provide a long-term benefit to the stormwater system, and hence the City proposes to add these select works to their infrastructure. The City may then credit these works in part or in full, and hence have created this item as a form of a Credit Pool. The City will also review whether previously identified works in the area may need to be updated to reflect the new works.

Low Impact Development Credit Policy

The City of Hamilton supports Low Impact Best Management Measures to complement traditional stormwater management techniques. Low Impact Development Best Management Practices (LID BMP's) essentially promote treatment/management of storm runoff at the source. The benefits of this approach are widely understood and documented, hence not repeated within this document. Key concerns relate to implementation. The issues and challenges associated with the implementation of Low Impact Development Best Management Practices relate primarily to the fact that these measures are typically "on-lot" within private control, outside of the direct control of the Municipality. Due to this basic circumstance, the question is raised by municipal managers as how best to ensure that the "on-lot" measures are maintained, working, and not removed by private landowners and/or businesses. Clearly, by installing these Best Management Practices on private property, there will be an eventual loss of effectiveness, either through lack of maintenance and/or removal in their entirety. The question relates to what extent this "loss" will occur and will this vary by land use.

Notwithstanding, Low Impact Development Best Management Practices in developing subwatersheds, have the potential to reduce the scale and scope of conventional end-of-pipe stormwater management systems. The question related to the foregoing perspective though, is how can this be accounted for functionally and financially in the construction and financing of traditional end-of-pipe stormwater management facilities. It must also be clear, in the case of intensification and infills, whether the stormwater management involves quality, quantity, or both.

As noted earlier, the City of Hamilton is supportive of Low Impact Development measures and as such wishes to encourage these through a form of incentive program. To this end, the City, through this Development Charge, has set up an initial Low Impact Development Credit Pool in the amount of $5,000,000. The City is developing a policy for the management of this credit, which will be refined as the policy evolves over time. At this time, developments under Site Plan Control that incorporate LID measures, and only in the absence of an identified stormwater

management facility to contribute to, will be eligible for a further credit of 75% of the stormwater credit identified in Section 2.7.

Retrofits

The City, as part of their Stormwater Master Plan (2007), has assessed the feasibility of retrofitting existing stormwater management facilities in order to provide stormwater quality control and erosion control measures. The objective for the City is to improve environmental conditions in the downstream receiving water bodies.

There are 29 identified retrofit opportunities (e.g. add a quality or erosion component to an area currently receiving only quantity or flood control) in the City. These have been separated into those 11 locations which serve only existing development (therefore not growth-related, and not currently considered), and those 18 which serve both existing and new development (the benefit to existing must be deducted).

For the 18 facilities that meet the criteria, the total area served is 759 ha and the growth-related fraction has been estimated at 54.45 %.

GRIDS

GRIDS is the City's Growth Related Integrated Development Strategy, which includes the areas identified as Potential new Business Park, in the existing Airport Business Park Special Policy Area, new employment lands adjacent to the Airport SPA lands, and a proposed urban boundary expansion/employment lands to the south and east of Highway 20 and Highway 53/Elfrida.

The growth areas identified in the GRIDS study accounts for approximately 75 new projects not included in the 2004 Development Charge, including an estimated 57 SWM facilities and 18 off-site erosion control projects, with the erosion projects lumped into 5 area erosion studies, based on the watersheds and distinct growth areas.

The City has recently completed the Draft Airport Employment Growth District study (December 2009), however this report does not detail the locating of all future stormwater management facilities. There may be opportunities to master plan the areas, and reduce the infrastructure, however it is left at the conservative level for the charge calculation purposes. Once a Final Master Drainage Plan is complete, an update may be required for the GRIDS stormwater management facilities (number, location, and sizes).

The GRIDS development areas are drained by the Welland River, Three Mile Creek, and Twenty Mile Creek, each of which are considered to be sensitive coldwater fish habitat. Based on the anticipated Enhanced level of protection to be applied to the tributaries, it is proposed that all watercourse tributaries will be required to remain open: this therefore increases the number of facilities required to service the area.

Similar to the 2004 and 2009 Development Charge Background Study, there are off-site erosion control studies and potentially work proposed for each receiving tributary downstream of the growth area.

The Airport SPA facilities have been preliminarily sized to have larger footprints on account of the condition that Transport Canada typically imposes on stormwater management facilities near airports. There cannot be open water facilities since these are considered to attract waterfowl, and pose a navigation hazard to aircraft. The facilities have therefore been sized as dry ponds.

Costs for Category D (Oversizing of Trunk Sewers and Culverts) are based on the relative increase in cost for storm sewers over a threshold diameter of 1200 mm, as set by previous City Financial Policy. A list of projects has been generated by the City Development Engineering Department, and is included in Appendix F3-D.

Unidentified Projects

The City has included a provisional entry under Category D for storm sewer oversizing projects that are currently not identified in the list of projects.

Costs for Category E (culvert and bridge upgrades not identified in previous studies) have been estimated in the following manner:

- Based on the planned DC eligible road projects (new and widening of existing) affected watercourse crossings, based on the topographic mapping, have been determined (current estimate =137),
- The size of the new culvert cross-sectional area has been estimated as a function of the upstream drainage area,
- All "small" crossings where the culvert will likely have a diameter smaller than 1200 mm have been removed from the calculation, as those works would be assumed to be part of the road works,
- Also, any culverts previously identified in Category A (6) have not been included under this category,
- The remaining (131) culverts have been separated into three categories, based on: estimated flow conveyance area of 2 m^2, 4m^2, and 8 m^2, (92, 21, and 18 respectively); for costing purposes unit rates of $75,000, $150,000 and $300,000 per culvert/bridge respectively have been used, assuming a 26 m road width for all culverts/bridges. This cost estimate is based on concrete box culverts, and has been developed using 2004 unit rates for box sections, installation estimated at double the supply cost, and allows for an average depth of cover on each culvert.

Many of these culverts/bridges will only require lengthening, as opposed to full replacement due to hydraulic or structural deficiencies, however costs have not been separated. The cost attributable to the new development though would only be that of the widening. However, insufficient information is currently available to establish the affected number of crossings.

In several cases, however, the re-classification of the road from rural to urban, and local to collector or arterial, will necessitate an upgrade of the design criteria, and hence a larger culvert/bridge. The cost for this is currently attributed entirely to new development, however will need to be reduced to reflect the portion of the culvert that serves existing development.

3.4 Existing Agreements

As noted in Section 2, there are existing agreements (e.g. Special Policy Areas, Local Area Improvements, and Developer Agreements) in force that will need to be accounted for in the financial section of the Development Charges Update. Where it can be identified and verified by the City, existing developer contributions that have been made under existing agreements will be credited after the Development Charges are collected.

4. SUMMARY OF STORMWATER COMPONENT OF DEVELOPMENT CHARGES

4.1 Overview

The following tables present the stormwater development charges cost estimates, by Category A to E, plus GRIDS. In each table, the costs have been split into Residential and Non-Residential, providing the gross costs and the DC related costs.

Table F.2: Summary of Stormwater Development Charges Costs

Type Of Work		Gross Estimated Cost	DC Eligible Growth %	Development Charge Cost
A Channel System Improvements (Identified Projects)				
	Residential	$3,233,275	50	$1,616,638
	Non-Residential	$12,206,435	82	$10,077,642
Subtotal A		$15,439,710	76	$11,694,279
B Erosion Control – Estimated Downstream Future Works				
	Residential	$11,535,150	31	$3,610,971
	Non-Residential	$4,296,300	50	$2,127,480
Subtotal B		$15,831,450	36	$5,738,451
C *Stormwater Management Quality/Quantity Facilities*				
	Residential	$149,880,445	94	$126,833,417
	Non-Residential	$104,902,131	0	$0
Subtotal C		$254,782,576	55	$140,385,653
D Oversizing of trunk sewers and culverts				
	Residential	$11,975,630	100	$11,975,630
	Non-Residential	$0	0	$0
Subtotal D		$11,975,630	100	$11,975,630
E Culverts and Bridges (not in Category A)				
	Residential	$9,750,000	100	$9,750,000
	Non-Residential	$5,700,000	100	$5,700,000
Subtotal E		$15,450,000	100	$15,450,000
GRIDS Stormwater Management Quality/Quantity Facilities				
	Residential	$61,459,018	100	$61,459,018
	Non-Residential	$112,154,266	0	$0
Subtotal		$173,613,284	35	$61,459,018

Table F.2: Summary of Stormwater Development Charges Costs				
Type Of Work		**Gross Estimated Cost**	**DC Eligible Growth %**	**Development Charge Cost**
GRIDS Watercourses				
	Residential	$3,404,814	100	$3,404,814
	Non-Residential	$6,128,160	100	$6,128,160
Subtotal		$9,532,974	100	$9,532,974
TOTAL		**$496,625,623**	51	**$256,236,005**
Residential		$251,238,332		$232,202,723
Non-Residential		$245,387,291		$24,033,282

All of the proposed projects in Categories A to E and GRIDS, which have been considered for the storm drainage Development Charge, can be attributed to distinct parcels of residential and/or non-residential growth lands. These linkages form the basis for the proposed split of the total charge. For categories D, and E, in the absence of information to support the establishment of a City share, the % attributable to the City has been set at zero.

4.2 Summary

The City of Hamilton is undertaking an update to the 2011 Development Charges By-Law, and updating costs.

The City has prepared an overall report, as well as separate background reports for each service. This background report provides information for the portion of the Development Charges relating to stormwater including: erosion control, channel improvements, stormwater management works, oversizing of existing stormwater related infrastructure and stormwater related studies. Projects included in this report are future growth related which includes both planned and unplanned projects. Future growth related information has been collected from the City and other studies, and where no information was available appropriate assumptions have been made.

This report provides a summary of the approach used in establishing the Development Charges related costs and summarizing of the stormwater-related Development Charges for both residential and non-residential development.

A gross total of $496,625,623 for stormwater projects has been identified, with the portion allocated to new development totaling $256,236,005.

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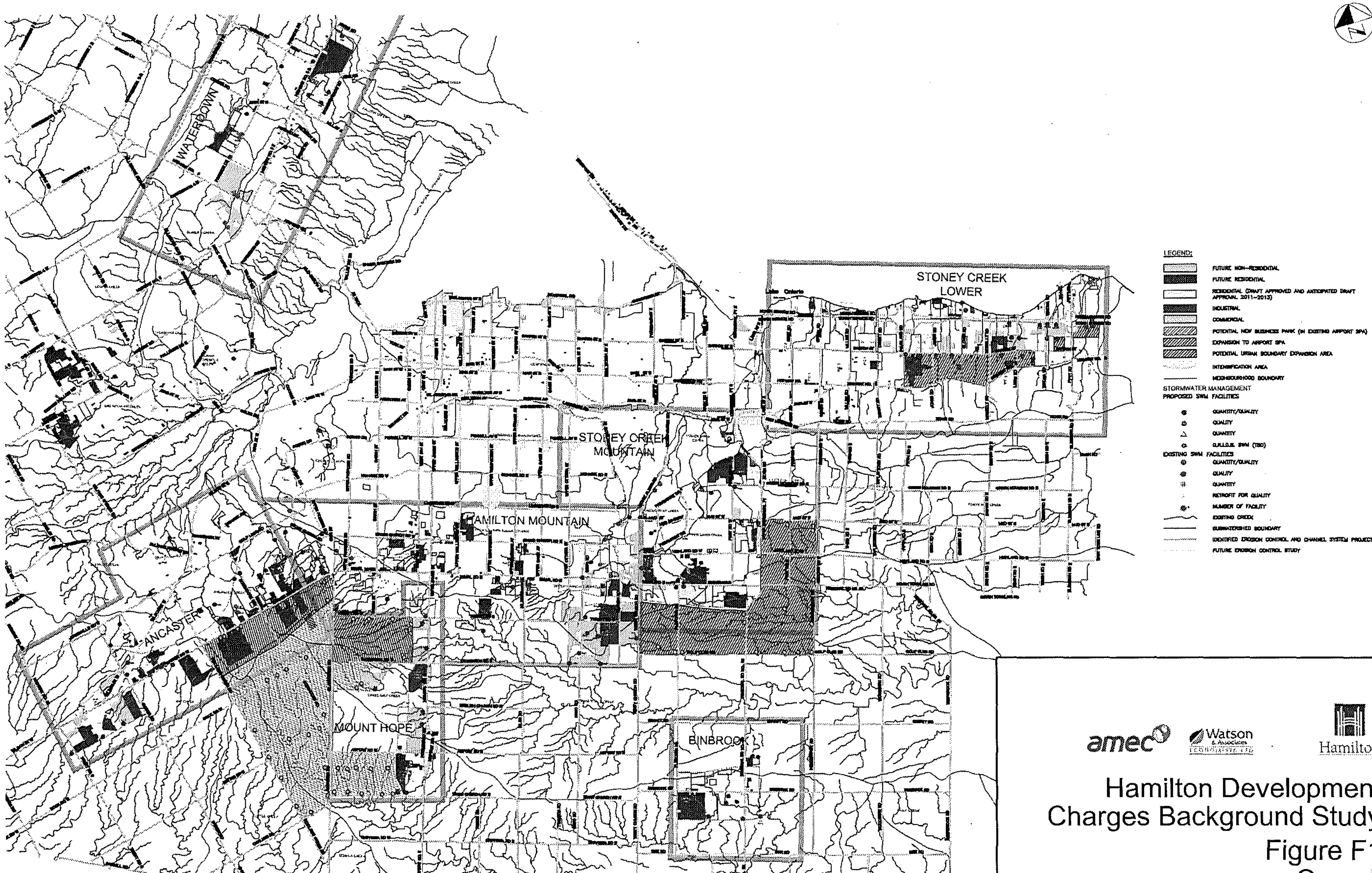

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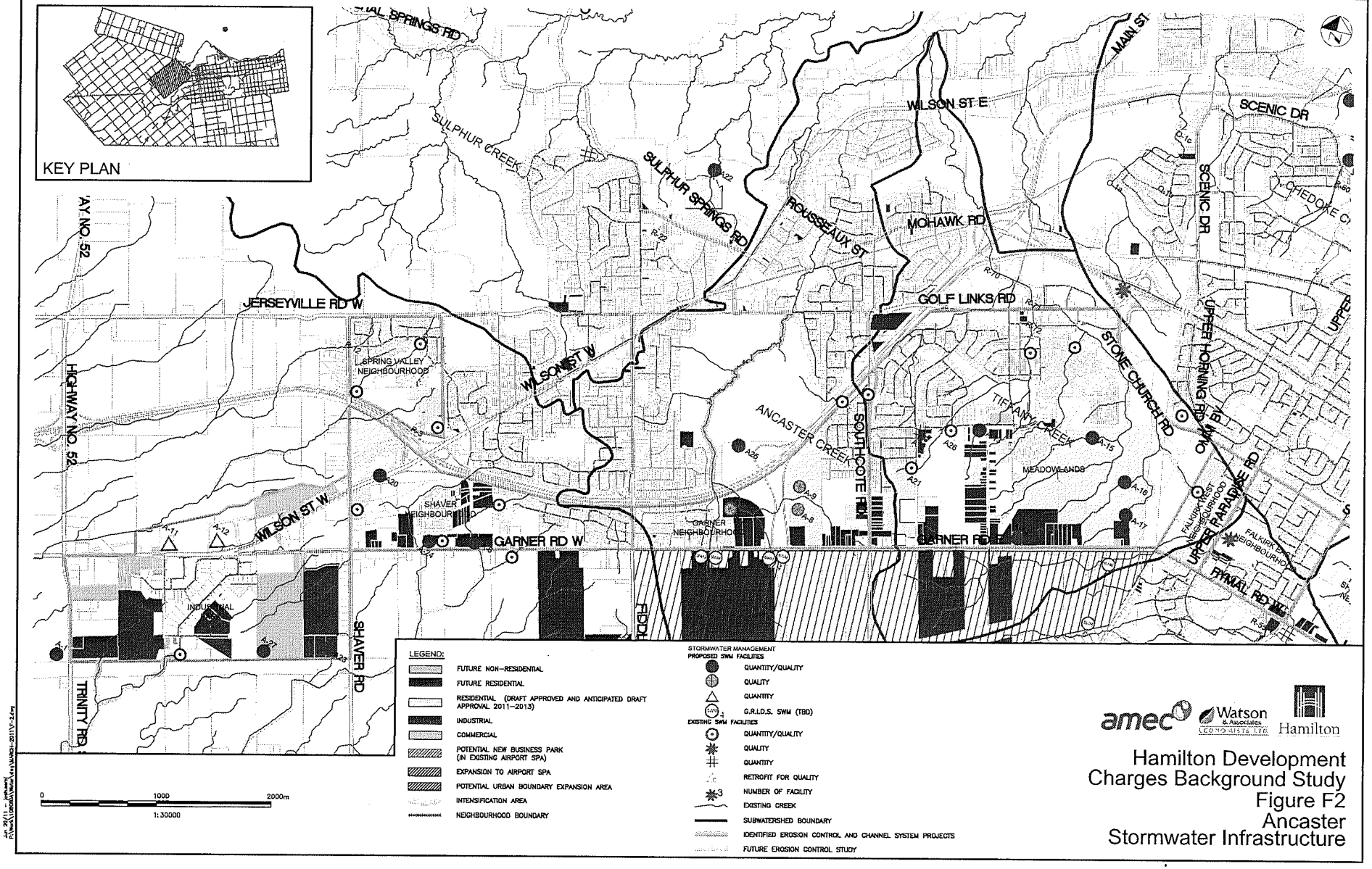
Hamilton Development Charges Background Study

Figure F1 Overall Keyplan



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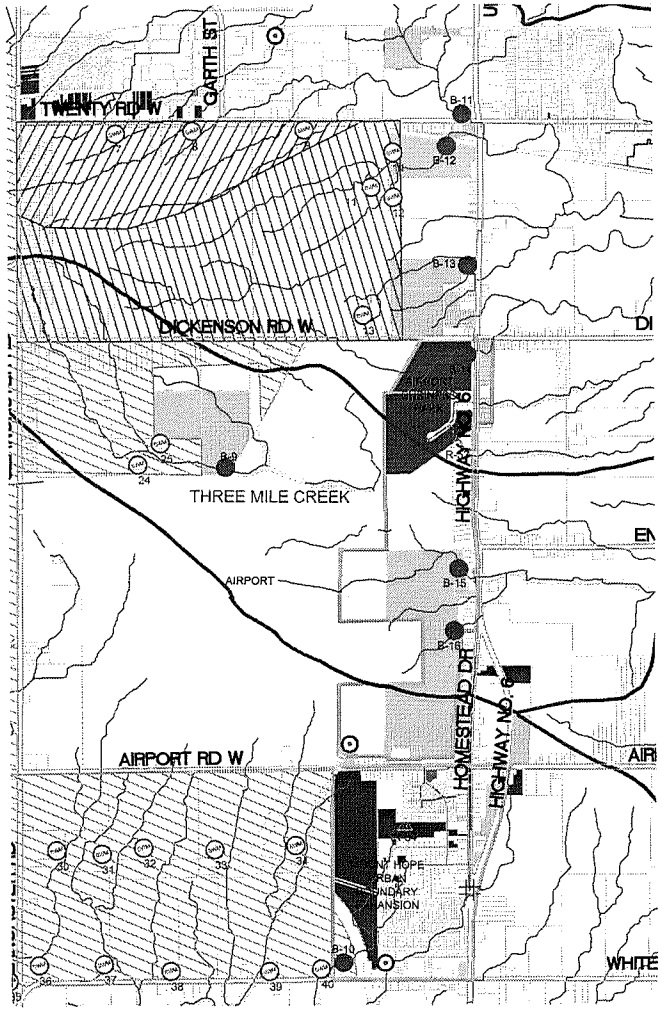
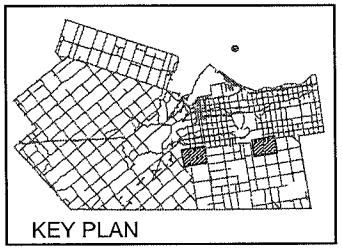
Hamilton Development Charges Background Study
Figure F2
Ancaster
Stormwater Infrastructure





LEGEND:

- FUTURE NON-RESIDENTIAL
- FUTURE RESIDENTIAL
- RESIDENTIAL (DRAFT APPROVED AND ANTICIPATED DRAFT APPROVAL 2011-2013)
- INDUSTRIAL
- COMMERCIAL
- POTENTIAL NEW BUSINESS PARK (IN EXISTING AIRPORT SPA)
- EXPANSION TO AIRPORT SPA
- POTENTIAL URBAN BOUNDARY EXPANSION AREA
- INTENSIFICATION AREA
- NEIGHBOURHOOD BOUNDARY

STORMWATER MANAGEMENT
PROPOSED SWM FACILITIES

- QUANTITY/QUALITY
- QUALITY
- QUANTITY
- G.R.I.D.S. SWM (TBD)

EXISTING SWM FACILITIES

- QUANTITY/QUALITY
- QUALITY
- QUANTITY
- RETROFIT FOR QUALITY
- NUMBER OF FACILITY
- EXISTING CREEK
- SUBWATERSHED BOUNDARY
- IDENTIFIED EROSION CONTROL AND CHANNEL SYSTEM PROJECTS
- FUTURE EROSION CONTROL STUDY

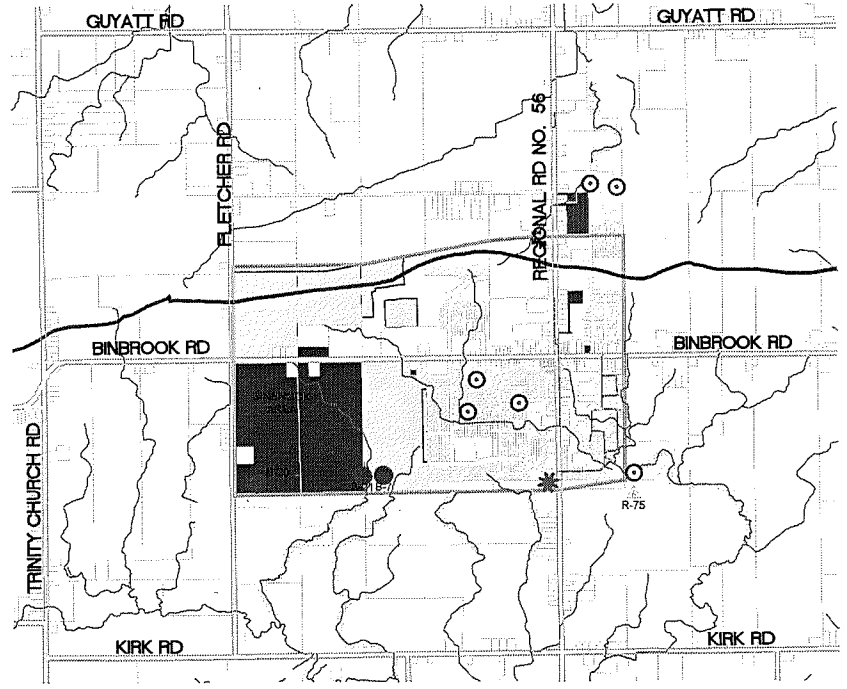


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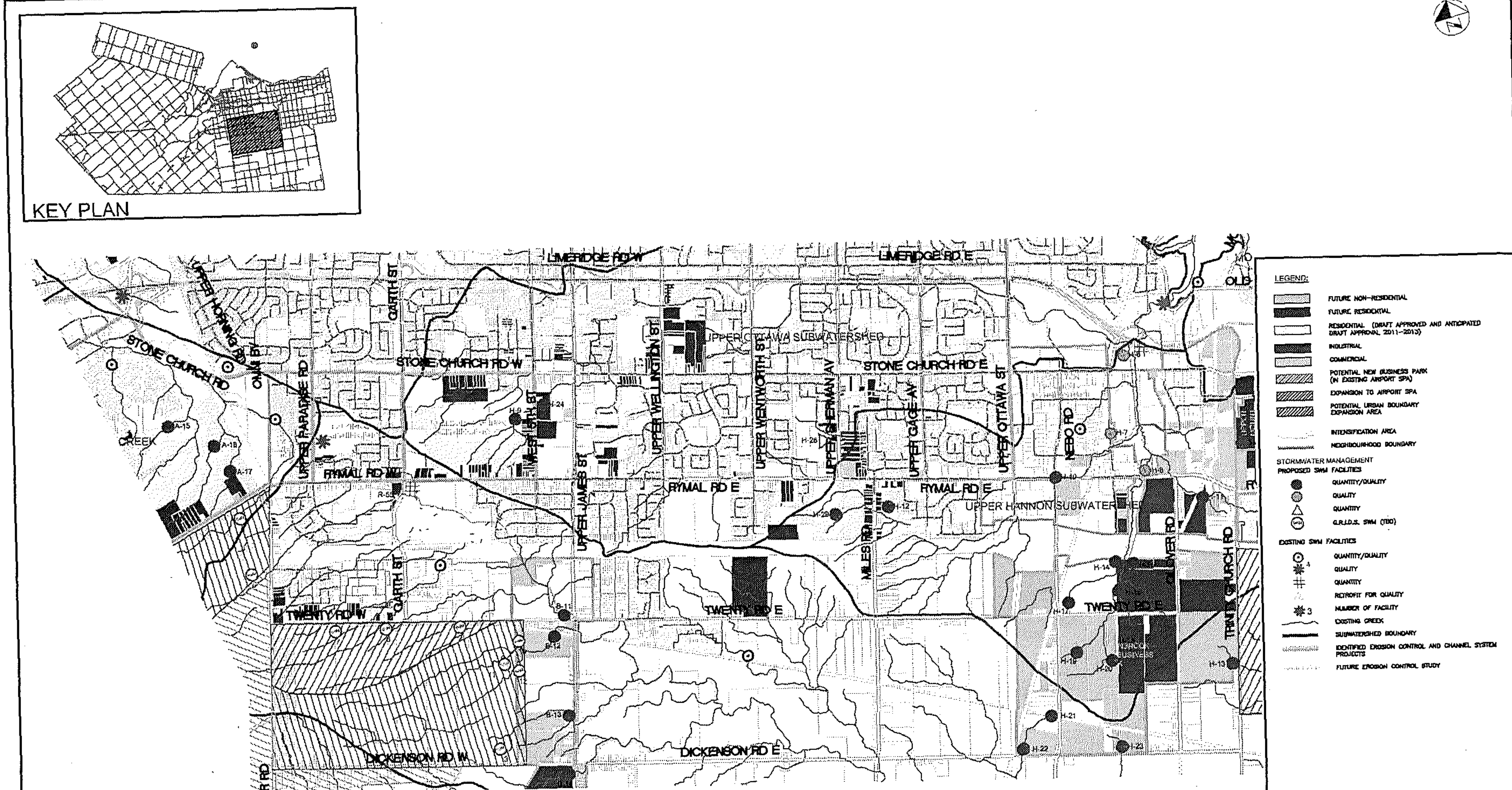
Figure F3
Binbrook / Mount Hope Stormwater Infrastructure



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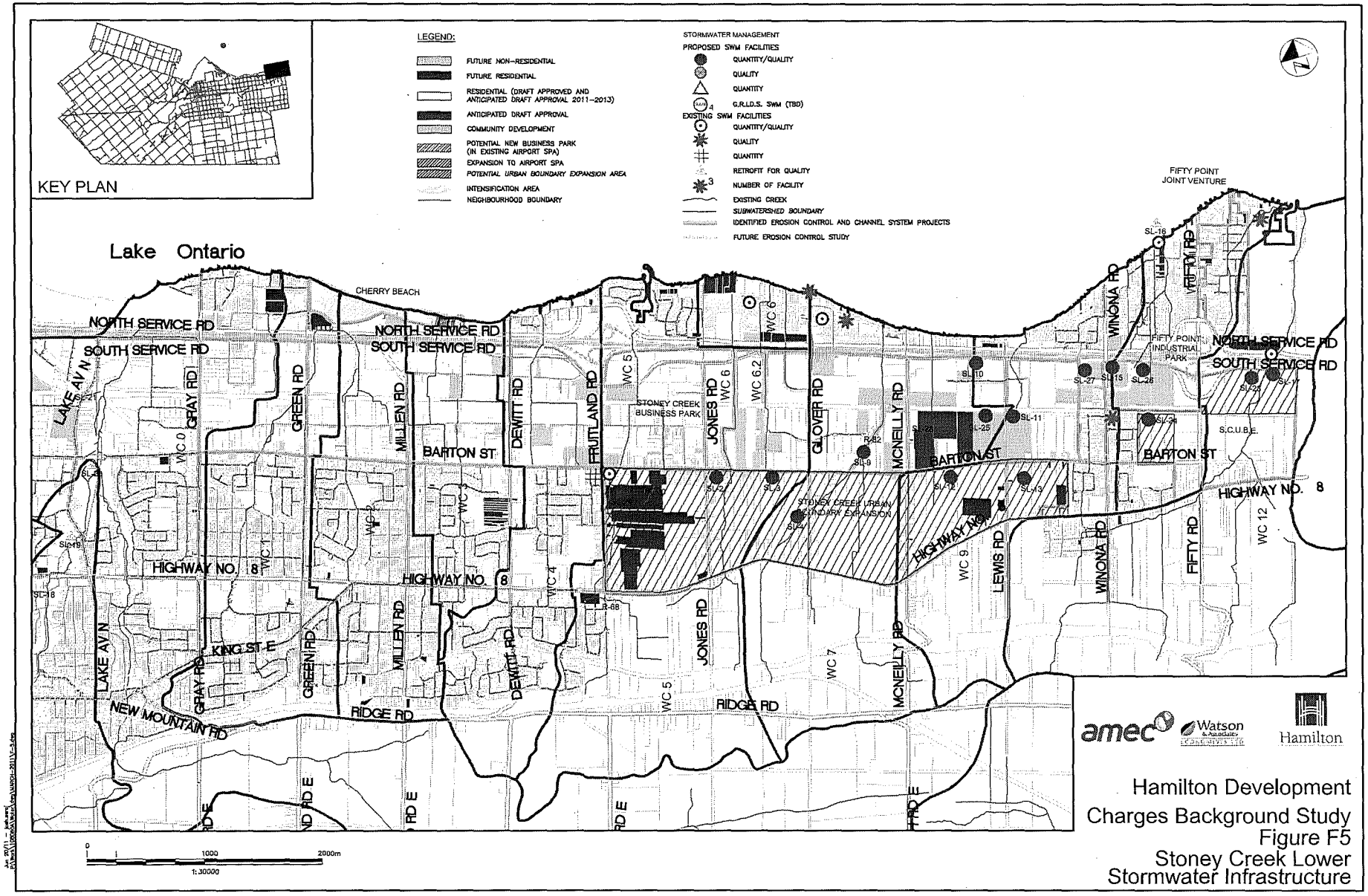
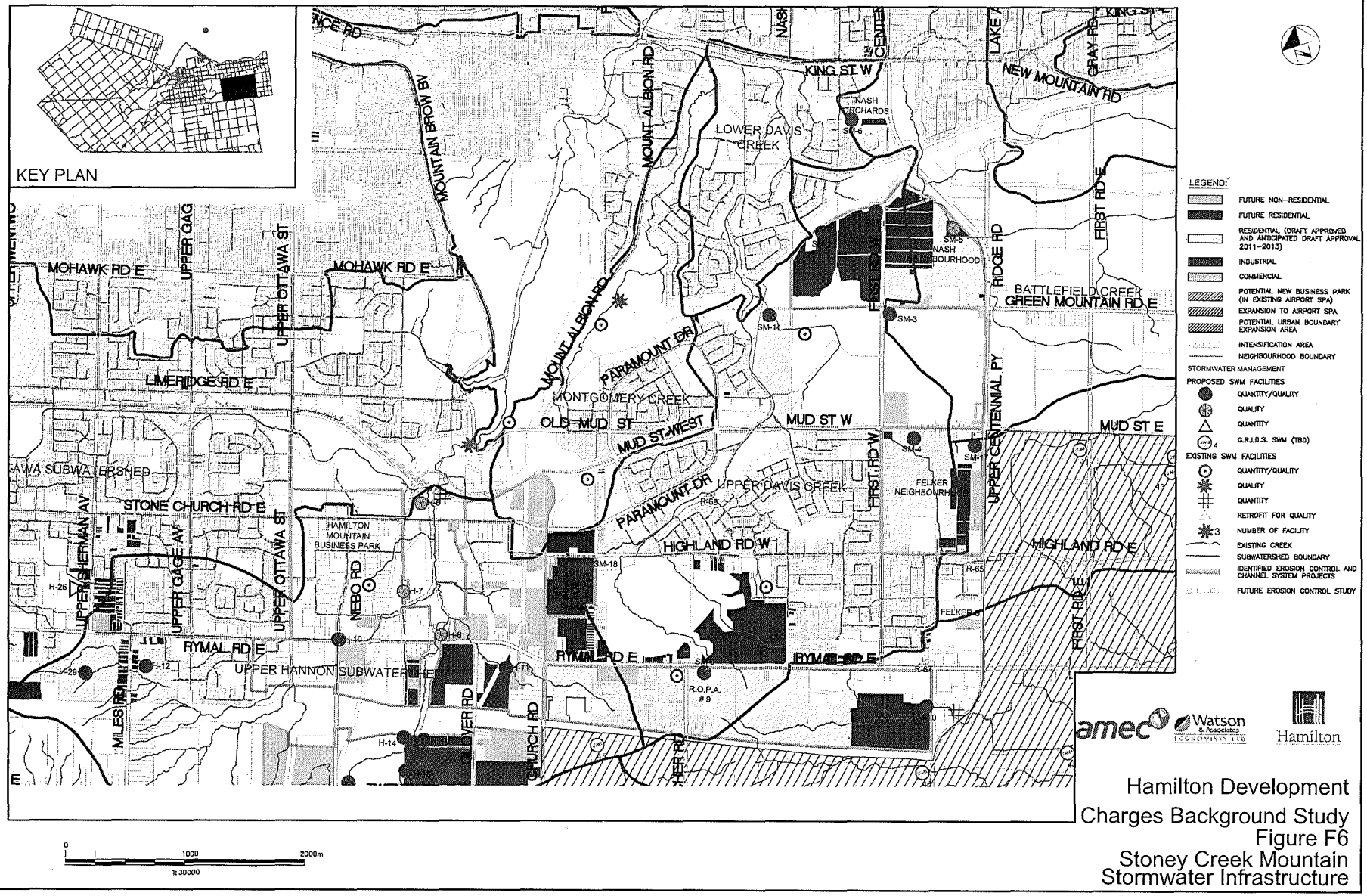
Hamilton Development Charges Background Study
Figure F4
Hamilton Mountain Stormwater Infrastructure



Hamilton Development Charges Background Study
Figure F5
Stoney Creek Lower Stormwater Infrastructure



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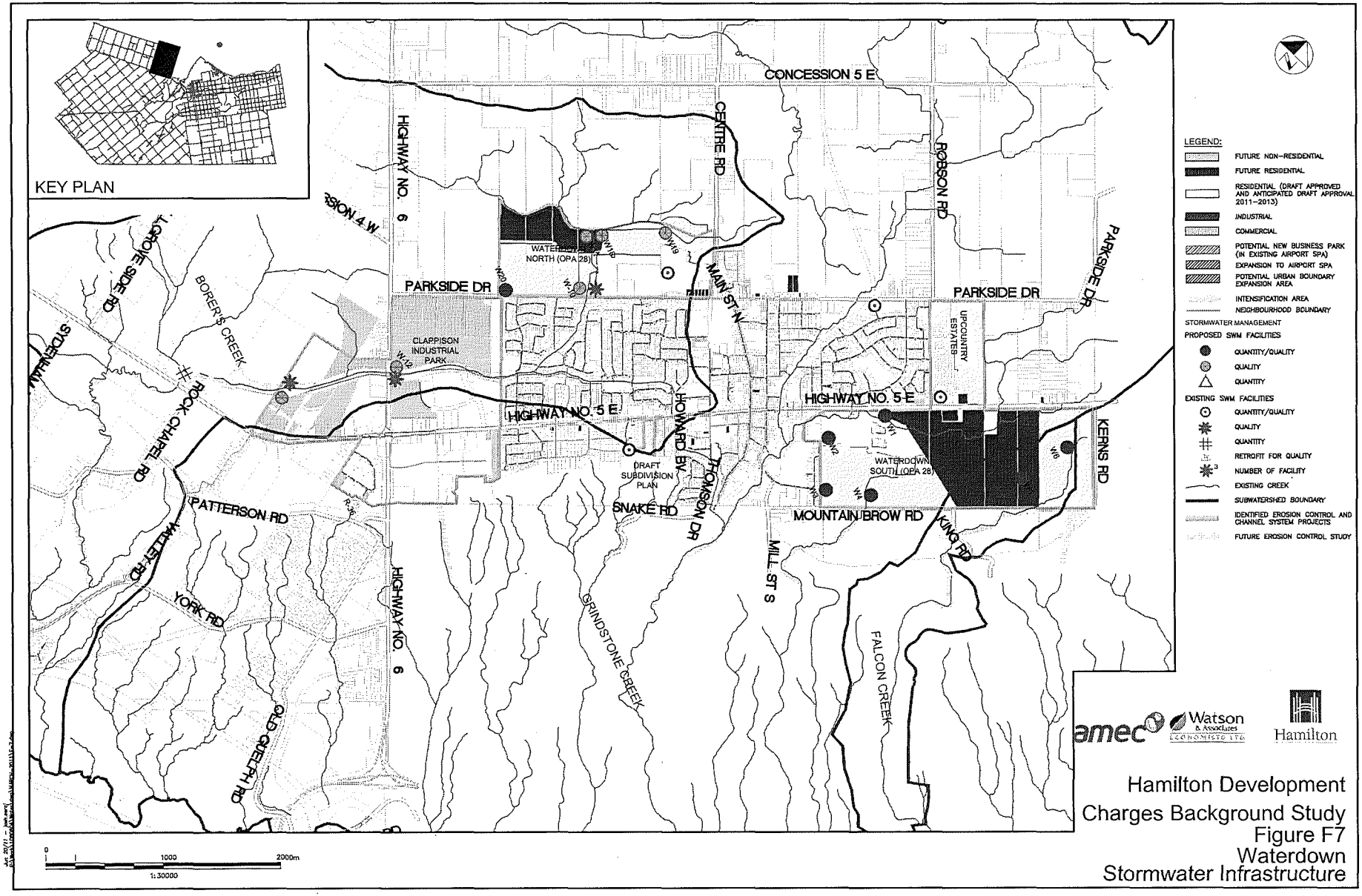
Hamilton Development Charges Background Study
Figure F6
Stoney Creek Mountain Stormwater Infrastructure



Hamilton Development Charges Background Study
Figure F7
Waterdown Stormwater Infrastructure

APPENDIX F-1
DETAILED LIST OF SUBWATERSHED AREAS

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS										
Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Big Creek (Outlet #1 & #2 Industrial Park)	Big Creek	ANC	271	-	11.6	10.5	16.09	9.81		Grand River
Big Creek (Spring Valley West and Shaver Neighbourhood)	Big Creek	ANC	333	221.43		13.57		4.08	South of Shaver Neighbourhood	Grand River
Big Creek (Spring Valley West and Shaver Neighbourhood)	Big Creek	ANC	100	70.92		22.08		22.08		Grand River
Garner Neighbourhood	Hamilton Harbour - Ancaster Creek	ANC	300	53		10.02		3.34		Hamilton
Sulphur Creek	Hamilton Harbour - Spencer Creek	ANC	1794					0.00		Hamilton
Three Mile Creek	Twenty Mile Creek	ANC	165		20		145	87.88	Part of Airport Business Park and Airport	NPCA
Tiffany Creek	Hamilton Harbour - Ancaster Creek	ANC	130	51.67		78.32		60.25	Meadowlands, Garner, Ancaster. A portion of the w/c is lined in a SWMF	Hamilton

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS										
Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Binbrook Node B	Welland River	BMH	200	191.27		8.73		4.37	Binbrook Urban area of 200 ha Draining at Node 'B'	NPCA
Binbrook Node C	Welland River	BMH	7			7		100.00		NPCA
Binbrook Node D	Welland River	BMH	133			133		100.00	Three tributaries B7-a,b,c	NPCA
Binbrook Node G	Twenty Mile Creek	BMH	50	50				0.00	Jackson Heights etc	NPCA
Node of Welland River north of Mount Hope Urban Boundary SWMF # B-17	Welland River	BMH	30				30	100.00		NPCA
Node of Welland River south of Mount Hope Urban Boundary SWMF # B-10	Welland River	BMH	220	128.52	20	31.47		14.30	Mount Hope & adjacent areas (incl. Airport Busi. Area)-two outlet	NPCA

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS

Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Hannon Creek subwatershed	Red Hill Creek	HAM	1070	115.2	357.7	72.1	419.9	45.98		Hamilton
Montgomery Creek	Red Hill Creek	HAM	318	108.1		13.9	15.0	9.09	Category A - Specific study completed	Hamilton
Node Downstream of SWMF # B 10	Twenty Mile Creek	HAM	40			27.5		68.75		NPCA
Node Downstream of SWMF # B 11 & B 12	Twenty Mile Creek	HAM	700	282.29		97.74	59.34	22.44		NPCA
Node Downstream of SWMF # B 13	Twenty Mile Creek	HAM	30	4.63			25.37	84.57		NPCA
Node Downstream of SWMF # H 21&22	Twenty Mile Creek	HAM	61.9				61.9	100.00		NPCA
Node Downstream of SWMF # H 23	Twenty Mile Creek	HAM	40				20	50.00		NPCA

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS										
Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Node Downstream of SWMF # H 13	Twenty Mile Creek	HAM	29.1				29.1	100.00		NPCA
Node Downstream of SWMF # H4	Twenty Mile Creek	HAM	50	20		25		50.00	Garth Trail, North Glenbrook Ind. Pk., Airport Ind. Pk., part of Binbrook & others	NPCA
Tiffany Creek	Hamilton Harbour - Ancaster Creek	HAM	11	6.5		4.5		40.73	Falkirk West and Bayview Glen Estates	Hamilton
Upper Ottawa subwatershed	Red Hill Creek	HAM	1356	766	308.9	134.6		9.93	Erosion works downstream identified in previous studies	Hamilton
Central Business Subwatershed	Hamilton Harbour - Central Business Subwatershed	OTH	2400					0.00		Hamilton
Chedoke Creek	Hamilton Harbour - Others	OTH	2706					0.00		Hamilton
Green Hill subwatershed	Red Hill Creek	OTH	1225	1102.5				0.00		Hamilton

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS

Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Logies Creek	Hamilton Harbour - Others	OTH	1217					0.00		Hamilton
Lower Spencer Creek	Hamilton Harbour - Others	OTH	277					0.00		Hamilton
Mid Spencer Creek	Hamilton Harbour - Others	OTH	5513					0.00		Hamilton
Spring Creek	Hamilton Harbour - Others	OTH	1305					0.00		Hamilton
Sydenham Creek	Hamilton Harbour - Others	OTH	442					0.00		Hamilton
Battlefield Creek	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	30			25.1		83.70	Nash	Hamilton
Fifty Point Joint Venture	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	45	32		1.7		3.78		Hamilton

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS									
Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Water Course 0	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	321	112.9	149.7	4.8	50.1	17.10		Hamilton
Water Course 1	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	330	157.5	61	4.4	2.6	2.12		Hamilton
Water Course 12	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	642	75.8	14.1	100.0		15.58		Hamilton
Water Course 2	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	283	148	76.8	5.6	4.1	3.43		Hamilton
Water Course 3	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	190	74.4	73.3		12.5	6.58	w/c 5.1-1100m, w/c 5.0-2500	Hamilton
Water Course 4	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	376	133.9	60.9		94.4	25.11		Hamilton
Water Course 5	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	636	121.4	112.9		57.3	9.01	Erosion work d/s identified in previous study	Hamilton

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS

Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Water Course 6	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	67	19	18.1	18.9	0.5	28.96	Erosion work d/s identified in previous study	Hamilton
Water Course 7	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	421	77.2	28.2		60.4	14.35	Erosion work d/s identified in previous study	Hamilton
Water Course 9	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	579	148.76	51.2	39	70.8	18.96		Hamilton
Davis Creek (Lower)	Red Hill Creek	SCM	933	492.26		207.74		22.27	Drainage area is from Upper Davis	Hamilton
Red Hill Valley subwatershed	Red Hill Creek	SCM	1290	0.6		2.4		0.19	Erosion work d/s identified in previous Red Hill Creek Watershed Study	Hamilton
ROPA #9 - Upper Davis Creek	Red Hill Creek	SCM	112	54.1		57.9		51.70	Two tributaries part of ROPA # 9	Hamilton
Sinkhole Creek	Twenty Mile Creek	SCM	140	63.1		74.9		53.50	Felker South and ROPA #9 (Rymal Rd.)	NPCA

APPENDIX F-1: FUTURE DEVELOPMENT ACCORDING TO SUBWATERSHEDS										
Subwatersheds (Ref. Figures F1 to F7)	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Future Development Fraction	Remarks	Conservation Authority
			A	B	C	D	E	F = 100 X (D+E) / A		
			(ha)	Res.	Non-Res.	Res.	Non-Res.	(%)		
Falcon Creek	North Shore Watersheds	WAT	48			22.0		45.83	OPA 28 South	Halton
Flamborough Industrial Park SWMF # W14	North Shore Watersheds	WAT	45			45		100.00	Grindstone Creek	Halton
Grindstone Creek SWMF # W1 to SWMF # W4, W7	North Shore Watersheds	WAT	1011	254.8		70.2		6.94	OPA 28 South and Upcountry Estates, Gatesbury, etc.	Halton
Grindstone Creek SWMF # W5	North Shore Watersheds	WAT	45			45		100.00		Halton
Indian Creek	North Shore Watersheds	WAT	80			10.91		13.64	OPA 28 South	Halton
Borer's Creek	North Shore Watersheds	WAT / OTH	734	179.6	47.1	101.4	137.9	32.60	OPA 28 North, Clappison, Waterdown	Halton
Fifty Point Industrial Park	Lake Ontario (Battle Creek, SC, WC 0-12)	SCL	20				19.1	95.50		Hamilton
		TOTALS	***30902***	***5317.35***	***1411.5***	***1527.02***	***1331.35***			

APPENDIX F-2
COST SUMMARY SHEETS – DETAILED BY CATEGORY

APPENDIX F-2: CATEGORY A - OPEN WATERCOURSES: CHANNEL SYSTEM IMPROVEMENTS (IDENTIFIED PROJECTS) RESIDENTIAL

Category			Project Title	Year	Drainage Area (ha)	Purpose	SWMF/ Drainage Work					2011 Estimated Capital Cost ($)	Estimated Total Cost ($)	Growth Related %	Net Total Cost ($)	Remarks
Primary Dev. Areas	Build Out (yr)	Secondary					Type of Work	Location of Work	Type	Description	Length (m)					
ANC	6-10	A	Garner neighbourhood supplemental downstream erosion assessment	2003	145	Erosion Control and Channel System Improvements	Channel Improvement			Length of channel improvement work	1,100	278,600	278,600	50	139,300	
SCM	11+	A	Lower Davis Creek SWS	2006		Erosion Control and Channel System Improvements	Erosion Control	strategic local works		erosion control		1,600,000	1,600,000	50	800,000	
SCM	11+	A	Lower Davis Creek SWS	2006		Erosion Control and Channel System Improvements	Flood contorl	TH&B crossing		hydraulic control		1,200,000	1,200,000	50	600,000	
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek			Erosion Control and Channel System Improvements	Lower culvert by 0.4 m - South Service Rd. under w/c #6					154,675	154,675	50	77,338	Reported erosion costs adjusted to 2011
Total Residential												3,233,275	3,233,275	50	1,616,638	

ANC: Ancaster
BMH: Binbrook / Mount Hope
HAM: Hamilton Mountain
SCL: Stoney Creek - Lower
SCM: Stoney Creek - Mountain
WAT: Waterdown

APPENDIX F-2: CATEGORY A - OPEN WATERCOURSES: CHANNEL SYSTEM IMPROVEMENTS (IDENTIFIED PROJECTS) NON-RESIDENTIAl

Category							SWMF/ Drainage Work									
Primary Dev. Areas	Build Out (yr)	Secondary	Project Title	Year	Drainage Area (ha)	Purpose	Type of Work	Location of Work	Type	Description	Length (m)	2011 Estimated Capital Cost ($)	Estimated Total Cost ($)	Growth Related %	Net Total Cost ($)	Remarks
ANC	11+	A	Stormwater Management Report - Update Ancaster Industrial Park Drainage Area 1	Dec. 2002	102	Erosion protection				Length of channel =	204	341,006	341,006	100	341,006	Cost Estimated values
ANC	11+	A	Stormwater Management Report - Update Ancaster Industrial Park Drainage Area 2	Dec. 2002	142	Erosion protection				Length of channel =	284	474,734	474,734	100	474,734	Estimated values
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Culvert replacement - Barton St. on w/c #6					180,504	180,504	100	180,504	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			New culvert - Arvin Ave. on w/c #6					160,322	160,322	100	160,322	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Triple-Culvert replacement - QEW Corridor at w/c #5					1,855,784	1,855,784	100	1,855,784	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			New culvert - North Service Rd. at w/c #5					308,221	308,221	100	308,221	Reported erosion costs adjusted to 2011
SCL	11+	A	Creek System Improvement W/C 7	2003			Lower culvert by 0.4 m - South Service Rd. under w/c #6					154,675	154,675	50	77,338	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Culvert replacement - Barton St. on east branches of w/c #7					158,653	158,653	100	158,653	Reported erosion costs adjusted to 2011
SCL	11+	A	Creek System Improvement W/C 7	2003			Culvert replacement - Barton St. on west branches of w/c #7					158,653	158,653	100	158,653	Reported erosion costs adjusted to 2011
SCL	0-5	A	Creek System Improvement W/C 7	2003			Culvert replacement - CNR on w/c #7					392,826	392,826	100	392,826	Reported erosion costs adjusted to 2011
SCL	0-5	A	Creek System Improvement W/C 7	2011			Eastern storm sewer tributary south of CNR	McNeilly to WC7		storm sewer		350,000	350,000	100	350,000	
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Culvert replacement - QEW Corridor on w/c #6.2					684,990	684,990	100	684,990	Reported erosion costs adjusted to 2011
SCL	11+	A	Water Course 5- Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990	582		Lined Channel			Length of channel improvement work	1015	3,044,402	3,044,402	100	3,044,402	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Culvert replacement - Barton St. on w/c #5					228,085	228,085	20	45,617	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Lower culvert by 1.6 m - Arvin Ave. on w/c #5					82,493	82,493	20	16,499	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Culvert replacement - CNR line on w/c #5					215,956	215,956	20	43,191	Reported erosion costs adjusted to 2011
SCL	11+	A	Water Course 6 - Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990	67		Lined Channel			Length of channel improvement work	1077	3,260,456	3,260,456	50	1,630,228	Reported erosion costs adjusted to 2011
SCL	11+	A	Master Drainage Plan Area No. 5, 6, 7. City of Stoney Creek	1990			Lower culvert by 1.84 m - South Service Rd. under w/c #5					154,675	154,675	100	154,675	Reported erosion costs adjusted to 2011
Total Non-Residential												12,206,435	12,206,435	83	10,077,642	
Grand Total												15,439,710	15,439,710	76	11,694,279	

ANC: Ancaster
BMH: Binbrook / Mount Hope
HAM: Hamilton Mountain
SCL: Stoney Creek - Lower
SCM: Stoney Creek - Mountain
WAT: Waterdown

APPENDIX F-2 CATEGORY B: OFF SITE EROSION WORKS NOT IDENTIFIED IN PREVIOUS STUDIES (RESIDENTIAL & NON RESIDENTIAL

Subwatershed	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Development Fraction	Fraction of Watercourse Assumed to Required Erosion Control[2]	Total Length of Downstream Watercourse to Assumed End-Point[3]	Length of Erosion Control Works	Cost[4]	Land Cost	Total Cost	New Development Fraction	Development Related Cost	Remarks
			A	B	C	D	E	F = 100 X (B+C+D+E) / A	G	H	I = G X H	J	K	L=J+K	M = (D+E) / A	L X M	
				Res.	Non-Res.	Res.	Non-Res.										
			(ha)	(ha)	(ha)	(ha)	(ha)	(%)		(m)	(m)	($)	($)	($)		($)	
Garner Neighbourhood	Coote's Paradise	ANC	300	53		48		33.67	0.05	1,100	55	$41,250	$24,750	$66,000	0.16	$10,560	Garner, Ancaster (1100 m additional work is previously identified
Big Creek (Outlet #1 & #2 Industrial Park)	Big Creek	ANC	271		11.6	10.5	16.09	14.09	0.05	4,500	225	$168,750	$101,250	$270,000	0.10	$26,492	
Big Creek (Spring Valley West and Shaver Neighbourhood)	Big Creek	ANC	333	221.43		13.57		70.57	0.15	3,200	480	$360,000	$216,000	$576,000	0.04	$23,472	South of Shaver Neighbourhood
Big Creek (Spring Valley West and Shaver Neighbourhood)	Big Creek	ANC	100	70.92		22.06		92.98	0.20	1,500	300	$225,000	$135,000	$360,000	0.22	$79,416	
Three Mile Creek	Twenty Mile Creek	ANC	165		20		145	100.00	0.20	1,500	300	$225,000	$135,000	$360,000	0.88	$316,364	Part of Airport Business Park and Airport
Tiffany Creek	Coote's Paradise	ANC	130	51.67		78.32		99.99	0.20	2,500	500	$375,000	$225,000	$600,000	0.60	$361,477	Meadowlands, Garner, Ancaster. A portion of the w/c is lined in a SWMF
Tiffany Creek	Coote's Paradise	HAM	11			11		100.00	0.20	450	90	$67,500	$40,500	$108,000	1.00	$108,000	Falkirk West and Bayview Glen Estates
Sulphur Creek	Coote's Paradise	ANC	1794			32		1.78	0.05	500	25	$37,500	$11,250	$48,750	0.02	$870	
Binbrook Node B	Welland River	BMH	200	191.27		8.73		100.00	0.20	4,500	900	$675,000	$324,000	$999,000	0.04	$43,606	Binbrook Urban area of 200 ha Draining at Node 'B'
Binbrook Node C	Welland River	BMH	7			7		100.00	0.20	300	60	$45,000	$21,600	$66,600	1.00	$66,600	
Binbrook Node D	Welland River	BMH	133			133		100.00	0.20	4,100	820	$615,000	$295,200	$910,200	1.00	$910,200	Three tributaries B7-a,b,c
Binbrook Node G	Twenty Mile Creek (Three Mile, Sinkhole Creek)	BMH	50	50				100.00	0.20	750	150	$112,500	$54,000	$166,500	0.00	$0	Jackson Heights etc
Node of Welland River south of Mount Hope Urban Boundary SWMF # B-10	Welland River	BMH	220	128.52	20	31.47		81.81	0.20	1,500	300	$225,000	$108,000	$333,000	0.14	$47,634	Mount Hope & adjacent areas (including Airport Business Area)-two outlet
Node of Welland River north of Mount Hope Urban Boundary SWMF # B-17	Welland River	BMH	30				30	100.00	0.20	1,200	240	$180,000	$86,400	$266,400	1.00	$266,400	
Node Downstream of SWMF # H4	Twenty Mile Creek (Three Mile, Sinkhole Creek)	HAM	50	20		25		90.00	0.20	900	180	$135,000	$64,800	$199,800	0.50	$99,900	Garth Trail, North Glenbrook Industrial Park, Airport Industrial Business Park, part of Binbrook and others

[1]To point immediately d/s of future development (start of off-site erosion assessment)

[2]-0.05 - Where Development Fraction is 0 - 25%
0.10 - Where Development Fraction is 26 - 49%
0.15 - Where Development Fraction is 50 - 74%
0.20 - Where Development Fraction is 75 - 100%

Coote's Paradise (Borer's Creek, Spencer Creek, Sulphur Creek, Ancaster Creek, Chedoke Creek, Others)
Hamilton Harbour (Red Hill Creek, Central Business Park)

[3]Location where d/s of this point no erosion is deemed to occur from subject development; total drainage area to this point estimated as a maximum of 2X the study watershed area (Column A). Note that the end point may also be set by Hamilton Harbour or La

[4]$1500/m for Watershed Area > 500 ha
$750/m for Watershed Area < 500 ha

APPENDIX F-2 CATEGORY B: OFF SITE EROSION WORKS NOT IDENTIFIED IN PREVIOUS STUDIES (RESIDENTIAL & NON RESIDENTIAL

Subwatershed	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Development Fraction	Fraction of Watercourse Assumed to Required Erosion Control[2]	Total Length of Downstream Watercourse to Assumed End-Point[3]	Length of Erosion Control Works	Cost[4]	Land Cost	Total Cost	New Development Fraction	Development Related Cost	Remarks
			A	B	C	D	E	F = 100 X (B+C+D+E) / A	G	H	I = G X H	J	K	L=J+K	M = (D+E) / A	L X M	
				Res.	Non-Res.	Res.	Non-Res.										
			(ha)	(ha)	(ha)	(ha)	(ha)	(%)		(m)	(m)	($)	($)	($)		($)	
Node Downstream of SWMF # H 11	Twenty Mile Creek (Three Mile, Sinkhole Creek)	HAM	35				35	100.00	0.20	300	60	$45,000	$21,600	$66,600	1.00	$66,600	
Node Downstream of SWMF # H 12	Twenty Mile Creek (Three Mile, Sinkhole Creek)	HAM	40				40	100.00	0.20	1,350	270	$202,500	$97,200	$299,700	1.00	$299,700	
Node Downstream of SWMF # H 13	Twenty Mile Creek (Three Mile, Sinkhole Creek)	HAM	29.1				29.1	100.00	0.20	900	180	$135,000	$64,800	$199,800	1.00	$199,800	
Node Downstream of SWMF # B 14	Twenty Mile Creek (Three Mile, Sinkhole Creek)	HAM	40				40	100.00	0.20	750	150	$112,500	$54,000	$166,500	1.00	$166,500	
Node Downstream of SWMF # B 11 & B 12	Twenty Mile Creek (Three Mile, Sinkhole Creek)	HAM	700	282.29		97.74	59.34	62.77	0.15	3,000	450	$675,000	$162,000	$837,000	0.22	$187,823	
Node Downstream of SWMF # B 13	Twenty Mile Creek (Three Mile, Sinkhole Creek)	HAM	30	4.63			25.37	100.00	0.20	600	120	$90,000	$43,200	$133,200	0.85	$112,643	
Upper Ottawa subwatershed	Hamilton Harbour	HAM	1356	766	308.9	134.6		89.20	0.20	1,100	220	$330,000	$79,200	$409,200	0.10	$40,618	Erosion works downstream identified in previous studies
Hannon Creek subwatershed	Hamilton Harbour	HAM	1070	115.2	357.7	72.1	419.9	90.18	0.20	2,000	400	$600,000	$144,000	$744,000	0.46	$342,101	
Montgomery Creek	Hamilton Harbour	HAM	318	108.1		13.9	15	43.08	0.10	4,500	450	$337,500	$162,000	$499,500	0.09	$45,395	Category A - Specific study completed
Battlefield Creek	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	30			25.1		83.67	0.20	300	60	$45,000	$21,600	$66,600	0.84	$55,722	Nash
Water Course 0	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	321	112.9	149.7	4.8	50.1	98.91	0.20	0	0	$0	$0	$0	0.17	$0	WC 0
Water Course 1	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	330	157.5	61	4.4	2.6	68.33	0.15	1,900	285	$213,750	$102,600	$316,350	0.02	$6,710	WC 1
Fifty Point Industrial Park	Lake Ontario (Battlefield Creek, SC, WC 0-12)	Water Course 10/12	20				19.1	95.50	0.20	600	120	$90,000	$43,200	$133,200	0.96	$127,206	

[1]To point immediately d/s of future development (start of off-site erosion assessment)

[2]-0.05 - Where Development Fraction is 0 - 25%
0.10 - Where Development Fraction is 26 - 49%
0.15 - Where Development Fraction is 50 - 74%
0.20 - Where Development Fraction is 75 - 100%

Coote's Paradise (Borer's Creek, Spencer Creek, Sulphur Creek, Ancaster Creek, Chedoke Creek, Others)
Hamilton Harbour (Red Hill Creek, Central Business Park)

[3]Location where d/s of this point no erosion is deemed to occur from subject development; total drainage area to this point estimated as a maximum of 2X the study watershed area (Column A). Note that the end point may also be set by Hamilton Harbour or La

[4]$1500/m for Watershed Area > 500 ha
$750/m for Watershed Area < 500 ha

APPENDIX F-2 CATEGORY B: OFF SITE EROSION WORKS NOT IDENTIFIED IN PREVIOUS STUDIES (RESIDENTIAL & NON RESIDENTIAL

Subwatershed	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Development Fraction	Fraction of Watercourse Assumed to Required Erosion Control[2]	Total Length of Downstream Watercourse to Assumed End-Point[3]	Length of Erosion Control Works	Cost[4]	Land Cost	Total Cost	New Development Fraction	Development Related Cost	Remarks
			A	B	C	D	E	F = 100 X (B+C+D+E) / A	G	H	I = G X H	J	K	L=J+K	M = (D+E) / A	L X M	
				Res.	Non-Res.	Res.	Non-Res.										
			(ha)	(ha)	(ha)	(ha)	(ha)	(%)		(m)	(m)	($)	($)	($)		($)	
Fifty Point Joint Venture	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	45	32		1.7		74.89	0.20	300	60	$45,000	$21,600	$66,600	0.04	$2,516	
Water Course 12	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	642	75.8	14.1	100	0	29.58	0.10	1,350	135	$202,500	$48,600	$251,100	0.16	$39,112	WC 12
Water Course 2	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	283	148	76.8	5.6	4.1	82.86	0.20	1,100	220	$165,000	$79,200	$244,200	0.03	$8,370	WC 2
Water Course 3	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	190	74.4	73.3		12.5	84.32	0.20	900	180	$135,000	$64,800	$199,800	0.07	$13,145	WC 3
Water Course 4	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	376	133.9	60.9		94.4	76.91	0.20	800	160	$120,000	$57,600	$177,600	0.25	$44,589	WC 4
Water Course 5	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	636	121.4	112.9		57.3	45.85	0.10	3,600	360	$540,000	$129,600	$669,600	0.09	$60,327	w/c 5.1-1100m, w/c 5.0-2500
Water Course 6	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	67	19	18.1	18.9	0.5	84.33	0.95	1,300	1235	$926,250	$444,600	$1,370,850	0.29	$396,933	WC 6
Water Course 7	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	421	77.2	28.2		60.4	39.38	0.10	1,000	100	$75,000	$36,000	$111,000	0.14	$15,925	WC 7
Water Course 9	Lake Ontario (Battlefield Creek, SC, WC 0-12)	SCL	579	148.76	51.2	39	70.8	53.50	0.15	800	120	$180,000	$43,200	$223,200	0.19	$42,327	WC 9
Davis Creek (Lower)	Hamilton Harbour	SCM	933	492.26		207.74		75.03	0.20	3,000	600	$900,000	$216,000	$1,116,000	0.22	$248,486	Drainage area is from Upper Davis
Red Hill Valley subwatershed	Hamilton Harbour	SCM	1290	0.6		2.4		0.23	0.05	0	0	$0	$0	$0	0.00	$0	Erosion work d/s identified in previous Red Hill Creek Watershed Study
Sinkhole Creek	Twenty Mile Creek (Three Mile, Sinkhole Creek)	SCM	140	63.1		74.9		98.57	0.20	1,200	240	$180,000	$86,400	$266,400	0.54	$142,524	Felkirk South and ROPA #9 (Rymal Rd.)
ROPA #9 - Upper Davis Creek	Hamilton Harbour	SCM	112	54.1	-	57.9	-	100.00	0.20	1,600	320	$240,000	$115,200	$355,200	0.52	$183,626	Two tributaries part of ROPA # 9

[1]To point immediately d/s of future development (start of off-site erosion assessment)

[2]-0.05 - Where Development Fraction is 0 - 25%
0.10 - Where Development Fraction is 26 - 49%
0.15 - Where Development Fraction is 50 - 74%
0.20 - Where Development Fraction is 75 - 100%

Coote's Paradise (Borer's Creek, Spencer Creek, Sulphur Creek, Ancaster Creek, Chedoke Creek, Others)
Hamilton Harbour (Red Hill Creek, Central Business Park)

[3]Location where d/s of this point no erosion is deemed to occur from subject development; total drainage area to this point estimated as a maximum of 2X the study watershed area (Column A). Note that the end point may also be set by Hamilton Harbour or La

[4]$1500/m for Watershed Area > 500 ha
$750/m for Watershed Area < 500 ha

APPENDIX F-2 CATEGORY B: OFF SITE EROSION WORKS NOT IDENTIFIED IN PREVIOUS STUDIES (RESIDENTIAL & NON RESIDENTIAL

Subwatershed	Watershed	Primary Development Area	Watershed Area[1]	Existing Development Area (ha)		Future Development Area (ha)		Development Fraction	Fraction of Watercourse Assumed to Required Erosion Control[2]	Total Length of Downstream Watercourse to Assumed End-Point[3]	Length of Erosion Control Works	Cost[4]	Land Cost	Total Cost	New Development Fraction	Development Related Cost	Remarks
			A	B	C	D	E	F = 100 X (B+C+D+E) / A	G	H	I = G X H	J	K	L=J+K	M = (D+E) / A	L X M	
			(ha)	Res. (ha)	Non-Res. (ha)	Res. (ha)	Non-Res. (ha)	(%)		(m)	(m)	($)	($)	($)		($)	
Falcon Creek	Grindstone Creek/ North Shore Watershed	WAT	48			22		45.83	0.10	1,200	120	$90,000	$54,000	$144,000	0.46	$66,000	OPA 28 South
Grindstone Creek SWMF # W7	Grindstone Creek/ North Shore Watershed	WAT	45			45		100.00	0.20	900	180	$135,000	$81,000	$216,000	1.00	$216,000	
Grindstone Creek SWMF # W1 to SWMF # W8	Grindstone Creek/ North Shore Watershed	WAT	1011	254.8		70.2		32.15	0.10	2,000	200	$300,000	$90,000	$390,000	0.07	$27,080	OPA 28 South and Upcountry Estates, Gatesbury, etc.
Flamborough Industrial Park SWMF # W14	Grindstone Creek/ North Shore Watershed	WAT	45			45		100.00	0.20	900	180	$135,000	$81,000	$216,000	1.00	$216,000	
Indian Creek	Grindstone Creek/ North Shore Watershed	WAT	80			10.91		13.64	0.05	450	23	$16,875	$10,125	$27,000	0.14	$3,682	OPA 28 South
Borer's Creek	Grindstone Creek/ North Shore Watershed	WAT / OTH	734	179.6	47.1			30.89	0.10	3,000	300	$450,000	$135,000	$585,000	0.00	$0	OPA 28 North, Clappison, Waterdown
Central Business Subwatershed	Hamilton Harbour	OTH	2400					0.00	0.00		0	$0	$0	$0	0.00	$0	Not in growth area
Chedoke Creek	Hamilton Harbour	OTH	2706					0.00	0.00		0	$0	$0	$0	0.00	$0	Not in growth area
Green Hill subwatershed	Hamilton Harbour	OTH	1225	1102.5				90.00	0.20	0	0	$0	$0	$0	0.00	$0	Not in growth area
Logies Creek	Coote's Paradise	OTH	1217					0.00	0.00		0	$0	$0	$0	0.00	$0	Not in growth area
Lower Spencer Creek	Coote's Paradise	OTH	277					0.00	0.00		0	$0	$0	$0	0.00	$0	Not in growth area
Mid Spencer Creek	Coote's Paradise	OTH	5513					0.00	0.00		0	$0	$0	$0	0.00	$0	Not in growth area
Spring Creek	Coote's Paradise	OTH	1305					0.00	0.00		0	$0	$0	$0	0.00	$0	Not in growth area
Sydenham Creek	Coote's Paradise	OTH	442					0.00	0.00		0	$0	$0	$0	0.00	$0	Not in growth area
Grand Total			30,875.1	5,310.9	1,411.5	1,474.5	1,226.6	30.52		71,200	12123	$11,199,375	$4,632,075	$15,831,450	36.25	$5,738,451	

[1]To point immediately d/s of future development (start of off-site erosion assessment)

[2]-0.05 - Where Development Fraction is 0 - 25%
0.10 - Where Development Fraction is 26 - 49%
0.15 - Where Development Fraction is 50 - 74%
0.20 - Where Development Fraction is 75 - 100%

Coote's Paradise (Borer's Creek, Spencer Creek, Sulphur Creek, Ancaster Creek, Chedoke Creek, Others)
Hamilton Harbour (Red Hill Creek, Central Business Park)

[3]Location where d/s of this point no erosion is deemed to occur from subject development; total drainage area to this point estimated as a maximum of 2X the study watershed area (Column A). Note that the end point may also be set by Hamilton Harbour or La

[4]$1500/m for Watershed Area > 500 ha
$750/m for Watershed Area < 500 ha

Total Residential	$11,535,150	31.30	$3,610,971
Total Non-Residential	$4,296,300	49.52	$2,127,480

APPENDIX F-2: CATEGORY C - STORMWATER MANAGEMENT (QUALITY AND OR QUANTITY) FACILITIES RESIDENTIA

Category				Project Title	Year	Drainage Area (ha)	Purpose	SWMF/ Drainage Work																	
Primary Dev. Areas	Build Out (yr)	Secondary	Project #					Type of Work	Location of Work	Type	Description	Volume (m3)	Estimated Footprint 4% (ha)	Estimated Footprint 6% (ha)	Study/Draft Plan Footprint (ha)	Land Cost	Estimated Capital Cost ($)	Estimated Total Cost including Land	Growth Related %	Net Growth/Total Associated Cost ($)	Existing Benefit	Direct Developer Contribution ($)	Non-Res Area Fraction Cost ($)	Net Total Associated Cost ($)	Remarks
ANC	11+	C	6	Spring Valley West and Shaver Neighbourhoods Master Drainage Plan	Aug. 1999	20	MDP to address existing and future land use consideration for *Spring Valley and West Shaver Neighbourhoods*	SWMF (Extended detention facility) #7	Southern end of the Neighbourhood along stream	Quantity / Quality	Storage Capacity =	8,700		1.20		1,334,340	522,000	1,856,340	100	1,856,340	-	-	-	1,856,340	listed as committed/actual in 2009
ANC	11+	C	7	Garner Neighbourhood Master Drainage Plan, Ancaster	July, 1996 Rev. Nov. 2002	10.4	MDP addressing drainage related issues for existing and future development	Proposed Quality Facility #1: Extended detention wetland	Between proposed Highway 6 (new) interchange corridor and the existing development	Quality	Storage Capacity =	910	0.42			462,571	54,600	517,171	100	517,171	-	-	-	517,171	
ANC	11+	C	8	Garner Neighbourhood Master Drainage Plan, Ancaster	July, 1996 Rev. Nov. 2002	17.06	MDP addressing drainage related issues for existing and future development	Proposed Quality Facility #2: Extended detention wet pond	Immediately east of the MTO lands, on the south side of the creek tributary	Quality	Storage Capacity =	3,080	0.68		1.26	1,402,169	184,800	1,586,969	100	1,586,969	-	-	-	1,586,969	
ANC	0-5	C	9	Garner Neighbourhood Master Drainage Plan, Ancaster	July, 1996 Rev. Nov. 2002	34.37	MDP addressing drainage related issues for existing and future development	Proposed Quantity Facility #3: Extended detention wet pond	Across the creek tributary from Facility #2 on the north side	Quality	Storage Capacity =	13,120	1.37		1.12	1,242,048	787,200	2,029,248	100	2,029,248	-	-	-	2,029,248	
ANC	0-5	C	13	Meadowlands Phase IV - Dusein Pond		21.64			Dusein Pond	Quality / Quantity	Storage Capacity =	3,800			0.85	945,158	228,000	1,173,158	100	1,173,158	-	-	-	1,173,158	
ANC	11+	C	14	Meadowlands Phase IV		6			Springbrook at Garner	Quality / Quantity	Storage Capacity =	1,140		0.36		400,302	68,400	468,702	100	468,702	-	-	-	468,702	
ANC	0-5	C	16	D'Amico Cimico Properties Stormwater Management Report	Oct. 2008	34.49	SWM Plan for proposed urban development	SWMF	*Garner Road East and Glancaster Road*	Quality / Quantity	Storage Volume =	11,500		2.07	1.15	1,278,743	690,000	1,968,743	100	1,968,743	-	-	-	1,968,743	Updated report, different drainage areas
ANC	0-5	C	17	D'Amico Cimico Properties Stormwater Management Report	Oct. 2008	17.84	SWM Plan for proposed urban development	SWMF	Garner Road East and Glancaster Road	Quality / Quantity	Storage Volume =	9,400		1.07	0.82	911,799	564,000	1,475,799	100	1,475,799	-	-	20,681	1,455,118	Updated report, different drainage areas
ANC	11+	C	20	Limestone Manor Functional Servicing Report	Dec. 2005	7.96	SWM Plan for proposed urban development	SWMF	Wilson Street West and Shaver Road	Quality / Quantity	Storage Volume =	730		0.47		524,396	43,800	568,196	100	568,196	-	-	-	568,196	
ANC	11+	C	22	Woodland Manor Preliminary SWM Report	Jul-06	15.3	SWM Plan for proposed urban development	SWMF	Sulpher Springs Road and Mansfield Drive	Quality / Quantity	Storage Volume =	10,816		0.92		1,020,770	648,960	1,669,730	100	1,669,730	-	-	-	1,669,730	
ANC	11+	C	24	Miller's pond expansion		6		SWMF	*Shaver Road and Garner Road*	Quality		950	0.20			222,390	57,000	279,390	100	279,390	-	-	-	279,390	See map for assumed location
ANC	11+	C	25	Golf Stream Manor		30				Quality / Quantity		25,920	1.44			1,601,208	1,555,200	3,156,408	100	3,156,408	-	-	-	3,156,408	See map for assumed location
ANC	11+	R	3	N/A	N/A	31.34	Flood Control	Future Retrofit	Galley Crt & Speers Rd	Quality						-	420,000	420,000	30	126,000	294,000	-	-	126,000	
ANC	11+	R	22	N/A	N/A	2.19	Flood Control	Future Retrofit	Hartington Place and Lovat's Lane	Quality						-	400,000	400,000	50	200,000	200,000	-	-	200,000	
ANC	11+	R	60	Tiffany, City of Hamilton, Rowland Homes Limited	Jun-03	26.07		Future Retrofit	Scenic Dr & Sandalbark Dr	Quality						-	400,000	400,000	60	240,000	160,000	-	-	240,000	
ANC	11+	R	70	Drainage Report - The Meadowlands	N/A	292.9		Future Retrofit	Hwy 403 and Golf Links Rd	Quality						-	3,920,000	3,920,000	40	1,568,000	2,352,000	-	-	1,568,000	
ANC	11+	R	71	Drainage Report - The Meadowlands	N/A	42.51		Future Retrofit	Golf Links Rd and Meadowlands Blvd	Quality						-	570,000	570,000	40	228,000	342,000	-	-	228,000	
ANC	11+	R	72	Drainage Report - The Meadowlands	N/A	16.03		Future Retrofit	Golf Links Rd. and Meadowlands Blvd	Quality						-	400,000	400,000	40	160,000	240,000	-	-	160,000	
BMH	11+	C	7	Master Drainage Plan Update Report : Binbrook Settlement Area	Oct. 2006	64.7	Identify SWM measures for existing and future redevelopment	SWMF#6 to treat flows from Node D	Area draining to the south west limits of Binbrook Urban Settlement Area	Quality / Quantity	Storage Capacity =	22,240	2.59			2,302,181	1,334,400	3,636,581	100	3,636,581	-	-	-	3,636,581	Moved west to creek, potential second facility across watercourse - City set to 4% on account of open space, large lots
BMH	11+	C	10	Mountaingate Functional Servicing Report	Oct. 2007	100.56	*SWM Plan for proposed urban development*	SWMF	South west of new Hwy - 6	Quality / Quantity	Storage Volume =	26,981		6.04	5.15	4,581,234	1,618,860	6,200,094	100	6,200,094	-	-	-	6,200,094	New drainage area
BMH	11+	C	21	Master Drainage Plan Update Report : Binbrook Settlement Area	Oct. 2006	68.4	Identify SWM measures for existing and future redevelopment	SWMF		Quality / Quantity	Storage Capacity =	26,258	2.74			2,433,836	1,575,480	4,009,316	100	4,009,316	-	-	-	4,009,316	Opposite side of watercourse from B-7 - City set to 4% on account of open space, large lots
BMH	11+	C	20	*Binbrook Settlement Area*	N/A	30	*additional facility adjacent to SW watercourse*	SWMF	Area draining to the south west near Fletcher Road	Quality / Quantity	Storage Capacity =	21,600		1.80		1,601,208	1,296,000	2,897,208	100	2,897,208	-	-	-	2,897,208	See map for assumed location SW near Fletcher Road
BMH	11+	R	54	N/A	N/A	16.01	Flood Control	Future Retrofit	Marion St and Spitfire Dr	Quality						-	400,000	400,000	20	80,000	320,000	-	-	80,000	
BMH	11+	R	75	Southbrook on the Green	Jun-00	52.36		Future Retrofit	Regional Rd 56 and Binbrook Rd	Quality						-	700,000	700,000	40	280,000	420,000	-	8,021	271,979	
HAM	0-5	C	5	Mountain Brow Boulevard Crossing and Central Mountain Stormwater management Class EA	Sept. 2003	317	Provide quality treatment to stormwater before discharging to Red Hill Creek	Proposed wetland	Within Mount Albion Conservation area between Stonehurch and Centrelli Road interchange - wetland	Quality	Storage volume =	11,500			-	-	762,500	762,500	100	762,500	-	-	-	762,500	Cost as reported
HAM	11+	C	9	Newburn and Sheldon Neighbourhoods Master Servicing Plan	2011	46	SWM Plan for proposed urban development	SWMF	Wm Connell West 5th	Quality / Quantity	Storage Capacity =	10,000		2.88		2,561,933	600,000	3,161,933	100	3,161,933	-	-	-	3,161,933	Same location
HAM	11+	C	12	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Nov. 2008	54.8	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	In tandem with HAM29	Quality / Quantity	Storage volume =	4,000		3.29		2,924,873	240,000	3,164,873	100	3,164,873	-	-	-	3,164,873	New location
HAM	0-5	C	24	Newburn and/or Sheldon Neighbourhoods Master Servicing Plan	Dec. 2004	15.9	SWM Plan for proposed urban development	SWMF	*Upper James Road and Stone* Creek Road	*Quality / Quantity*	Storage Capacity =	5,800		0.95		846,640	348,000	1,196,640	100	1,196,640	-	-	-	1,196,640	*New pond to help H-9*
HAM	11+	C	26	Upper Sherman/Acadia		3	Stormwater quality and associated resource management	SWMF	Upper Sherman and Acadia	Quantity	Storage Volme =	600	0.12			106,747	36,000	142,747	100	142,747	-	-	-	142,747	Per Development engineering comments/future extension
HAM	11+	C	28	Eden Park/Fairview	2011	33.29	SWM Plan for proposed urban development	SWMF	NE limit of development	Quality / Quantity	Storage volume =	6,850		2.00		1,778,807	531,000	2,307,807	100	2,307,807	-	-	-	2,307,807	
HAM	11+	C	29	Miles	2011	10	SWM Plan for proposed urban development	SWMF	NE limit of development	Quality / Quantity	Storage volume =	1,900		0.60		533,736	114,000	647,736	100	647,736	-	-	-	647,736	
HAM	11+	C	30	Montgomery Creek Nash Orchards		6				Quality		1,064	0.24			213,494	63,840	277,334	100	277,334	-	-	-	277,334	formerly SCM6
HAM	11+	R	55	Villages of Glancaster	Jul. 1990	77.63	Flood Control	Future Retrofit	Twenty Rd and Garth St	Quality			3.11			2,762,262	1,030,000	3,792,262	80	3,033,809	758,452	-	-	3,033,809	
SCL	11+	C	2	SCUBE West Subwatershed Study (Draft)	Oct. 2010	28.4	Stormwater management strategy	SWMF	WC6 south of Barton SCUBE West	Quantity / Quality	wet pond #3	22,038		1.58		1,408,063	1,322,280	2,731,343	100	2,731,343	-	-	-	2,731,343	See map for assumed location
SCL	11+	C	3	SCUBE West Subwatershed Study (Draft)	Oct. 2010	26.5	Stormwater management strategy	SWMF	WC6.1 south of Barton SCUBE West	Quantity / Quality	wet pond #4	16,006		1.59		1,414,400	960,360	2,374,760	100	2,374,760	-	-	-	2,374,760	See map for assumed location
SCL	11+	C	4	SCUBE West Subwatershed Study (Draft)	Oct. 2010	21.1	Stormwater management strategy	SWMF	WC7 south of Barton SCUBE West	Quantity / Quality	wet pond #5	17,088		1.27		1,126,163	1,025,280	2,151,463	100	2,151,463	-	-	-	2,151,463	See map for assumed location
SCL	11+	C	12	SCUBE East Subwatershed Study (Draft)	Nov. 2010	54	Stormwater management strategy	SWMF	SCUBE Central	Quantity / Quality	wet pond #9-2	33,191		3.24		2,882,174	1,991,460	4,873,634	100	4,873,634	-	-	-	4,873,634	See map for assumed location
SCL	11+	C	13	SCUBE East Subwatershed Study (Draft)	Nov. 2010	23.1	Stormwater management strategy	SWMF	SCUBE Central	Quantity / Quality	wet pond #9-3	14,218		1.39		1,232,930	853,080	2,086,010	100	2,086,010	-	-	-	2,086,010	See map for assumed location

ANC: Ancaster
BMH: Binbrook / Mount Hope
HAM: Hamilton Mountain
SCL: Stoney Creek - Lower
SCM: Stoney Creek - Mountain
WAT: Waterdown

APPENDIX F-2: CATEGORY C - STORMWATER MANAGEMENT (QUALITY AND OR QUANTITY) FACILITIES RESIDENTIA

Category									SWMF/ Drainage Work															
Primary Dev. Areas	Build Out (yr)	Secondary	SWMF #	Project Title	Year	Drainage Area (ha)	Purpose	Type of Work	Location of Work	Type	Description	Volume (m3)	Estimated Footprint 4% (ha)	Estimated Footprint 4% (ha)	Study/Draft Plan Footprint (ha)	Land Cost	Estimated Capital Cost ($)	Estimated Total Cost including Land	Growth Related %	Net Growth Total Associated Cost ($)	Existing Benefit	Direct Developer Contribution ($)	Non-Res Area Fraction Cost ($)	Net Total Associated Cost ($)	Remarks
SCL	11+	C	24	SCUBE East Subwatershed Study (Draft)	Nov. 2010	14.7	Stormwater management strategy	SWMF	SCUBE East	Quantity / Quality	wet pond #S-1	1,544		0.88		784,592	92,640	877,232	100	877,232	-		-	877,232	See map for assumed location
SCL	11+	C	26	SCUBE West Subwatershed Study (Draft)	Oct. 2010	39.8	Stormwater management strategy	SWMF	WCS south of Barton SCUBE West	Quantity / Quality	wet pond #1	28,268		2.39		2,124,268	1,695,960	3,820,229	100	3,820,229	-		-	3,820,229	See map for assumed location
SCL	11+	C	30	SCUBE West Subwatershed Study (Draft)	Oct. 2010	24.6	Stormwater management strategy	SWMF	WC6.2 south of Barton SCUBE West	Quantity / Quality	wet pond #2	23,666		1.47		1,307,653	1,419,960	2,727,613	100	2,727,613	-		-	2,727,613	See map for assumed location
SCL	11+	R	16	Lake Vista			Stormwater quality and associated resource management	Storm outfall retrofit	Lake Vista	Quality	OGS					-	50,000	50,000	100	50,000	-		-	50,000	possible retrofit
SCL	11+	R	18	Stormwater Quality Management Strategy Stoney Creek Master Plan	2004	27.2	Stormwater quality and associated resource management	Storm outfall retrofit	BFC, Little League Park, Queenston Rd	Quality	Wetland	2,413				-	144,780	144,780	100	144,780	-		-	144,780	
SCL	11+	R	19	Stormwater Quality Management Strategy Stoney Creek Master Plan	2004	33	Stormwater quality and associated resource management	Storm outfall retrofit	BFC, Lake Ave. Park, Huckleberry Dr.	Quality	Wetland	2,582	-			-	154,920	154,920	100	154,920	-		-	154,920	
SCL	11+	R	20	Stormwater Quality Management Strategy Stoney Creek Master Plan	2004	77	Stormwater quality and associated resource management	Storm outfall retrofit	North of Barton St.	Quality	Wetland	6,724				-	403,440	403,440	100	403,440	-		-	403,440	
SCL	11+	R	21	Stormwater Quality Management Strategy Stoney Creek Master Plan	2004	20.5	Stormwater quality and associated resource management	Storm outfall retrofit	Lake Avenue, Warrington St.	Quality	Wetland	1,923				-	115,380	115,380	100	115,380	-		-	115,380	
SCL	11+	R	66	Stormwater Quality Management Strategy Stoney Creek Master Plan	2004	11	Stormwater quality and associated resource management	Retrofit Existing facility	South of Hwy. 8 and east of Fruitland		wetland	753				-	1,430,000	1,430,000	20	286,000	1,144,000		-	286,000	
SCM	11+	C	1	Davis Ck SWS - Nash Nhd		149.46	Preliminary grading plans and SWMF type, locations and preliminary configuration	Wet pond #B	North limit of First Road W, at west side	Quantity / Quality	Extended Detention Pond	37,740			2.98	2,633,098	2,264,400	4,897,498	100	4,897,498	-		-	4,897,498	per City comments June 17, 2011
SCM	11+	C	2	Davis Ck SWS - Nash Nhd		22.85	Preliminary grading plans and SWMF type, locations and preliminary configuration	Wet pond #C	Northwest portion, west of historical lands	Quantity / Quality	Extended Detention Pond	10,255			1.86	1,476,670	615,300	2,091,970	100	2,091,970	-		-	2,091,970	per City comments June 17, 2011
SCM	11+	C	3	Nash Neighbourhood SWM Update Stoney Creek	June, 1999	97	Preliminary grading plans and SWMF type, locations and preliminary configuration	Wet pond #D		Quantity / Quality	Include ED in W Quarry wetland (proposed for golf course)	3,500				-	210,000	210,000	0	-	210,000		-	-	Private development subject to future planning
SCM	0-5	C	4	Penny Lane		74	Impact of proposed redevelopment on quantity and quality of stormwater	Proposed quality wet pond	Penny Lane	Quantity / Quality	Detention Vol	26,000		4.44	2.49	2,215,004	1,560,000	3,775,004	100	3,775,004	-		-	3,775,004	Cost estimates adjusted from 1998 to 2004
SCM	0-5	C	5	Nash Neighbourhood Functional Servicing Report	Apr. 2008	31.0	Stormwater quality and associated resource management	Planned/ Greenfield	Mud St. West and Upper Centennial Parkway	Quality		5,487		1.61		1,702,616	329,220	2,031,838	100	2,031,838	-		127,388	1,904,450	Updated report, different drainage areas
SCM	11+	C	9	Rymal Road Planning Area Master Servicing and Drainage Plan - RDPA 9		19.6	MDP addressing drainage related issues for future development	Proposed wetland/wetpond #2B	Summit Park Phase 7	Quantity / Quality		11,088			1.46	1,298,758	664,080	1,962,838	100	1,962,838	-		-	1,962,838	per City comments June 17, 2011
SCM	11+	C	10	Rymal Road Planning Area Master Servicing and Drainage Plan - RDPA 9		120	MDP addressing drainage related issues for future development	Proposed wetland/wetpond #3	West side of Swayze Road	Quantity / Quality		78,000			7.00	6,226,920	4,680,000	10,906,920	100	10,906,920	-		-	10,906,920	per City comments June 17, 2011
SCM	0-5	C	14	ORC Mud St West		22		SWMF		Quantity / Quality		4,200			1.32	1,174,219	252,000	1,426,219	100	1,426,219	-		-	1,426,219	
SCM	0-5	C	17	Fieldgate Estates - Fisher Community Functional SWM Assessment	Nov. 2009	40.75	Functional Service Plan for proposed urban development		SW corner Mud St. and Upper Centennial PKWY.		Storage volume =	18,000			2.45	1.87	1,663,477	1,080,000	2,743,477	100	2,743,477	-		-	685,869	2,057,608	
SCM	0-5	C	18	Future Planned Residential Development		6	easterly portion			Quality / Quantity		4,320			0.36		320,242	259,200	579,442	100	579,442	-		-	579,442	See map for assumed location
SCM	0-5	C	19	Future Planned Residential Development		14	westerly portion			Quality / Quantity		10,080			0.84		747,230	604,800	1,352,030	100	1,352,030	-		-	1,352,030	See map for assumed location
SCM	11+	R	65	N/A	N/A	15.2		Future Retrofit	Hwy 20 and Highland Rd	Quality						-	400,000	400,000	30	120,000	280,000		-	120,000	
SCM	11+	R	67	Deerfield Estate Phase 1	Apr. 1991	19.8		Future Retrofit	Rymal Rd E and Whitedeer Rd.	Quality						-	400,000	400,000	50	200,000	200,000		-	200,000	
SCM	11+	R	68	Heritage Green Valley Park Phase II	Sept. 1999	63.9		Future Retrofit	Winter Drive and Paramount Drive	Quality						-	1,100,000	1,100,000	50	550,000	550,000		-	550,000	
WAT	11+	C	1	South Waterdown Subwatershed Study	Apr. 2007	15	To guide future development and management of the South Waterdown lands	SWMF	Grindstone Creek - East Tributary on Northwest	Quantity / Quality	Storage Capacity =	11,500		0.90	1.20	1,334,340	690,000	2,024,340	0	-	-	2,024,340	-	-	
WAT	11+	C	3	South Waterdown Subwatershed Study	Apr. 2007	9.8	To guide future development and management of the South Waterdown lands	SWMF	Grindstone Creek - East Tributary (north west) SD	Quantity / Quality	Storage Capacity =	8,600		0.59	1.00	1,111,950	516,000	1,627,950	100	1,627,950	-		-	1,627,950	
WAT	0-5	C	4	South Waterdown Subwatershed Study	Apr. 2007	45	To guide future development and management of the South Waterdown lands	SWMF	Grindstone Creek - South west Tributary 2	Quantity / Quality	Storage Capacity =	46,650		2.70	2.60	2,891,070	2,799,000	5,690,070	100	5,690,070	-		-	5,690,070	
WAT	11+	C	5	South Waterdown Subwatershed Study	Apr. 2007	21.2	To guide future development and management of the South Waterdown lands	SWMF	East side of Waterdown Bay property	Quantity / Quality	Storage Capacity =	28,000		1.27	1.70	1,890,315	1,560,000	3,450,315	100	3,450,315	-		-	3,450,315	
WAT	11+	C	6	South Waterdown Subwatershed Study	Apr. 2007	17.73	To guide future development and management of the South Waterdown lands	SWMF	Salem Property	Quantity / Quality	Storage Capacity =	15,839		1.06		1,182,892	950,340	2,133,232	100	2,133,232	-		-	2,133,232	
WAT	0-5	C	10	Waterdown North Master Drainage Plan	Feb. 2007	11.91	Stormwater quality and associated resource management	SWMF for quality and erosion control	West of Borer's Creek, North of Parkside Drive	Quality/Erosion	Storage Capacity =	5,007		0.71	0.87	967,397	300,420	1,267,817	100	1,267,817	-		-	1,267,817	Updated report, based on drainage plan
WAT	11+	C	17	Waterdown North Master Drainage Plan	Feb. 2007	16.54	Stormwater quality and associated resource management	SWMF for quality and erosion control	West of Borer's Creek confluence, North of Parkside Drive	Quality/Erosion	Storage Capacity =	8,172		0.89		1,103,499	490,320	1,593,819	100	1,593,819	-		-	1,593,819	
WAT	11+	C	18	Waterdown North Master Drainage Plan	Feb. 2007	10.4	Assess proposed expansion for the urban settlement area of Waterdown	SWMF for quality and erosion control	East of Borer's Creek confluence, North of Parkside Drive	Quality/Erosion	Storage Capacity =	3,250		0.62	1.01	1,127,517	195,000	1,322,517	100	1,322,517	-		-	1,322,517	
WAT	11+	C	19	Waterdown North Master Drainage Plan	Feb. 2007	9.7	Assess proposed expansion for the urban settlement area of Waterdown	SWMF for quality and erosion control	Along Borer's Creek, NW of Centre Road and Parkside Road Intersection	Quality/Erosion	Storage Capacity =	4,350			1.75	1,945,913	281,000	2,206,913	100	2,206,913	-		-	2,206,913	footprint estimated June 1, 2011 by Metropolitan/City
WAT	0-5	C	20	Silverwood Homes Inc. Functional Servicing and SWM Report	Jul-08	11.16	Stormwater quality and associated resource management	SWMF	Along Parkside Drive, west of Borer's Creek	Quality / Quantity	Storage Capacity =	7,500		0.67	0.92	1,018,546	450,000	1,468,546	100	1,468,546	-		-	1,468,546	New design from Feb. '07 report
U	11+	C	U1	Unidentified			provisional item for unidentified SWM works		open	Quantity / Quality						-	5,000,000	5,000,000	100	5,000,000	-		-	5,000,000	per development engineering
U	11+	C	U2		Infills		to include provision for LID infrastructure cost recovery		open	Quality						-	5,000,000	5,000,000	100	5,000,000	-		-	5,000,000	per development engineering
U	11+	C	U3	Frontage Costs			estimate of road frontage costs for 52 residential SWM facilities		open	Quantity / Quality	40m * $1500/m per facility					-	3,120,000	3,120,000	100	3,120,000	-		-	3,120,000	per development engineering
Total Residential																89,305,785	89,574,660	149,880,445	93.67	140,385,653	7,470,452	2,024,340	841,960	139,543,693	

APPENDIX F-2: CATEGORY C - STORMWATER MANAGEMENT (QUALITY AND OR QUANTITY FACILITIES) NON-RESIDENTI

Category			SWMP #	Project Title	Year	Drainage Area (ha)	Purpose	SWMP/ Drainage Work				Volume (m3)	Estimated Footprint 4% (ha)	Estimated Footprint 6% (ha)	Study/Draft Plan Footprint (ha)	Land Cost ($)	Estimated Capital Cost ($)	Estimated Total Cost Including Land	Growth Related %	Net Growth Total Associated Cost ($)	Existing Benefit	Direct Developer Contribution ($)	Residential Area Fraction Cost ($)	Net Total Associated Cost ($)	Remarks
Primary Dev. Areas	Build Out (yr)	Secondary						Type of Work	Location of Work	Type	Description													
ANC	11+	C	1	Stormwater Management Report - Update Ancaster Industrial Park	Dec. 2002	74.47	SWM Plan for proposed urban development	Extended detention pond for quantity and quality treatment of Drainage Area 1	Close to the outlet of Drainage Area 1	Quantity / Quality	Storage Capacity =	21,700		4.47		4,988,415	1,302,000	6,270,415	0	-	-	6,270,415	-	-	City estimate of revised drainage area
ANC	11+	C	11	Ancaster Industrial Park, Stormwater Detention Facilities Area No. 1,3 and 4	July, 1999	8.2			Detention Pond #A	Quantity		1,558	0.33			364,720	93,480	458,200	0	-	-	458,200	-	-	
ANC	0-5	C	12	Duff's Corner Corporate Business Park SWM Report	Apr. 2007	45.99	SWM Plan for proposed urban development	Wilson Street West and Garner Road West (Duff's Corner)	Detention Pond #B	Quantity	Storage Volume =	23,350	1.84		1.10	1,223,145	1,401,000	2,624,145	0	-	-	2,624,145	-	-	Updated report, different drainage area
ANC	11+	C	23	Trustwood Industrial Park east facility	Dec-07	30	Functional Servicing Report Industrial	SWMF	west of Shaver	Quality / Quantity	final drainage area to be determined	29,760		1.80		2,001,510	1,785,600	3,787,110	0	-	-	3,787,110	-	-	drainage area to change, meeting with City and A.J. Clarke May 14 2009
ANC	11+	C	27	Trustwood Industrial Park west facility		19	Functional Servicing Report Industrial	SWMF	west of Shaver	Quality / Quantity	final drainage area to be determined	3,728		1.14		1,267,523	223,643	1,491,266	0	-	-	1,491,266	-	-	assumed cost, meeting with City and A.J. Clarke May 14 2009
BMH	11+	C	9	Future Planned Non-Residential Development		25		SWMF		Quality / Quantity	Storage Capacity =	4,750		1.50		1,334,340	285,000	1,619,340	0	-	-	1,619,340	-	-	See map for assumed location
BMH	11+	C	11	Future Planned Non-Residential Development		38		SWMF		Quality / Quantity	Storage Capacity =	6,840		2.16		1,921,450	410,400	2,331,850	0	-	-	2,331,850	-	-	See map for assumed location
BMH	11+	C	12	Future Planned Non-Residential Development		20		SWMF		Quality / Quantity	Storage Capacity =	3,800		1.20		1,067,472	228,000	1,295,472	0	-	-	1,295,472	-	-	See map for assumed location
BMH	11+	C	13	Future Planned Non-Residential Development		26		SWMF		Quality / Quantity	Storage Capacity =	4,940		1.56		1,387,714	296,400	1,684,114	0	-	-	1,684,114	-	-	See map for assumed location
BMH	0-5	C	14	Orlick Aeropark Design Brief	Jan. 2009	36.94	SWM Plan for proposed urban development	dry pond	Upper James St. and Dickenson Road	Quantity	Storage Volume =	14,100	1.48		1.23	1,084,159	846,000	1,940,159	0	-	-	1,940,159	-	-	Updated report, defined location
BMH	11+	C	15	Future Planned Non-Residential Development		40		dry pond		Quantity	Storage Capacity =	7,800	1.80			1,423,296	456,000	1,879,296	0	-	-	1,879,296	-	-	See map for assumed location
BMH	11+	C	16	Future Planned Non-Residential Development		15		dry pond		Quantity	Storage Capacity =	2,850	0.60			533,736	171,000	704,736	0	-	-	704,736	-	-	See map for assumed location
BMH	11+	R	53	Greater Hamilton Airport Business Park	Oct. 1991	11.65	Quality control facility		Hwy 6 & Dickenson Rd W	Quality						-	400,000	400,000	0	-	-	400,000	-	-	
HAM	11+	C	7	Mountain Brow Boulevard Crossing and Central Mountain Stormwater management Class EA, City of Hamilton	Sept. 2003	221	Provide quality treatment to stormwater before discharging to Red Hill Creek	Proposed wetland	Mount Albion Conservation Area at West Hannon Creek Tributary - wetland	Quality	Storage Volume =	10,700			-	-	508,750	508,750	0	-	407,000	101,750	-	-	Cost as reported - 20% growth related
HAM	11+	C	10	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	335.19	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC10	Quality / Quantity	Flood Control Volume =	83,295			5.46	4,852,864	4,997,858	9,850,723	0	-	-	9,850,723	146,942	(146,942)	New location
HAM	11+	C	11	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	109.7	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC3	Quality / Quantity	Flood Control Volume =	41,719		8.52	4.10	3,647,196	2,503,140	6,150,336	0	-	-	6,150,336	433,889	(433,889)	New location
HAM	11+	C	13	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	36	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	TM3	Quality / Quantity	Flood Control Volume =	13,537		2.16	1.85	1,645,686	812,220	2,457,906	0	-	-	2,457,906	-	-	New location
HAM	11+	C	14	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	46.3	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC6	Quality / Quantity	Flood Control Volume =	16,404		2.78	2.09	1,859,180	984,240	2,843,420	0	-	-	2,843,420	-	-	See map for assumed location
HAM	11+	C	16	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	71.3	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC7	Quality / Quantity	Flood Control Volume =	26,904		4.28	3.11	2,766,532	1,734,240	4,500,772	0	-	-	4,500,772	-	-	See map for assumed location
HAM	11+	C	18	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	21.5	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC8	Quality / Quantity	Flood Control Volume =	15,155		1.30	2.00	1,779,120	909,300	2,688,420	0	-	-	2,688,420	-	-	See map for assumed location
HAM	11+	C	17	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	14.1	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC9	Quality / Quantity	Flood Control Volume =	10,224		0.85	1.54	1,369,922	613,440	1,983,362	0	-	-	1,983,362	-	-	See map for assumed location
HAM	11+	C	18	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	19.2	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC12	Quality / Quantity	Flood Control Volume =	9,671		1.15	1.80	1,423,296	580,260	2,003,556	0	-	-	2,003,556	-	-	See map for assumed location
HAM	11+	C	20	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	40.7	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	HC14	Quality / Quantity	Flood Control Volume =	24,159		2.44	2.72	2,419,603	1,449,540	3,869,143	0	-	-	3,869,143	-	-	See map for assumed location
HAM	11+	C	21	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	16.6	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	TM1a	Quality / Quantity	Flood Control Volume =	4,902		1.00	0.75	667,170	294,120	961,290	0	-	-	961,290	-	-	See map for assumed location
HAM	11+	C	22	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	16.6	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	TM1b	Quality / Quantity	Flood Control Volume =	4,902		1.00	0.75	667,170	294,120	961,290	0	-	-	961,290	-	-	See map for assumed location
HAM	11+	C	23	Hannon Creek SWS – North Glanbrook Industrial Business Park MDP	Mar-09	35.5	Develop a Master Drainage Plan for the Hannon Creek Subwatershed	SWMF	TM2	Quality / Quantity	Flood Control Volume =	12,768		2.13	1.78	1,583,417	766,140	2,349,557	0	-	-	2,349,557	-	-	See map for assumed location
SCL	6-10	C	9	Creek System Improvement WC 7	2003	100	Stormwater quality and associated resource management	Previously planned	Arvin Avenue	Quality / Quantity	Wetland	12,325		6.00	2.74	2,437,394	739,500	3,176,894	0	-	-	3,176,894	-	-	Cost reported in SC-WQMS 2004
SCL	11+	C	10	Stormwater Quality Management Strategy, City of Stoney Creek - Master Plan	2004	93	Stormwater quality and associated resource management	Proposed SWMF/Quality	Area F/G, S/W of Lewis & S. service Rd.	Quality / Quantity	Wetland	13,067		3.78		3,362,537	509,421	3,871,958	0	-	-	3,871,958	-	-	listed as committed/actual in 2009
SCL	0-5	C	11	SCUBE East Subwatershed Study (Draft)	Nov. 2010	24.6	Stormwater management strategy	SWMF	WC 8 south of CNR west of Lewis - Ridgeview	Quality	wet pond #0-5	3,596		1.49	0.70	6,226,920	215,760	6,442,680	0	-	-	6,442,680	-	-	See map for assumed location
SCL	0-5	C	16	SCUBE East Subwatershed Study (Draft)	Nov. 2010	9.6	Stormwater management strategy	SWMF	Trib 16-2 east of Winona	Quantity / Quality	wet pond #16-2	6,288		0.58		512,387	377,280	889,667	0	-	-	889,667	-	-	See map for assumed location
SCL	11+	C	17	SCUBE East Subwatershed Study (Draft)	Nov. 2010	11.8	Stormwater management strategy	SWMF	Fifty Creek east SCUBE East	Quantity / Quality	wet pond #12-1	7,703		0.71		629,808	462,180	1,091,988	0	-	-	1,091,988	-	-	See map for assumed location
SCL	0-5	C	23	SCUBE East Subwatershed Study (Draft)	Nov. 2010	16	Stormwater management strategy	SWMF	Fifty Creek west SCUBE East	Quantity / Quality	wet pond #12-2	10,480		0.96		853,978	628,800	1,482,778	0	-	-	1,482,778	-	-	See map for assumed location

ANC: Ancaster
BMH: Binbrook / Mount Hope
HAM: Hamilton Mountain
SCL: Stoney Creek - Lower
SCM: Stoney Creek - Mountain
WAT: Waterdown

APPENDIX F-2: CATEGORY C - STORMWATER MANAGEMENT (QUALITY AND OR QUANTITY FACILITIES) NON-RESIDENTIA

Category			SWMF #	Project Title	Year	Drainage Area (ha)	Purpose	SWMF Drainage Work																	
Primary Dev. Areas	Build Out (yr)	Secondary						Type of Work	Location of Work	Type	Description	Volume (m3)	Estimated Footprint 4% (ha)	Estimated Footprint 8% (ha)	Study/Draft Plan Footprint (ha)	Land Cost ($)	Estimated Capital Cost ($)	Estimated Total Cost including Land	Growth Related %	Net Growth Total Associated Cost ($)	Existing Benefit	Direct Developer Contribution ($)	Residential Area Fraction Cost ($)	Net Total Associated Cost ($)	Remarks
SCL	11+	C	25	SCUBE East Subwatershed Study (Draft)	Nov. 2010	18.2	Stormwater management strategy	SWMF	WC 9 south of CNR	Quantity / Quality	wet pond #9-4	10,606		0.97		864,652	636,360	1,501,012	0	-	-	1,501,012	-	-	See map for assumed location
SCL	0-5	C	26	SCUBE East Subwatershed Study (Draft)	Nov. 2010	16.4	Stormwater management strategy	SWMF	Trib 10.1 east of Winona Fifty Point Industrial Park	Quantity / Quality	wet pond #10-1	10,742		0.98		875,327	644,520	1,519,847	0	-	-	1,519,847	-	-	See map for assumed location
SCL	11+	C	27	SCUBE East Subwatershed Study (Draft)	Nov. 2010	9.3	Stormwater management strategy	SWMF	Trib 10.3 west of Winona	Quantity / Quality	wet pond #10-3	6,092		0.56		496,374	365,520	861,894	0	-	-	861,894	-	-	See map for assumed location
SCL	11+	C	28	SCUBE East Subwatershed Study (Draft)	Nov. 2010	18.4	Stormwater management strategy	SWMF	WC 7.2 south of CNR	Quantity / Quality	wet pond #7-2-1	6,778		0.62		555,085	408,880	961,785	0	-	-	961,785	-	-	See map for assumed location
SCL	11+	R	32	Glover Industrial Park Phase 2D	Jan. 1999	2.05	Flood Control	Future Retrofit	Arvin Av. / Glover Rd	Quality						-	400,000	400,000	0	-	320,000	80,000	-	-	20 % growth related
WAT	11+	C	12	Clappison Industrial Park		60	Quality only	SWMF	to be determined	Quality / Quantity	Storage Capacity =	11,400		3.60		4,003,020	684,000	4,687,020	0	-	-	4,687,020	-	-	Location and size are subject to detail study
WAT	11+	R	35	Tech Park	Feb. 1994	15.66	Quality and Flood Control	Future Retrofit	Hwy 6 & Hwy 5	Quality						-	400,000	400,000	0	-	320,000	80,000	-	-	20 % growth related
U	11+	C	U4	Unidentified			provisional item for unidentified non-res SWM works with residential component		open	Quantity / Quality						-	10,000,000	10,000,000	0	-	-	10,000,000	-	-	per development engineering
																							-	-	
Total Non-Residential																64,086,218	40,815,912	104,902,131	0.00	0	1,047,000	103,855,131	580,512	(580,512)	
Grand Total																144,392,004	110,390,572	254,782,576	55.10	140,385,653	8,517,452	105,879,471	1,422,571	138,963,081	

ANC: Ancaster
BMH: Binbrook / Mount Hope
HAM: Hamilton Mountain
SCL: Stoney Creek - Lower
SCM: Stoney Creek - Mountain
WAT: Waterdown

APPENDIX F-2: CATEGORY D - OVERSIZING OF TRUNK STORM SEWERS - DRAFT APPROVED SUBDIVISIONS

Subdivision and Road-Related Oversizing (where draft plans indicate storm sewers over 1200 mm diameter)

TYPE	Pipe Size	Application Number	Pipe Length	Oversize Pipe Cost	Number MH	Oversize MH Cost	Total Over-Size Cost 0-5 Years	Total Over-Size Cost 5-10 Years	Notes
Storm Sewer	1350 mm Diam.	25T200723 - Mountaingate	400	$131,164.00	7		$131,164.00		West leg of Provident Way and south along Rosebury Way to Block 307
		25T-88031 - Sandrina Gardens	135	$44,267.85	0		$44,267.85		Street "G" From west limit of Plan to Street "B" and Street "B" From Street "G" To Street "C"
		25T-95002 - Miles Estates	283	$92,798.53	9		$92,798.53		Through Block 132 to Upper Sherman Avenue
		Parkside Drive	260				$520,000.00		Development Engineering Estimate
	1500 mm Diam.	25T200208 - Red Hill Summit Est E	130	$94,380.00	2		$94,380.00		This size not yet verified - approximate only.
		25T200808 - Penny Lane Estates	44	$31,944.00	2		$31,944.00		Street 'A' Manholes 6 to 17/18
		25T-88031 - Sandrina Gardens	135	$98,010.00	0		$98,010.00		Street "C" From Street "B" To Court "E"
		25T-95002 - Miles Estates	152	$110,352.00	4		$110,352.00		Street "G" From Miles Road To Street "F" and Street "F" From Street "G" To Block 132
	1650 mm Diam.	25T200605 - Summerlea West	225	$261,087.75	2	$9,694.52		$270,782.27	Street "G" from Street "C" to Street "H"
		25T200908 - Paletta - Felker Nhd	190	$220,474.10	3	$14,541.78	$235,015.88		Highbury drive from Sir Isaac Brock Drive to Approx. 200m Southerly
		25T200908 - Paletta - Felker Nhd	210	$243,681.90	5	$24,236.30	$267,918.20		Sir Isaac Brock Drive from Highbury Drive to Approx. 220 metres westerly
		25T-88031 - Sandrina Gardens	80	$92,831.20	2	$9,694.52	$102,525.72		Street "C" from Terni Blvd. To Court "E"
		25T-200513 - Waterdown Bay	500					$479,500.00	Development Engineering Estimate - (W-4 inlet)
	1800 mm Diam.	25T200605 - Summerlea West	270	$460,320.30	5	$24,236.30		$484,556.60	Street "G" from Street "H" to proposed storm pond
		25T200808 - Penny Lane Estates	352					$512,415.00	Development Engineering Estimate
		Rymal Road	1200					$2,400,000.00	Development Engineering Estimate
		Highland Road	500				$1,000,000.00		Development Engineering Estimate
		Sandrina	250				$500,000.00		Development Engineering Estimate
		Upper Sherman/Acadia	300				$600,000.00		Development Engineering Estimate
		Trinity Road	250				$500,000.00		Development Engineering Estimate
		Unidentified Oversizing	1000					$3,500,000.00	Development Engineering Estimate
Total by Period			**5866**		**41**		**$4,328,376.18**	**$7,647,253.87**	
Grand Total								**$11,975,630.05**	

APPENDIX F-2 - CATEGORY E - CULVERT AND BRIDGES NOT PREVIOUSLY IDENTIFIED

Ref: Hamilton Development Charges -Transportation (EarthTech)

Item Number	Road Project Description	Improvement	Length km.	Number of Culverts/Bridges > 1m^2 end area	New or Widening	Width m	Identified in Category "A"	Small @$75k 1-4m^2	Meduim @$150k 4-8m^2	Large @$300k >8m^2	Cost (2011$)
1	Airport Rd. - U. James to GlancasterRd.	2r-2i	3.2	7	Widening	26		7			$525,000
2	Anchor Road Extension	2i	0.53								$0
3	Annual Intersection Ped.&Traffic sig. Mod.	City wide	N/A								
4	Annual Misc. Land Acquisition	City wide	N/A								
5	Annual New Sidewalk Program	City wide	N/A								
6	Annual new Traffic Signals	City wide	N/A								
7	Annual Road Urbanization	City wide	N/A								
8	Annual Roadside Substandard Drainage	City wide	N/A								
9	Annual Roadabouts										
10	Annual Street Lighting	City wide	N/A								
11	Annual Traffic Calming-various locations	City wide	N/A								
12	Arvin Ave- McNeilly to Lewis	2i	0.80								
13	Arvin Ave.-Jones to existing end	2i	0.50	1	New		1	IDENTIFIED IN CATEGORY "A"			
14	Arvin Avenue -extend to McNeilly	2i	0.38	1	New		1	IDENTIFIED IN CATEGORY "A"			
15	Barton St.-Fruitland Rd to Glover Rd.	2r-3u	2.61	1	New		1	IDENTIFIED IN CATEGORY "A"			
16	Barton Street- Glover to Fifty	2r-3u	3.34	1	New		1	IDENTIFIED IN CATEGORY "A"			
17	Binbrook Rd.-E and W of Hwy. 56	2r-5u	0.50								
18	Binbrook Rd.-Fletchers Rd. to .3 km west of Hwy. 56	2r-2-+bike	1.70								
19	Book Road - Southcote To Fiddlers Green (AEGD)	2r-2i	2.00	4	Widening	26		4			$300,000
20	Butter Road - Glancaster to Fiddlers Green (AEGD)	2r-2i	2.20	5	Widening	26		5			$375,000
21	Carluke Road - Fiddlers Green to Glancaster Road (AEGD)	2r-2i	1.00	1	Widening	26		1			$75,000
22	Centre Rd.- Northlawn to Parkside Dr.	2r-3u	1.20								
23	Community Ave.-Stoney Creek limits to Teal Ave.	2r-2i	0.50								
24	Copes Lane east of Jones Road	2r-2u	0.50								$0
25	Cormorant Road Ext. - Tradewind to Trinity Road (AIP)	2i	0.80	1	Widening	26				1	$300,000
26	Dartnall Rd. - Stone Church Rd. to Rymal Rd.	2r-4/5u	1.00								
27	Dartnall Rd. - Rymal Rd to Dickenson	2i	2.80	2	New	26		2			$150,000
28	Dickenson Rd.E-East of Hwy. 6 to west of Nebo Rd.	2r-3u	4.50	5	Widening	26		4		1	$600,000
29	Dickenson Rd.E-west of Nebo Rd. to west of Glover	2r-2i	1.10								
30	Dickenson Rd.W-west of Highway 6 to Glancaster Rd.	2r-2i	2.90								
31	Dickenson Rd Ext. - Glancaster Rd. to Southcote Rd. (AEGD)	2r-2i	1.20	2	New	26		2			$150,000
32	Fall Fairway - Binbrook										$0
33	Fiddlers Green Road - Garner to Carluke Road (AEGD)	2r-2i	6.00	9	Widening	26		9			$675,000

APPENDIX F-2 - CATEGORY E - CULVERT AND BRIDGES NOT PREVIOUSLY IDENTIFIED

Ref: Hamilton Development Charges -Transportation (EarthTech)

Item Number	Road Project Description	Improvement	Length km.	Number of Culverts/Bridges > 1m^2 end area	New or Widening	Width m	Identified in Category "A"	Small @$75k 1-4m^2	Meduim @$150k 4-8m^2	Large @$300k >8m^2	Cost (2011$)
34	Fifty Rd.-QEW to Hwy. 8	2r-2u	0.80	1	Widening	26		1			$75,000
35	First Rd. West-Green Mountain to Glover Mountain	3u	0.90								
36	First Rd. - Hwy 20 to Green Mtn Road	2r-3u	3.00	2	Widening	26		2			$150,000
37	Fletcher Rd.- Golf Club Rd to Binbrook Rd.	2r-2ru	6.25	2	Widening	26		2			$150,000
38	Fletcher Rd.- Rymal to Golf Club Rd	2r-3u	2.00	1	Widening	26		1			$75,000
39	Fruitland Rd. By-pass- land requirements	N/A	N/A								
40	Fruitland Rd. Escarpment Access	2r	2.10								
41	Fruitland Rd.-Arvin Ave. to Barton St.	2u-4u	0.36								
42	Fruitland Road By-pass	4u	1.15	1	New	26		1			$75,000
43	Garden Ave.-Teal to Pinelands	2r-2i	0.20								
44	Garner Rd.- 50 M e of Fiddlers to 50m w of Miller La	2r-5u	0.51								
45	Garner Rd.-50 m e of Shaver to 50m w of Fiddlers	2r-5u	2.36								
46	Garner Rd.-50m w of Southcote to 50M e of Southcote	4r-5u	0.10								
47	Garner Rd.-Hwy. 2 to 50m w of Shaver	2r-5u	0.72								
48	Garth St.- Twenty Rd. to Dickenson Rd.	2i	1.40								
49	Garth St.-Stone Church to Rymal	2r-2u	1.04								
50	Glancaster Rd.- Garner Rd. to Twenty Rd.	2r-2ru	1.20	1	Widening	26				1	$300,000
51	Glover Rd.-Rymal to 650m s. of Twenty Rd.	2r-2i	2.00								
52	Golf Club Road - Trinity Chruch Rd. to Second Rd. East	2r-2u	7.00	4	Widening	26		4			$300,000
53	Golf Links Rd.-McNiven to Hwy. 403	2r-3u	0.40								
54	Governor's Rd. - Creighton to Osler	3u-5u	1.30								
55	Green Mtn. Road - U. Cetennial to Second Road E.	2r-2u		2	Widening	26		2			$150,000
56	Green Mtn. Road- First Rd. W. to Centennial	3u	0.85								
57	Hamilton Drive - Hwy. 403 to .35 km south	2r-2u	0.35								
58	Highland Road - Pritchard Rd. to U. Mt. Albion (EMIBP)	2r-5u	0.74		Widening	26		2			$150,000
59	Highland Road - U. Centennial to Second Road E.	2r-5u	2.00	4	Widening	26		4			$300,000
60	Highland Road - U. Mt. Albion to Winterberry	2r-5u	0.56	2	Widening	26		2			$150,000
61	Highway 20 - 350m S of Mud to 830m S of Mud	4r-5u	0.48								
62	Highway 20 -100m s of Grn Mtn to 800m s of Grn Mtn	4r-5u	0.70								
63	Hwy. 2 Wilson St.-Hwy. 52 to Hwy 53	4r-5u	1.80								
64	Hwy. 5/6 Interchange	n/a		1	New				1		$150,000
65	Hwy. 5/6 Northwest Quadrant Collector Road (FIP)	2i	0.75								$0

APPENDIX F-2 - CATEGORY E - CULVERT AND BRIDGES NOT PREVIOUSLY IDENTIFIED

Ref: Hamilton Development Charges -Transportation (EarthTech)

Item Number	Road Project Description	Improvement	Length km.	Number of Culverts/Bridges > 1m^2 end area	New or Widening	Width m	Identified in Category "A"	Small @$75k 1-4m^2	Meduim @$150k 4-8m^2	Large @$300k >8m^2	Cost (2011$)
66	Hwy. 8 (Stoney Creek) - Dewitt to Fruitland	2r-5u	0.80								
67	Hwy. 8 (Dundas)- Bond St. to Dundas limits	2r-3u	0.40								
68	Hwy. 8 (Dundas)- Hillcrest to Park	2r-3u	0.62								
69	Hwy. 8-Fruitland Rd. to Hamilton Boundary	2r-4r	3.34	4	Widening	26		4			$300,000
70	Isaac Brock- Mud to Green Mtn	3u	1.00								
71	Jerseyville Rd. W.-Wilson to Lloyminn	2r-3u	3.10								
72	Jones Rd.-Barton to South Service Rd	2r-2i	0.90								
73	Kenmore-Arvin to Barton	2r-2i	0.40								
74	Land Acquisition										$0
75	Leaside Ave.-Arvin to Barton	2r-2i	0.30								
76	Lewis Rd.-Barton to South Service Rd.	2r-2i	0.81	1	New		1	IDENTIFIED IN CATEGORY "A"			
77	McNeilly-Barton to South Service Rd.	2r-2u	1.00								
78	McNiven-Rousseaux to Golf Links	2r-4u	0.62								
79	Mid Block Arterial - Mtn Brow to Dundas	4u	1.05	2	Widening	26		2			$150,000
80	Millen Rd-South Service Rd. to Hwy. 8	2r-3u	2.00								
81	Mohawk - McNiven to Hwy. 403	2r-4u	1.30								
82	Mountain Brow Blvd. (Waterdown)	2r-2u	1.50	3	Widening	26		2			$150,000
83	Mud Street - U. Centennial to 2nd Rd East	2r-2u	2.00	2	Widening	26		2			$150,000
84	N/S Collector - Twenty Rd. to Dickenson Rd. (AEGD)	2i	1.40	?							$0
85	Nebo Rd.-Twenty Rd. to Dickenson Rd.	2r-2i	2.00	4	Widening	26			1	3	$1,050,000
86	Nebo Rd.-Rymal Rd. to Twenty Rd.	2r-3i	0.60								
87	New E/W Road -Tradewind to Trinity Rd.	2i	0.80								
88	New Mid-block Collector-Cormorant to Tradewind	2i	0.30	1	New	26				1	$300,000
89	Noise barriers	N/A	N/A								
90	North Service Rd.-Green to Grays	2r-4i	0.91								
91	North Service Road- Green Rd. to East City Limits	2r-2u	8.30	1	New		1	IDENTIFIED IN CATEGORY "A"			
92	Oriole - South Service Rd. to Winona	2r-2i	0.50								
93	Parkside Dr.- 900m e. of Hwy 6 to east part of industrial section	2r-3u	2.70								
94	Parkside Dr.-Hwy. 6 to 900m east	2r-5u	0.90	1	New				1		$150,000
95	Pritchard Rd - Stone Church to Rymal (EMIBP)	2r-2i	1.03								
96	Pinelands Ave.-Community to South Service Road	2r-2i	0.30								
97	Rail Grade Separations	N/A	N/A								

APPENDIX F-2 - CATEGORY E - CULVERT AND BRIDGES NOT PREVIOUSLY IDENTIFIED

Ref: Hamilton Development Charges -Transportation (EarthTech)

Item Number	Road Project Description	Improvement	Length km.	Number of Culverts/Bridges > 1m^2 end area	New or Widening	Width m	Identified in Category "A"	Small @$75k 1-4m^2	Meduim @$150k 4-8m^2	Large @$300k >8m^2	Cost (2011$)
98	Reg. Rd. 56-Community Core to North Limits	2r-5u	0.60								
99	Reg. Rd. 56- South Limits of ROPA 9 to Binbrook	2r-4r	6.35	6	Widening	26		2	2	2	$1,050,000
100	Rymal Rd. W.-Garth to West 5th	2r-5u	1.22								
101	Rymal Rd.-Ryckmans St. to w. of Dartnall Rd.	3r-5u	5.00								
102	Rymal Rd- w. of Dartnall Rd. to Hwy. 20	2r-5u	5.70	6	New				5	1	$1,050,000
103	Rymal Road- e. of Glancaster to Garth	2r-5u	1.30								
104	Rymal Road- former west city limits to Upper Paradise	3r-5u	0.20	1	Widening	26				1	$300,000
105	Scenic Dr.-Old City limits to Lavender S. Leg	2r-3u	1.40	1	Widening	26			1		$150,000
106	Seaman St-South Service to Dewitt	2r-2i	0.60								
107	Second Road - Hwy. 20 to Green Mtn. Road	2r-3u	3.00	3	Widening	26		2			$150,000
108	Shaver -Hwy. 403 to Wilson	2r-2u	1.50	1	Widening	26			1		$150,000
109	Shaver - Trustwood to Garner Road (AIP)	2r-2i	1.00								
110	South Service Rd.-Millen to Grays	2r-4i	1.74	3	Widening	26		1	2		$375,000
111	Southcote Rd. - Garner Rd. to Book Rd. (AEGD)	2r-2i	2.00								
112	Southcote-Golf Links Rd. to Garner Rd.	2r-4u	2.20	1	New				1		$150,000
113	Springbrook Rd.-Meadowlands Blvd. To Garner Rd.	2r-3u	1.10								
114	Stone Church Rd.-Pritchard to Winterberry	2r-3u	0.75								
115	Stone Church-Wellington to Upper James	2r-3u	0.80								
116	Stoney Creek Ind. Park Infrastructure	N/A	N/A								
117	Sunnyhurst-Barton to North end	2r-2i	0.52								
118	Teal Ave.-Garden Ave. to South Service Rd.	2r-2i	0.30								
119	Trinity Church- Golf Club Rd. to Binbrook Rd.	2r-2ru	5.20	2	Widening	26				2	$600,000
120	Trinity Church - Rymal to Darntall Rd. Ext. (NGIBP)	5u	2.50	3	New	26		3			$225,000
121	Trinity Church-extension from Rymal to Stone Church	5u	1.10	1	New					1	$300,000
122	Trinity Church-Rymal to Golf Club Rd.	2r-2i	1.10	2	Widening	26			1	1	$450,000
123	Trinity Rd- 1 km south of Wilson to Hwy. 403	2r-4u	2.20	2	Widening	26				2	$600,000
124	Twenty Rd.-Glancaster to 600m w. f Nebo	2r-3r	1.80								
125	Twenty Rd.-600m w. of Nebo to Trinity Church	2i	7.10								
126	U. Centennial - 100 m of Grn Mtn to 800m of Grn Mtn	4r-5u	0.70								
127	U. Centennial - 350m of Mud to 830 s of Mud	4r-5u	0.48	1	new				1		$150,000
128	Upper Gage-Mohawk to Thorley/Edwina	4u-5u	0.58								
129	Upper James-Rymal to City Limits	4r-5u	0.70	1						1	$300,000

APPENDIX F-2 - CATEGORY E - CULVERT AND BRIDGES NOT PREVIOUSLY IDENTIFIED

Ref: Hamilton Development Charges -Transportation (EarthTech)

Item Number	Road Project Description	Improvement	Length km.	Number of Culverts/Bridges > 1m^2 end area	New or Widening	Width m	Identified in Category "A"	Small @$75k 1-4m^2	Meduim @$150k 4-8m^2	Large @$300k >8m^2	Cost (2011$)
130	Upper Mount Albion Rd.-Rymal Rd. to Mud St.	2r-3u	1.70	1					1		$150,000
131	Upper Ottawa St.-extend to Twenty Rd.	2i	1.00								
132	Upper Sherman- Stone Church to LINC	2r-3u	0.90								
133	Upper Sherman-Stone Church to Rymal	2r-3u	1.00								
134	Upper Wellington-Limeridge to Stone Church	2r-5u	1.20								
135	Upper Wellington-Rymal to Stone Church	2r-3u	1.00								
136	Waterdown - Burlington Rd. Upgrades	n/a									$0
137	Waterdown Bypass (E/W Road)	2u/4u	10.85	9				9			$675,000
138	Waterdown Road - Hamilton Section	2r-3u+bikes	0.29								$0
139	Waterdown - Creek Crossing #1			1	New			1			$75,000
140	Waterdown - Creek Crossing #2			1	New			1			$75,000
141	Waterdown - Creek Crossing #3			1	New			1			$75,000
142	Waterdown Network Improvements-Hamilton Section	4u	N/A	1	Widening	26			1		$150,000
143	Weir's Lane-Hwy. 8 to escarpment	2r-2u	1.50	1	Widening	26			1		$150,000
144	West 5th- Stone Church to Rymal	2r-3u	1.00	1	Widening	26			1		$150,000
145	West 5th-Limeridge to Stone Church	2r-3u	1.20								
146	White Church Rd. - Glancaster to Hwy. 6 (AEGD)	2r-2i	2.30	7	Widening	26		7			$525,000
147	Wilson St.-Hamilton Dr. to just west of Halson	2r-4u	1.60								
148	York Rd.-Hwy. 6 to York Rd. west leg	2r-2ru	3.40								
Grand Total				**137**			**6**	**92**	**21**	**18**	**$15,450,000**
Growth %											**100**
Total Growth											**$15,450,000**

Res	**$9,750,000**
Non-Res	**$5,700,000**

APPENDIX F-2 - GRIDS-RELATED STORMWATER MANAGEMENT (QUALITY AND OR QUANTITY) FACILITIES

Primary Dev. Areas	SWMF #	AEGD Stage #	Drainage Area (ha)	Volume (m3)	Estimated Footprint 4% (ha)	Land Cost 4%	Estimated Capital Cost ($)	Estimated Cost ($)	Growth Related %	Total Growth Associated Cost ($)	Post Period Cost ($)	Net Total Associated Cost 2011-2031 ($)	Direct Developer Contribution (%)	Direct Developer Contribution ($)	Net Total Associated Cost ($)	Remarks
Expansion to Airport SPA	1	2	77	17,325	3.08	2,739,845	1,039,500	3,779,345	100	3,779,345	3,779,345	-	100	-	-	In Ancaster, south of Garner Road
	2	2	33	7,425	1.32	1,174,219	445,500	1,619,719	100	1,619,719	1,619,719	-	100	-	-	In Ancaster, south of Garner Road
	3	2	38.5	8,663	1.54	1,369,922	519,750	1,889,672	100	1,889,672	1,889,672	-	100	-	-	In Ancaster, south of Garner Road
	4	2	88	19,800	3.52	3,131,251	1,188,000	4,319,251	100	4,319,251	4,319,251	-	100	-	-	In Ancaster, south of Garner Road
	5	1	160	36,000	6.40	5,693,184	2,160,000	7,853,184	100	7,853,184	-	7,853,184	100	7,853,184	-	In Ancaster, south of Garner Road
	6	1	63	14,175	2.52	2,241,691	850,500	3,092,191	100	3,092,191	-	3,092,191	100	3,092,191	-	In Ancaster, south of Garner Road
	10	1	33	7,425	1.32	1,174,219	445,500	1,619,719	100	1,619,719	-	1,619,719	100	1,619,719	-	North of Airport
	11	1	28	6,300	1.12	996,307	378,000	1,374,307	100	1,374,307	-	1,374,307	100	1,374,307	-	North of Airport
	12	1	17.88	4,023	0.72	636,213	241,380	877,593	100	877,593	-	877,593	100	877,593	-	North of Airport
	13	1	108	24,300	4.32	3,842,899	1,458,000	5,300,899	100	5,300,899	-	5,300,899	100	5,300,899	-	North of Airport
Potential New Busniess Park (In existing Airport Spa)	14	1	42.5	9,563	1.70	1,512,252	573,750	2,086,002	100	2,086,002	-	2,086,002	100	2,086,002	-	
	15	1	25.5	5,738	1.02	907,351	344,250	1,251,601	100	1,251,601	-	1,251,601	100	1,251,601	-	
	16	1	34	7,650	1.36	1,209,802	459,000	1,668,802	100	1,668,802	-	1,668,802	100	1,668,802	-	
	17	1	41	9,225	1.64	1,458,878	553,500	2,012,378	100	2,012,378	-	2,012,378	100	2,012,378	-	
	18	1	124.88	28,098	5.00	4,443,530	1,685,880	6,129,410	100	6,129,410	-	6,129,410	100	6,129,410	-	
	19	1	100	22,500	4.00	3,558,240	1,350,000	4,908,240	100	4,908,240	-	4,908,240	100	4,908,240	-	Involves off-site stream work
	20	1	230.5	51,863	9.22	8,201,743	3,111,750	11,313,493	100	11,313,493	-	11,313,493	100	11,313,493	-	
	21	1	15	3,375	0.60	533,736	202,500	736,236	100	736,236	-	736,236	100	736,236	-	
	22	1	34	7,650	1.36	1,209,802	459,000	1,668,802	100	1,668,802	-	1,668,802	100	1,668,802	-	
	23	1	140.88	31,698	5.64	5,012,849	1,901,880	6,914,729	100	6,914,729	-	6,914,729	100	6,914,729	-	
	24	1	50.5	11,363	2.02	1,796,911	681,750	2,478,661	100	2,478,661	-	2,478,661	100	2,478,661	-	
	25	1	97	21,825	3.88	3,451,493	1,309,500	4,760,993	100	4,760,993	-	4,760,993	100	4,760,993	-	
	26	2	45	10,125	1.80	1,601,208	607,500	2,208,708	100	2,208,708	2,208,708	-	100	-	-	Involves off-site stream work
	27	2	42.75	9,619	1.71	1,521,148	577,125	2,098,273	100	2,098,273	2,098,273	-	100	-	-	Involves off-site stream work
	28	2	18	4,050	0.72	640,483	243,000	883,483	100	883,483	883,483	-	100	-	-	Involves off-site stream work
	29	2	196.75	44,269	7.87	7,000,837	2,656,125	9,656,962	100	9,656,962	9,656,962	-	100	-	-	
	30	2	24.75	5,569	0.99	880,664	334,125	1,214,789	100	1,214,789	1,214,789	-	100	-	-	
	31	2	16.25	3,656	0.65	578,214	219,375	797,589	100	797,589	797,589	-	100	-	-	
	32	2	15	3,375	0.60	533,736	202,500	736,236	100	736,236	736,236	-	100	-	-	
	33	2	30.25	6,806	1.21	1,076,368	408,375	1,484,743	100	1,484,743	1,484,743	-	100	-	-	
	34	1	24.75	5,569	0.99	880,664	334,125	1,214,789	100	1,214,789	-	1,214,789	100	1,214,789	-	
	35	2	12.75	2,869	0.51	453,676	172,125	625,801	100	625,801	625,801	-	100	-	-	
	36	2	22.5	5,063	0.90	800,604	303,750	1,104,354	100	1,104,354	1,104,354	-	100	-	-	
	37	2	33.75	7,594	1.35	1,200,906	455,625	1,656,531	100	1,656,531	1,656,531	-	100	-	-	Involves off-site stream work
	38	2	56.25	12,656	2.25	2,001,510	759,375	2,760,885	100	2,760,885	2,760,885	-	100	-	-	Involves off-site stream work
	39	1	37.5	8,438	1.50	1,334,340	506,250	1,840,590	100	1,840,590	-	1,840,590	100	1,840,590	-	Involves off-site stream work
Potential Urban Boundary Expansion Area	7	1	20	4,500	0.80	711,648	270,000	981,648	100	981,648	-	981,648	100	981,648	-	South of Twenty Road West, north of Airport
	8	1	37.25	8,381	1.49	1,325,444	502,875	1,828,319	100	1,828,319	-	1,828,319	100	1,828,319	-	South of Twenty Road West, north of Airport
	9	1	58.13	13,079	2.33	2,068,405	784,755	2,853,160	100	2,853,160	-	2,853,160	100	2,853,160	-	South of Twenty Road West, north of Airport
	40	1	11.25	2,531	0.45	400,302	151,875	552,177	100	552,177	-	552,177	100	552,177	-	potential to combine with B10
	41	Elfrida (Res)	126	28,350	5.04	4,483,382	1,701,000	6,184,382	100	6,184,382	-	6,184,382	0	-	6,184,382	First Rd E and Mud
	42	Elfrida (Res)	21.25	4,781	0.85	756,126	286,875	1,043,001	100	1,043,001	-	1,043,001	0	-	1,043,001	Second Rd E, Involves off-site stream work
	43	Elfrida (Res)	60	13,500	2.40	2,134,944	810,000	2,944,944	100	2,944,944	-	2,944,944	0	-	2,944,944	Second Rd E, Involves off-site stream work
	44	Elfrida (Res)	71.25	16,031	2.85	2,535,246	961,875	3,497,121	100	3,497,121	-	3,497,121	0	-	3,497,121	Second Rd E, Involves off-site stream work
	45	Elfrida (Res)	22	4,950	0.88	782,813	297,000	1,079,813	100	1,079,813	-	1,079,813	0	-	1,079,813	NW corner, Trinity Church at Hydro ROW
	46	Elfrida (Res)	147	33,075	5.88	5,230,613	1,984,500	7,215,113	100	7,215,113	-	7,215,113	0	-	7,215,113	HWY 56
	47	Elfrida (Res)	168.75	37,969	6.75	6,004,530	2,278,125	8,282,655	100	8,282,655	-	8,282,655	0	-	8,282,655	HWY 56
	48	Elfrida (Res)	140	31,500	5.60	4,981,536	1,890,000	6,871,536	100	6,871,536	-	6,871,536	0	-	6,871,536	First Rd E, Involves off-site stream work
	49	Elfrida (Res)	66	14,850	2.64	2,348,438	891,000	3,239,438	100	3,239,438	-	3,239,438	0	-	3,239,438	Second Rd E, Involves off-site stream work
	50	Elfrida (Res)	130.75	29,419	5.23	4,652,399	1,765,125	6,417,524	100	6,417,524	-	6,417,524	0	-	6,417,524	Second Rd E, Involves off-site stream work
	51	Elfrida (Res)	38.5	8,663	1.54	1,369,922	519,750	1,889,672	100	1,889,672	-	1,889,672	0	-	1,889,672	u/s confluence u/s Fletcher
	52	Elfrida (Res)	102.25	23,006	4.09	3,638,300	1,380,375	5,018,675	100	5,018,675	-	5,018,675	0	-	5,018,675	Fletcher at Golf Club
	53	Elfrida (Res)	25.16	5,661	1.01	895,253	339,660	1,234,913	100	1,234,913	-	1,234,913	0	-	1,234,913	Fletcher at Golf Club ,Involves off-site stream work
	54	Elfrida (Res)	29.25	6,581	1.17	1,040,785	394,875	1,435,660	100	1,435,660	-	1,435,660	0	-	1,435,660	Golf Club E of 56, Involves off-site stream work
	55	Elfrida (Res)	48.75	10,969	1.95	1,734,642	658,125	2,392,767	100	2,392,767	-	2,392,767	0	-	2,392,767	Golf Club btwn 56 and Hendershott
	56	Elfrida (Res)	29.25	6,581	1.17	1,040,785	394,875	1,435,660	100	1,435,660	-	1,435,660	0	-	1,435,660	Golf Club W of Hendershott, Involves off-site stream work
	57	Elfrida (Res)	26	5,850	1.04	925,142	351,000	1,276,142	100	1,276,142	-	1,276,142	0	-	1,276,142	Gol Club at Hendershott, Involves off-site stream work
Total								**173,613,284**	**100**	**173,613,284**	**36,836,341**	**136,776,942**		**75,317,924**	**61,459,018**	

Total Residential								**61,459,018**	**100**	**61,459,018**	**-**	**61,459,018**		**-**	**61,459,018**	
Total Non-Residential								**112,154,266**	**100**	**112,154,266**	**36,836,341**	**75,317,924**		**75,317,924**	**-**	

APPENDIX F-2 - GRIDS-RELATED OPEN WATERCOURSES: EROSION CONTROL AND CHANNEL SYSTEM IMPROVEMENTS

Primary Dev. Areas	Location	Total Length of Downstream Watercourse to Assumed End-Point[3]	Fraction of Watercourse Assumed to Required Erosion Control[2]	Length of Erosion Control Works	Estimated Cost ($)	Land Cost	Estimated Total Cost ($)	Growth Related %	Net Total Assiciated Cost ($)	Remarks
Expansion to Airport SPA	Ancaster	1,303	0.2	260.6	195,450	117,270	312,720	100	312,720	
	North of Airport	-	0.2	-	-	-	-	100	-	
Potential New Busniess Park (In Existing Airport Spa)	West of Airport	24,231	0.2	4,846.2	3,634,650	2,180,790	5,815,440	100	5,815,440	
Potential Urban Boundary Expansion Area	South of Twenty Road West, north of Airport	-	0.2	-	-	-	-	100	-	
	Northwest of Golf Club Road and Second Road East	15,337	0.2	3,067.4	2,300,550	1,104,264	3,404,814	100	3,404,814	Residential
Grand Total							**9,532,974**	**100**	**9,532,974**	
Total Residential							**3,404,814**	**100**	**3,404,814**	
Total Non-Residential							**6,128,160**	**100**	**6,128,160**	

[2]-0.05 - Where Development Fraction is 0 - 25%
0.10 - Where Development Fraction is 26 - 49%
0.15 - Where Development Fraction is 50 - 74%
0.20 - Where Development Fraction is 75 - 100%

[3]Location where d/s of this point no erosion is deemed to occur from subject development; total drainage area to this point estimated as a maximum of 2X the study watershed area.

[4]$1500/m for Watershed Area > 500 ha
$750/m for Watershed Area < 500 ha