CITY OF MISSISSAUGA

2009 DEVELOPMENT CHARGE BACKGROUND STUDY: STORM DRAINAGE COMPONENT

Report prepared for:

THE CITY OF MISSISSAUGA

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12 May, 2009
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1.0 INTRODUCTION

The City of Mississauga is carrying out an update to its current Development Charges By-law, By-law Number 316-2004 (amended by By-law 345-06). Updates to the By-law are undertaken every five years in accordance with the Development Charges Act, 1997. Prior to the passing of the Development Charges By-law, a number of development charge background studies will need to be completed.

The City of Mississauga has retained Aquafor Beech Limited to complete the development charge background study - storm drainage component in support of the By-law update.

1.1 Background

The City of Mississauga, through its Development Charges By-law, imposes development charges against land to pay for increased capital costs required due to increased needs for services arising from development. Capital costs associated with new development or growth can include both the construction of new as well as the upgrading of existing services, where it must be completed to facilitate growth. This applies to all forms of municipal services including storm drainage.

When considering storm drainage, all components of drainage works which require municipal funding are evaluated to establish a development charge. This includes growth related works such as stream erosion control and restoration, conveyance improvements, stormwater management and storm sewer oversizing.

The City's development charge for storm drainage is based on a projection of costs to the year 2031. This requires an evaluation of development, and its associated cost, anticipated to occur over this time frame.

By allowing for the collection of funds for growth related works 'up front', development charges can facilitate the construction of large scale capital projects while providing an equitable funding arrangement among developers.

1.2 Development Charge Update – Storm Drainage Component

Storm drainage costs related to development charges are developed based on identified growth related projects, as well as projections of future works. The identified and projected works fall into the following categories:

- stream erosion control and restoration
- conveyance improvements, including channelization, culvert upgrades, and storm sewer improvements
- stormwater management, including stormwater management ponds and water quality retrofits
- storm sewer oversizing
- background studies and monitoring

The categories above are consistent with the 2004 study, however, development has continued to occur in the City and initiatives and studies have been undertaken since the last development charges update. New projects have been added and previously identified projects have been revised to reflect current requirements and conditions. For instance, the City is in the process of updating its Mississauga Storm Water Quality Control Strategy. The findings for the appropriate location of future stormwater management facilities have been considered in this study.

The methodology, summarizing the required capital works related to storm drainage, the estimated costs of these works, and the allocation of the costs between growth and non-growth components, is also similar to the past approach apart from one modification. With the City maturing and changing from greenfield development to more redevelopment and infill or

intensification, a fraction of the anticipated redevelopment lands has been accounted for in the calculation of net developable lands. This is discussed further in Section 3.

In determining the development charge for storm drainage, the resulting costs of projects are applied over the available development lands to calculate a uniform stormwater charge on a per net hectare basis for chargeable lands.

1.3 Steering Committee

The following list of individuals provided input, guidance, and analysis for this study:

Lincoln Kan	- City of Mississauga
Jeremy Blair	- City of Mississauga
Brian Chan	- City of Mississauga
Dan McFadyen	- City of Mississauga
Wendy Alexander	- City of Mississauga
Martin Powell	- City of Mississauga
Susan Cunningham	- City of Mississauga
Dave Maunder	- Aquafor Beech Limited
Greg Frew	- Aquafor Beech Limited
Mathew Wilson	- Aquafor Beech Limited
Fred Koenig	- Hemson Consulting Limited
Bert Leat	- Private consultant

2.0 STORM DRAINAGE REQUIREMENTS AND COSTING

All municipalities have minimum design standards, or levels of service, for the conveyance and treatment of stormwater runoff. These standards provide for safety from potential flooding and erosion and are defined by the municipality, local Conservation Authorities, and the Province of Ontario.

To maintain a consistent level of service, existing infrastructure needs to be expanded or upgraded as development proceeds. Therefore, the capital costs associated with urban growth include both the construction of new infrastructure, and upgrades to existing infrastructure to accommodate for new upstream development. The City's stormwater drainage system is just one form of such infrastructure.

Typical components of the storm drainage system which require municipal funding include:

- storm sewer pipes to collect stormwater runoff
- open watercourses to convey stormwater runoff through the City
- stormwater management facilities, such as stormwater ponds, to provide water quality and flood control

As previously mentioned, for the purposes of establishing development charges, the required capital works projects related to storm drainage have been categorized as shown below and discussed in detail in the following sections:

- stream erosion control and restoration
- conveyance improvements, including channelization, culvert upgrades, and storm sewer improvements
- stormwater management, including stormwater management ponds and retrofits;
- storm sewer oversizing

- background studies and monitoring

2.1 Stream Erosion Control and Restoration Works

Many small and large open watercourses drain through the City of Mississauga. As urban development takes place within a watershed, the rainfall-runoff response is altered, typically resulting in increased rates of runoff and increased runoff volumes. This in turn results in erosion and channel enlargement within the receiving streams in the form of downcutting along the channel bed and widening of the channel banks.

Historically, no stormwater controls were applied to control runoff rates into the local streams, resulting in increased rates of erosion. Starting in the 1980s, stormwater management facilities were constructed to control runoff rates from new development areas. However, these controls often cannot prevent increased runoff volumes, so streams continue to erode.

For the purposes of allocating erosion and restoration costs to future development (i.e. growth) and existing development (non-growth) components, the apportioned costs were calculated on a simple linear basis, based on the percentage of land that is already developed against the percentage of land to be developed. This approach is similar to the one followed in the previous update.

Three groups of erosion control and restoration works were identified and costed for inclusion in the City's development charges:

- required works as identified in previous detailed studies for specific watercourses
- future works that may be required on streams which have *not* been studied in detail
- minor erosion control works

2.1.1 Identified Erosion Control Works

Inventory of Works

An inventory of identified erosion control works was created from detailed studies which outlined recommended works on three major watercourses accounting for approximately 35% of the total stream length in the City:

- Cooksville Creek (Cooksville Creek Rehabilitation Study - TSH, 1997)
- Mullet Creek (Mullet Creek Rehabilitation Study - Aquafor, 2001)
- Credit River (Credit River Adaptive Management Strategy - Aquafor, 2005)

It should be mentioned that the inventory of works recommended in the above studies also formed the basis of the 2004 development charge update. Some of these works have subsequently been completed and the list of identified erosion control and restoration works has been updated accordingly. The inventory of projects has been further refined to include erosion and restoration works recommended through the City of Mississauga's Etobicoke Creek Watercourse Evaluation Report (City of Mississauga, 2007). Other projects already identified in the City's 2009-2018 10-year Capital Budget and Forecast were also included to augment the works for the above streams and to restore other smaller streams. The list of identified works is provided in Table 2.1.1 (Item A).

Cost Estimates

Cost estimates for the identified erosion control and restoration projects are summarized in Table 2.1.1 (Item A). The estimated costs were taken from either the City's 2009-2018 10-Year Capital Budget and Forecast or through prior cost estimates from background studies, adjusted for inflation using the Statistic Canada non-residential construction cost index.

Cost Allocation

The above costs were allocated to future development (i.e. growth) according to the percentage of

TABLE 2.1.1
EROSION CONTROL WORKS

A - EROSION CONTROL - IDENTIFIED WORKS

Site References / ID #'s				Budget Timing		Cost Estimates							Site References / ID #'s	
10-Year Cap.Budget	Background Study*	Project Name	Location	Design	Construction	Design Cost	Approx. Length of Works (m)	Unit Cost ($/m)	Construction Cost	Total Cost	DC Portion (09)	DC Amount	10-Year Cap.Budget	Background Study*
09-01	--	Sheridan Creek Erosion Control	D/S of Meadow Wood Road	2008	2009	DONE	--	--	$1,020,000	$1,020,000	3.3%	$33,900	09-01	--
10-01	CCRS site #3a	Cooksville Creek Erosion Control	Camilla Rd To N Service Rd	2008	2010	DONE	--	--	$270,000	$270,000	2.9%	$7,900	10-01	CCRS site #3a
10-02	--	Mary Fix Erosion Control	Harborn Rd To Premium Way	2009	2010	$50,000	--	--	$170,000	$220,000	4.8%	$10,500	10-02	--
10-03	CRAMS site#25(reach 3)	Credit River Watershed Erosion Control	R3 Adjacent To Ostler Court	2008	2010	DONE	--	--	$1,260,000	$1,260,000	1.8%	$22,500	10-03	CRAMS site#25(reach 3)
10-04	--	Cooksville Creek Erosion Control	Dundas St. E. to King St. E.	2009	2010	$30,000	--	--	$100,000	$130,000	2.9%	$3,800	10-04	--
11-01	MCRS site#2a & 2b	Mullet Creek Erosion Control	Burnhamthorpe Rd. W. to behind Woodchuck Ln.	2008	2011	DONE	--	--	$1,500,000	$1,500,000	2.6%	$38,300	11-01	MCRS site#2a & 2b
11-02	--	Sheridan Creek Erosion Control	Clarkson Rd. to Meadow Wood Rd.	2001	2011	DONE	--	--	$1,340,000	$1,340,000	3.3%	$44,500	11-02	--
12-01	CCRS site #4a	Cooksville Creek Erosion Control	North Of Dundas Behind Jaguar Valley Blvd	2010	2012	$170,000	--	--	$950,000	$1,120,000	2.9%	$32,900	12-01	CCRS site #4a
12-02	CRAMS site #21	Credit River Watershed Erosion Control	South Of Dundas, Behind Jarvis Street	2010	2012	$160,000	--	--	$810,000	$970,000	1.8%	$17,300	12-02	CRAMS site #21
13-01	CRAMS site #28	Credit River Watershed Erosion Control	South Of QEW, Behind Pinetree Cres.	2011	2013	$110,000	--	--	$540,000	$650,000	1.8%	$11,600	13-01	CRAMS site #28
13-02	--	Cooksville Creek Erosion Control	Burnhamthorpe Rd. E. to Mississauga Valley Blvd. (East Branch)	2011	2013	$110,000	--	--	$450,000	$560,000	2.9%	$16,500	13-02	--
13-03	--	Fletchers Creek Erosion Control	West Of Second Line	2012	2013	$50,000	--	--	$220,000	$270,000	5.7%	$15,500	13-03	--
14-01	SCNCDS Reach #1 & 4	Sawmill Creek Erosion Control	South of Burnhamthorpe Rd. / Gazebo Court	2012	2014	$140,000	--	--	$730,000	$870,000	5.3%	$46,200	14-01	SCNCDS Reach #1 & 4
14-02	CCRS site #7a	Cooksville Creek Erosion Control	Rathburn Road To Absolute Ave.	2012	2014	$240,000	--	--	$1,380,000	$1,620,000	2.9%	$47,600	14-02	CCRS site #7a
14-03	MCRS site # 15a	Mullet Creek Erosion Control	Wabukayne Trib, U/S of Cpr	2012	2014	$480,000	--	--	$2,820,000	$3,300,000	2.6%	$84,300	14-03	MCRS site # 15a
15-01	CCRS site #1c	Cooksville Creek Erosion Control	North of Lakeshore Road, Cawthra Creek Diversion	2013	2015	$50,000	--	--	$170,000	$220,000	2.9%	$6,500	15-01	CCRS site #1c
15-02	CCRS site #2e	Cooksville Creek Erosion Control	QEW To Elaine Trail	2013	2015	$190,000	--	--	$1,030,000	$1,220,000	2.9%	$35,800	15-02	CCRS site #2e
15-03	CCRS site #8	Cooksville Creek Erosion Control	Hwy 403 To Kingsbridge Garden Circle	2013	2015	$110,000	--	--	$600,000	$710,000	2.9%	$20,900	15-03	CCRS site #8
15-04	CCRS site #4b	Cooksville Creek Erosion Control	Kirwin Ave To CPR	2013	2015	$80,000	--	--	$420,000	$500,000	2.9%	$14,700	15-04	CCRS site #4b
15-05	MCRS site#3a & 3b	Mullet Creek Erosion Control	U/S and D/S of Hwy 403	2013	2015	$70,000	--	--	$200,000	$270,000	2.6%	$6,900	15-05	MCRS site#3a & 3b
15-06	--	Tecumseh Creek Erosion Control	South of Indian Road	2013	2015	$130,000	--	--	$530,000	$660,000	0.5%	$3,100	15-06	--
15-07	--	Lornewood Creek Erosion Control	North of Springhill to behind Algonquin	2013	2015	$50,000	--	--	$150,000	$200,000	0.7%	$1,300	15-07	--
15-08	--	Mimico Creek Erosion Control	South of Etude Dr. to Derry Rd.	2013	2015	$30,000	--	--	$90,000	$120,000	2.9%	$3,500	15-08	--
15-09	MCRS site # 15b	Mullet Creek Erosion Control	Wabukayne Trib, D/S of Erin Mills Pkwy	2013	2015	$250,000	--	--	$1,410,000	$1,660,000	2.6%	$42,400	15-09	MCRS site # 15b
16-01	--	Fletcher's Creek Erosion Control	U/S of Derry Rd. to Storm Outfal	2016	2016	--	--	--	--	$140,000	5.7%	$8,000	16-01	--
16-02	CCRS site #3e	Cooksville Creek Erosion Control	King St To North Of Paisley	2015	2016	$90,000	--	--	$390,000	$480,000	2.9%	$14,100	16-02	CCRS site #3e
16-03	MCRS site#6b	Mullet Creek Erosion Control	Tannery To Thomas St.	2014	2016	$160,000	--	--	$880,000	$1,040,000	2.6%	$26,600	16-03	--
16-04	Internal (2007 WCE)	Etobicoke Creek Erosion Control	Eglinton Avenue to Hydro Corridor	2014	2016	$110,000	--	--	$410,000	$520,000	2.3%	$11,900	16-04	Internal (2007 WCE)
17-02	--	Wolfedale Creek Erosion Control	North and South Of Central Pkwy W	2015	2017	$160,000	--	--	$740,000	$900,000	1.2%	$10,600	17-02	--
17-03	CRAMS site #4	Credit River Watershed Erosion Control	West Of Creditview Road, Behind Kenninghall Blvd.	2016	2017	$170,000	--	--	$890,000	$1,060,000	1.8%	$18,900	17-03	CRAMS site #4
17-05	--	Mary Fix Erosion Control	Old River Rd To Credit River	2015	2017	$90,000	--	--	$530,000	$620,000	4.8%	$29,600	17-05	--
18-01	Internal (2007 WCE)	Etobicoke Creek Erosion Control	North Of Eglinton Ave	2018	2018	--	--	--	--	$150,000	2.3%	$3,400	18-01	Internal (2007 WCE)
18-03	CRAMS site #27	Credit River Watershed Erosion Control	North Of QEW, Behiind Mississauga Cres.	2016	2018	$170,000	--	--	$890,000	$1,060,000	1.8%	$18,900	18-03	CRAMS site #27
18-04	MCRS site #14a & 14b	Mullet Creek Erosion Control	Queniippenon Trib U/S of Erin Mills Pkwy. to Middlebury Dr.	2016	2018	$290,000	--	--	$1,710,000	$2,000,000	2.6%	$51,100	18-04	MCRS site #14a & 14b
18-05	CCRS site #4d	Cooksville Creek Erosion Control	Rhonda Valley To CPR	2017	2018	$100,000	--	--	$430,000	$530,000	2.9%	$15,600	18-05	CCRS site #4d
FUTURE PROJECTS														
19-01	MCRS site #5a&b	Mullet Creek Erosion Control	Go Transit To Downstream Of Erin Centre Blvd	2019	2019	$100,000	--	--	$520,000	$620,000	2.6%	$15,800	19-01	MCRS site #5a&b
19-02	--	Applewood Creek Erosion Control	CNR to S. of Lakeshore	2019	2019	$120,000	--	--	$230,000	$350,000	1.2%	$4,100	19-02	--
19-03	Internal (2007 WCE)	Etobicoke Creek Erosion Control	U/S & D/S of CPR, south of Dundas St.	2019	2019	$100,000	--	--	$440,000	$540,000	2.3%	$12,300	19-03	Internal (2007 WCE)
19-04	CRAMS site #29 & #30	Credit River Watershed Erosion Control	North Of CNR, Behind Mississauga Rd. & behind Stavebank Rd.	2016	2019	$450,000	--	--	$2,450,000	$2,900,000	1.8%	$51,800	19-04	CRAMS site #29 & #30
19-05	CRAMS site #6	Credit River Watershed Erosion Control	North Of Britannia, Behind Shady Lawn Ct.	2019	2019	$90,000	--	--	$420,000	$510,000	1.8%	$9,100	19-05	CRAMS site #6
19-06	CRAMS site #24	Credit River Watershed Erosion Control	North Of Hydro ROW, Behind Shawanaga Trail	2019	2019	$90,000	--	--	$380,000	$470,000	1.8%	$8,400	19-06	CRAMS site #24
19-07	Internal (2007 WCE)	Etobicoke Creek Erosion Control	d/s of QEW (adjacent to Toronto Golf Club)	2019	2019	$250,000	--	--	$1,120,000	$1,370,000	2.3%	$31,200	19-07	Internal (2007 WCE)
19-08	Internal (2007 WCE)	Etobicoke Creek Erosion Control	u/s of CNR (adjacent to Toronto Golf Club)	2019	2019	$40,000	--	--	$140,000	$180,000	2.3%	$4,100	19-08	Internal (2007 WCE)
20-01	--	Tecumseh Creek Erosion Control	Lakeshore Rd. to Lake Ontario	2020	2020	--	--	--	--	$390,000	0.5%	$1,800	20-01	--
20-02	--	Applewood Creek Erosion Control	S. of Dixie Mall to CNR	2020	2020	$240,000	--	--	$2,020,000	$2,260,000	1.2%	$26,800	20-02	--
20-03	MCRS site # 16a	Mullet Creek Erosion Control	Aquitaine Trib, Eastridge Rd To CPR	2020	2020	$310,000	--	--	$1,880,000	$2,190,000	2.6%	$55,900	20-03	MCRS site # 16a
20-04	CRAMS site #6-FP	Credit River Watershed Erosion Control	South Of Hydro ROW, Behind Mississauga Rd.	2020	2020	--	--	--	--	$790,000	1.8%	$14,100	20-04	CRAMS site #6-FP
21-01	CRAMS site #5b-FP	Credit River Watershed Erosion Control	Mississauga Golf & Country Club	2021	2021	--	--	--	--	$110,000	1.8%	$2,000	21-01	CRAMS site #5b-FP
21-02	CRAMS site #10	Credit River Watershed Erosion Control	Streetsville Public Cemetery	2021	2021	--	--	--	--	$800,000	1.8%	$14,300	21-02	CRAMS site #10
22-01	CRAMS site #1	Credit River Watershed Erosion Control	Downstream of Old Derry Rd.	2022	2022	--	--	--	--	$200,000	1.8%	$3,600	22-01	CRAMS site #1
22-02	CRAMS site #22	Credit River Watershed Erosion Control	Downstream of Dundas St. W., behind Blythe Rd.	2022	2022	--	--	--	--	$520,000	1.8%	$9,300	22-02	CRAMS site #22
24-01	CRAMS site #20a	Credit River Watershed Erosion Control	Upstream of Dundas St. (adjacent to UTM Campus)	2024	2024	--	--	--	--	$800,000	1.8%	$14,300	24-01	CRAMS site #20a
24-02	CRAMS site #17	Credit River Watershed Erosion Control	Bridewell Crt., downstream of Hwy. 403	2024	2024	--	--	--	--	$500,000	1.8%	$8,900	24-02	CRAMS site #17
25-01	CRAMS site #1-FP	Credit River Watershed Erosion Control	Upstream of Old Derry Rd.	2025	2025	--	--	--	--	$240,000	1.8%	$4,300	25-01	CRAMS site #1-FP
26-01	CRAMS site #7	Credit River Watershed Erosion Control	U/S of Britannia, adjacent to St. Ives Way	2026	2026	--	--	--	--	$1,040,000	1.8%	$18,600	26-01	CRAMS site #7
28-01	CRAMS site #3	Credit River Watershed Erosion Control	West of Crediview Rd., adjacent to Hollywell Ave.	2028	2028	--	--	--	--	$1,000,000	1.8%	$17,900	28-01	CRAMS site #3
29-01	CRAMS site #5a-FP	Credit River Watershed Erosion Control	Mississauga Golf & Country Club	2029	2029	--	--	--	--	$250,000	1.8%	$4,500	29-01	CRAMS site #5a-FP
29-02	CRAMS site #8	Credit River Watershed Erosion Control	Amity Rd., downstream of Britannia Rd. W.	2029	2029	--	--	--	--	$420,000	1.8%	$7,500	29-02	CRAMS site #8
30-01	CRAMS site #11a	Credit River Watershed Erosion Control	Old Station Rd., upstream of Reid Dam	2030	2030	--	--	--	--	$710,000	1.8%	$12,700	30-01	CRAMS site #11a
31-01	CRAMS site #5a	Credit River Watershed Erosion Control	Mullet Creek Diversion outlet	2031	2031	--	--	--	--	$260,000	1.8%	$4,600	31-01	CRAMS site #5a
31-02	CRAMS site #4-FP	Credit River Watershed Erosion Control	Barbertown Bridge	2031	2031	--	--	--	--	$90,000	1.8%	$1,600	31-02	CRAMS site #4-FP
23-01	MCRS site #10a & 10b	Mullet Creek Erosion Control	Derry Rd. to Argentia Rd.	2023	2023	--	--	--	--	$3,700,000	2.6%	$94,500	23-01	MCRS site #10a & 10b
24-03	MCRS site #3e	Mullet Creek Erosion Control	The Chase Road (Ministrel Mews to u/s of Sandown Rd.	2024	2024	--	--	--	--	$120,000	2.6%	$3,100	24-03	MCRS site #3e
25-02	MCRS site #10c	Mullet Creek Erosion Control	Meadowvale Blvd. to Derry Rd. W.	2025	2025	--	--	--	--	$1,300,000	2.6%	$33,200	25-02	MCRS site #10c
27-01	MCRS site #9c & 9d	Mullet Creek Erosion Control	Argentia Rd. to Erin Mills Pkwy.	2027	2027	--	--	--	--	$1,650,000	2.6%	$42,100	27-01	MCRS site #9c & 9d
28-02	MCRS site #9b	Mullet Creek Erosion Control	Erin Mills Pkwy. to Diversion	2028	2028	--	--	--	--	$1,140,000	2.6%	$29,100	28-02	MCRS site #9b
29-03	MCRS site #12a & 12b	Mullet Creek Erosion Control	Quen. Trib. - Credit Valley Rd. to Confluence	2029	2029	--	--	--	--	$1,350,000	2.6%	$34,500	29-03	MCRS site #12a & 12b
30-02	MCRS site #6c	Mullet Creek Erosion Control	U/S of Tannery Rd.	2030	2030	--	--	--	--	$400,000	2.6%	$10,200	30-02	MCRS site #6c
30-03	MCRS site #8b	Mullet Creek Erosion Control	Diversion to Rail Line	2030	2030	--	--	--	--	$1,020,000	2.6%	$26,000	30-03	MCRS site #8b
31-03	MCRS site #13a	Mullet Creek Erosion Control	Eglinton Ave. to Credit Valley Rd.	2031	2031	--	--	--	--	$390,000	2.6%	$10,000	31-03	MCRS site #13a
21-03	--	Cooksville Creek Erosion Control	Willa Rd. to Orano Ave.	2021	2021	$90,000	--	--	$450,000	$540,000	2.9%	$15,900	21-03	--
23-02	--	Cooksville Creek Erosion Control	behind 4556 Tribal Crt.	2023	2023	$60,000	--	--	$240,000	$300,000	2.9%	$8,800	23-02	--
25-03	--	Cawthra Creek Erosion Control	Dellwood Park	2025	2025	$80,000	--	--	$380,000	$460,000	1.4%	$6,500	25-03	--
A - SUBTOTAL:										**$61,040,000**		**$1,450,500**		

B - EROSION CONTROL - FUTURE WORKS

--	--	Various erosion control works for stream without detailed rehabilitation studies (approx. 28,100 m).	various	various	$6,247,500	28,100	$1,482	$41,650,000	$47,897,500	3.2%	$1,529,200	--	--
B - SUBTOTAL:									**$47,897,500**		**$1,529,200**		

C - MINOR EROSION CONTROL

--	--	Minor erosion control for small projects (2009)	2009	2009				$80,000	6.2%	$5,000	--	--
--	--	Minor erosion control for small projects (2010-2031)	2010 to 2031			$80,000 for 22 years		$1,760,000	3.2%	$56,200	--	--
C - SUBTOTAL:								**$1,840,000**		**$61,200**		

TOTAL EROSION CONTROL WORKS: **$110,777,500** **$3,040,900**

* Background Studies include:
CRAMS - Credit River Adaptive Management Strategy (2005)
MCRS - Mullet Creek Rehabilitation Study (2001)
CCFRP - Cooksville Creek Flood Remidiation Plan (2002)
CCRS - Cooksville Creek Rehabilitation Study (1997)
SCNCDS - Sawmill Creek Natural Channel Design Study (1995)

developable lands remaining within the respective watersheds. The determination of the net growth area within each watershed is discussed in Section 3.

Table 2.1.1 (Item A) presents the complete list of identified erosion control and restoration projects, together with total costs of the works and the portion of those costs to be allocated to development charges.

2.1.2 Future Erosion Control Works

This group of erosion control works includes those future stream rehabilitation works that are anticipated but have not yet been identified. As discussed, streams continue to adjust to development over many years. Therefore, future erosion and restoration requirements, *beyond* those identified in Section 2.1.1, can be expected due to:

- on-going stream enlargement in response to existing development impacts
- future stream enlargement in response to future development impacts.

Inventory of Works

The length of channel within Mississauga that is anticipated to require restoration within a planning timeframe of approximately 23 years was determined through the completion of field investigations and desktop analyses. The assessments included:

- delineation of stream reaches based on land use history, geology, and drainage area
- selection of five watercourses representing a range of conditions within the City of Mississauga:
    - Cooksville Creek
    - Carolyn Creek
    - Mimico Creek
    - Sawmill Creek

    - Lornewood Creek
- field verification of reaches and application of the Rapid Geomorphic Assessment tool which identifies whether reaches are stable, in transition, or in adjustment (i.e., unstable)

Once results from the rapid geomorphic assessments were compiled and analyzed, the following trends became apparent:

- where the geology of the stream bed consisted of exposed or thinly covered bedrock, approximately 25% to 35% of the channel length was found to be unstable
- where the geology of the stream bed consisted of modern alluvium, channel stability was found to vary considerably. For alluvial streams within smaller drainage areas, such as Carolyn Creek and Lornewood Creek, approximately 13% of the channel was classified as unstable. For alluvial streams with larger drainage areas, such as Mimico Creek, approximately 43% of the channel was classified as unstable
- where the geology of the stream bed varied, with portions of both modern alluvium and bedrock, the portion of the stream requiring restoration was found to vary from 22% for smaller drainage areas up to 37% for larger drainage areas
- for other alluvial bed channels, consisting of other local geology, approximately 22% of the channel reach was classified as unstable

A breakdown of the extent of estimated future works required by watershed is provided in Table 2.1.2. As shown, approximately 28 kilometers of future erosion control and restoration works are expected. This represents an increase of over 12 kilometers of future erosion and restoration works from the previous estimate determined as part of the 2004 Development Charges Background Report: Storm Drainage Component. The increase is attributed to the fact that the previous estimate considered only the natural stream reaches within the City, whereas the current estimate also considers engineered stream reaches which also require restoration over time.

TABLE 2.1.2
ESTIMATED FUTURE EROSION CONTROL WORKS

Watercourse	Total Length (km)	Drainage Area (km2)	Rationale*	Estimated Unstable(%)	Length for Restoration (m)
Applewood	2.70	4.5	ma	13%	351
Avonhead	3.60	1.7	other	22%	792
Birchwood Creek	4.20	3.5	ma	13%	546
Carolyn	3.80	5.3	ma	13%	494
Cawthra	1.00	2.0	other	22%	220
Chappell	3.00	1.9	ma	13%	390
Clearview	1.70	1.3	other	22%	374
Cooksville	24.60	35.3	n/a	n/a	n/a
Credit	25.60	27.0	n/a	n/a	n/a
Cumberland Creek	0.30	0.5	other	22%	66
Etobicoke	20.40	47.8	n/a	n/a	n/a
Etobicoke Lakeshore	0.80	2.8	other	22%	176
Fletcher's	7.33	7.9	ma	13%	952
Joshua	0.20	0.2	BR	30%	60
Kenollie	3.80	2.2	MA-BR	22%	836
Lakeside	0.30	4.5	other	22%	66
Levi	2.44	2.3	ma	13%	317
Little Etobicoke	13.80	22.3	MA	43%	5,934
Lornewood	3.20	4.2	ma	13%	416
Loyalist	4.90	8.8	BR	30%	1,470
Mary Fix	9.20	6.5	MA-BR	22%	2,024
Meadowvale N	0.63	0.9	other	22%	139
Mimico	11.00	17.3	MA	43%	4,730
Moore	0.30	0.2	ma	13%	39
Mullet	20.70	27.7	n/a	n/a	n/a
Sawmill	8.77	15.8	MA-BR	22%	1,929
Serson	1.50	2.3	other	22%	330
Sheridan	5.02	7.4	BR	30%	1,506
Sixteen Mile Creek	5.80	9.5	MA	37%	2,146
Tecumseh	1.50	1.6	ma	13%	195
Turtle	2.90	2.6	ma	13%	377
Wolfedale	5.70	7.2	MA-BR	22%	1,254
				Total Length (m)	**28,129**

NOTES

*ma - modern alluvium bed with drainage area <10ha, MA - modern alluvium bed with drainage area >10ha, BR - exposed or thinly covered bedrock, MA-BR - bedrock and modern alluvium, other - alluvial bed composed of other local geology

n/a - not applicable. Restoration/erosion works for these watercourses have been estimated in individual, detailed studies.

Cost Estimates

Costs estimates for future erosion control and restoration works are summarized in Table 2.1.1 (Item B). As part of the 2004 Development Charges Background Report: Storm Drainage Component, a unit cost for stream restoration was estimated based on past construction experience within the City of Mississauga (11,822 metres of stream works at a cost of $12,511,800). This cost estimate was adjusted for inflation using the Statistic Canada non-residential construction cost index, resulting in a unit cost of $1,482/m for future erosion and restoration works, plus 15% for design and administration.

Cost Allocation

The portion of the above cost allocated to future development (i.e. growth) was set equal to the percentage of developable lands remaining within the City of Mississauga. The determination of the net growth area within the City is discussed in Section 3. As shown in Table 2.1.1 (Item B), the remaining net developable area within the City of Mississauga is approximately 3.2% of the total lands. This percentage was taken to represent the portion of the total costs for future erosion works to be included in the updated development charges.

2.1.3 Minor Erosion Control Works

Other, smaller-scale, or site specific erosion control works have also been included in the City's budget. These costs are summarized in Table 2.1.1 (Item C). For the *current* budget year, $80,000 has been budgeted with a "growth" portion assumed to be equal 6.2% - the value used in the 2004 Development Charges Background Report: Storm Drainage Component.

After 2009, an annual cost of $80,000 has been budgeted for minor erosion control works. The portion of these costs allocated to future growth was set equal to 3.2% which represents the percentage of undeveloped land remaining within the City. The determination of the net growth area is discussed in Section 3.

2.2 Conveyance - Channelization, Culvert and Storm Sewer Improvements

As urban development continues, drainage systems need to be upgraded to accommodate future growth. Examples of these types of works may include:

- reconstruction or channelization of streams to provide additional capacity
- culvert improvements to mitigate flood damage areas
- upgrading storm sewer systems to provide additional capacity

Inventory of Works

An inventory of future works associated with conveyance improvements was compiled from projects listed in the City's 2009-2018 10-year Capital Budget and Forecast together with information from other detailed flood/rehabilitation studies, including:

- Cooksville Creek Rehabilitation Study (Totten Sims Hubicki, 1997);
- Cooksville Creek Flood Remediation Plan (Environmental Water Resources Group, 2002)
- North 16 District 'Scoped' Subwatershed Study and Ninth Line District Floodplain Mapping report (Philips Engineering Ltd., December 2004)

The list of works is provided in Table 2.2.1.

Cost Estimates

Cost estimates for the identified conveyance improvement projects are summarized in Table 2.2.1. All costs were adjusted for inflation, where appropriate, using the Statistic Canada non-residential construction cost index.

For one of the projects, the cost was revised to account for anticipated recovery of funds from future development areas. Specifically, for the Cooksville Creek culvert improvement at the

TABLE 2.2.1
CONVEYANCE WORKS (CHANNELIZATION, CULVERT IMPROVEMENTS, STORM SEWER IMPROVEMENTS)

Site References / ID #'s					Budget Timing		Cost Estimates										
							Design & Construction Costs				Land Costs						
10-Year Cap.Budget	2004 ID	Background Study*	Project Name	Location	Design	Construction	Design	Construction	Sub-Total	Developer's Contribution****	Table Land Requirement (ha)**	Land Classification	Unit Land Cost ($/ha)	Land Cost	Net Cost Estimate	DC Portion	DC Amount
09-03	n/a	NSDSSS	Meadowvale Business Park (North 16 District) - Remaining Channelization & Culvert Works	North 16 district	2006	2009	--	$820,000	$820,000		-			$0	$820,000	100.0%	$820,000
10-05	n/a	NSDSSS	Meadowvale Business Park (North 16 District) - Remaining Channelization & Culvert Works - additional construction and land costs	North 16 district	2010	2010	--	$1,932,000	$1,932,000		0.60	industrial	$1,976,880	$1,186,000	$3,118,000	100.0%	$3,118,000
17-01	no ID (but on map)	CCFRP site #EA2	Cooksville Creek Culvert Improvements	CPR Culvert	2017	2017	--	--	$2,190,000		-			$0	$2,190,000	2.9%	$64,300
17-04	J2	CCFRP site# C3	Cooksville Creek- Dyking	D/S Central Parkway	2017	2017	--	--	$210,000		-			$0	$210,000	2.9%	$6,200
18-02	G3	--	Little Etobicoke Creek Channelization	North of Burnhamthorpe Rd.	2017	2018	$40,000	$340,000	$380,000		0.00			$0	$380,000	2.5%	$9,700
18-06	E5	CCFRP site# C2, CCRS-part of site#4d	Cooksville Creek Channelization	Mississauga Valley Blvd-CPR	2017	2018	$200,000	$1,050,000	$1,250,000		0.00			$0	$1,250,000	2.9%	$36,700
19-09	J1	CCFRP site #EA1	Cooksville Creek Culvert Improvements	CNR Culvert	--	2019	--	--	$2,256,000		-			$0	$2,256,000	2.9%	$66,300
19-10	no ID (but on map)	CCFRP site #EA4	Cooksville Creek Culvert Improvements	Queensway East	2019	2019	--	--	$1,625,000		-			$0	$1,625,000	2.9%	$47,700
19-11	no ID (but on map)	--	Tecumseh Creek Channel Culvert Improvement	CNR Culvert	2019	2019	--	--	$1,247,000		-			$0	$1,247,000	0.5%	$5,800
20-05	no ID (but on map)	--	Clearview Creek Channelization	Lakeshore Rd Northerly 800M	2020	2020	--	--	$2,226,000		0.00			$0	$2,226,000	100.0%	$2,226,000
30-04	C3	CCFRP site #EA3	Cooksville Creek Culvert Enlargement	QEW	2030	2030	--	--	$6,865,000	$3,432,500	-			$0	$3,432,500	2.9%	$101,000
TOTAL CONVEYANCE IMPROVEMENT WORKS:									**$21,001,000**	**$3,432,500**				**$1,186,000**	**$18,754,500**		**$6,501,700**

* Background studies include:
CCFRP - Cooksville Creek Flood Remidiation Plan
CCRS - Cooksville Creek Rehabilitation Study
NSDSSS - North Sixteen District Scoped Subwatershed Study

QEW, where the works would remove roughly 2.0 ha of land from the floodplain, it was assumed that approximately half of the project costs would be recovered from the development proponent(s).

Cost Allocation

The above costs for conveyance improvement works were allocated to future development (i.e. growth) areas as follows:

- for projects in which capacity improvements are required to facilitate future development, the full cost of the works was allocated to development charges. These works include:
    - watercourse diversions, channelization, and culvert improvements in the North 16 District (Sixteen Mile Creek watershed)
    - Clearview Creek Channelization
- for all other conveyance projects, the portion of the cost allocated to future growth was set equal to the percentage of developable lands remaining within the respective watersheds. The determination of the net growth area within each watershed is discussed in Section 3.

Table 2.2.1 presents the complete list of conveyance improvement works, together with total costs of the works and the portion of those costs to be allocated to development charges.

2.3 Stormwater Management

Stormwater management works have been included in previous development charges, both in terms of water quality control, and quantity (flood) control. Typically, these controls take the form of stormwater management ponds, constructed to capture and treat runoff from an upstream development before discharging into the City's creeks and rivers.

Two groups of stormwater management works were identified and costed for inclusion in the City's development charges:

- new stormwater management facilities (water quality and/or quantity control)
- stormwater quality retrofits at storm sewer outfalls and quantity control facilities.

2.3.1 New Stormwater Management Facilities

Current stormwater management practices require several forms of treatment for runoff from new developments, including water quality control, erosion control and quantity (flood) control. Most often, a stormwater management pond is constructed to remove pollutants through settling in a permanent pool of water (quality control), and to capture and release runoff at pre-development rates to minimize downstream erosion and flooding impacts.

Inventory of Works

The City of Mississauga has compiled an inventory of locations where future stormwater management ponds have been proposed. The locations were identified in numerous background stormwater management and master drainage studies, as well as the currently ongoing update of the City of Mississauga Stormwater Quality Control Strategy. The list of identified works is provided in Table 2.3.1 (Item A).

Estimated storage volume requirements, drainage areas, and land requirements are also summarized in Table 2.3.1**.** This information was taken from previous studies, where available, and from the ongoing Mississauga Stormwater Quality Control Strategy Update. This study estimated each facility size based on the larger of the target water quality control volume as specified by the MOE Stormwater Management Planning and Design Manual or where insufficient space is available to achieve the MOE target volume, the largest volume attainable given the site constraints such as bounding properties, adjacent utilities, estimated depth to the

TABLE 2.3.1
STORMWATER MANAGEMENT WORKS

A - STORMWATER MANAGEMENT FACILITIES - NEW FACILITIES:

DC Pond #	Background Study*	Pond Name	Location	Pond Type	Estimated Total Drainage Area (ha)	Storage Volume Requirements (m3) Permanent Pool	Extended Detention	Quantity Control	Total Volume	Estimated Pond Area Required (footprint) Area (ha)	Notes	Cost Estimates Pond Storage Volume (m3)	Unit Construction Cost ($/m³)	Construction Cost	Design & Admin. Cost (+15%)	Total Design and Construction Cost	Land Costs Tableland Required (ha)	Land Classification	Unit Cost ($/ha)	Land Cost	Total Estimated Project Cost	DC Portion	DC Amount	Constr. Year	DC Pond #
4503	Meadowvale District MDP / 2009 MSWQCS Update	Meadowvale Area Stormwater Management Facility 1	North of Hwy 401, E of Credit River	new offline pond- quality & quantity	23	3,200	2,721	8,503	14,424	0.91	Assumed pond in floodplain, as per MDP. To provide quantity control, assume berming used.	14,424	$58.98	$851,000	$127,650	$978,650	0.00	Floodplain	$0	$0	$978,650	100.0%	$978,650	2014	4503
5805	Sawmill Creek SWS &Earthtech Glen Erin Brook/Hwy403 study	Sawmill Creek (Glen Erin Brook) SWM Facility 4	North of Hwy 403, , west of Winston Churchill Blvd.	new online pond - quantity	69.9	0	0	18,600	18,600	1.13	100% tableland	18,600	N/A - total pond cost estimates based on AECOM report	$830,000	$124,500	$954,500	1.13	Industrial	$1,976,880	$2,236,000	$3,190,500	100.0%	$3,190,500	2011	5805
5501	North 16 District 'Scoped' Subwatershed Study	On-Line quantity control - additional land costs	Between Ninth Line & Tenth Line, on-line with watercourse	online quantity	259.4	0	0	44,000	44,000	4.20	100% tableland	44,000	N/A - previously budgeted	N/A - previously budgeted	N/A - previously budgeted	N/A - previously budgeted	4.20	Industrial and ORC	-	$839,000	$839,000	100.0%	$839,000	2009	5501
5502 & 5503	North 16 District 'Scoped' Subwatershed Study	Q1 & Q2 - offline quality control ponds	Between Ninth Line &Tenth Line, east & west side of watercourse	new offline pond- quality	60.3	7,096	2,411	0	9,507	N/A	100% tableland	9,507	N/A - based on 2009 Capital Budget	$2,410,000	N/A - previously budgeted	$2,410,000	N/A	Industrial	-	N/A	$2,410,000	100.0%	$2,410,000	-	5502 & 5503
5502 & 5503	North 16 District 'Scoped' Subwatershed Study	Q1 & Q2 - offline quality control ponds - land costs	Between Ninth Line &Tenth Line, east & west side of watercourse	new offline pond- quality	-	-	-	-	-	0.88	100% tableland	-	-	-	-	-	0.88	Industrial	$1,976,880	$1,733,000	$1,733,000	100.0%	$1,733,000	2010	5502 & 5503
401	Southdown MDP / 2009 MSWQCS Update	Clearview Creek Stormwater Management Facility	South of Lakeshore Rd, East of Winston Churchill Blvd.	new online pond - quality	237	38,400	0	0	38,400	2.93	within proposed City park	38,400	$58.98	$2,265,000	$339,750	$2,604,750	2.93	City park	$0	$0	$2,604,750	100.0%	$2,604,750	2015	401
402	Southdown MDP / 2009 MSWQCS Update	Avonhead Creek Stormwater Management Facility	North of Lakeshore Rd, West and East of Hazelhurst Rd.	new online pond - quality	41.5	7,700	0	0	7,700	1.09	100% tableland	7,700	$58.98	$454,000	$68,100	$522,100	1.09	Industrial	$1,976,880	$2,155,000	$2,677,100	100.0%	$2,677,100	2016	402
403	Southdown MDP / 2009 MSWQCS Update	Lakeside Creek Stormwater Management Facility	NW corner of Lakeshore Rd W and Southdown Rd.	new online pond - quality	155	13,700	0	0	13,700	1.15	100% tableland	13,700	$58.98	$808,000	$121,200	$929,200	1.15	Industrial	$1,976,880	$2,273,000	$3,202,200	100.0%	$3,202,200	2016	403
2101	2009 MSWQCS Update	Cooksville Creek-City Centre Stormwater Management Facility	City Centre at Mississauga Valley Blvd and Central Pkwy E.	new pond - quality	166	11,400	6,640	0	18,040	1.01	100% tableland	18,040	$58.98	$1,064,000	$159,600	$1,223,600	1.01	City park	$0	$0	$1,223,600	100.0%	$1,223,600	2021	2101
A - SUBTOTAL:					**1,012**	**81,496**	**11,772**	**71,103**	**164,371**	**13.30**		**164,371**		**$8,682,000**	**$940,800**	**$9,622,800**	**12.39**			**$9,236,000**	**$18,858,800**		**$18,858,800**		

B - STORMWATER QUALITY RETROFITS :

DC Pond #	Background Study*	Pond Name	Location	Pond Type	Estimated Total Drainage Area (ha)	Proposed Volume (m3) Permanent Pool	Extended Detention	Quantity Control	Total Volume	Estimated Pond Area Required (footprint) Area (ha)	Notes	Cost Estimates Pond Storage Volume (m3)	Unit Construction Cost ($/m³)	Construction Cost	Design & Admin. Cost (+15%)	Total Design and Construction Cost	Land Costs Tableland Required (ha)	Land Classification	Unit Cost ($/ha)	Land Cost	Total Estimated Project Cost	DC Portion	DC Amount	Constr. Year	DC Pond #
5903	2009 MSWQCS Update	Loyalist Creek Stormwater Management Facility	SW corner of Winston Churchill Blvd & The Collegeway	ex. online quantity retrofit for quality	149	15,900	0	0	15,900	0.00	assume no land req'd for retrofit of ex. Pond	15,900	$129.20	$2,054,000	N/A - previously budgeted	$2,054,000	0.00	Residential	$3,201,347	$0	$2,054,000	100.0%	$2,054,000	2010	5903
5901	2009 MSWQCS Update	Loyalist Creek Stormwater Management Facility	NW corner of Winston Churchill Blvd & Dundas St.	ex. online quantity retrofit for quality	152	21,000	0	0	21,000	0.00	assume no land req'd for retrofit of ex. Pond	21,000	$129.20	$2,713,000	N/A - previously budgeted	$2,713,000	0.00	Industrial	$1,976,880	$0	$2,713,000	100.0%	$2,713,000	2010	5901
5401	2009 MSWQCS Update	Mullet Creek Arch Pond Stormwater Management Facility	Argentia Road, South of Hwy 401.	ex. online wet quantity retrofit for quality	144	27,800	0	0	27,800	0.00	assume no land req'd for retrofit of ex. Pond	27,800	$129.20	$3,592,000	$538,800	$4,130,800	0.00	City owned	$0	$0	$4,130,800	100.0%	$4,130,800	2011	5401
3701	2009 MSWQCS Update	Cooksville Creek Stormwater Management Facility	North of Bristol Road, between McLaughlin Rd. & Hurontario St.	ex. online wet quantity retrofit for quality	604	116,600	0	0	116,600	7.14	assume ex. on-line pond to be enlarged to meet water quality target	116,600	$129.20	$15,065,000	$2,259,750	$17,324,750	4.56	School Board lands (another 2.58ha is located in flooplain)	$0	$0	$17,324,750	100.0%	$17,324,750	2018	3701
5402	2009 MSWQCS Update	Mullet Creek Stormwater Management Facility	Syntex Drive & Meadowvale Road	ex. online quantity retrofit for quality	608	58,900	0	0	58,900	0.00	assume no land req'd for retrofit of ex. Pond	58,900	$129.20	$7,610,000	$1,141,500	$8,751,500	0.00	City owned	$0	$0	$8,751,500	100.0%	$8,751,500	2012	5402
3602	2009 MSWQCS Update	Little Etobicoke Creek Timberlea Stormwater Management Facility	South of Matheson Blvd, East of Driftcurrent Drive	planned quantity pond to be retrofit for quality	181	34,900	0	0	34,900	0.00	assume no land req'd for retrofit of ex. Pond	34,900	$129.20	$4,509,000	$676,350	$5,185,350	0.00	City owned	$0	$0	$5,185,350	100.0%	$5,185,350	2014	3602
13	2009 MSWQCS Update	Storm sewer outfall	Wellsborough pl & Tillingham Gardens	new pond (retrofit of ex. storm outfall) - quality	216	29,800	0	0	29,800	2.84	floodplain	29,800	$129.20	$3,850,000	$577,500	$4,427,500	0.00	Floodplain	$0	$0	$4,427,500	100.0%	$4,427,500	2029	13
23	2009 MSWQCS Update	Storm sewer outfall	North of 403 & East of Confederation pkwy	new pond (retrofit of ex. storm outfall) - quality	235	24,900	0	0	24,900	2.44	flow easement (hydro ROW)	24,900	$129.20	$3,217,000	$482,550	$3,699,550	2.44	Ontario Hydro	$2,401,010	$5,858,000	$9,557,550	100.0%	$9,557,550	2027	23
61	2009 MSWQCS Update	Storm sewer outfall	Derry Rd E & Dixie Rd	new pond (retrofit of ex. storm outfall) - quality	28	5,400	0	0	5,400	0.88	park	5,400	$129.20	$698,000	$104,700	$802,700	0.88	City owned	$0	$0	$802,700	100.0%	$802,700	2022	61
70	2009 MSWQCS Update	Storm sewer outfall	Britannia Rd E & Netherhart Rd	new pond (retrofit of ex. storm outfall) - quality	54	10,400	0	0	10,400	1.39	floodplain	10,400	$129.20	$1,344,000	$201,600	$1,545,600	0.00	Floodplain	$0	$0	$1,545,600	100.0%	$1,545,600	2023	70
72 & 79	2009 MSWQCS Update	Storm sewer outfall	Dixie Rd & Eastgate pkwy	new pond (retrofit of ex. storm outfall) - quality	30	5,800	0	0	5,800	1.17	tableland (hydro ROW)	5,800	$129.20	$749,000	$112,350	$861,350	1.17	Ontario Hydro	$1,482,660	$1,735,000	$2,596,350	100.0%	$2,596,350	2026	72 & 79
128	2009 MSWQCS Update	Storm sewer outfall	401 & Creditview Rd	new pond (retrofit of ex. storm outfall) - quality	196	37,800	0	0	37,800	3.63	assume 50% floodplain	37,800	$129.20	$4,884,000	$732,600	$5,616,600	1.82	Residential	$3,201,347	$5,810,000	$11,426,600	100.0%	$11,426,600	2025	128
129	2009 MSWQCS Update	Storm sewer outfall	Goreway Dr & Nashua Dr	new pond (retrofit of ex. storm outfall) - quality	32	6,300	0	0	6,300	0.81	park	6,300	$129.20	$814,000	$122,100	$936,100	0.81	TRCA	$0	$0	$936,100	100.0%	$936,100	2024	129
B - SUBTOTAL:					**2,629**	**395,500**	**0**	**0**	**395,500**	**20.30**		**395,500**		**$ 51,099,000**	**$ 6,949,800**	**$ 58,048,800**	**11.68**			**$ 13,403,000**	**$ 71,451,800**		**$ 71,451,800**		

TOTAL STORMWATER MANAGEMENT WORKS: **3,641** **33.60** **559,871** **$ 59,781,000** **$ 7,890,600** **$ 67,671,600** **24.06** **$ 22,639,000** **$ 90,310,600** **$ 90,310,600**

* Backgroound studies include:
MSWQCS - Mississauga Stormwater Quality Control Strategy (1995)
2009 MSWQCS Update (2009, in progress)

storm sewer, allowance for access roads, etc.

Cost Estimates

The total cost to build the proposed new stormwater management facilities was estimated in terms of the following:

- construction costs
- design and administration costs
- land costs

A review of past stormwater management facility construction costs was undertaken to estimate the costs of future facilities planned in Mississauga. A summary of the construction costs associated with 18 constructed new stormwater management facilities in Mississauga is provided in Table 2.3.2 and Figure 2.3.1. As shown, the average unit cost in 2009 dollars was calculated to be $\$58.98/m^3$.

Design and administration costs were estimated to be 15% of the construction cost. The resulting design and construction cost for each of the proposed new stormwater facilities is summarized in Table 2.3.1 (Item A).

With respect to land requirements, the following land values were provided by the City's Finance Department to determine the costs to acquire the land for the proposed stormwater facilities:

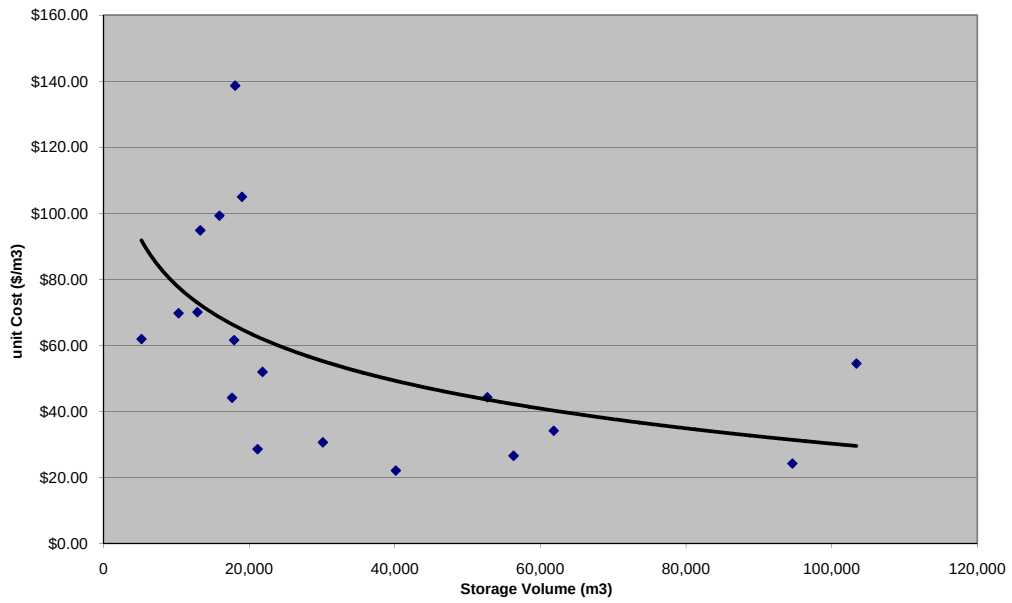
- residential lands - $1,295,515 per acre, or $3,201,347 per hectare; and
- industrial lands - $800,000 per acre, or $1,976,880 per hectare.

Some of the proposed facilities are located within floodplain lands or City-owned lands. It is assumed that there would be no land costs associated with these facilities.

TABLE 2.3.2
SUMMARY OF RECENT MISSISSAUGA STORMWATER POND CONSTRUCTION COSTS

Pond #	Description	Storage Volume (m^3)	Adjusted Cost (2009$)	Unit Cost (2009$/m3)
5803	Sawmaill Creek - Erin Mills, Nbhd 408	103,400	$5,632,951.61	$54.48
5702	Sixteen Mile Creek - Churchill Meadows Development	52,700	$3,376,450.00	$44.25
5701	Sixteen Mile Creek - Churchill Meadow Development	23,600		
5303	Levi Creek FFP3 - Meadow Ridge Development	12,880	$902,042.13	$70.03
5302	Levi Creek - Meadow Ridge Development	15,900	$1,578,034.93	$99.25
5301	Credit River - Fieldrun Sub. Ph.3 (SWM Facility #3)	10,290	$717,304.53	$69.71
5101	Etobicoke Creek - Everlast Construction Ltd.	56,300	$1,493,894.70	$26.53
4504	Credit River - Heritage Walk Development	5,200	$321,772.14	$61.88
4405	Fletcher's Creek - SWM Facility #5	61,820	$2,109,771.53	$34.13
4403	Levi Creek - Meadowvale Village	30,110	$921,654.35	$30.61
4402B	Fletcher's Creek - Fletcher's Creek Business Park	40,130	$885,600.86	$22.07
4402A	Fletcher's Creek - Missassauga Gateway Centre	94,600	$2,288,103.01	$24.19
4401	Fletcher's Creek - Arrowsmith Sub. Phases 4 & 5 (SWM Facility #4)	21,140	$603,701.54	$28.56
3601	LEC - Neighbourhood 5D	19,000	$1,994,235.15	$104.96
2601A	Etobicoke Creek - Eastgate Business Park	17,920	$1,103,132.69	$61.56
2601B	Etobicoke Creek - Bell Mobility Centre	13,270	$1,258,111.70	$94.81
0801	Tecumseh Creek - Mattamy Lorne Park	17,640	$778,214.31	$44.12
	Mill Creek Business Park	18,060	$2,503,434.05	$138.62
	Fletchers Creek - Derrydale & McLaughlin	21,818	$1,133,154.41	$51.94
			Avg. Cost ($/m3):	**$58.98**

FIGURE 2.3.1
Summary of Recent Mississauga Stormwater Pond Construction Costs



The total estimated cost for each of the new stormwater management facilities, including construction, design/administration, and land costs are summarized in Table 2.3.1 (Item A).

2.3.2 Stormwater Quality Retrofits

In the 1980's, the importance of stormwater management planning gained recognition, and new developments often included stormwater control facilities in order to prevent increased flooding and erosion downstream. Stormwater control facilities often took the form of a "detention pond" to "hold back" runoff from the development and then gradually release it at reduced flow rates into the streams, minimizing the risk of downstream impacts. One of the most common types of stormwater ponds constructed in the 1980's was the so-called "dry pond" which drained completely after each storm and remained dry until the next storm.

In the 1990s the importance of protecting the downstream natural environment gained recognition, and stormwater management ponds were often constructed as "wet ponds" which utilize a permanent pool of water to remove pollutants from urban runoff. In order to improve upon the design of older stormwater management facilities that were constructed for water quantity control alone, the ponds may be retrofitted to also provide water quality controls. Typically, this involves further excavation and grading within the existing pond to provide a permanent pool of water, reconstruction of the outlet control structure, landscaping and restoration works, and addition of maintenance access roads.

Inventory of Works

The City of Mississauga Stormwater Quality Control Strategy (Winter Associates and Gore & Storrie Limited. January, 1996) recommended that several existing quantity control facilities be retrofitted to provide water quality controls. The ongoing Mississauga Stormwater Quality Control Strategy Update reviewed these previous recommendations and updated the findings based on current standards and site conditions. For example, "Level 1" or "enhanced" water quality control targets were assumed based on current Conservation Authority guidelines. The

study also identified water quality retrofit opportunities at existing uncontrolled storm sewer outfalls.

Table 2.3.1 (Item B) lists the water quality retrofit opportunities together with storage volume requirements. As with the new stormwater ponds (Section 2.3.1), the retrofit facility sizes were estimated through the ongoing Mississauga Stormwater Quality Control Strategy Update. This study estimated each facility size based on the larger of the target water quality control volume as specified by the MOE Stormwater Management Planning Manual or where insufficient space is available to achieve the MOE target volume, the largest volume attainable given the site constraints such as bounding properties, adjacent utilities, estimated depth to the storm sewer, allowance for access roads, etc.

Cost Estimates

The total cost to construct the water quality retrofit facilities was estimated in terms of construction costs, and design and administration costs. In some cases, land costs were also considered.

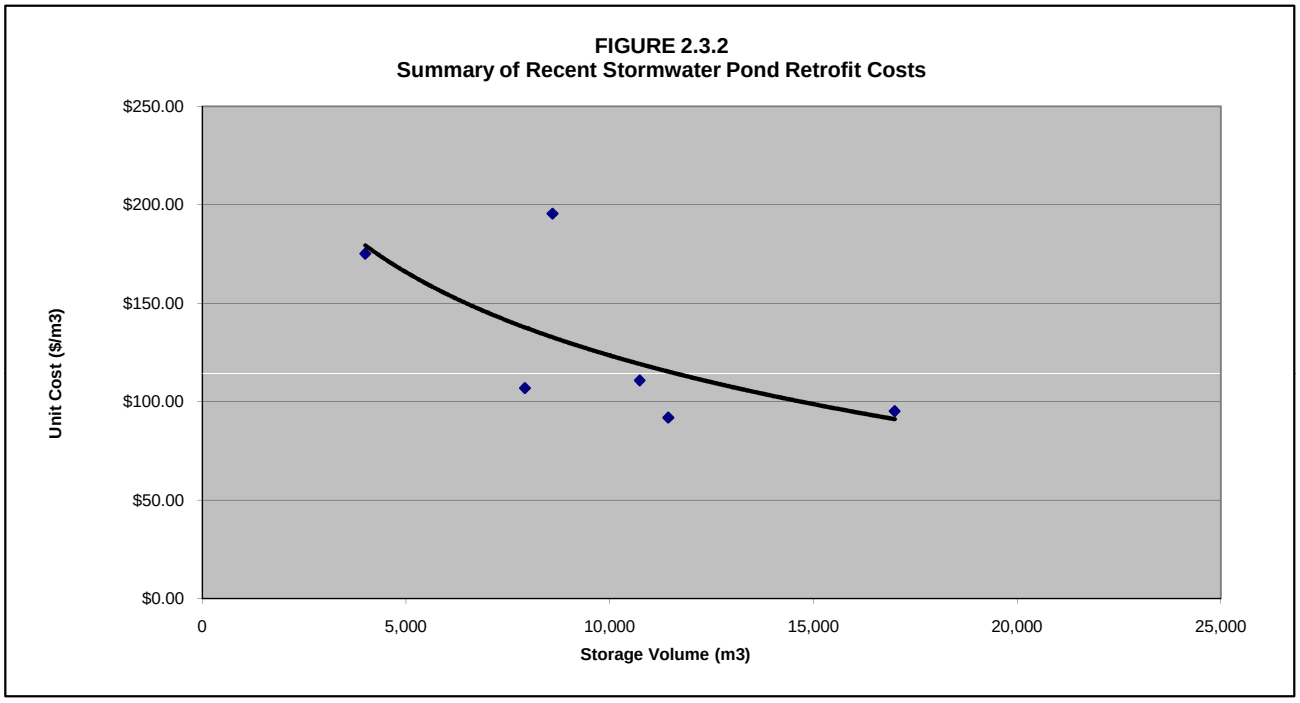
It should be recognized that retrofitting existing stormwater management ponds is often considerably more expensive than the construction of new facilities. Typically, new stormwater ponds are constructed at the same time as the lands they service are developed, and excavated material from the pond construction can be disposed of on-site. However, excavated material from retrofit works must be hauled and disposed of off-site. This, together with the cost of relocating existing municipal services and construction access restrictions make retrofit works more expensive than the construction of new facilities.

The costs of several recent stormwater retrofit projects were reviewed in order to estimate an appropriate unit cost for use in this study. A summary of the construction costs associated with 6 recently-constructed stormwater retrofits in the Greater Toronto Area is provided in Table 2.3.3 and Figure 2.3.2. As shown, unit cost vary between \$91.85/m^3 to \$195.48/m^3 and the average

TABLE 2.3.3
SUMMARY OF RECENT STORMWATER POND RETROFIT COSTS

Pond Name	Location	Drainage Area (ha)	Storage Volume (m3)	Adjusted Cost (2009$)	Unit Cost (2009$/m3)
Bridal Trail Pond	Markham	76	11,440	$1,050,719	$91.85
Wincott Pond	Etobicoke	26	4,000	$700,479	$175.12
Pioneer Park Pond	Richmond Hill	57	8,600	$1,681,150	$195.48
Derry Road East Pond 4301	Mississauga	175	17,000	$1,618,107	$95.18
Leitchcroft Pond	Markham	64	7,920	$846,179	$106.84
Carolyn Creek SWM Pond	Mississauga		10,740	$1,189,388	$110.74
				Avg. Cost ($/m3):	**$129.20**

FIGURE 2.3.2
Summary of Recent Stormwater Pond Retrofit Costs



unit cost in 2009 dollars was found to be $129.20/m^3. Design and administration costs were estimated to be 15% of the construction cost. The resulting design and construction costs for each of the proposed water quality retrofit facilities are summarized in Table 2.3.1 (Item B).

With respect to land requirements, it was assumed that most of the proposed retrofit works could be undertaken within the existing pond "footprints" and/or within non-developable floodplain lands or City-owned lands. In these situations, no additional land costs would be required. However, several retrofit opportunities required some consideration for land costs. These situations are discussed below:

- two of the proposed stormwater retrofits are located on lands owned by Ontario Hydro. The estimated cost to acquire these lands was assumed to be 75% of the adjacent "over the fence" land values. For Pond No. 23, 75% of the adjacent residential land cost was applied, and for Pond No. 72/79, 75% of the adjacent industrial land cost was applied
- proposed retrofit pond No. 128 is partially located within the Credit River floodplain. Approximately half of the facility was assumed to be located outside of the floodplain and the residential land values discussed in Section 2.3.1 were applied to estimate the land costs for this facility

Cost Allocation

Consistent with past approach, development charges are collected uniformly across all subwatersheds within the City of Mississauga rather than on an individual subwatershed basis, which has previously been deemed unreasonable as this would produce significantly different charges in each subwatershed. The collected levies are then appropriated toward the construction of new facilities and the retrofitting of existing facilities. These identified facilities should be viewed as an opportunity pool which allows decisions to be made on the order of facility construction based on the pattern of development within the City over time. For example, funds raised from a small infill development may be utilized to fund a retrofit facility in another part of the City. The full cost of all stormwater management facilities will be recovered through

development charges.

2.4 Storm Sewer Oversizing

Background

This component relates to the provision of oversized storm sewers within a development in order to accommodate upstream drainage areas under future landuse conditions. Historically, the City of Mississauga has provided a development charges credit to developers related to the cost of storm trunk sewers greater than 1500mm (60 inches). This oversizing provision mitigates the impact of providing service for upstream lands.

Cost Estimate

The 2004 Development Charges Background Report: Storm Drainage Component, applied two methods to estimate the cost of oversizing credits to the City. The first method looked at historical rates at which oversizing credits were paid out by the City, while the second looked at a series of specific future development sites where there may be potential for storm sewer oversizing. Both methods were considered for use in the current study, however, it should be recognized that, as the available development lands within the City continue to decline, the oversizing costs will also continue to decline as development proceeds to completion. Therefore, using historical rates to estimate future oversizing credits is less applicable today, and, for this reason, the second method discussed above was applied instead.

The potential storm sewer oversizing sites evaluated in the 2004 Report were re-evaluated for inclusion in the 2009 update with respect to:

- potential for development
- current development status
- completed developments
- updated cost estimates

Details are provided in Appendix A. In total, four sites were identified where future storm sewer oversizing credits are anticipated. These four sites and the associated oversizing costs are summarized in Table 2.4.1. As shown, the budget estimate for these sites is $4,701,000.

Cost Allocation

Costs for storm sewer oversizing are related to future development, and therefore, 100% of the costs are to be recovered through development charges.

2.5 Studies and Monitoring

In order to facilitate future Development Charges Study updates and to better define future stormwater-related works, a series of future studies and study updates will be undertaken. These studies include:

- updates to the Mississauga Stormwater Quality Control Strategy
- future Development Charges Study Updates
- annual monitoring studies
- future City-wide Erosion and Rehabilitation Studies.

The full cost of these studies and monitoring projects have been allocated to the storm drainage development charge.

TABLE 2.4.1
STORM SEWER OVER-SIZING

Potential Oversizing Site*	Location	Cost	DC portion	DC amount
Site No. 3	South of Royal Windsor Dr. between Southdown Rd. & Avonhead Rd.	$4,419,000	100.0%	$4,419,000
Site No. 6c (north)	South of Thomas Street, between Tenth Line and Winston Churchill Blvd.	$11,000	100.0%	$11,000
Site No. 7	South of Hwy 401, between Ninth Line & Tenth Line.	$84,000	100.0%	$84,000
Site No. 8	South of Eglinton, between Ninth Line to Ridgeway Drive	$187,000	100.0%	$187,000
TOTALS:		**$4,701,000**		**$4,701,000**

* Other sites were evaluated but are not expected to require storm sewer oversizing credits. Refer to Appendix A for details.

3.0 FUTURE DEVELOPMENT AREA

The available development lands within the City of Mississauga were evaluated using 2008 landuse data supplied by the City's Planning and Building Department. A detailed breakdown of the available vacant lands is provided in Appendix B.

Table 3.1 provides a summary of the developable lands within the City, by watershed, and in terms of their status as residential, non-residential, or mixed-use lands. These values represent the estimated *net* developable lands, and account for portions of those areas which will ultimately be dedicated to roadways, valleys, and green space. As shown in Table 3.1, the total *net* vacant lands available for future development is approximately 881 hectares, or 3.1% of the total lands within the City.

As the amount of vacant land within the City continues to decrease, re-development activities are anticipated to represent a larger portion of the future development opportunities. The urban intensification associated with these future re-developments has the potential to add additional demands to the existing stormwater conveyance and treatment systems. Therefore, a portion of those redevelopment lands, representing the intensification over existing urbanization, has been included in the development charges calculations. In total, the City's Planning and Building Department has identified approximately 255 hectares of lands with high redevelopment potential. It is assumed that 15% of these anticipated redevelopment lands can be accounted for in the calculation of net developable lands. This is based on the fact that all properties subject to redevelopment are entitled to development charges credits for buildings that exist. In the case of storm drainage, that would include all paved areas. As such, it is assumed about 85% of a site is occupied by buildings or paved areas leaving the remainder subject to development charges. Therefore, as shown in Table 3.1, approximately 38 hectares of re-development lands have been identified.

In total, approximately 919 hectares of lands have been identified for inclusion in the

TABLE 3.1
SUMMARY OF AVAILABLE DEVELOPMENT LANDS

Watershed Name	Total Area (ha)	2009 DC Future Development Areas provided by P&B Dept.* Area (ha) Residential	Non-Residential	Mixed Use	*Sub-total*	Redevelopment Lands**	*Total*	Percent (%)
Applewood	449.6	0.17	4.68	0.00	*4.85*	0.48	*5.32*	1.2%
Avonhead	164.9	0.00	37.84	0.00	*37.84*	0.00	*37.84*	22.9%
Birchwood	351.3	0.40	0.00	0.00	*0.40*	0.38	*0.78*	0.2%
Carolyn	525.8	6.39	5.89	0.00	*12.28*	0.31	*12.59*	2.4%
Cawthra	209.3	1.90	0.42	0.00	*2.32*	0.64	*2.97*	1.4%
Chappel	181.0	0.68	0.09	0.00	*0.77*	0.00	*0.77*	0.4%
Clearview	130.7	0.00	21.24	0.00	*21.24*	0.00	*21.24*	16.2%
Cooksville	3,520.2	30.91	53.65	9.35	*93.91*	9.50	*103.41*	2.9%
Credit	2,702.6	27.51	18.69	0.00	*46.20*	2.07	*48.26*	1.8%
Cumberland	54.5	0.00	0.00	0.00	*0.00*	0.02	*0.02*	0.0%
Etobicoke	4,770.6	0.33	107.56	0.00	*107.89*	0.93	*108.81*	2.3%
Etobicoke Lakeshore	282.8	3.94	0.88	0.00	*4.83*	0.08	*4.91*	1.7%
Fletchers	787.8	4.04	38.78	0.00	*42.81*	2.29	*45.10*	5.7%
Joshua	16.3	0.00	2.89	0.00	*2.89*	0.00	*2.89*	17.8%
Kenollie	216.6	0.26	0.00	0.00	*0.26*	0.00	*0.26*	0.1%
Lakeside	445.1	0.00	51.57	0.00	*51.57*	0.00	*51.57*	11.6%
Levi	225.2	0.31	3.15	0.00	*3.45*	0.01	*3.47*	1.5%
Little Etobicoke	2,224.4	0.98	53.35	0.00	*54.33*	2.26	*56.58*	2.5%
Lornewood	422.3	0.89	0.95	0.00	*1.84*	0.95	*2.79*	0.7%
Loyalist	878.3	0.21	21.98	0.00	*22.19*	0.66	*22.85*	2.6%
Mary Fix	652.4	12.21	0.28	17.28	*29.77*	1.33	*31.10*	4.8%
Meadowvale North	93.0	1.81	8.61	0.00	*10.42*	0.00	*10.42*	11.2%
Mimico	1,734.1	0.84	49.81	0.00	*50.64*	0.18	*50.82*	2.9%
Moore	18.5	0.00	0.00	0.00	*0.00*	0.00	*0.00*	0.0%
Mullet - downstream	1,157.5	7.90	4.71	0.00	*12.61*	2.93	*15.54*	1.3%
Mullet - upstream	1,611.3	0.45	52.85	0.00	*53.30*	1.86	*55.16*	3.4%
Mullet - total	n/a	n/a	n/a	n/a	*n/a*			2.6%
Watershed No. 012/Oakville	68.5	0.00	29.57	0.00	*29.57*	0.00	*29.57*	43.1%
Port Credit	95.4	1.17	0.12	0.00	*1.29*	0.76	*2.06*	2.2%
Port Credit West	163.4	0.48	2.42	0.00	*2.90*	0.71	*3.61*	2.2%
Sawmill	1,577.0	46.36	31.11	0.00	*77.47*	6.22	*83.69*	5.3%
Serson	234.5	0.25	0.00	0.00	*0.25*	0.00	*0.25*	0.1%
Sheridan	737.0	1.92	21.90	0.00	*23.82*	0.64	*24.46*	3.3%
Sixteen Mile	942.6	8.87	53.62	0.00	*62.49*	0.19	*62.68*	6.6%
Tecumseh	162.6	0.37	0.39	0.00	*0.76*	0.00	*0.76*	0.5%
Turtle	257.4	1.65	6.17	0.00	*7.82*	0.05	*7.87*	3.1%
Wolfdale	718.8	1.16	4.53	0.00	*5.69*	2.80	*8.49*	1.2%
Total:	**28,783.3**	**164.4**	**689.7**	**26.6**	**880.7**	**38.2**	**918.9**	**3.2%**

development charge calculations, comprising 881 hectares of net vacant development lands and 38 hectares of re-development lands. As shown in Table 3.1, these future development and re-development growth lands represent approximately 3.2% of the total lands within the City.

The vacant lands summarized in Table 3.1 were used in Section 2 of the report to allocate costs between future development (i.e. growth) and existing development (i.e. non-growth) components), where appropriate, for such works as erosion control, and conveyance improvements.

4.0 DEVELOPMENT CHARGES

A summary of the calculations to determine an appropriate value for development charges in terms of storm drainage for the City of Mississauga is provided in Table 4.1.

Overall Charges

An inventory of future storm drainage works, the associated costs, and the allocation of these costs to future development were compiled in Section 2. A summary of the costs for each of the five categories discussed in Section 2 is provided in Table 4.1. As shown, the total cost of the works is $109,114,200.

Reserves

The above overall costs have been reduced to recognize funds related to stormwater drainage and water quality control which the City has already collected through the development process. As shown in Table 4.1, a total of $38,357,539 in reserve funds are available.

Development Charge

As shown in Table 4.1, after accounting for reserve funds, the total cost to be recovered through development charges is $70,756,661. The total net land available for development and growth through re-development is approximately 919 hectares. Therefore, the resulting development charge for storm drainage is $77,000 per net hectare, which represents a 19% change from the current rate of $64,739 per net hectare.

TABLE 4.1
2009 STORM DRAINAGE DEVELOPMENT CHARGES

	2009 DC
1 - EROSION CONTROL WORKS	
A - EROSION CONTROL - IDENTIFIED WORKS	$1,450,500
B - EROSION CONTROL - FUTURE WORKS	$1,529,200
C - MINOR EROSION CONTROL	$61,200
SUBTOTAL	**$3,040,900**
2 - CONVEYANCE (CHANNELIZATION. CULVERT IMPROVEMENTS, STORM SEWER IMPROVEMENTS)	**$6,501,700**
3 - STORMWATER MANAGEMENT	
A - STORMWATER MANAGEMENT FACILITIES - NEW FACILITIES:	$18,858,800
B - STORMWATER QUALITY RETROFITS:	$71,451,800
SUBTOTAL	**$90,310,600**
4 - STORM SEWER OVERSIZING	**$4,701,000**
5 - BACKGROUND STUDIES AND MONITORING:	**$4,560,000**
TOTAL PROGRAM	**$109,114,200**
LESS RESERVES:	
(STORM DRAINAGE)	$21,211,709
(WATER QUALITY)	$2,345,561
SECTION 14 LOT LEVY LIABILITY	$14,800,269
TOTAL RESERVES:	**$38,357,539**
TOTAL DEVELOPMENT CHARGES	**$70,756,661**
FUTURE DEVELOPMENT AREA (NET)	**919 ha**
UNIT DEVELOPMENT CHARGE	**$77,000 /ha**

5.0 SUMMARY AND CONCLUSIONS

The City of Mississauga is completing a 5-year review of its existing development charges by-law which was last revised in 2004. This study updates the storm drainage component of the development charges. The storm drainage component includes the following categories:

- stream erosion and restoration
- conveyance improvements, including channelization, culvert upgrades, and storm sewer improvements;
- stormwater management, including stormwater ponds and water quality retrofits;
- storm sewer oversizing; and
- background studies and monitoring.

This Development Charge Background Study summarizes the required capital works related to storm drainage, the estimated costs of these works, and the allocation of the costs between future development (growth) and existing development (non-growth) components. The resulting development charges costs were then applied over the available development lands to determine the appropriate development charge for storm drainage.

Key findings include:

- the total cost of the identified works is $109,114,200
- a total of $38,357,539 in reserve funds are available;
- the resulting total cost to be recovered through development charges is $70,756,661; and
- the total net lands available for development and growth through re-development is approximately 919 hectares.

Based on the above, the updated storm drainage component of the development charges should be set at $77,000 per net hectare.

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APPENDIX A

POTENTIAL STORM SEWER OVERSIZING

STORM SEWER OVER-SIZING

The potential storm sewer over-sizing sites listed and described in Appendix B of the 2004 DC Background Report: Storm Drainage Component were evaluated for inclusion in the 2009 report, with respect to their current status, whether they have been built, if they are still expected to be required, what their updated cost is, and whether there are additional storm sewer over-sizing sites expected in the new 2009-2031 time horizon. The following is a summary of this evaluation.

Potential Storm Sewer Over-sizing Sites, 2004 DC Background Report

Site 1:

Watercourse:	Fletchers Creek
Storm Network Map:	Z-44
Location:	North of Hwy 401, between Hurontario Street and McLaughlin Road, south of Courtneypark Drive East
Status:	This development was approved in 2008 (per. comm. with OPT). No additional storm sewer over-sizing credits are expected to be paid in this area.
Over-sizing budget:	$ -

Site 2:

Watercourse:	Etobicoke Creek
Storm Network Map:	Z-35
Location:	North of Hwy 401, west of Etobicoke Creek, east of Dixie Road, south of Shawson Drive
Status:	These vacant lands are owned by the Greater Toronto Airports Authority. The GTAA neither pays DCs or receives credits. No storm sewer over-sizing credits expected to be paid in this area.
Over-sizing budget:	$ -

Site 3:

Watercourse:	Lakeside Creek
Storm Network Map:	Z-04
Location:	South of Royal Windsor Drive, between Southdown Road and Avonhead Road
Status:	The area is currently serviced with a 1500mm storm sewer which discharges to a channel on the Wastewater Treatment Plant lands just upstream of Lakeshore Road. This sewer system is considered undersized and will likely need to be twinned as development on the lands north of the WWTP intensifies. The cost of twinning the storm sewer is considered to be an over-sizing cost as the existing sewer is at the 1500mm pipe threshold for over-sizing compensation.
Over-sizing budget:	$ 4,418,889

Site 4:

Watercourse:	Clearview Creek and Avonhead Creek
Storm Network Map:	Z-04
Location:	South of Royal Windsor Drive, between Avonhead Road and Winston Churchill Boulevard
Status:	A Levy Credit was paid in 2008 to Certain Treed Gypsum Canada Inc. for the cost associated with the construction of a 2100mm storm sewer on Hazelhurst Road. No additional storm sewer over-sizing costs are anticipated in this area.
Over-sizing budget:	$ -

Site 5:

Watercourse:	Oakville watershed (incorrectly identified as Loyalist Creek in the 2004 DC background report)
Storm Network Map:	Z-59
Location:	South of Burhamthorpe Road, between Hwy 403 and Ninth Line.
Status:	This site is encumbered by the ORC/Hydro corridor and is considered to have little development potential.
Over-sizing budget:	$ -

Site 6a - West:

Watercourse:	Sawmill Creek
Storm Network Map:	Z-57
Location:	North of Eglinton Avenue, between Ninth Line and Winston Churchill Boulevard
Status:	This site has been developed (T-94024 Ph. 4) and levy credits were paid for storm sewer over-sizing costs in 2004. No further over-sizing costs are expected.
Over-sizing budget:	$ -

Site 6b - Central:

Watercourse:	Sawmill Creek
Storm Network Map:	Z-57
Location:	South of Erin Centre Boulevard, between Ninth Line and Tenth Line.
Status:	This site has been developed. No additional development or future storm sewer over-sizing costs are expected.
Over-sizing budget:	$ -

Site 6c - North:

Watercourse:	Sawmill Creek		
Storm Network Map:	Z-57		
Location:	South of Thomas Street, between Tenth Line and Winston Churchill Boulevard		
Status:	Based on drawings prepared by RAND Engineering for the ultimate development condition of these lands ("TACCPAR Gate Develoments Inc." and "McCracken Lands"), 25m of 1800mm storm sewer will be required along Oscar Peterson Boulevard.		
Over-sizing budget:	Pipe:	25m x ($1320/m 1800mm - $1188/m 1500mm) = $	3,300
	MH:	1 x ($19,000/ 3000mm MH - $12,210/ 2400mm MH) = $	6,790
		Subtotal = $	10,090
		Eng'g & Fees (10%) = $	1,009
		Total Cost Est. = $	11,099

Site 7:

Watercourse:	Sixteen Mile Creek
Storm Network Map:	Z-55
Location:	South of Hwy 401, between Ninth Line and Tenth Line
Status:	Erin Mills and ProLogis have initiated the development planning process for their lands. Exact over-sizing requirements still unknown. Will carry forward estimated over-sizing budget provided in 2004 DC background study.
Over-sizing budget:	$ 84,058 (based on inflation of 2004 budget: $60,000 indexed to 2009)

Potential Storm Sewer Over-sizing Sites, Newly Identified

Site 8:

Watercourse:	Glen Erin Brook		
Storm Network Map:	Z-58		
Location:	South of Eglinton, between Ninth Line to Ridgeway Drive		
Status:	Churchill Meadows District, Neighbourhood 407. Drawings and cost estimates prepared by AECOM, December 2008, amended by J. Blair. Expect development to proceed in next few years.		
Over-sizing budget:	Pipe:	$	117,597
	MHs:	$	52,722
	Subtotal:	$	170,319
	10% eng'g & fees:	$	17,032
	Total cost est:	$	187,351

Summary of Storm Sewer Over-sizing Sites and Budgets

Site 1:	$	-
Site 2:	$	-
Site 3:	$	4,419,000
Site 4:	$	-
Site 5:	$	-
Site 6a:	$	-
Site 6b:	$	-
Site 6c:	$	11,000
Site 7:	$	84,000
Site 8:	$	187,000
Total:	**$**	**4,701,000**

APPENDIX B

2008 VACANT LANDS DATA

TABLE B.1
Total of Residential Vacant Lands

Watershed	Vacant Committed Lands (ha)	Vacant Potential Lands (ha)	Endorsed Sub Areas	Endorsed OZ Areas	Total Potential Areas
Applewood Creek	0.17				0.00
Avonhead Creek					0.00
Birchwood Creek	0.25	0.15			0.15
Carolyn Creek	0.08	0.49	5.82		6.31
Cawthra Creek	1.58	0.32			0.32
Chappell Creek	0.68				0.00
Clearview Creek					0.00
Cooksville Creek	12.22	12.31	6.38		18.68
Credit River	8.40	17.59	1.43	0.09	19.11
Cumberland Creek					0.00
Etobicoke Creek		0.33			0.33
Etobicoke Lakeshore	3.94				0.00
Fletcher Creek	0.03	0.99	3.01		4.00
Joshua Creek					0.00
Kenolle Creek	0.26				0.00
Lakeside Creek					0.00
Levi's Creek		0.31			0.31
Little Etobicoke Creek	0.71	0.27			0.27
Lornewood Creek	0.69	0.20			0.20
Loyalist Creek	0.21				0.00
Mary Fix Creek	4.35		0.37	7.49	7.86
Meadowvale North		1.81			1.81
Mimico Creek	0.84				0.00
Moore Creek					0.00
Mullett Creek Downstream	5.90	0.55	1.38	0.08	2.01
Mullett Creek Upstream	0.45				0.00
Oakville					0.00
Port Credit	0.94	0.23			0.23
Port Credit West	0.48				0.00
Sawmill Creek	13.54	0.05	10.84	21.93	32.82
Serson Creek	0.25				0.00
Sheridan Creek	0.11	1.81			1.81
Sixteen Mile Creek	7.37	1.50			1.50
Tecumseh Creek	0.15	0.22			0.22
Turtle Creek	1.59	0.06			0.06
Wolfedale Creek	1.07			0.09	0.09
Totals	66.25	39.20	29.23	29.67	**98.10**

Grand Total	**164.36**
Total Commited (ha)	**66.25**
Total Potential (ha)	**98.10**

* Land areas are net (15% reduction from potential lands, lands for which DC's already paid and Section 14 lands removed from total).

TABLE B.2
Total of Non Residential Vacant Lands

Watershed	Vacant Committed Lands (ha)	Vacant Potential Lands (ha)	Endorsed Sub Areas	Endorsed OZ Areas	Total Potential Areas
Applewood Creek	4.68				0.00
Avonhead Creek	35.60	2.24			2.24
Birchwood Creek					0.00
Carolyn Creek	4.81	0.57	0.07	0.44	1.08
Cawthra Creek	0.42				0.00
Chappell Creek	0.09				0.00
Clearview Creek	7.18	14.05			14.05
Cooksville Creek	20.32	1.23	32.10		33.33
Credit River	18.20	0.49		0.00	0.49
Cumberland Creek					0.00
Etobicoke Creek	106.66	0.90			0.90
Etobicoke Lakeshore	0.88				0.00
Fletcher Creek	3.00	35.30	0.48		35.78
Joshua Creek	0.61	2.28			2.28
Kenolle Creek					0.00
Lakeside Creek	51.56	0.01			0.01
Levi's Creek	3.15				0.00
Little Etobicoke Creek	39.51	11.50	2.34		13.84
Lornewood Creek	0.95				0.00
Loyalist Creek	21.98				0.00
Mary Fix Creek	0.28				0.00
Meadowvale North	8.40	0.21			0.21
Mimico Creek	49.58	0.23			0.23
Moore Creek					0.00
Mullett Creek Downstream	3.27	1.26	0.17		1.43
Mullett Creek Upstream	49.27	3.58			3.58
Oakville	29.55	0.02			0.02
Port Credit		0.12			0.12
Port Credit West	2.42				0.00
Sawmill Creek	1.64	29.17	0.30		29.47
Serson Creek					0.00
Sheridan Creek	21.90				0.00
Sixteen Mile Creek	4.16	49.46			49.46
Tecumseh Creek	0.39				0.00
Turtle Creek	5.17			1.01	1.01
Wolfedale Creek	4.53				0.00
Totals	500.16	152.62	35.46	1.45	**189.53**

Grand Total	**689.69**
Total Commited (ha)	**500.16**
Total Potential (ha)	**189.53**

* Land areas are net (15% reduction from potential lands, lands for which DC's already paid and Section 14 lands removed from total).

TABLE B.3
Total of Mixed Use Lands

Watershed	Vacant Committed Lands (ha)	Vacant Potential Lands (ha)	Endorsed Sub Areas	Endorsed OZ Areas	Total Potential Areas
Applewood Creek					0.00
Avonhead Creek					0.00
Birchwood Creek					0.00
Carolyn Creek					0.00
Cawthra Creek					0.00
Chappell Creek					0.00
Clearview Creek					0.00
Cooksville Creek	9.35				0.00
Credit River					0.00
Cumberland Creek					0.00
Etobicoke Creek					0.00
Etobicoke Lakeshore					0.00
Fletcher Creek					0.00
Joshua Creek					0.00
Kenolle Creek					0.00
Lakeside Creek					0.00
Levi's Creek					0.00
Little Etobicoke Creek					0.00
Lornewood Creek					0.00
Loyalist Creek					0.00
Mary Fix Creek	8.36		8.92		8.92
Meadowvale North					0.00
Mimico Creek					0.00
Moore Creek					0.00
Mullett Creek Downstream					0.00
Mullett Creek Upstream					0.00
Oakville					0.00
Port Credit					0.00
Port Credit West					0.00
Sawmill Creek					0.00
Serson Creek					0.00
Sheridan Creek					0.00
Sixteen Mile Creek					0.00
Tecumseh Creek					0.00
Turtle Creek					0.00
Wolfedale Creek					0.00
Totals	17.71	0.00	8.92	0.00	**8.92**

Grand Total	**26.63**
Total Commited (ha)	**17.71**
Total Potential (ha)	**8.92**

* Land areas are net (15% reduction from potential lands, lands for which DC's already paid and Section 14 lands removed from total).

TABLE B.4
Re-Development Lands

Watershed	Total Re-Development Area (ha)	Estimated "Growth" Portion (ha)
APPLEWOOD CREEK Total	3.17	0.48
BIRCHWOOD CREEK Total	2.53	0.38
CAROLYN CREEK Total	2.05	0.31
CAWTHRA CREEK Total	4.29	0.64
COOKSVILLE CREEK Total	63.36	9.50
CREDIT RIVER Total	13.77	2.07
CUMBERLAND CREEK Total	0.15	0.02
ETOBICOKE CREEK Total	6.19	0.93
ETOBICOKE LAKESHORE Total	0.54	0.08
FLETCHER CREEK Total	15.24	2.29
LEVI CREEK Total	0.10	0.01
LITTLE ETOBICOKE CREEK Total	15.04	2.26
LORNEWOOD CREEK Total	6.37	0.95
LOYALIST CREEK Total	4.37	0.66
MARY FIX CREEK Total	8.85	1.33
MIMICO CREEK Total	1.19	0.18
MULLETT CREEK DOWNSTREAM Total	19.52	2.93
MULLETT CREEK UPSTREAM Total	12.43	1.86
PORT CREDIT Total	5.09	0.76
PORT CREDIT WEST Total	4.74	0.71
SAWMILL CREEK Total	41.44	6.22
SHERIDAN CREEK Total	4.27	0.64
SIXTEEN MILE CREEK Total	1.27	0.19
TURTLE CREEK Total	0.34	0.05
WOLFEDALE CREEK Total	18.66	2.80
Total:	**254.95**	**38.24**

* "growth" portion assumed to be 15%.

MISSISSAUGA
Transportation and Works

CITY OF MISSISSAUGA

2009 DEVELOPMENT CHARGE BACKGROUND STUDY: DRAINAGE COMPONENT

LOCATIONS OF STORM DRAINAGE WORKS

LEGEND

- CULVERT IMPROVEMENTS
- NEW SWM FACILITY
- SWM FACILITY RETROFIT
- EROSION CONTROL WORKS
- CONVEYANCE WORKS
- WATERSHED BOUNDARIES

SCALE

METRIC 2500M 2000 1500 1000 500 0 2.5 5 KM