







Project Name:	FIGURE	1-1 OVERLA	ND FLOW						
Solutions By:	EDM IN	Ζ.		DATE: 10/18/2013					
Problem:	Yard eros	sion at Q48 - 5	539 Briar Ridg	e					
Strategy:	1) Install	berm to direc	t water to exist	ing swale on back prop	perty line. 2) Add				
	Bioswale	to infiltrate r	unoff and prote	ect natural channels.					
				1) Alternative 1	2) Alternative 1				
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's				
New Berm	LF	97	\$25	\$2,425	\$2,425				
Regrade Back Property Line	LS	1	\$3,000	\$3,000	\$3,000				
Bioswale	LF	98	\$90	\$0	\$8,820				
Subtotal				\$5.425	\$14.245				
Total Benefit Points				30	40				
Individual Benefit Point Rati	0			2.64	1.33				
Estimated Increased Propert	v Vəluec			\$2,000	\$3,000				
Problem.	Street poi	ading at low e	not on Briar P	φ <b>2,000</b> idge I n	\$5,000				
Stratogy:	1) Replac	a under sized	12" RCP with	new 18" PCP					
Strategy.	1) Kepiac	e under sized	12 KCI with	1) Alternative 1	2) Alternative 1				
Decomintion	I Init	Quantity	Unit Cost	Without BMD's	With BMD's				
Description Develo Inlet	UIII EA				¢2 150				
	EA	1	\$5,150	\$3,150	\$3,150				
18" RCP CLASS III	LF	26	\$129	\$3,361	\$3,361				
Subtotal				\$6,511	\$6,511				
<b>Fotal Benefit Points</b>				25	25				
Individual Benefit Point Rati	0			1.83	1.83				
Estimated Increased Propert	v Values			\$0	\$0				
Problem.	Vard non	ding at 0313	- 1627 N Geve	er Rd and driveway po	nding at $0.401 - 515$				
robiem.	Timbersy	wek Dr	- 1027 N.Ocyc	i Ru. and drive way po					
Stratom.	1) Add P	yck Di. ain Garden to	infiltrate runo	ff and protect natural c	hannals				
Strategy.	I) Add K		minutate runo.	1) Alternative 1	2) Alternative 1				
Description	Unit	Quantity	Unit Cost	Without BMD's	With RMD's				
Single Inlet	UIII EA								
Single Inter	EA	1	\$1,850	\$1,830	\$1,830				
	EA	1	\$1,500	\$1,500	\$1,500				
12" RCP CLASS III		286	\$116	\$33,193	\$33,193				
12" FES	EA	1	\$1,100	\$1,100	\$1,100				
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000				
Subtotal				\$1,850	\$1,850				
Total Benefit Points				45	45				
Individual Benefit Point Rati	0			11.60	11.60				
Estimated Increased Propert	v Values			\$2,000	\$2,000				
å	×								
Total				\$13,786	\$22,606				
Utility Relocation			20%	\$2,757	\$4,521				
Clearing			5%	\$689	\$1,130				
Mobilization			4%	\$551	\$904				
Total with Percent Allowance	es			\$17,784	\$29,162				
Contingency			25%	\$4,446	\$7,291				
Probable Construction Cost	Estimate			\$22,230	\$36,453				
Design Engineering and Geote	chnical		30%	\$20,000	\$20,000				
Total Conceptual Cost Estim	ate			\$43,000	\$57,000				
<b>Fotal Benefit Points</b>				150	160				
Total Benefit Point Ratio				3.49	2.80				

**Additional Comments:** 

PROJECT NAME: Figure 1-1 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ЮV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	I						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 1-1 with BMP's

DATE: 10/18/2013

			Chr (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
FLOW	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIDC	If there is an existing public system and points are taken fo any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	ſ/N	N		
'ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWI		Yard Flooding (1 per lot) Address: Q401-515 Timberwyck; Q313-1627 N. Geyer	10	2	6		0		20
RMS		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
0 STOI		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Briar Ridge Ln.	No. P	onds:	1	Points	/pond:	5	5
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q48-539 Briar Ridge	No.	Lots:	1	Point	ts/lot:	10	10
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age			, ,	- /	Ì	. ,	0
			тот	AL PR	OBLE	EM PC	DINTS		35

PROJECT NAME: Figure 1-1 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1.48	PER 1	100 LF	10		15
R QL		Forebays		A	C	200		
ATEI		Wet Ponds		A	C	100		
N/		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)			11-15 (5 pts)	>15 (0 pts)	
5.0	Points for Easements							5
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			5
			тс	TAL	SOLU		тѕ	125
			т	OTAL	BEN	EFIT POINT	S	160

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

57

2.80

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 1-1 - CHANNEL FTMT1					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Creek incision, bank erosion and gully formati 558, 550, 538, 526 Briar Ridge Lane and 545, and 1600 & 1609 Forest Aire Dr., Yard Flood	ion SR ( 593, 59 ing at Q	3, MSD 18, 99, 592 Tin 2399 599 T	, Q400, Q49 nberwyck, 70 imberwyck	, Q47, Q44, 01 & 705 Ti	Q406, 564, mber Trail,
Strategy:	1) Install bank protection, Station 23+50 to 37 37+25 Line 150' long gulley at station 27+00 Remove blockage in creek at station 28+00, cl if necessary.	(right de ean out	375LP). R escending b and video s	emove canti pank) with bl storm pipe at	levered pipe locks and pa t station 28+	at Station vers. 50, replace
	Description	Unit	Ouantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L)	LF	1375	\$300	\$412.500	\$0
	Soft stabilization $(L)$	LF	1375	\$200	\$0	\$275.000
	Geomorphic Study	Ea.	3	\$10,000	\$0	\$30,000
	Remove pipe	Ea.	1	\$1,000	\$1,000	\$1,000
	Line gulley	LF	150	\$35	\$5,250	\$5,250
	Remove blockage	Ea.	1	\$1,000	\$1,000	\$1,000
	Clean out pipe	Ea.	1	\$2,000	\$2,000	\$2,000
	Video pipe	Ea.	1	\$2,000	\$2,000	\$2,000
	12" RCP Class III	LF	158	\$54	\$8,532	\$8,532
	Subtotal				\$423,750	\$316,250
	Total				\$423,750	\$316,250
	Utility Relocation			20%	\$84,750	\$63,250
	Clearing			5%	\$21,188	\$15,813
	Mobilization			4%	\$16,950	\$12,650
	Total with Percent Allowances				\$546,638	\$407,963
	Contingency			25%	\$136,659	\$101,991
	Probable Construction Cost Estimate				\$683,297	\$509,953
	Design Engineering and Geotechnical			30%	\$204,989	\$152,986
	Total Conceptual Cost Estimate				\$889,000	\$663,000
	Benefit Points Benefit/Cost Ratio				615 0.69	1,100 1.66

**Additional Comments:** 

PROJECT NAME: Figure 1-1 Channel FTMT1 - Alternate 2

				Chro (<=2 Floor	onic 2-Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infree (>1 Floc	quent 5-Yr) oding	ints
		_	PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	ILOODIN		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	н. Н.		Yard Flooding (1 per lot) Address:	10		5		0		
	<u>+</u>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

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PROJECT NAME: Figure 1-1 Channel FTMT1 - Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.		No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Pc
		2.1.1. Structure Flooding							
FLOW		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*			200		50		
	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIQ	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
ER / OVERL		Attached Garage (1 lot per structure)	100		75		25		
	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWI		Yard Flooding (1 per lot) Address: Q399 599 Timberwyck	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	I	1	<u> </u>	<u> </u>			
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	ō yrs pts)	
		Points for Age		-		ŕ			
			тот						10

PROJECT NAME: Figure 1-1 Channel FTMT1 - Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3 REGI	3.2.	Combines smaller projects into regional solution (see note)	No. A Proje	Add'l ects:	12	Points per Add'l Proj.:	50	600
	4.1.	Addresses pollutants:	Ν	Io. Unit	S	Points per	Unit	
ΙΑLITY		Bioswales		PER 1	100 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
N /		Wetlands		A	C	C 50		
ENTAL		Biostabilization of banks (per bank)	28	PER 1	100 LF	10		280
RONM		Riffle Pool Complex	14	PER 1	100 LF	10		140
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	0-5 (20 pts) 6-10 (10 pts)		11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements				13		5
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s	Yes		65
			т		SOLU		TS	1090
	TOTAL SOLUTION POINTS 100 TOTAL BENEFIT POINTS 110							

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.66

Place "X" in one box below:

MSD Project Project by Others CITY OF FRONTENAC CONCEPTUAL SOLUTIONS



Project Name:	FIGURE 1	-2 OVERLAN	D FLOW					
Solutions By:	EDM INC		DATE:	DATE: 10/18/2013				
Problem:	Yard pond	ing at O260 - 6	20 Hickory Ln	and vard ponding and e	rosion at O248 - 531			
	Hickory L	1.	20 Inenory 20	and yard ponding and e	1051011 at <b>Q</b> 210 001			
Strategy:	1) Install b	erm to catch o	verland flow and	d direct to inlet and pipe	e system. 2) Add			
	Bioswale t	o infiltrate run	off and protect r	natural channels.				
				1) Alternative 1	2) Alternative 1			
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's			
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250			
Single Inlet	EA	5	\$1,850	\$9,250	\$9,250			
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150			
12" RCP CLASS III	LF	187	\$116	\$21,703	\$21,703			
18" RCP CLASS III	LF	277	\$129	\$35,811	\$35,811			
21" RCP CLASS III	LF	380	\$137	\$52,018	\$52,018			
30" RCP CLASS III	LF	224	\$163	\$36,566	\$36,566			
33" RCP CLASS III	LF	531	\$174	\$92,622	\$92,622			
New Berm	LF	764	\$25	\$19,100	\$19,100			
Bioswale	LF	591	\$90	\$0	\$53,190			
Subtotal				\$275.470	\$328,660			
Total Benefit Points				55	114			
Individual Benefit Point R	Ratio			0.10	0.17			
Estimated Increased Prop	erty Values			\$9,000	\$10,000			
Problem:	Yard pond	ing and yard er	osion at Q337-5	597 Oak Valley Dr.				
Strategy:	1) Install b	erm to catch or	verland flow and	d direct to inlet and pipe	e system. 2) Add Ra			
	Gardens to	infiltrate runo	ff and protect na	atural channels.	•			
			1	1) Alternative 1	2) Alternative 1			
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's			
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500			
12" RCP CLASS III	LF	195	\$116	\$22,632	\$22,632			
12" FES	EA	5	\$1,100	\$5,500	\$5,500			
Erosion Protection	LF	111	\$100	\$11,100	\$11,100			
Rain Garden	EA	1	\$10,000	\$0	\$10,000			
Subtotal				\$42.732	\$52.732			
Total Renefit Points				20	20			
Individual Benefit Point R	atio			0.22	0.18			
Estimated Increased Pron	erty Values			\$0	\$2,000			
Problem:	Yard pond	ing and erosior	n at MSD7 - 525	5 Twin Fawns Rd.	φ <b>2</b> ,000			
Strategy:	1) Install in	nlets and pipe s	system to collect	t water.				
				1) Alternative 1	2) Alternative 1			
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's			
Single Inlet	EA	2	\$1,850	\$3,700	\$3,700			
Manhole	EA	2	\$1,500	\$3,000	\$3,000			
12" RCP CLASS III	LF	347	\$116	\$40,273	\$40,273			
15" RCP CLASS III	LF	115	\$124	\$14,292	\$14,292			
15" FES	EA	1	\$1,200	\$1,200	\$1,200			
Erosion Protection	LS	1	\$2,000	\$2,000	\$2,000			
Subtotal				\$64,465	\$64,465			
Total Benefit Points				40	40			
Individual Benefit Point R	latio			0.30	0.30			
Estimated Increased Prop	erty Values			\$5,000	\$5,000			
Total		·	·	\$282 667	\$AAE 027			
10181				<b>φ30</b> ∠,007	\$ <del>44</del> 3,837			

Utility Relocation	20%	\$76,533	\$89,171
Clearing	5%	\$19,133	\$22,293
Mobilization	4%	\$15,307	\$17,834
Total with Percent Allowances		\$493,640	\$575,155
Contingency	25%	\$123,410	\$143,789
Probable Construction Cost Estimate		\$617,050	\$718,944
Design Engineering and Geotechnical	30%	\$185,115	\$215,683
Total Conceptual Cost Estimate		\$803,000	\$935,000
Total Benefit Points		180	249
Total Benefit Point Ratio		0.22	0.27

Additional Comments:

PROJECT NAME: Figure 1-2 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	LOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address	35		25		6		
			Residential Road: Address:	20		12		3		

### PROJECT NAME: Figure 1-2 with BMP's

DATE: 10/18/2013

				onic 2-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infree (>18 Floc	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
LOW	6	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
ND FI	DINO	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	(/N	N		
( / OVERLAN	L00	Attached Garage (1 lot per structure) Address:	100	0	75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWER		Yard Flooding (1 per lot) Address: Q260-620 Hickory; Q248-531 Hickory; MSD7-525 Twin Fawns; Q337-597 Oak Valley Dr.	10	4	6		0		40
RM :		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q248-531 Hickory; MSD7-525 Twin Fawns; Q337-597 Oak Valley Dr.	No.	Lots:	3	Point	s/lot:	10	30
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	i yrs ots)	
		Points for Age							0
			тоти	AL PR	OBLE		INTS		70

#### PROJECT NAME: Figure 1-2 with BMP's

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
JALITY		Bioswales*	5.91	PER 1	100 LF	10		59
R QL		Forebays		A	С	200		
ATE	Wet Ponds					100		
N /		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2.	Recreational/Educational	Ye no	es = 10 o = 0 pt	0, s			10
			тс	TAL	SOLU		TS	179
			т	OTAL	BEN		S	249

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

#### TOTAL COST IN THOUSANDS=

935	

0.27

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project Project by Others

Project Name:	FIGURE 1	-2 OVERLAN	D FLOW STRU	CTURAL FLOODING	
Solutions By:	EDM INC.			DATE:	10/18/2013
Problem:	Basement	Flooding 585 T	win Fawns		
Strategy:	1) Install b	erm to catch ov	verland flow and	direct to inlet and pipe	system.
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's
New Berm	LE	316	\$25	\$7 900	\$7 900
New Defin	Li	510	Ψ23	ψ1,900	φ7,700
Subtotal				\$7,900	\$7,900
Total Benefit Points				250	250
Individual Benefit Point Ratio	)			15.10	15.10
Problem:	Yard pond	ing at 0342 - 5	47 Oak Vallev I	Dr., O340 - 518 Oak Val	lev Dr., 0314 - 1705
	Geyer Rd.	and yard erosic	on at Q338 - 534 ok Valley Dr	Oak Valley Dr. and ya	rd ponding and garage
Stratogy	1) Install h	$Q_{3+1} = 323 \text{ Oz}$	verland flow and	direct to inlet and nine	system 2) Add
Strategy.	Rioswale a	nd Rain Garde	ns to infiltrate ru	unoff and protect natural	channels
	Dioswale a			1) Alternative 1	2) Alternative 1
Description	Unit	Ouantity	Unit Cost	Without BMP's	With BMP's
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
12" RCP CLASS III	LF	54	\$116	\$6,267	\$6,267
15" RCP CLASS III	LF	29	\$124	\$3,604	\$3,604
18" RCP CLASS III	LF	389	\$129	\$50,290	\$50,290
21" RCP CLASS III	LF	21	\$137	\$2,875	\$2,875
New Berm	LF	538	\$25	\$13,450	\$13,450
New Swale	LF	265	\$18	\$4,770	\$4,770
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Bioswale	LF	460	\$90	\$0	\$41,400
Subtotal				\$90,006	\$161,406
Total Benefit Points				160	221
Individual Benefit Point Ratio	)			0.85	0.65
<b>Estimated Increased Property</b>	Values			\$9,000	\$13,000
Total				\$97,906	\$169,306
Utility Relocation			20%	\$19,581	\$33,861
Clearing			5%	\$4,895	\$8,465
Mobilization			4%	\$3,916	\$6,772
Total with Percent Allowances	S			\$126,299	\$218,405
Contingency			25%	\$31,575	\$54,601
Probable Construction Cost E	stimate			\$157,873	\$273,006
Design Engineering and Geotec	hnical		30%	\$47,362	\$81,902
Total Conceptual Cost Estima Total Benefit Points	ite			\$206,000 410	\$355,000 506
Total Benefit Point Ratio				1.99	1.43

**Additional Comments:** 

PROJECT NAME: Figure 1-2 Structural with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
	97		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Е		Yard Flooding (1 per lot) Address:	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISOS		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 1-2 Structural with BMP's

DATE: 10/18/2013

				onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: 585 Twin Fawns	250	1	200		50		250
		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* <i>Address:</i>	300		200		50		
	DINO	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
R / OVERLA		Attached Garage (1 lot per structure) Address: Q341-525 Oak Valley	100	1	75		25		100
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWE		Yard Flooding (1 per lot) Address: Q342-547 Oak Valley; Q340-518 Oak Valley; Q314-1705 Geyer; Q341-525 Oak Valley	10	4	6		0		40
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: QQ338-534 Oak Valley	No.	Lots:	1	Point	s/lot:	10	10
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							0
			тоти	AL PR	OBLE	M PO	INTS		400

PROJECT NAME: Figure 1-2 Structural with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	6.1	PER 1	100 LF	10		61
R QL		Forebays		А	C	200		
ATE	Wet Ponds					100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye no	es = 10 o = <u>0 p</u> t	0, s			35
			тс	TAL	SOLU		тѕ	106
			т	OTAL	BEN		S	506

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

355

1.43

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 1-2 - CHANNEL FTMT1					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Creek incision/erosion SR2, MSD 19, Q242, Q Erosion at Hickory Lane and Geyer and at Oak erosion - Q336.	2336 - 5 Valley	512 Hickor Drive and	y Lane and 5 Geyer and §	501 Oak Val garage threat	ley Drive. ened by
Strategy:	1) Install bank protection from station 3+70 to	8+30 (	460 LF)			
	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L)	LF	460	\$300	\$138,000	\$0
	Soft stabilization (L)	LF	460	\$200	\$0	\$92,000
	Geomorphic Study	Ea.	1	\$10,000	\$0 ¢120.000	\$10,000
	Subtotal				\$138,000	\$102,000
	Total				\$138,000	\$102,000
	Utility Relocation			20%	\$27,600	\$20,400
	Clearing			5%	\$6,900	\$5,100
	Mobilization			4%	\$5,520	\$4,080
	Total with Percent Allowances				\$178,020	\$131,580
	Contingency			25%	\$44,505	\$32,895
	Probable Construction Cost Estimate				\$222,525	\$164,475
	Design Engineering and Geotechnical			30%	\$66,758	\$49,343
	Total Conceptual Cost Estimate				\$290,000	\$214,000
	Benefit Points Benefit/Cost Ratio				94 0.32	254 1.19
<b>Additional Comments:</b>						

PROJECT NAME: Figure 1-2 Channel FTMT1, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infree (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	Ъ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	ш. 		Yard Flooding (1 per lot) Address:	10		5		0		
	 	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	1		1				
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Geyer	35		25		6	2	12
			Address: Near Oakvalley and Near Hickory Residential Road: Hickory Address: 512 Hickory	20		12	1	3		12

PROJECT NAME: Figure 1-2 Channel FTMT1, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	DINIC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
ER / OVERL	=LO(	Attached Garage (1 lot per structure)	100		75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Į					<u> </u>
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System		yrs pts)	26-5 (15	0 yrs <25 pts) (0		ō yrs pts)	
		Points for Age		· ·					
			тот		OBLE		DINTS		24

PROJECT NAME: Figure 1-2 Channel FTMT1, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
ΙΑLITY		Bioswales		PER 1	00 LF	10		
RQL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
N /		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	10	PER 1	00 LF	10		100
RONM		Riffle Pool Complex	5	PER 1	00 LF	10		50
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	of Implementation (No. of Easements)		(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements	2					20
	5.2.	Recreational/Educational	Ye	es = 100 o = 0 pt	), s	YES		10
			тс		SOLU		TS	230
			Т	OTAL	BEN		S	254

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.19

Place "X" in one box below:

MSD Project Project by Others



Project Name:	FIGURE	1-3 OVERLA	ND FLOW					
Solutions By:	EDM INC	2		DATE:	10/18/2013			
~								
Problem:	Yard pon	ding at O402 -	725 Timber Ti	rail				
Strategy:	1) Install inlet and pipe system to collect water. Attach to existing system.							
	rain garde	en to infiltrate	runoff and prot	ect natural channels.				
	8		F	1) Alternative 1	2) Alternative 1			
Description	Unit	Ouantity	Unit Cost	Without BMP's	With BMP's			
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500			
12" RCP CLASS III	LF	40	\$116	\$4,642	\$4,642			
Rain Garden	EA	1	\$10,000	\$0	\$10,000			
Subtotal				\$8,142	\$18,142			
Total Benefit Points				30	35			
Individual Benefit Point Ratio	0			1.76	0.92			
Estimated Increased Dreneut				\$0	\$2,000			
Esumated increased Property	y values	ding of 0.426	1600 30- 1'0	Uو د ا	<b>₽</b> 2,000			
Problem:	Y and pon	ding at Q436 -	1600 Wyncliff	Ln.				
strategy:	1) Install	met and pipe	system to colle	ci water. Replace unde	ersized existing			
	system. 2	2) Add rain gai	rden to infiltrate	e runoff and protect nat	tural channels.			
				1) Alternative 1	2) Alternative 1			
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's			
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250			
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850			
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150			
Manhole	EA	1	\$1,500	\$1,500	\$1,500			
12" RCP CLASS III	LF	17	\$116	\$1,973	\$1,973			
18" RCP CLASS III	LF	196	\$129	\$25,339	\$25,339			
21" RCP CLASS III	LF	302	\$137	\$41,341	\$41,341			
24" RCP CLASS III	LF	116	\$144	\$16,646	\$16,646			
27" RCP CLASS III	LF	257	\$150	\$38,578	\$38,578			
27" FES	EA	1	\$1,700	\$1,700	\$1,700			
Erosion Protection	LS	1	\$3,000	\$3,000	\$3,000			
Rain Garden	EA	1	\$10,000	\$0	\$10,000			
Subtotal				\$140,327	\$150,327			
Total Benefit Points				30	35			
Individual Benefit Point Ratio	0			0.10	0.11			
<b>Estimated Increased Property</b>	y Values			\$0	\$2,000			
Problem:	Yard pon	ding at Q434 -	1521 Woodga	te Dr. and Q432 - 1509	Woodgate Dr.			
Strategy:	1) Install	inlet and pipe	system to colle	ct water. Regrade swa	le by asphalt path and			
	direct tow	ards new inlet	t. Add Rain Ga	urdens to infiltrate runo	ff and protect natural			
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1			
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750			
12" RCP CLASS III	LF	181	\$116	\$21.007	\$21.007			
6" PVC	LF	61	\$24	\$1,464	\$1,464			
Trench Drain	LF	28	\$100	\$2,800	\$2,800			
Grading along ashalt path	LF	152	\$20	\$3,040	\$3,040			
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000			
Subtotal				\$40,061	\$40.061			
Total Benefit Points				45	45			
Individual Benefit Point Ratio	0			0.54	0.54			
Estimated Increased Property	y Values			\$5,000	\$5,000			
Total				\$188,530	\$208,530			

Utility Relocation	20%	\$37,706	\$41,706
Clearing	5%	\$9,427	\$10,427
Mobilization	4%	\$7,541	\$8,341
Total with Percent Allowances		\$243,204	\$269,004
Contingency	25%	\$60,801	\$67,251
Probable Construction Cost Estimate		\$304,005	\$336,255
Design Engineering and Geotechnical	30%	\$91,201	\$100,876
Total Conceptual Cost Estimate		\$396,000	\$438,000
Total Benefit Points		160	180
Total Benefit Point Ratio		0.40	0.41
Additional Comments:			

PROJECT NAME: Figure 1-3 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ВV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOODIN		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 1-3 with BMP's

DATE: 10/18/2013

				onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
MO1-	(1)	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	DINO	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
ERL∕	L00	Attached Garage (1 lot per structure) Address:	100	0	75		25		
R / OVE	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWE		Yard Flooding (1 per lot) Address: Q402-725 Timber Trail; Q436-Wyncliff; Q434- 1521 Woodgate; Q432-1509 Woodgate	10	4	6		0		40
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) <i>Address:</i>	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE	M PO	INTS		40

PROJECT NAME: Figure 1-3 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1.5	PER 1	100 LF	10		15
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
∧ _		Wetlands		A	C	C 50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, s			15
			тс	TAL	SOLU		тѕ	140
			т	OTAL	BEN		s	180

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

438

0.41

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others



Project Name:	FIGURE	2-1 OVERLA	ND FLOW						
Solutions By:	EDM IN	C.		DATE: 10/18/2013					
-									
Problem:	Yard pon	Yard ponding at Q266 - 645 Hickory Ln.							
Strategy:	1) Remov	ve existing tre	nch drain and ir	nstall berm to direct wa	ter towards existing				
	inlet. 2)	Add Bioswale	to infiltrate rur	noff and protect natural	channels.				
				1) Alternative 1	2) Alternative 1				
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's				
New Berm	LF	118	\$25	\$2,950	\$2,950				
Regrade Yard	LS	1	\$2,000	\$2,000	\$2,000				
Bioswale	LF	115	\$90	\$0	\$10,350				
Subtotal				\$4,950	\$15,300				
Total Benefit Points				30	42				
Individual Benefit Point	Ratio			2.89	1.29				
Estimated Increased Pro	perty Values			\$2,000	\$3,000				
Problem:	Yard pon	ding at Q435	- 1637 Woodga	te Dr., Q413 - 727 Twi	in Fawn Dr., Q345 -				
	700 Oak	Valley Dr., Q	346 - 668 Oak V	Valley Dr., and FR8 - 1	701 Butter Nut Dr.				
Strategy:	1) Install	berm to catch	overland flow	and direct to inlet and	pipe system. Place				
80	inlets at t	wo exisitng si	nk holes and pi	pe downstream. 2) Ad	d Bioswale and Rain				
	Gardens	to infiltrate ru	noff and protect	t natural channels.					
			F	1) Alternative 1	2) Alternative 1				
Description	Unit	Ouantity	Unit Cost	Without BMP's	With BMP's				
Single Area Inlet	EA	10	\$1.750	\$17.500	\$17.500				
Manhole	EA	1	\$1.500	\$1.500	\$1.500				
12" RCP CLASS III	LF	24	\$116	\$2.785	\$2.785				
15" RCP CLASS III	LF	267	\$124	\$33,183	\$33,183				
18" RCP CLASS III	LF	282	\$129	\$36.457	\$36.457				
21" RCP CLASS III	LF	235	\$137	\$32,169	\$32,169				
24" RCP CLASS III	LF	39	\$144	\$5.597	\$5.597				
27" RCP CLASS III	LF	1132	\$150	\$169.925	\$169.925				
30" RCP CLASS III	LF	122	\$163	\$19,915	\$19,915				
21" FES	EA	1	\$1.500	\$1.500	\$1.500				
30" FES	EA	1	\$1.900	\$1.900	\$1.900				
Junction Chamber	LS	1	\$15.000	\$15,000	\$15.000				
Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000				
Asphalt	SY	1380	\$65	\$89.700	\$89.700				
Rain Garden	ĒA	6	\$10.000	\$0	\$60.000				
		~	+,	T ~	+ ,				
Subtotal				\$432,131	\$492,131				
Total Benefit Points				75	105				
Individual Benefit Point	Ratio			0.08	0.10				
Estimated Increased Pro	perty Values			\$26,000	\$32,000				
		·							
Total				\$437,081	\$507,431				

Additional Comments:			
Total Benefit Point Ratio		0.15	0.19
Total Benefit Points		135	202
Total Conceptual Cost Estimate		\$917,000	\$1,064,000
Design Engineering and Geotechnical	30%	\$211,438	\$245,470
Probable Construction Cost Estimate		\$704,792	\$818,232
Contingency	25%	\$140,958	\$163,646
Total with Percent Allowances		\$563,834	\$654,585
Mobilization	4%	\$17,483	\$20,297
Clearing	5%	\$21,854	\$25,372
Utility Relocation	20%	\$87,416	\$101,486

PROJECT NAME: Figure 2-1 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ЮV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	<u>-</u>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ë.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 2-1 with BMP's

DATE: 10/18/2013

				onic 2-Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
LOW		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
ND F	DNIC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	//N	Ν		
RLAI	00	Attached Garage (1 lot per structure) Address:	100	0	75		25		
( OVEI	2.1. FL	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
A SEWER		Yard Flooding (1 per lot) Address: Q266-645 Hickory; Q435-1637 Woodgate; Q413- 727 Twin Fawn; Q345-700 Oak Valley; Q346-668 Oak Valley; FR8-1701 Butter Nut	10	6	6		0		60
rorn		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 SI		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	ts/lot:	10	
	2.4.	.4. Age of Existing System		yrs pts)	26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age							15
			тот	AL PR	OBLE		INTS		75

PROJECT NAME: Figure 2-1 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	4.15	PER 1	100 LF	10		42
R QL		Forebays		А	C	200		
ATEI		Wet Ponds		А	C	100		
M -		Wetlands		A	C	C 50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye	es = 100 b = 0 pt	0, s			25
			тс	TAL	SOLU		TS	127
			т	OTAL	BEN	EFIT POINT	S	202

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1064

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.19

Place "X" in one box below:

MSD Project
Project by Others
Project Name:
---------------
Solutions By:
Problem:
Strategy:

Additional Comments:

# PROJECT NAME: Figure 2-1 Channel FTMT5 and Two Mile Creek , Alternate 2

				Chro (<=2 Floor	onic 2-Yr) ding	Freq (>2<= Floo	juent 15-Yr) oding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	н. Н.		Yard Flooding (1 per lot) Address: 10 Shepherd Woods Drive, 709 Laurel Oaks Drive	10	2	5		0		20
	-	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		•					
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	-	10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address: 10 Shepherd Woods Drive	20	1	12		3		20

# PROJECT NAME: Figure 2-1 Channel FTMT5 and Two Mile Creek , Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floor	onic 2-Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
FLOW	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIDC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem Y	′/N			
ERL	ĽŐ	Attached Garage (1 lot per structure)	100		75		25		
R / OVI	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
SEWE		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Į					
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	. Yard Erosion (1 per lot) Address:		Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	o yrs ots)	
		Points for Age							
			тот	AL PR			INTS		40

#### PROJECT NAME: Figure 2-1 Channel FTMT5 and Two Mile Creek , Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	Ν	Io. Unit	6	Points per	Unit	
IALITY		Bioswales		PER 1	00 LF	10		
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	С	100		
N /		Wetlands		A	С	50		
ENTAL		Biostabilization of banks (per bank)	11	PER 1	00 LF	10		110
NNOF		Riffle Pool Complex	6	PER 1	00 LF	10		60
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						20
	5.2.	Recreational/Educational	Ye n	es = 100 o = 0 pt	), s	Yes		10
			т		SOLU		TS	250
			Т	OTAL	BEN		s	290

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.30

Place "X" in one box below:

MSD Project Project by Others



CITY OF FRONTENAC CONCEPTUAL SOLUTIONS

Project Name:	FIGURE	2-2 OVERLA	AND FLOW					
Solutions By:	EDM IN	C.		DATE:	10/18/2013			
Problem:	Yard and	driveway por	nding at Q207	7 - 6 Geyer Wood Ln.	and yard ponding at			
	Q315 - 19	915 N. Geyer	Rd.					
Strategy:	1) Install	inlet and pipe	e system. Rej	place undersized storn	nwater system 2) Add			
	Rain Gar	den to infiltra	te runoff and	protect natural channel	els.			
				1) Alternative 1	2) Alternative 1			
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's			
Single Inlet	EA 5 \$1,850 \$9,250 \$9,25							
12" RCP CLASS III	LF	83	\$116	\$9,633	\$9,633			
15" RCP CLASS III	LF	86	\$124	\$10,688	\$10,688			
Rain Garden	EA	1	\$10,000	\$0	\$10,000			
Subtotal				\$29,571	\$39,571			
Total Benefit Points				40	45			
Individual Benefit Point Rati	0			0.65	0.54			
<b>Estimated Increased Propert</b>	y Values			\$4,000	\$6,000			
Problem:	Yard eros	sion at Q274 ·	- 541 High M	eadow Rd.				
Strategy:	1) Install	berm to catch	n overland flo	w and direct to inlet a	nd pipe system. 2)			
	Add Bios	wale to infilt	rate runoff an	d protect natural chan	nels.			
				1) Alternative 1	2) Alternative 1			
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's			
Yard Drain	EA	2	\$500	\$1,000	\$1,000			
6" PVC	LF	263	\$24	\$6,312	\$6,312			
Bioswale	LF	149	\$90	\$0	\$13,410			
Subtotal				\$7,312	\$20,722			
Total Benefit Points				30	45			
Individual Benefit Point Rati	0			1.96	1.03			
<b>Estimated Increased Propert</b>	y Values			<u>\$0</u>	\$0			

Problem:	Yard pon	ding at O327	- 2026 North	Gever Rd. , 0326 - 20	016 North Geyer Rd.,
	Q325 - 21	06 North Ge	yer Rd., Q31'	7 - 1960 North Geyer	Rd., and Q210 - 5
	Geyer Wo	ood Ln. Yard	l erosion at Q	326 - 2016 North Gey	er Rd.
Strategy:	1) Install	berms to cate	h overland fl	ow and direct to inlet	and pipe system. 2)
	Add Bios	wale to infilt	rate runoff an	d protect natural chan	nels.
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Area Inlet	EA	18	\$1,750	\$31,500	\$31,500
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	705	\$116	\$81,822	\$81,822
15" RCP CLASS III	LF	89	\$124	\$11,061	\$11,061
18" RCP CLASS III	LF	252	\$129	\$32,579	\$32,579
21" RCP CLASS III	LF	171	\$137	\$23,408	\$23,408
24" RCP CLASS III	LF	887	\$144	\$127,285	\$127,285
2/" RCP CLASS III	LF	42	\$150	\$6,305	\$6,305
New Berm		1232	\$25	\$30,800	\$30,800
Grading		1	\$30,000	\$30,000	\$30,000
Juntion Chamber		1	\$15,000	\$15,000	\$15,000
Asphalt Pavement (IBR&R)	51	124	ቅር/ \$10,000	\$0,5U8	\$8,508 \$10,000
Rain Garden	EA	l 1195	\$10,000	\$0 \$0	\$10,000
Bioswale	LF	1185	\$90	<b>\$</b> 0	\$100,030
Subtotal				\$300 567	\$516 217
Total Banafit Points				¢399,307 60	\$310,217 154
Individual Banafit Point Patic				0.07	134
Estimated Increased Property	, 7 Vəluec			\$10,000	\$12,000
Estimated increased i toperty	values			\$10,000	<i><b>µ12,000</b></i>
Total				\$436,450	\$576,510
Problem:	Yard pon	ding and eros	ion at Q329 -	2124 North Geyer Ro	1.
Problem: Strategy:	Yard pon 1) Install	ding and eros	ion at Q329 - system. Cor	2124 North Geyer Ro nnect to existing syste	l. m 2) Add Rain
Problem: Strategy:	Yard pon 1) Install	ding and eros inlet and pipe	ion at Q329 - e system. Cor	2124 North Geyer Ro nnect to existing syste 1) Alternative 1	<ul> <li>h.</li> <li>m 2) Add Rain</li> <li>2) Alternative 1</li> </ul>
Problem: Strategy: Description	Yard pon- 1) Install <b>Unit</b>	ding and eros inlet and pipe Quantity	ion at Q329 - e system. Cor <b>Unit Cost</b>	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's	l. m 2) Add Rain <b>2) Alternative 1</b> <b>With BMP's</b>
Problem: Strategy: Description Single Area Inlet	Yard pon- 1) Install Unit EA	ding and eros inlet and pipe <b>Quantity</b> 1	ion at Q329 - e system. Cor <b>Unit Cost</b> \$1,750	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's \$1,750	l. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750
Problem: Strategy: Description Single Area Inlet Manhole	Yard pone 1) Install Unit EA EA	ding and eros inlet and pipe <b>Quantity</b> 1 1	ion at Q329 - e system. Con <b>Unit Cost</b> \$1,750 \$1,500	2124 North Geyer Ro mect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500	<ul> <li>dd Rain</li> <li>2) Add Rain</li> <li>2) Alternative 1</li> <li>With BMP's</li> <li>\$1,750</li> <li>\$1,500</li> </ul>
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III	Yard pone 1) Install Unit EA EA LF	ding and eros inlet and pipe <b>Quantity</b> 1 1 186	ion at Q329 - e system. Con <b>Unit Cost</b> \$1,750 \$1,500 \$116	2124 North Geyer Ro nect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587	<ul> <li>dd Rain</li> <li>2) Add Rain</li> <li>2) Alternative 1</li> <li>With BMP's</li> <li>\$1,750</li> <li>\$1,500</li> <li>\$21,587</li> </ul>
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden	Yard pon- 1) Install Unit EA EA LF EA	ding and eros inlet and pipe <b>Quantity</b> 1 186 1	ion at Q329 - e system. Con <b>Unit Cost</b> \$1,750 \$1,500 \$116 \$10,000	2124 North Geyer Ro nect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0	<ul> <li>a.</li> <li>m 2) Add Rain</li> <li>2) Alternative 1</li> <li>With BMP's</li> <li>\$1,750</li> <li>\$1,500</li> <li>\$21,587</li> <li>\$10,000</li> </ul>
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden	Yard pone 1) Install Unit EA EA LF EA	ding and eros inlet and pipe <b>Quantity</b> 1 1 186 1	ion at Q329 - e system. Con <b>Unit Cost</b> \$1,750 \$1,500 \$116 \$10,000	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0	<ul> <li>a. 2) Add Rain</li> <li>2) Alternative 1</li> <li>With BMP's</li> <li>\$1,750</li> <li>\$1,500</li> <li>\$21,587</li> <li>\$10,000</li> </ul>
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal	Yard pone 1) Install Unit EA EA LF EA	ding and eros inlet and pipe <b>Quantity</b> 1 1 186 1	ion at Q329 - e system. Con <b>Unit Cost</b> \$1,750 \$1,500 \$116 \$10,000	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points	Yard pone 1) Install Unit EA EA LF EA	ding and eros inlet and pipe <b>Quantity</b> 1 186 1	ion at Q329 - e system. Con <b>Unit Cost</b> \$1,750 \$1,500 \$116 \$10,000	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837 330	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio	Yard pon 1) Install Unit EA EA LF EA	ding and eros inlet and pipe <b>Quantity</b> 1 186 1	ion at Q329 - e system. Con <b>Unit Cost</b> \$1,750 \$11,500 \$116 \$10,000	2124 North Geyer Ro nect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837 330 6.34 \$0 \$200	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property	Yard pone 1) Install Unit EA EA LF EA Values	ding and eros inlet and pipe <b>Quantity</b> 1 186 1	ion at Q329 - system. Con <b>Unit Cost</b> \$1,750 \$1,500 \$116 \$10,000	2124 North Geyer Ro nect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837 330 6.34 \$8,000	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property	Yard pon 1) Install Unit EA EA LF EA Values	ding and eros inlet and pipe <b>Quantity</b> 1 1 186 1	ion at Q329 - system. Con Unit Cost \$1,750 \$1,500 \$116 \$10,000	2124 North Geyer Ro nect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837 330 6.34 \$8,000	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000 \$115 202
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ration Estimated Increased Property Utility Relocation	Yard pon 1) Install Unit EA EA LF EA Values	ding and eros inlet and pipe <b>Quantity</b> 1 1 186 1	ion at Q329 - system. Con Unit Cost \$1,750 \$1,500 \$116 \$10,000 20% 5%	2124 North Geyer Ro nect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837 330 6.34 \$8,000 \$87,290 \$21,823	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000 \$115,302 \$28,826
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property Utility Relocation Clearing Mobilization	Yard pon 1) Install Unit EA EA LF EA Y Values	ding and eros inlet and pipe <b>Quantity</b> 1 1 186 1	ion at Q329 - system. Con Unit Cost \$1,750 \$1,500 \$116 \$10,000 20% 5% 4%	2124 North Geyer Ro mect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837 330 6.34 \$8,000 \$87,290 \$21,823 \$17,458	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000 \$115,302 \$28,826 \$23,060
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property Utility Relocation Clearing Mobilization	Yard pon 1) Install Unit EA EA LF EA 7 Values	ding and eros inlet and pipe Quantity 1 1 186 1	ion at Q329 - e system. Con Unit Cost \$1,750 \$1,500 \$116 \$10,000 20% 5% 4%	2124 North Geyer Ro nect to existing syster 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 \$24,837 330 6.34 \$8,000 \$87,290 \$21,823 \$17,458	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000 \$115,302 \$28,826 \$23,060
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property Utility Relocation Clearing Mobilization Total with Percent Allowance	Yard pon 1) Install Unit EA EA LF EA 7 Values	ding and eros inlet and pipe <b>Quantity</b> 1 186 1	ion at Q329 - e system. Con Unit Cost \$1,750 \$1,500 \$116 \$10,000 20% 5% 4%	2124 North Geyer Ro nuect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 <b>\$24,837</b> <b>330</b> <b>6.34</b> <b>\$8,000</b> \$87,290 \$21,823 \$17,458 <b>\$563,021</b>	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000 \$115,302 \$28,826 \$23,060 \$743,698
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property Utility Relocation Clearing Mobilization Total with Percent Allowance Contingency	Yard pon 1) Install Unit EA LF EA Values s	ding and eros inlet and pipe <b>Quantity</b> 1 186 1	ion at Q329 - e system. Con Unit Cost \$1,750 \$1,500 \$116 \$10,000 20% 5% 4% 25%	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 <b>\$24,837</b> <b>330</b> <b>6.34</b> <b>\$8,000</b> \$87,290 \$21,823 \$17,458 <b>\$563,021</b> \$140,755	<ul> <li>i.</li> <li>m 2) Add Rain</li> <li>2) Alternative 1</li> <li>With BMP's</li> <li>\$1,750</li> <li>\$1,500</li> <li>\$21,587</li> <li>\$10,000</li> <li>\$34,837</li> <li>335</li> <li>4.59</li> <li>\$10,000</li> <li>\$115,302</li> <li>\$28,826</li> <li>\$23,060</li> <li>\$743,698</li> <li>\$185,925</li> </ul>
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property Utility Relocation Clearing Mobilization Total with Percent Allowance Contingency Probable Construction Cost E	Yard pond 1) Install Unit EA LF EA Values s S S S	ding and eros inlet and pipe <b>Quantity</b> 1 186 1	ion at Q329 - e system. Con Unit Cost \$1,750 \$1,500 \$116 \$10,000 20% 5% 4% 25%	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 <b>\$24,837</b> <b>330</b> <b>6.34</b> <b>\$8,000</b> \$87,290 \$21,823 \$17,458 <b>\$563,021</b> \$140,755 <b>\$703,776</b>	<ul> <li>i. m 2) Add Rain</li> <li>2) Alternative 1</li> <li>With BMP's</li> <li>\$1,750</li> <li>\$1,500</li> <li>\$21,587</li> <li>\$10,000</li> <li>\$34,837</li> <li>335</li> <li>4.59</li> <li>\$10,000</li> <li>\$115,302</li> <li>\$28,826</li> <li>\$23,060</li> <li>\$743,698</li> <li>\$185,925</li> <li>\$929,623</li> </ul>
Problem: Strategy: Description Single Area Inlet Manhole 12" RCP CLASS III Rain Garden Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property Utility Relocation Clearing Mobilization Total with Percent Allowance Contingency Probable Construction Cost F Design Engineering and Geotec	Yard pond 1) Install Unit EA EA LF EA Values v Values s Estimate	ding and eros inlet and pipe Quantity 1 186 1	ion at Q329 - e system. Con Unit Cost \$1,750 \$11,500 \$116 \$10,000 20% 5% 4% 25% 30%	2124 North Geyer Ro nnect to existing syste 1) Alternative 1 Without BMP's \$1,750 \$1,500 \$21,587 \$0 <b>\$24,837</b> <b>330</b> <b>6.34</b> <b>\$8,000</b> \$87,290 \$21,823 \$17,458 <b>\$563,021</b> \$140,755 <b>\$703,776</b> \$211,133	i. m 2) Add Rain 2) Alternative 1 With BMP's \$1,750 \$1,500 \$21,587 \$10,000 \$34,837 335 4.59 \$10,000 \$115,302 \$28,826 \$23,060 \$743,698 \$185,925 \$929,623 \$278,887

Additional Comments:

PROJECT NAME: Figure 2-2 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ЮV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	<u>-</u>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	I						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш Ц	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 2-2 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
MO		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
) FL	DNG	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
ANI		Attached Garage (1 lot per structure)	100	0	75		25		
SEWER / OVERL	2.1. FL	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q207-6 Geyer Wood; Q315-1915 N. Geyer; Q327- 2026 N. Geyer; Q326-2016 N. Geyer; Q325-2106 N. Geyer; Q317-1960 N. Geyer; Q210-5 Geyer Wood	10	8	6		0		80
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No. I	_ots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q274-541 High Meadow; Q326-2016 N. Geyer; Q329- 2124NGeyer	No. I	Lots:	3	Point	s/lot:	10	30
	2.4.	Age of Existing System	>50 (30	yrs ots)	26-5 (15	0 yrs pts)	<25 (0	o yrs ots)	
		Points for Age							0
			тот	AL PR	OBLE		INTS		110

PROJECT NAME: Figure 2-2 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	3	Points per Add'l Proj.:	50	150
	4.1. Addresses pollutants:					Points per	Unit	
IALITY		Bioswales*	11.85	PER 1	100 LF	10		119
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	C	100		
N /		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, s			50
			тс	TAL	SOLU		тѕ	319
			т		BEN		S	429

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1209

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.35

Place "X" in one box below:



Project Name: Solutions By:	FIGURE EDM INC	2-2 OVERLA 2.	AND FLOW :	STRUCTURAL FLO DATE:	DDING 10/18/2013
Problem:	Yard pon Deteriora Woods R	ding and base ted wood tie d.	ement floodin wall upstream	g at Q268 - 522 High a of the culvert at the c	Meadow Ln. entrance of Shephero
Strategy:	1) Install Replace u and prote wall and i	berm to catch indersized sto ct natural cha install a new	h overland flo ormwater syst annels.Replace guardrail.	w and direct to inlet a em. 2) Add Bioswald e the existing tie wall	nd pipe system. e to infiltrate runoff with new concrete
				1) Alternative 1	2) Alternative 1
Description Vand Darin	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Y and Drain	EA	4	\$500	\$2,000	\$2,000
Contrain Connection	EA	3 104	\$200	\$000 \$2.406	\$000 \$2.406
		104	Φ24 \$15	\$2,490	\$2,490
		120	Φ43 Φ47	\$5,240 \$6,062	\$3,240 \$6,062
IZ PVC		129	ቅ47 ድጋታ	\$0,003 \$1,750	\$0,005 \$1,750
		70	\$25 \$45	\$1,750 \$4,005	\$1,730 \$4,005
Slock Wall Provide Erection Protection	F2F	91 1	343 \$2.000	\$4,093 \$2,000	\$4,095 \$2,000
-iovide Erosion Protection		1	\$3,000 #17	\$3,000	\$3,000
Regrade Lawn	SY	70	\$15	\$1,050	\$1,050
310swale	LF	172	\$90	\$0	\$15,480
Reinforced Concrete	CY	15	\$800	\$12,000	\$12,000
Juardrail	LF	100	\$25	\$2,500	\$2,500
Landscaping	LS	1	5,500	\$5,500	\$5,500
Subtotal				\$44,294	\$59,774
Total Benefit Points				335	350
ndividual Benefit Point Ratio				3.61	2.79
Estimated Increased Property	Values			\$7,000	\$8,000
Problem:	Yard pon	ding and base	ement/garage	flooding at Q329 - 21	24 North Geyer Rd
Strategy:	1) Install	inlet and pipe	e system. Co	nnect to existing syste 1) Alternative 1	<ul><li>m 2) Add Rain</li><li>2) Alternative 1</li></ul>
Description 🦳 🌈		Quentity	Unit Cost	Without BMP's	With BMP's
Single Area Inlet			\$1,750		\$1,750
Manhole			\$1,500	\$1.500	\$1,500
		186	\$116	\$21 587	\$21 587
Rain Garden	EA	100	\$10.000	\$0	\$10.000
Subtotal		B		\$24,801	\$34,837
Fotal Benefit Points		-0/00	5/-31		335
Individual Benefit Point Ratio				6.34	4.59
<b>Estimated Increased Property</b>	Values			\$8,000	\$10,000
Problem:	Yard pon	ding and base	ement floodin	g at Q318-2001 North	Geyer Rd. and yar
Strategy:	1) Install	inlet and pipe	e system. Con	nnect to existing syste	m 2) Add Rain
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative
Single Inlet			\$1,850		\$3,700
24" FES		ושווי	\$1,600	\$1.600	\$1,600
Flood protection (2009 Noticyca		υU <sub>1</sub> L	<b>360,00</b> 0		\$60,000
Asphalt Pavement (TBR&R)	SY	20	\$67	\$1,340	\$1,340
Subtotal				\$91,466	\$91,466
Fotal Benefit Points				380	380
Individual Benefit Point Ratio				1.46	1.46
Estimated Increased Property	Values			\$0	<u>\$0</u>
				¢44.204	¢50.774
Fotal				544 /94	NNY / /4

Utility Relocation Clearing Mobilization	20% 5% 4%	\$8,859 \$2,215 \$1,772	\$11,955 \$2,989 \$2,391
Total with Percent Allowances		\$57,139	\$77,108
Contingency	25%	\$14,285	\$19,277
Probable Construction Cost Estimate		\$71,424	\$96,386
Design Engineering and Geotechnical	30%	\$21,427	\$28,916
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio		\$93,000 <mark>1,040</mark> 11.18	\$126,000 1,070 8.49

**Additional Comments:** 

PROJECT NAME: Figure 2-2 Structural with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address: 2009 North Geyer	200		100	1	15		100
			Attached Garage (1 lot per structure)	100		50		8		
	DN		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address:	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	rosion		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Е.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12	<u> </u>	3		

PROJECT NAME: Figure 2-2 Structural with BMP's

DATE: 10/18/2013

				onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350	0	250		65		
		Basement (1 lot per structure)* Address:Q268-522 High Meadow:Q329-2124 N. Geyer: Q318 - 2001 North Geyer Rd	250	3	200		50		750
FLOW	Ð	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND-		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	Y	50	50
ERL	FLO	Attached Garage (1 lot per structure)	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
N SEWI		Yard Flooding (1 per lot) Address: Q268-522 High Meadow; Q329-2124 N. Geyer; Q324-2009 N. Geyer, Q318 - 2001North Geyer	10	4	6		0		40
ORI		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street	50		35		6		
		Traffic obstruction (> 6" of water) on collector street	25		15		2		
		Traffic obstruction (> 6" of water) on residential street	10		6		1		
		Ponding (per ponding area) Address	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No. I	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No. I	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30 )	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	i yrs ots)	
		Points for Age				. /			0
			тот	AL PR	OBLE	EM PO	INTS		940

PROJECT NAME: Figure 2-2 Structural with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
ΙΑLITY		Bioswales*	2.01	PER 1	100 LF	10		20
R QL		Forebays		A	C	200		
ATEI	Wet Ponds					100		
M -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s			10
			тс	TAL	SOLU		тѕ	130
			т	OTAL	BEN		S	1070

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

126

8.49

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 2-2 CHANNEL - Two-Mile Cree	ж				
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Erosion along Two Mile Creek at Q324-20 Erosion along a Tributary to Two-Mile Cre	09 N. Gey ek at 2033	er Road and N. Geyer I	d Q318-2003 Road.	l N. Geyer F	Road.
Strategy:	1) Install bank protection on Two-Mile Cre Tributary to Two-Mile Creek from station 1	ek from sta +00 to 1+	ation 9+50 85 (85 LF)	to station 13	+32 (382 LI	F) and on a
	<b>Description</b>	Unit	Quantity	Unit Cost	<b>ALT 1</b> \$140,100	ALT 2
	Soft stabilization (L)	LF	467	\$300 \$200	\$140,100 \$0	\$93 400
	Geomorphic Study	Ea.	2	\$10,000	\$0	\$20,000
	Clean out creek	Ea.	1	\$10,000	\$10,000	\$10,000
	Subtotal				\$150,100	\$123,400
	Total				\$150,100	\$123,400
	Utility Relocation			20%	\$30,020	\$24,680
	Clearing			5%	\$7,505	\$6,170
	Mobilization			4%	\$6,004	\$4,936
	Total with Percent Allowances				\$193,629	\$159,186
	Contingency			25%	\$48,407	\$39,797
	Probable Construction Cost Estimate				\$242,036	\$198,983
	Design Engineering and Geotechnical			30%	\$72,611	\$59,695
	Total Conceptual Cost Estimate				\$315,000	\$259,000
	Benefit Points Benefit/Cost Ratio				165 0.52	255 0.98

#### **Additional Comments:**

PROJECT NAME: Figure 2-2 Channel - Two Mile Creek , Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address: 2009 N. Gever Boad	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	NG		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	т. -		Yard Flooding (1 per lot) Address: 2	10		5		0		
	÷.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
	-		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	ROISOR		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend	2	lots	1	10 poin	ts per lo	ot	20
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25	1	6		25
			Residential Road: Address:	20			1	3		

PROJECT NAME: Figure 2-2 Channel - Two Mile Creek , Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	vstem Y	′/N			
ER / OVERL		Attached Garage (1 lot per structure)	100		75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	. Age of Existing System		yrs pts)	3 26-50 ) (15 n		0 yrs <25 pts) (0		
		Points for Age							
			тот	AL PR	OBLE		INTS		45

PROJECT NAME: Figure 2-2 Channel - Two Mile Creek , Alternate 2

DATE: 10/18/2013

# CONTINUED:

r			1									
		SOLUTION CATEGORY										
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000					
REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100				
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit					
ΙΑLITY		Bioswales		PER 1	00 LF	10						
R QL		Forebays		A	C	200						
ATE		Wet Ponds		A	C	100						
M /		Wetlands		A	C 50		AC 50		.C 50			
ENTAL		Biostabilization of banks (per bank)	8	PER 1	00 LF	10		80				
NNOF		Riffle Pool Complex	4	PER 1	00 LF	10		40				
IN	4.2.	Eliminates combined sewer (per project)		E	A	100						
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10						
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)					
5.01		Points for Easements						20				
	5.2.	Recreational/Educational	Yes = 100, no = 0 pts YES									
			т	DTAL S	SOLU		rs	255				
			Т	OTAL	BEN		s	300				

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.16

Place "X" in one box below:

MSD Project Project by Others

Project Name:         FIGURE 2-2S         CHANNEL STRUCTURAL FLOODING - Two-Mile Creek								
Solutions By:	DATE:	10/18/2013						
Problem:	Creek floods basement at 1841 N. Geyer Road, Yard erosion at 200	1 Geyer						
Strategy:	1) Install flood protection at 1841 N. Geyer, and riprap swale at 200	)1 Geyer.						
		-						

<b>Description</b> Flood protection (1841 N. Geyer) Soft stabilization (S) <b>Subtotal</b>	Unit Ea. LF	Quantity 1 105	<b>Unit Cost</b> \$20,000 \$125	<b>ALT 1</b> \$20,000 \$13,125 \$33,125
Total				\$33,125
Utility Relocation Clearing Mobilization			20% 5% 4%	\$6,625 \$1,656 \$1,325
Total with Percent Allowances				\$42,731
Contingency			25%	\$10,683
Probable Construction Cost Estimate				\$53,414
Design Engineering and Geotechnical			30%	\$20,000
Total Conceptual Cost Estimate				\$74,000
Benefit Points Benefit/Cost Ratio				180 2.43

#### **Additional Comments:**

PROJECT NAME: Figure 2-2S Channel - Two Mile Creek , Alternate 1

				Chro (<=2 Floor	onic 2-Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infree (>1 Floo	quent 5-Yr) oding	nts
		_	PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address: 1841 N. Gever Road	200		100	1	15		100
			Attached Garage (1 lot per structure)	100		50		8		
	ЫG		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	н. Н		Yard Flooding (1 per lot) Address: 2009 N. Gever Road	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	1	1					
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
АM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
	_		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 2-2S Channel - Two Mile Creek , Alternate 1

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
ER / OVERLAND FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem Y	′/N			
		Attached Garage (1 lot per structure)	100		75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
S M S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: 2001 Gever	No.	Lots:	1	Point	ts/lot:	10	10
	2.4.	. Age of Existing System		yrs pts)	26-5 (15	-50 yrs <25 5 pts) (0		oyrs ots)	
		Points for Age	, ,		,		,		
			тот	AL PR		EM PO	INTS		110

PROJECT NAME: Figure 2-2S Channel - Two Mile Creek , Alternate 1

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1. Reduction of flowrate leaving site		% red of p flowr	uction eak ate :		Max points:	1000	
3 REGI	3.2.	Combines smaller projects into regional solution (see note)	No. A Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	N	lo. Unite	6	Points per	Unit	
ΙΑLITY		Bioswales		PER 1	00 LF	10		
R QL		Forebays		A	С	200		
ATE	Wet Ponds					100		
N / -		Wetlands		A	С	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
MNOF		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						20
	5.2.	Recreational/Educational	Y€ no	es = 100 o = 0 pt	), s	NO		
			тс		SOLU		rs	70
			т	OTAL	BEN		S	180

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.43

Place "X" in one box below:

MSD Project Project by Others



CITY OF FRONTENAC CONCEPTUAL SOLUTIONS

10/18/13



Project Name: Solutions By:	FIGURE EDM INC	FIGURE 3-1 OVERLAND FLOWEDM INC.DATE: 10/18/2013							
Problem:	Yard erosion and ponding at Q430 - 10 West Geyer Ln. and Q360 - 5 Portland Dr. and yard ponding at Q431-9 West Geyer Ln. and Q334-2709 N. Geyer Rd.								
Strategy:	1) Line e install ya overland	1) Line existing box culvert to prevent water from causing erosions at joints and install yard drains to fix yard ponding in the front yard. Install berm to catch overland flow and direct to inlet and pipe system. Replace undersized stormwater							
	system .	system . 2) Add Rain Gardens to infiltrate runoff and protect natur							
				1) Alternative 1	2) Alternative 1 With				
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's				
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850				
Single Area Inlet	EA	8	\$1,750	\$14,000	\$14,000				
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150				
Manhole	EA	2	\$1,500	\$3,000	\$3,000				
Large Diameter Manhole	EA	3	\$6,000	\$18,000	\$18,000				
Large Diameter Inlet	EA	2	\$6,000	\$12,000	\$12,000				
15" RCP CLASS III	LF	236	\$124	\$29,330	\$29,330				
18" RCP CLASS III	LF	220	\$129	\$28,442	\$28,442				
21" RCP CLASS III	LE	516	\$137	\$70,635	\$70,635				
24" RCP CLASS III	LF	38	\$144	\$5 453	\$5 453				
27" RCP CLASS III	LF	166	\$150	\$24.918	\$24 918				
33" RCP CLASS III	LI	364	\$174	\$63,493	\$63.493				
36" RCP CLASS III		521	\$186	\$96,927	\$96 927				
A2" RCP CLASS III		204	\$215	\$13,815	\$43.815				
42" KEI ELASS III 42" EES		1	\$2.600	\$2,600	\$2,600				
42 TES Vord Drain	EA	1	\$2,000	\$2,000	\$2,000				
		122	\$300	\$1,000	\$1,000				
2v2 Dox Culvert Liner		132	\$24 \$70	\$5,100	\$5,108				
Creding		94	\$70 \$10,000	\$0,580	\$0,380				
Name Dame		1	\$10,000	\$10,000	\$10,000				
New Berm		148	\$25	\$U #0	\$3,700				
Rain Garden	EA	3	\$10,000	\$0	\$30,000				
Erosion Protection	LS	I	\$30,000	\$30,000	\$30,000				
Subtotal				\$468,361	\$502,061				
Total Benefit Points				80	95				
Individual Benefit Point Ratio				0.08	0.09				
<b>Estimated Increased Property Va</b>	lues			\$21,000	\$28,000				
Problem:	Yard eros	sion at Q348	- 1 Outer Lad	lue Drive, (Q349)					
Strategy:	1) Regrad	le yard to exi	sting area inle	et. 2) Add Bioswale t	o infiltrate runoff and				
	protect na	atural channe	ls.						
	77			1) Alternative 1	2) Alternative 1 With				
Description	Irait	1 Juganisty	Uniteex	Withmilt Pener's	BMP's				
Regrade yard	1.35		\$4,000		\$4,000				
Bioswale		167	598		\$15,030				
Subtotal				\$4,000	\$19,030				
Total Benefit Points				30	47				
Individual Benefit Point Ratio				3.58	1.17				
Estimated Increased Property Va	lues			\$1,000	\$3,000				

Problem:	Y and ponding at Q231 - 2437 Hermitage Hills Ln. and Q233 - 2467 Hermitage							
_	Hills Ln.a	ind yard eros	ion at Q232 -2	2434 Hermitage Hills	Ln.			
Strategy:	1) Install	berm to catcl	n overland flo	w and direct to inlet a	nd pipe system. 2) Add			
	Bioswale	and Rain Ga	rdens to infilt	rate runoff and protec	t natural channels.			
		_		1) Alternative 1	2) Alternative 1 With			
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's			
New Berm	LF	583	\$25	\$14,575	\$14,575			
12" RCP CLASS III	LF	455	\$116	\$52,807	\$52,807			
15" RCP CLASS III	LF	277	\$124	\$34,426	\$34,426			
15" FES	EA	2	\$1,200	\$2,400	\$2,400			
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750			
Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000			
Bioswale	LF	458	\$90	\$0	\$41,220			
Rain Garden	EA	1	\$10,000	\$0	\$10,000			
Subtotal				\$117,958	\$169,178			
Total Benefit Points				50	101			
Individual Benefit Point Ratio				0.20	0.28			
<b>Estimated Increased Property Value</b>	es			\$12,000	\$14,000			
Total				\$586,319	\$671,239			
Utility Relocation			20%	\$117,264	\$134,248			
Clearing			5%	\$29,316	\$33,562			
Mobilization			4%	\$23,453	\$26,850			
Total with Percent Allowances				\$756,351	\$865,898			
Contingency			25%	\$189,088	\$216,474			
Probable Construction Cost Estimat	te			\$945,439	\$1,082,372			
Design Engineering and Geotechnical			30%	\$283,632	\$324,712			
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio				\$1,230,000 210 0.17	\$1,408,000 318 0.23			

**Additional Comments:** 

PROJECT NAME: Figure 3-1 with BMP's

			Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints	
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ВV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-1 with BMP's

DATE: 10/18/2013

				Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding	
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
Mo		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
SEWER / OVERLAND FLO	DNG	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	System Y/N		N		
	000	Attached Garage (1 lot per structure)	100	0	75		25		
	.1. FL	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
	5	Yard Flooding (1 per lot) Address: Q430-10 W. Geyer; Q360-5 Portland; Q431-9 W. Geyer; Q231-2437 Hermitage Hills; Q233-2467 Hermitage Hills; Q334-2709 North Geyer	10	6	6		0		60
ORM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q430-10 W. Geyer; Q360-5 Portland; Q348-1 Outer Ladue; Q232-2434 Hermitage Hills	No. Lots: 4 Poin		Point	s/lot:	10	40	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	i yrs ots)	
		Points for Age							0
			тоти	AL PR	OBLE	M PO	INTS		100

PROJECT NAME: Figure 3-1 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3 REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per		
IALITY		Bioswales*	8.25	PER 1	100 LF	10		83
R QL		Forebays		A	C	200		
ATE	Wet Ponds					100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			25
			тс	TAL	SOLU	TION POIN	TS	218
			т	OTAL	BEN	EFIT POINT	s	318

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.23

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	Figure 3-1 CHANNEL - FTMT2 and FTM2-2					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Channel incision/yard erosion SR-6, MSD-29, Hill Place, Q225, 2404 Hermitage Hill Lane Q2 11114 Hermitage Hill Road, 11201 Hermitage Lane	11115 230, 23 Hill Pl	Hermitage 607 N. Geye ace, 2412, 2	Hill Road Q er Road Q33 2434, 2450,	224, 11209 0, 11102, 1 2467 Hermi	Hermitage 1106, and tage Hill
Strategy:	1) Install bank protection on FTMT2 from stati (260 LF), station 42+30 to 44+00 (170 LF), an	on 32+ d on F	-50 to 36+0 ΓΜΤ 2-3 fr	0 (350 LF), om station 0	station 39+2 +00 to 5+85	20 to 41+80 5 (585 LF).
	<b>Description</b>	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Soft stabilization (L)		1,305	\$300	\$409,500 \$0	\$U \$273.000
	Geomorphic Study	Ea	4	\$10,000	\$0 \$0	\$40,000
	Subtotal	24		\$10,000	\$409,500	\$313,000
	Total				\$409,500	\$313,000
	Utility Relocation			20%	\$81,900	\$62,600
	Clearing			5%	\$20,475	\$15,650
	Mobilization			4%	\$16,380	\$12,520
	<b>Total with Percent Allowances</b>				\$528,255	\$403,770
	Contingency			25%	\$132,064	\$100,943
	Probable Construction Cost Estimate				\$660,319	\$504,713
	Design Engineering and Geotechnical			30%	\$198,096	\$151,414
	Total Conceptual Cost Estimate				\$859,000	\$657,000
	Benefit Points Benefit/Cost Ratio				555 0.65	1,035 1.58
Additional Comments:						

# PROJECT NAME: Figure 3-1 Channel FTMT2 and FTMT2-3, Alternate 2

	_			Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding	
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	1. FLOODII		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
	÷.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway		1					
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street	50		25		4		
ΕAM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-1 Channel FTMT2 and FTMT2-3, Alternate 2

DATE: 10/18/2013

			Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Pc
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
ER / OVERL		Attached Garage (1 lot per structure)	100		75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures		Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	s/lot:	10	
	2.4.	. Age of Existing System		yrs pts)	26-5 (15	0 yrs pts)	<25 (0	o yrs ots)	
		Points for Age	· · ·						
TOTAL PROBLEM POINTS									

PROJECT NAME: Figure 3-1 Channel FTMT2 and FTMT2-3, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	11	Points per Add'l Proj.:	50	550
	4.1.	Addresses pollutants:	Ν	Io. Unit	S	Points per	Unit	
ΙΑLITY		Bioswales		PER 1	00 LF	10		
R QU		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
<b>N</b> /		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	28	PER 1	00 LF	10		280
RONM		Riffle Pool Complex	14	PER 1	00 LF	10		140
INVI	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						5
	5.2.	Recreational/Educational	Ye n	es = 100 o = 0 pt	), s			60
			т	DTAL S	SOLU		rs	1035
			Т	OTAL	BEN		s	1035

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.58

Place "X" in one box below:

MSD Project Project by Others



CITY OF FRONTENAC CONCEPTUAL SOLUTIONS


Project Name:	FIGURE	3-2 OVERL	AND FLOW					
Solutions By:	EDM INC	2.		DATE:	10/18/2013			
e e								
Problem:	Yard eros	ion at Q158	- Countryside	Ln and yard ponding	at Q154 - 26			
	Countrys	ide Ln and va	rd flooding 2	3 Countryside from C	itv.			
Strategy:	1) Install inlets to existing system to collect water. Resized undersized storm							
	sewer nin	es.	8 ~ ) ~					
	sener pip	••••		1) Alternative 1	2) Alternative 1			
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's			
Yard Drain	EA	4	\$500	\$2.000	\$2,000			
6" PVC	LF	373	\$24	\$8.952	\$8,952			
Bioswale	LE	213	\$90	\$19,170	\$19,170			
Single Area Inlet	FA	215	\$1.750	\$3 500	\$3 500			
15" PCP CLASS III		130	\$124	\$16,156	\$16,156			
15 KCI CLASS III	LI	150	\$124	\$10,150	\$10,150			
Subtotal				\$19.656	\$19.656			
				<i>41,000</i>	<i>41,000</i>			
Total Benefit Points				50	50			
Individual Benefit Point Ratio	)			1.21	1.21			
Estimated Increased Property	/ Values			\$6,000	\$6,000			
Problem:	Yard pon	ding and eros	sion at Q149 -	- 16 Countryside Ln., (	Q163 - 11 Countryside			
Strategy:	1) Install	inlet and pipe	e system to co	ollect water. Divert wa	ater coming from			
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1			
Single Area Inlet	EA	6	\$1,750	\$10,500	\$10,500			
15" RCP CLASS III	LF	28	\$124	\$3,480	\$3,480			
18" RCP CLASS III	LF	187	\$129	\$24,175	\$24,175			
21" RCP CLASS III	LF	214	\$137	\$29,294	\$29,294			
42" RCP CLASS III	LF	346	\$215	\$74,314	\$74,314			
42" FES	EA	1	\$2,600	\$2,600	\$2,600			
Rain Garden	EA	6	\$10,000	\$0	\$60,000			
Subtotal				\$144,364	\$204,364			
Total Benefit Points				125	155			
Individual Benefit Point Ratio	)			0.41	0.36			
Estimated Increased Property	t Values			\$20,000	\$28,000			
Problem:	Storm wa	ter running d	own drivewa	y at Q234 - 11242 Her	mitage Hill Place			
Strategy:	1) Add in	let and pipe s	system to coll	ect water and connect	to existing storm			
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1			
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850			
12" RCP CLASS III	LF	80	\$116	\$9,285	\$9,285			
15" RCP CLASS III	LF	155	\$124	\$19,263	\$19,263			
Connect to existing culvert	LS	1	\$2,000	\$2,000	\$2,000			
				¢22.200	#22.200			
Subtotal				\$32,398	\$32,398			
Total Benefit Points				30	30			
Individual Benefit Point Ratio	)			0.44	0.44			
Estimated Increased Property	Values	tion at 10 Car	untrusida I co	\$2,000	\$2,000			
Strotogy.	1) Add ~	urb to divort y	unu y siue Lall	vent erosion				
ou allegy.	i) Auu cl		vator and prev	1) Alternativo 1	2) Alternativo 1			
Description	Unit	Quantity	Unit Cost	Without BMD's	With RMD's			
Description Proposed Cyrth			CIIII COSI	\$5 200	\$5 200			
rioposed Curb	LF	105	\$32	\$3,280	\$3,280			
Subtotal				\$5 200	¢5 700			
				ф3,20U 20	\$3,20U			
I otal Benefit Points				3U 2 71	3U 2 71			
Individual Benefit Point Ratio	) . Wal			2./1 ¢0	2./1 ¢0			
Esumated Increased Property	values			<u> </u>	<u>⊅0</u>			
Total				\$201,698	\$261,698			

Utility Relocation	20%	\$40,340	\$52,340
Clearing	5%	\$10,085	\$13,085
Mobilization	4%	\$8,068	\$10,468
Total with Percent Allowances		\$260,191	\$337,591
Contingency	25%	\$65,048	\$84,398
Probable Construction Cost Estimate		\$325,238	\$421,988
Design Engineering and Geotechnical	30%	\$97,571	\$126,596
Total Conceptual Cost Estimate		\$423,000	\$549,000
Total Benefit Points		340	400
Total Benefit Point Ratio		0.80	0.73

**Additional Comments:** 

PROJECT NAME: Figure 3-2 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	1	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш Ц	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-2 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
SEWER / OVERLAND FLOW		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	ВN	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	′/N	N		
		Attached Garage (1 lot per structure)	100	0	75		25		
	1. FLO	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
	Ň	Yard Flooding (1 per lot) Address: Q154-26 Countryside; Q149-16 Countryside; Q163-11 Countryside; Q155-42 Countryside; Q153-45 Countryside; 12&23 Countryside; 13 Countryside; Q234- 11242 Hermitage Hill	10	9	6		0		90
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q158-29 Countryside; Q149-16 Countryside; Q163-11 Countryside; Q155-42 Countryside; Q153-45 Countryside; 12 Countryside; 13 Countryside, 10 Countryside		Lots:	8	Point	s/lot:	10	80
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age		. ,				. ,	15
			тот	AL PR	OBLE	M PO	INTS		185

PROJECT NAME: Figure 3-2 with BMP's

DATE: 10/18/2013

### **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	3	Points per Add'l Proj.:	50	150
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	3	PER 1	100 LF	10		30
R QL		Forebays		A	C	C 200		
ATEI		Wet Ponds		A	C	; 100		
M -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	)0 LF 10		
IN	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						5
	5.2. Recreational/Educational			es = 10 o = 0 pt	0, s			30
			тс	TAL	SOLU		TS	215
			т	OTAL	BEN	EFIT POINT	S	400

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

549

0.73

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Duciant Name	FICUDE	2.2 OVEDI	AND EL OW	STDUCTUDAL FLO	ODINC
Froject Maine:	FIGURE	5-2 UVERL	AND FLOW	SIKUUIUKAL FLU	10/19/2012
Solutions By:	EDM INC	<i>.</i> .		DATE:	10/18/2013
Problem:	Basement	Flooding an	d street pondi	ing in front of Q152 -	43 Countryside Ln,
	yard pond	ling and eros	ion at Q157 -	14 Countryside Ln	
Strategy:	1) Install	inlet and pipe	e system to co	ollect water. Provide 3	3" overlay at Sisters of
	Mercy to	account for d	lownstream ri	se due to new strom s	ewer system 2) Add
	rain garde	en to infiltrate	e runoff and p	rotect natural channel	S.
			-	1) Alternative 1	2) Alternative 1
Description	Unit	Ouantity	Unit Cost	Without BMP's	With BMP's
Manhole	EA	1	\$1,500	\$1,500	\$1,500
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
12" RCP CLASS III	LF	222	\$116	\$25,765	\$25,765
15" RCP CLASS III	LF	100	\$124	\$12,428	\$12,428
24" RCP CLASS III	LF	113	\$144	\$16,216	\$16,216
42" RCP CLASS III	LF	273	\$215	\$58,635	\$58,635
42" FES	EA	1	\$2,600	\$2,600	\$2,600
3" Overlay at Sisters of Mercy	SY	250	\$25	\$6,250	\$6,250
Provide Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Subtotal				\$137,144	\$167,144
<b>Total Benefit Points</b>				285	300
Individual Benefit Point Ratio				0.99	0.86
Estimated Increased Property	Values			\$16,000	\$20,000
Total				\$137,144	\$167,144
Utility Relocation			20%	\$27,429	\$33,429
Clearing			5%	\$6,857	\$8,357
Mobilization			4%	\$5,486	\$6,686
Total with Percent Allowances				\$176,915	\$215,615
Contingency			25%	\$44,229	\$53,904
Probable Construction Cost Es	timate			\$221,144	\$269,519
Design Engineering and Geotech	nical		30%	\$66,343	\$80,856
Total Conceptual Cost Estimat Total Benefit Points Total Benefit Point Ratio	e			\$288,000 285 0.99	\$351,000 315 0.90

Additional Comments:

PROJECT NAME: Figure 3-2 Structural with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	SNIDOOL		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Е		Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISOS		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-2 Structural with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
FLOW		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q152-43 Countryside	250	1	200		50		250
	<u>U</u>	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	ODIN	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N				N		
ERL	FLO	Attached Garage (1 lot per structure) <i>Address:</i>	100	0	75		25		
R / OVI	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot) Address: Q157-14 Countryside	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
~		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Q152-43 Countryside	No. P	onds:	1	Points	/pond:	5	5
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q157-14 Countryside	No.	Lots:	1	Point	s/lot:	10	10
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age					``````````````````````````````````````		0
			тот	AL PR	OBLE				275

PROJECT NAME: Figure 3-2 Structural with BMP's

DATE: 10/18/2013

### **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1.5	PER 1	100 LF	10		15
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	C	2 100		
N -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 100 L		10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2. Recreational/Educational			es = 10 o = 0 pt	0, s			15
			тс	TAL	SOLU		TS	40
			т	OTAL	BEN		s	315

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

351

0.90

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name: Solutions By:	FIGURE 3-2 - STREAM CROSSING STRUCTURAL FLOODING DATE: 10/18/2013 EDM INC.											
Problem: Strategy:	roblem:Undersized culvert under Countryside Ln, basement flooding at Q163 - 11 Countryside Ln (Q156)trategy:1) Replace existing undersized twin 36" RCP with new 7'x4' double box culvert designed for 15 YR Storm - Non Diverted Flow. 2) Replace existing undersized twin 36" RCP with new 8'x5' double box culvert designed for 100 YR Storm - Non Diverted Flow. 3) Replace existing undersized twin 36" RCP with new 6'x3' double box culvert designed for 15 YR Storm - Diverted Flow. 4) Replace existing undersized twin 36" RCP with new 7x5 double box culvert designed for 100 YR Storm - Diverted Flow.											
Description	Unit	Quantity	Unit Cost	1) Alternative 1	1) Alternative 2	1) Alternative 3	1) Alternative 4					
Double 7'x4' box culvert (45 LF)	CY	210	\$600	\$126,000	\$0	\$0	\$0					
Double 8'x5' box culvert (45 LF)	CY	250	\$600	\$0	\$150,000	\$0	\$0 * 0					
Double 6'x3' box culvert (45 LF)	CY	190	\$600	\$0 \$0	\$0 \$0	\$114,000	\$0					
Double /'x5' box culvert (45 LF)	CY	230	\$600	\$0	\$0	\$0	\$138,000					
Restoration			\$25,000	\$25,000	\$25,000	\$25,000	\$25,000					
Associated Erosion Protection	LS	1	\$50,000	\$50,000	\$50,000	\$50,000	\$50,000					
Subtotal				\$201,000	\$225,000	\$189,000	\$213,000					
Total				\$201,000	\$225,000	\$189,000	\$213,000					
Utility Relocation			20%	\$40,200	\$45,000	\$37,800	\$42,600					
Clearing			5%	\$10,050	\$11,250	\$9,450	\$10,650					
Mobilization			4%	\$8,040	\$9,000	\$7,560	\$8,520					
Total with Percent Allowances				\$259,290	\$290,250	\$243,810	\$274,770					
Contingency			25%	\$64,823	\$72,563	\$60,953	\$68,693					
Probable Construction Cost Est	timate			\$324,113	\$362,813	\$304,763	\$343,463					
Design Engineering and Geotechn	nical		30%	\$97,234	\$108,844	\$91,429	\$103,039					
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio	ž			\$422,000 245 0.58	\$472,000 245 0.52	\$397,000 245 0.62	\$447,000 245 0.55					

**Additional Comments:** 

PROJECT NAME: Figure 3-2 STREAM CROSSING ALTERNATIVE 3 -15 YR

-	DIVERTED FLOW									
				Chro (<=2 Floo	onic ?-Yr) ding	Frec (>2<= Floc	luent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	nts
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address: Q163 - 11 Countryside Lane	200	1	100		15		200
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŊĊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOODII		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	- -		Yard Flooding (1 per lot)	10		5		0		
	÷.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway		l					
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street	50		25		4		
Δ			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE/			Address: Traffic obstruction (> 6" of water) on residential street Address:	10		5	1	1		5
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	OSION		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	ШШ	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

#### PROJECT NAME: Figure 3-2 STREAM CROSSING ALTERNATIVE 3 -15 YR

DATE: 10/18/2013

	1				_				
			Chro	onic V-Vr)	Frec	uent	Infre	quent 5-Vr)	~
			Floo	ding	Floo	oding	Floo	oding	ints
		PROBLEM CATEGORY, CONT.	ber ry	<i>0</i> 7	ry T	ω T	ber ry	8 T	al Po
			its p egoi	cted:	its p egoi	cted:	its p egoi	Lot: ctec	Tota
			Poir Cate	No. Affe	Poir Cate	No. Affe	Poir Cate	No. Affe	
		2.1.1. Structure Flooding							1
		Habitable 1st floor, residential: includes spaces with							
		mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
≥		Industrial, office, commercial and warehouse							
2		(1 lot per 2,500 sf of floor space flooded)*	300		200		50		
Ē	Q	Address:							
AND		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	//N	Ν		
ERL	ΓŌ	Attached Garage (1 lot per structure)	100	0	75		25		
2	<b>—</b> .	Misc. structures including patio/decks, pools, sheds, tennis							
WER / (	2.1	courts, detached garages, etc.(1 lot per structure)	50		35		12		
		Address:							
		Yard Flooding (1 per lot)	10	0	6		0		
SE		Address:		Ũ	Ŭ		Ů		
Σ		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway							
NO NO		Emergency Access restricted (s 12" water over only access							
Э <u>Т</u>		route to babitable structure) ots per structure	200		150		25		
õ		Address:	200		100		20		
N		Traffic obstruction (> 6" of water) on arterial street	50		05		_		
		Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street	25		15		2		
		Address:					_		
		I raffic obstruction (> 6" of water) on residential street	10		6		1		
		Ponding (per ponding area)		ondoi	4	Dointo	/nondu	E	F
		Address: Countryside	INO. P	onus.	1	Points	/pona.	5	5
	2.2.	Moderate Risk Erosion of misc. structures	No	l ots:		Point	s/lot	20	
		Address:	110.	Loto.		1 011	.0/101.	20	
	2.3.	Yard Erosion (1 per lot)	No.	Lots:	0	Point	s/lot:	10	
		Address:			-				
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	o yrs pts)	
		Points for Age			1	5			15
			тот		OBLE				225
									>

#### PROJECT NAME: Figure 3-2 STREAM CROSSING ALTERNATIVE 3 -15 YR

DATE: 10/18/2013

### **CONTINUED:**

		SOLUTION CATEGORY						
.0 DNAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0 PER 100 LF			10		
R QL		Forebays		А	C	200		
ATE		Wet Ponds		A	C	100		
ENTAL / W		Wetlands		A	C	50	50	
		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements	4					20
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, :s			
			тс	TAL	SOLU		TS	20
		TOTAL BENEFIT POINTS 24						

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

397

0.62

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 3-2 CHANNEL - FTMT2 and FTM	AT2-2				
Solutions By:	EDM INC.			DATE:	10/18/	2013
Problem:	Erosion Q228 - 11230 and 11242 Hermitage Lane; bank stabilization will be needed wher Countryside Lane), . Yard flooding and erosi Hermitage Hill Place, 15, 19, 20, 22 Country	Hill Plac culvert t on MSD side Lane	e, Q163-11 under Cour -6: 26 Portl e.	l Country Si htry Side is u and, Q369-2	de Lane and 8 psized (7 and 27Portland, 11	3 Foxrun 12 266
Strategy:	1) Install bank protection on FTMT2 from st LF), FTMT2-2 from station 5+50 to 14+70 (	ation 19+ 920 LF)	-00 to 23+0 and 60 feet	00 (400LF), 2 upstream of	24+50 to 30+: Portland Place	50 (600 ce.
	Description	Unit	Ouantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L)	LF	1,000	\$300	\$300,000	\$0
	Soft stabilization (L)	LF	1,000	\$200	\$0	\$200,000
	Hard stabilization (S)	LF	1120	\$225	\$252,000	\$0
	Soft stabilization (S)	LF	1120	\$125	\$0	\$140,000
	Bioswale	LF	150	\$90	\$0	\$13,500
Infrastructure	New Swale	LF	150	\$18	\$2,700	\$0
Infrastructure	New Asphalt Curb	LF	100	\$32	\$3,200	\$3,200
	Geomorphic Study	Ea.	4	\$10,000		\$40,000
	Subtotal				\$557,900	\$396,700
	Total				\$557,900	\$396,700
	Utility Relocation			20%	\$111,580	\$79,340
	Clearing			5%	\$27,895	\$19,835
	Mobilization			4%	\$22,316	\$15,868
	Total with Percent Allowances				\$719,691	\$511,743
	Contingency			25%	\$179,923	\$127,936
	Probable Construction Cost Estimate				\$899,614	\$639,679
	Design Engineering and Geotechnical			30%	\$269,884	\$191,904
	Total Conceptual Cost Estimate				\$1,170,000	\$832,000
	Benefit Points Benefit/Cost Ratio				650 0.56	1,320 1.59

**Additional Comments:** 

# PROJECT NAME: Figure 3-2 Channel FTMT2 and FTMT2-2, Alternate 2

					onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infree (>15 Floo	ints	
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	н. Н		Yard Flooding (1 per lot) 11266Hermitage Hill Place Address:15,19,20,22Countryside;26,27Portland	10	7	5		0		70
	-	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

# PROJECT NAME: Figure 3-2 Channel FTMT2 and FTMT2-2, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)* Address:	250		200		50		
D FLOW	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIDC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	vstem Y	//N			
ER / OVERL	FLOC	Attached Garage (1 lot per structure) Address:	100		75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWI		Yard Flooding (1 per lot) Address: 27Portland	10	1	6		0		10
RM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	I	<u> </u>		<u> </u>			
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:27 Portland	No. P	onds:	1	Points	/pond:	5	5
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) <i>Addre</i> .27Portland	No.	Lots:	1	Point	ts/lot:	10	10
	2.4.	4. Age of Existing System		yrs pts)	26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							
				AL PR	OBLE	EM PC	DINTS		95

PROJECT NAME: Figure 3-2 Channel FTMT2 and FTMT2-2, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	11	Points per Add'l Proj.:	50	550
	4.1.	Addresses pollutants:	N	lo. Units	6	Points per	Unit	
ΙΑLITY		Bioswales	1.5	PER 1	ER 100 LF			15
R QU		Forebays		A	С	200		
ATE		Wet Ponds		A	С	100		
ENTAL / W		Wetlands		A	С	50		
		Biostabilization of banks (per bank)	40	PER 1	00 LF	10		400
NNOF		Riffle Pool Complex	19	PER 1	00 LF	10		190
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1. Ease of Implementation (No. of Easements)				(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements				12		5
	5.2.	Recreational/Educational	Ye	es = 100 o = 0 pt	), s	Yes		65
			тс		SOLU		rs	1225
			т	OTAL	BEN		s	1320

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.59

Place "X" in one box below:

MSD Project Project by Others



Project Name:	FIGURE	3-3 OVERL	AND FLOW		
Solutions By:	EDM INC	Ζ.		DATE:	10/18/2013
·					
Problem:	Yard pon	ding at Q389	-401 Steeple	Chase Ln.	
Strategy:	1) Install	berm to catcl	n overland flo	w and direct to new ir	nlet and pipe system to
	collect wa	ater. Replace	undersized s	ystem. 2) Add bioswa	ale to infiltrate runoff
	and prote	ct natural cha	nnels.		
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
New Berm		354	\$25	\$8,850	\$8,850
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
Single Inlet	EA EA	0	\$1,850	\$U \$2,000	\$U \$2,000
	LE	2	\$1,500	\$3,000 \$24,827	\$5,000
12 KCP CLASS III		214	\$110 \$144	\$24,837 \$20,561	\$24,837 \$20,561
24 KCF CLASS III Pioswala		200	\$144 \$00	\$29,301	\$29,301
Bloswale	Lſ	339	\$90	<b>\$</b> 0	\$52,510
Subtotal				\$71.498	\$103 808
Total Benefit Points				45	\$103,000 <b>81</b>
Individual Benefit Point Ratio	0			0.30	0.37
Estimated Increased Property	v Values			\$2,000	\$4.000
Problem:	Yard pon	ding at O385	-440 Steeple	Chase Ln.	<i>φ</i> .,000
Strategy:	1) Catch	water with ne	w inlet and p	ipe system to collect v	vater. Replace
	undersize	d system. 2)	Add Rain Ga	rden to infiltrate runo	ff and protect natural
	channels.	,			1
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Inlet	EA	2	\$1,850	\$3,700	\$3,700
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
12" RCP CLASS III	LF	260	\$116	\$30,176	\$30,176
18" RCP CLASS III	LF	167	\$129	\$21,590	\$21,590
Rain Garden	EA	1	\$10,000	\$0	\$10,000
~				+ <b>-</b>	*=* = * =
Subtotal				\$60,715	\$70,715
Total Benefit Points				45	50
Individual Benefit Point Ratio	0			0.35	0.34
Estimated Increased Propert	y Values			\$5,000	\$7,000
Total				\$132,213	\$174,523
Utility Relocation			20%	\$26,443	\$34,905
Clearing			5%	\$6.611	\$8,726
Mobilization			4%	\$5,289	\$6,981
			170	\$3,207	φ0,901
Total with Percent Allowance	es			\$170,555	\$225,135
Contingency			25%	\$42,639	\$56,284
Probable Construction Cost I	Estimate			\$213,194	\$281,419
Design Engineering and Geotee	chnical		30%	\$63,958	\$84,426
Total Conceptual Cost Estim Total Benefit Points Total Benefit Point Ratio	ate			\$278,000 80 0.29	\$366,000 131 0.36

**Additional Comments:** 

PROJECT NAME: Figure 3-3 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	r Infrequent (r) (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŊĊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-3 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
MO1-	(1)	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	DINO	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
ERL∕	LOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
SEWER / OVE	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q389-401 Steeple Chase;Q385-440 Steeple Chase	10	2	6		0		20
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE	M PO	INTS		20

PROJECT NAME: Figure 3-3 with BMP's

DATE: 10/18/2013

### **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	4.09	PER 1	100 LF	0 LF 10		41
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	C	100		
ENTAL / W		Wetlands		A	C	50	50	
		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	nal/Educational Yes = 100, no = 0 pts					
			тс	TAL	SOLU		тѕ	111
TOTAL BENEFIT POINTS 13								131

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

366

0.36

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE	3-3 OVERL	AND FLOW				
Solutions By:	EDM INC	с. С.		DATE: 10/18/2012	3		
Problem:	Yard pon	ponding at Q173 - 541 Fox Ridge Rd.					
Strategy:	1) Resize	undersized s	torm sewer pi	pe.			
Description	Unit	Quantity	Unit Cost	1) Alternative 1			
42" RCP CLASS III	LF	283	\$215	\$60,783			
42" FES	EA	1	\$2,600	\$2,600			
Single Area Inlet	EA	1	\$1,750	\$1,750			
Subtotal				\$65,133			
<b>Total Benefit Points</b>				45			
Individual Benefit Point Ratio	)			0.33			
Total				\$65,133			
Utility Relocation			20%	\$13,027			
Clearing			5%	\$3,257			
Mobilization			4%	\$2,605			
Total with Percent Allowance	s			\$84,021			
Contingency			25%	\$21,005			
Probable Construction Cost E	Estimate		\$105,027				
Design Engineering and Geotec	hnical		30% \$31,508				
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio	ite			\$137,000 45 0.33			
Additional Comments:							

PROJECT NAME: Figure 3-3 without BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
	1.1. FLOODING		Attached Garage (1 lot per structure) Address:	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) Address:	300		150		25		
			Yard Flooding (1 per lot)	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	ER.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-3 without BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic P-Yr) ding	Freq (>2<= Floo	juent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints		
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po		
		2.1.1. Structure Flooding									
) FLOW		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65				
		Basement (1 lot per structure)*	250	0	200		50				
	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50				
AND		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing Syst		/stem \	stem Y/N					
ER / OVERI	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25				
	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12				
EWI		Yard Flooding (1 per lot) Address: Q173-541 Fox Ridge	10	1	6		0		10		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)					1				
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25				
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6				
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2				
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1				
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5			
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20			
	2.3.	2.3. Yard Erosion (1 per lot) Address:		Lots:	0	Point	ts/lot:	10			
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 (0	ō yrs pts)			
		Points for Age			1	5	,		15		
	TOTAL PROBLEM POINTS 25										

PROJECT NAME: Figure 3-3 without BMP's

DATE: 10/18/2013

### **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	Ν	lo. Unit	s	Points per	Unit	
IALITY		Bioswales*	0	PER 1	100 LF	10		
R QL	Forebays     AC					200		
ATE	Wet Ponds AC				100			
N -	Wetlands AC					50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0	Points for Easements							20
	5.2. Recreational/Educational			es = 10 o = 0 pt	0, :s			
			тс	TAL	SOLU		тѕ	20
			т	OTAL	BEN		S	45

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

137000

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.00

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE	3-3 OVERLA	AND FLOW ST	TRUCTURAL FLOODING			
Solutions By:	EDM IN	С.	10/18/2013				
Problem:	Yard ponding and garage flooding at Q390 - 455 Steeple Chase Ln						
Strategy:	1) Add rain garden to infiltrate runoff and pipe under driveway.						
Description	Unit	Quantity	Unit Cost	1) Alternative 1 With BMP's			
Rain Garden	EA	1	\$10,000	\$10,000			
Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property Values				\$10,000 135 6.44 \$2,000			
Total				\$10,000			
Utility Relocation			20%	\$2,000			
Clearing			5%	\$500			
Mobilization			4%	\$400			
Total with Percent Allowances				\$12,900			
Contingency			25%	\$3,225			
Probable Construction Cost Estimate				\$16,125			
Design Engineering and Geotechnical			30%	\$20,000			
Total Conceptual Cost Estimate				\$37,000			
Total Benefit Points				130			
Total Benefit Point Ratio				3.51			
Additional Comments:							
	Conceptu	al Cost are ro	unded to the nea	arest \$1000			

# City of Frontenac Stormwater System Master Improvement Plan

PROJECT NAME: Figure 3-3 Structural with BMP

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ЮZ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	ILOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	ť.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 point	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-3 Structural with BMP

DATE: 10/18/2013

			Chro (<=2 Floo	onic P-Yr) ding	Freq (>2<= Floo	juent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints		
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po		
		2.1.1. Structure Flooding									
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65				
		Basement (1 lot per structure)*	250	0	200		50				
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50				
AND	NIDC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N			N					
ER / OVERL	FLO	Attached Garage (1 lot per structure) Address: Q390-455 Steeple Chase	100	1	75		25		100		
	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12				
EWI		Yard Flooding (1 per lot) Address: Q390-455 Steeple Chase	10	1	6		0		10		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)					1				
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25				
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6				
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2				
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1				
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5			
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20			
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	ts/lot:	10			
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs		<25 yrs				
		Points for Age				. /			0		
	TOTAL PROBLEM POINTS 110										

PROJECT NAME: Figure 3-3 Structural with BMP

DATE: 10/18/2013

### **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0.5	PER 1	100 LF	10		5
R QL		Forebays		A	C	200		
ATEI	Wet Ponds AC					100		
M -		Wetlands		AC		50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2. Recreational/Educational			es = 10 o = 0 pt	0, s			5
			тс	TAL	SOLU	TION POIN	TS	20
			т	OTAL	BEN	EFIT POINT	S	130

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

37

3.51

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 3-3	CHANNEL I	FTMT2-1								
Solutions By:	EDM INC.			DATE:	10/18	/2013					
Problem:	Damage to pr	operty due to	erosion MS	D 28, Q171	-525 Fox R	idge, 533 and	1 517 Fox				
	Ridge Rd, 4 a	nd 6 Coach a	nd Four Lar	ne. For ALT	3 and 4 add	Yard Floodi	ng and				
	erosion: Q173, 541 Fox Ridge Rd.creek erosion MSD-1, 3 Countryside Lane										
Strategy:	1) Install ban	k protection o	n FTMT2-1	at 3 Countr	y Side (200	LF) and from	n station				
	14+50 to 17+00 (250 LF) or from station 10+25 to 17+00 (675 LF).										
Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2	ALT 3	ALT 4				
Hard stabilization (S)	LF	450	\$225	\$101,250	\$0	\$0	\$0				
Soft stabilization (S)	LF	450	\$125	\$0	\$56,250	\$0	\$0				
Geomorphic Study	Ea.	2	\$10,000	\$0	\$20,000	\$0	\$20,000				
Hard stabilization (S)	LF	875	\$225	\$0	\$0	\$196,875	\$0				
Soft stabilization (S)	LF	875	\$125	\$0	\$0	\$0	\$109,375				
Subtotal				\$101,250	\$76,250	\$196,875	\$129,375				
Total				\$101,250	\$76,250	\$196,875	\$129,375				
Utility Relocation			20%	\$20,250	\$15,250	\$39,375	\$25,875				
Clearing			5%	\$5,063	\$3,813	\$9,844	\$6,469				
Mobilization			4%	\$4,050	\$3,050	\$7,875	\$5,175				
Total with Percent Allows	ances			\$130,613	\$98,363	\$253,969	\$166,894				
Contingency			25%	\$32,653	\$24,591	\$63,492	\$41,723				
Probable Construction Co	ost Estimate			\$163,266	\$122,953	\$317,461	\$208,617				
Design Engineering and Ge	eotechnical		30%	\$48,980	\$36,886	\$95,238	\$62,585				
Total Conceptual Cost Es	Total Conceptual Cost Estimate						\$272,000				
	Benefit Poin Benefit/Cost	270 1.27	440 2.75	320 0.77	625 2.30						

**Additional Comments:** 

PROJECT NAME: Figure 3-3 Channel FTMT2-1, Alternate 2

PROBLEM CATEGORY				Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		ints
				Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1. Structure Flooding								
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	1.1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
1.0 STREAM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
	1.2. EROSION	1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
			Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	10 points per lot				
		1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-3 Channel FTMT2-1, Alternate 2

DATE: 10/18/2013

		PROBLEM CATEGORY, CONT.		Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding				
2.0 STORM SEWER / OVERLAND FLOW				No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po			
		2.1.1. Structure Flooding										
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65					
		Basement (1 lot per structure)*	250		200		50					
	DDING	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50					
		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N									
	-LO(	Attached Garage (1 lot per structure)	100		75		25					
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12					
		Yard Flooding (1 per lot)	10		6		0					
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)										
		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25					
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6					
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2					
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1					
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5				
	2.2.	Moderate Risk Erosion of misc. structures Address:		No. Lots:		Points/lot:		20				
	2.3.	Yard Erosion (1 per lot) Address:		No. Lots:		Pointe		:s/lot: 10				
	2.4.	Age of Existing System		>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)				
		Points for Age										
			тот		OBLE		INTS					

PROJECT NAME: Figure 3-3 Channel FTMT2-1, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
0. DNAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	5	Points per Add'l Proj.:	50	250
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per		
ΙΑLITY		Bioswales		PER 100 LF		10		
R QU		Forebays AC				200		
ATEI		Wet Ponds		AC		100		
NVIRONMENTAL / W		Wetlands		AC		50		
		Biostabilization of banks (per bank)	9	PER 100 LF		10		90
		Riffle Pool Complex	5	PER 100 LF		10		50
	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		10		
5.0 MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10 (10 pts)		11-15 (5 pts)	>15 (0 pts)	
		Points for Easements						20
	5.2. Recreational/Educational			Yes = 100, no = 0 pts			Yes	
			тс	DTAL S	SOLU		TS	440
			т	OTAL	BEN	EFIT POINT	S	440

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.75

Place "X" in one box below:

MSD Project Project by Others



Project Name:	FIGURE	3-4 OVERL	AND FLOW						
Solutions By:	EDM IN(	7		DATE: 10/18/2013					
Problem:	Erosion at Q143 - 2 Country Estates and undersized culvert at Country Estates								
Strategy:	1) Replace existing culvert under Country Estates with new culvert 2) Add Rain								
	Gardens t	o infiltrate ru	noff and prot	ect natural channels.	channels.				
Description	Unit	Quantity	Unit Cost	Without BMP's	2) Anternative 1 with BMP's				
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500				
12" RCP CLASS III	LF	90	\$116	\$10,445	\$10,445				
12" FES	EA	2	\$1,100	\$2,200	\$2,200				
Rain Garden	EA	1	\$10,000	\$0	\$10,000				
Subtotal				\$16,145	\$26,145				
Total Benefit Points				35	40				
Individual Benefit Point Ratio				1.03	0.73				
<b>Estimated Increased Property Valu</b>	ies			\$0	\$2,000				
Problem:	Yard Pon	ding at Q358	- 2 Portland	Drive					
Strategy:	1) Regrade yard around house								
				1) Alternative 1	2) Alternative 1 With				
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's				
Regrade yard	LS	1	\$3,000	\$3,000	\$3,000				
Subtotal				\$3,000	\$3,000				
Total Benefit Points				30	30				
Individual Benefit Point Ratio				4.77	4.77				
<b>Estimated Increased Property Valu</b>	es			\$1,000	\$1,000				
Problem:	Yard pon	ding at Q332	- 2600 N. Ge	yer Rd., Q316 - 2535	N Geyer Rd. and Q428 -				
Strategy:	1) Install inlets and pipe system to collect water. Connect to existing stormsewer								
	system ar	nd resized uno	dersized storn	nsewer pipes. 2) Add	Rain Gardens to infiltrate				
	runoff an	d protect natu	ral channels.						
				1) Alternative 1	2) Alternative 1 With				
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's				
Single Inlet	EA	12	\$1,850	\$22,200	\$22,200				
Manhole	EA	3	\$1,500	\$4.500	\$4,500				
12" RCP CLASS III	LF	95	\$116	\$11.026	\$11.026				
15" RCP CLASS III	LF	291	\$124	\$36,165	\$36,165				
18" RCP CLASS III	LF	617	\$129	\$79,766	\$79.766				
21" RCP CLASS III	LF	321	\$137	\$43.942	\$43,942				
27" RCP CLASS III	LF	282	\$150	\$42,331	\$42,331				
30" RCP CLASS III	IF	31	\$163	\$5,060	\$5,060				
33" RCP CLASS III	IF	230	\$174	\$40,119	\$40,119				
36" RCP CLASS III	LF	211	\$186	\$39,254	\$39.254				
Rain Garden	EA	4	\$10,000	\$0 \$0	\$40,000				
Subtotal				\$324.363	\$364.363				
<b>Total Benefit Points</b>				55	75				
Individual Benefit Point Ratio				0.08	0.10				
Estimated Increased Property Valu	les			\$12,000	\$16,000				
Total				\$343,509	\$393,509				
Utility Relocation	20%	\$68,702	\$78,702						
-------------------------------------	-----	-----------	-----------						
Clearing	5%	\$17,175	\$19,675						
Mobilization	4%	\$13,740	\$15,740						
Total with Percent Allowances		\$443,126	\$507,626						
Contingency	25%	\$110,782	\$126,907						
Probable Construction Cost Estimate		\$553,908	\$634,533						
Design Engineering and Geotechnical	30%	\$166,172	\$190,360						
Total Conceptual Cost Estimate		\$721,000	\$825,000						
Total Benefit Points		170	220						
Total Benefit Point Ratio		0.24	0.27						

**Additional Comments:** 

PROJECT NAME: Figure 3-4 with BMP's

	_				onic -Yr) ding	Frequent (>2<=15-Yr) Flooding		Infre (>1 Floc	quent 5-Yr) oding	oints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	1.1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ë.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 3-4 with BMP's

DATE: 10/18/2013

				onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
	.LOODING	Basement (1 lot per structure)*	250	0	200		50		
SEWER / OVERLAND FLOW		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
		Attached Garage (1 lot per structure) Address:	100	0	75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q358-2 Portland; Q332-2260 N. Geyer; Q316- 2535 N. Geyer; Q428-2 W. Geyer	10	4	6		0		40
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Country Estates and Geyer	No. P	onds:	1	Points	/pond:	5	5
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q143-2 Country Estates	No.	Lots:	1	Point	s/lot:	10	10
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	i yrs ots)	
		Points for Age							15
			тот	AL PR	OBLE	M PO	INTS		70

PROJECT NAME: Figure 3-4 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	Add'l ects:	2	Points per Add'l Proj.:	50	100	
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	2.5	PER 1	100 LF	10	10	
R QL		Forebays		A	C	200		
ATEI		Wet Ponds		A	C	100		
N /	Wetlands AC					50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	EA 100			
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			25
			тс	TAL	SOLU	TION POIN	тѕ	150
			т	OTAL	BEN	EFIT POINT	S	220

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

825

0.27

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

CITY OF FRONTENAC CONCEPTUAL SOLUTIONS



Project Name:	FIGURE	4-1 OVERL	AND FLOW		
Solutions By:	EDM INC	С.		DATE:	10/18/2013
Problem	Vard pop	ding at O103	1699 Eront	anaa Woods I n and w	ard arosion at 0104
r robiem:	1673 Ero	ullig at Q195 ntenac Wood	- 1000 F1010 « I n	enac woods Lif and y	aru erosioir ar Q194 -
Strategy.	1) Add R	ain Garden to	s Ell. Minfiltrate run	off and protect natura	l channels and
Strategy.	construct	a dry creek b	ed to prevent	erosion	i chamiers and
	construct	u di y creck c	ieu to prevent	1) Alternative 1	2) Alternative 1
Description	Unit	Ouantity	Unit Cost	Without BMP's	With BMP's
Construct Dry Creek Bed	LF	163	\$100	\$16,300	\$16,300
Grading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$31.300	\$31.300
<b>Total Benefit Points</b>				45	45
Individual Benefit Point Rat	io			0.69	0.69
<b>Estimated Increased Proper</b>	ty Values			\$2,000	\$2,000
Problem:	Yard pon	ding at Q84 -	10 Chipper H	Rd, Q82 - 7 Chipper R	d., and Q290-10420
	Litzsinge	r Road and Y	ard Erosion a	it Q198 - 10589 Front	enac Woods Ln.
	0			C C	
Strategy:	1) Install	inlets pipes t	o collect storr	nwater. Replace unde	ersized existing
	stormwat	er system 2)	Add Rain Ga	rdens to infiltrate run	off and protect natural
	channels.				
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Area Inlet	EA	4	\$1,750	\$7,000	\$7,000
Double Area Inlet	EA	1	\$3,050	\$3,050	\$3,050
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	261	\$116	\$30,292	\$30,292
18" RCP CLASS III	LF	783	\$129	\$101,226	\$101,226
36" RCP CLASS III	LF	201	\$186	\$37,394	\$37,394
Grading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	3	\$10,000	\$0	\$30,000
Subtotal				\$185,462	\$215,462
Total Benefit Points				65	80
Individual Benefit Point Rat	io			0.17	0.18
<b>Estimated Increased Proper</b>	ty Values			\$12,000	\$16,000
Problem:	Street por	nding at Q384	4 - 2001 S. Li	ndbergh Blvd.	
Strategy:	1) Cleano	out and rehab	ilitate detentio	on area.	
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1
Rehbilitate Detention Basin	EA	1	\$60,000	\$60,000	\$60,000
Subtotal				\$60,000	\$60,000
<b>Total Benefit Points</b>				5	5
Individual Benefit Point Rat	io			0.04	0.04
<b>Estimated Increased Proper</b>	ty Values			\$2,000	\$2,000
Total				\$776 767	\$306 762
1 Utdl				$\varphi_{21}0,102$	φ <b>500,70</b> 2

Utility Relocation	20%	\$55,352 \$12,828	\$61,352 \$15,228
Mobilization	3% 4%	\$13,838	\$13,338 \$12,270
Total with Percent Allowances		\$357,023	\$395,723
Contingency	25%	\$89,256	\$98,931
Probable Construction Cost Estimate		\$446,279	\$494,654
Design Engineering and Geotechnical	30%	\$133,884	\$148,396
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio		\$581,000 175 0.30	\$644,000 200 0.31

**Additional Comments:** 

PROJECT NAME: Figure 4-1 with BMP's

					onic -Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	1.1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ë.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 4-1 with BMP's

DATE: 10/18/2013

				onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
LOW	(1)	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
ND F	DING	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	(/N	N		
SEWER / OVERLAN	LOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q193-1688 Frontenac Woods; Q84-10 Chipper; Q82-7 Chipper, Q290-10420 Litzsinger	10	4	6		0		40
RM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
~		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Q384-2001 S. Lindbergh Blvd	No. P	onds:	1	Points	/pond:	5	5
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q198-10589 Frontenac Woods; Q194-1673 Frontenac Woods Lane	No.	Lots:	2	Point	s/lot:	10	20
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE	EM PO	INTS		65

PROJECT NAME: Figure 4-1 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	2	PER 1	00 LF	10	10	
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	С	100		
M -	Wetlands AC					50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	EA 100			
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1. Ease of Implementation (No. of Easements)		0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0	Points for Easements							
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s			15
			тс	TAL	SOLU		тѕ	135
			т	OTAL	BEN		s	200

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

644

0.31

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others



Project Name:	FIGURE	4-2 OVERL	AND FLOW				
Solutions By:	EDM INC		DATE:	ATE: 10/18/2013			
Problem:	Yard pon	ding at Q391	- 2815 Sonin	gton Pl and Q200 - 8	Georgian Acres, (Q202)		
Strategy:	1) Add in existing s	let and pipe s ystem 2) Ad	pe system along Georian Acres to collect water and connect to Add Rain Gardens to infiltrate runoff and protect natural				
	channels.			1) Alternative 1	2) Alternative 1 With		
Description	Unit	Ouantity	Unit Cost	Without BMP's	BMP's		
Single Area Inlet	EA	10	\$1.750	\$17.500	\$17.500		
12" RCP CLASS III	LF	241	\$116	\$27,970	\$27.970		
15" RCP CLASS III	LF	463	\$124	\$57,542	\$57.542		
18" RCP CLASS III	LF	148	\$129	\$19,133	\$19,133		
21" RCP CLASS III	LF	314	\$137	\$42,983	\$42,983		
27" RCP CLASS III	LF	282	\$150	\$42.331	\$42.331		
Rain Garden	EA	8	\$10,000	\$0	\$80,000		
Subtotal				\$207,460	\$287,460		
Total Benefit Points				30	70		
Individual Benefit Point Ratio	)			0.07	0.12		
<b>Estimated Increased Property</b>	Values			\$3,000	\$5,000		
Problem:	Yard pon	ding at Q99 -	10928 Clayte	on Rd.			
Strategy:	1) Add ya	rd drain and	pipe system t	o collect runoff and pi	pe under driveway. 2)		
	Add Rain	Gardens to i	nfiltrate runo	ff and protect natural of	channels.		
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With		
Yard Drain	EA	1	\$500	\$500	\$500		
6" PVC	LF	75	\$24	\$1.800	\$1.800		
Restoration	LS	1	\$3,000	\$3,000	\$3,000		
Rain Garden	EA	1	\$10,000	\$0	\$10,000		
Subtotal				\$5,300	\$15,300		
Total Benefit Points				30	35		
Individual Benefit Point Ratio	)			2.70	1.09		
Estimated Increased Property	Values			\$0	\$2,000		
Total				\$212,760	\$302,760		
Utility Relocation			20%	\$42,552	\$60,552		
Clearing			5%	\$10,638	\$15,138		
Mobilization			4%	\$8,510	\$12,110		
Total with Percent Allowance	8			\$274,460	\$390,560		
Contingency			25%	\$68,615	\$97,640		
Probable Construction Cost E	stimate			\$343,076	\$488,201		
Design Engineering and Geotec	hnical	\$102,923	\$146,460				
Total Conceptual Cost Estima	te			\$446.000	\$635.000		
Total Benefit Points				145	235		
<b>Total Benefit Point Ratio</b>				0.33	0.37		

**Additional Comments:** 

PROJECT NAME: Figure 4-2 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ЭV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
ND FLOW	(1)	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	DING	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	vstem Y	′/N	N		
ERLA	LOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
3 / OVE	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWE		Yard Flooding (1 per lot) Address: Q391-2815 Stonington; Q200- 8 Georgian Acres; Q392-2828 Stonington; Q99-10928 Clayton	10	3	6		0		30
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No. I	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No. I	_ots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30 )	yrs ots)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age		•	•			·	0
			тоти	AL PR	OBLE		INTS		30

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3 REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	4.5	PER 1	100 LF	10		45
R QL		Forebays		А	C	200		
Wet Ponds					C	100		
Wetlands					C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex	PER 100 L			10		
IN	4.2.	Eliminates combined sewer (per project)	EA			100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1. Ease of Implementation (No. of Easements)		0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye	es = 100 b = 0 pt	0, s			50
			тс	TAL	SOLU	TION POIN	TS	205
			т	OTAL	BEN		s	235

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

635

0.37

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 4	4-2 OVERL	AND FLOW					
Solutions By:	EDM INC	2.		DATE: 10/18/2013				
Problem	Yard ponding at Q392 - 2828 Stonington Pl							
Strategy:	1) Add Ra	d Rain Gardens to infiltrate runoff and protect natural channels.						
Description	Unit	Quantity	Unit Cost	1) Alternative 1				
Rain Garden	EA	1	\$10,000	\$10,000				
Subtotal				\$10,000				
<b>Total Benefit Points</b>				35				
Individual Benefit Point Ratio	)			1.67				
Estimated Increased Property	Values			\$2,000				
Total				\$10,000				
Utility Relocation			20%	\$2,000				
Clearing			5%	\$500				
Mobilization			4%	\$400				
Total with Percent Allowance	5			\$12,900				
Contingency			25%	\$3,225				
Probable Construction Cost E	stimate			\$16,125				
Design Engineering and Geotec	hnical		30%	\$20,000				
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio	ite			\$37,000 40 1.08				

Additional Comments:

PROJECT NAME: Figure 4-2 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ВN		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	 Т		Yard Flooding (1 per lot) Address:	10		5		0		
	<u>-</u>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

				onic P-Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
FLOW	Q	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	(/N	Ν		
ER / OVERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot) Address: Q392-2828 Stonington	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)					1		
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age	1.2.5	,					0
			тот	AL PR	OBLE	EM PC	INTS		10

PROJECT NAME: Figure 4-2 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY							
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000		
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50		
	4.1.	Addresses pollutants:	N	o. Unit	S	Points per	Unit		
IALITY		Bioswales*	0.5	PER 1	00 LF	10		5	
r al		Forebays		A	С	200			
Wet Ponds					С	100			
/ M	Wetlands AC					50			
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10			
RONM		Riffle Pool Complex		PER 100 LF		10			
IN	4.2.	Eliminates combined sewer (per project)	EA			100			
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10			
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)		
5.0		Points for Easements	1					20	
	5.2.	Recreational/Educational	Y€ no	es = 100 o = 0 pt	), s			5	
			тс	TAL	SOLU		TS	30	
		TOTAL SOLUTION POINT							

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

37

1.08

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others





Project Name:	FIGURE	4-3 OVERL	AND FLOW							
Solutions By:	EDM INC	7.		DATE:	: 10/18/2013					
Problem:	Yard ponding at Q80 - 5 Chipper Rd., Q411 - 451 Tregaron Place, Q408 - 436 Tregaron Place and Q407 - 424 Tregaron Place, yard flooding at Q148 - 10 Country Estates, yard erosion at Q146 - 9 Country Estates and Q414 - 423 Tregaron Place. and yard flooding at Q409 - 411 Tregaron Place									
Strategy:	1) Install runoff an	inlet and pipe d protect natu	e system to co iral channels.	bllect water. 2) Add F	Rain Gardens to infiltrate					
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 With BMP's					
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750					
Manhole	EA	2	\$1,500	\$3,000	\$3,000					
New Berm	LF	860	\$25	\$21,500	\$21,500					
33" RCP CLASS III	LF	180	\$174	\$31,397	\$31,397					
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000					
Additonal Grading	LS	1	\$10,000	\$10,000	\$10,000					
Erosion Protection	LS	1	\$5,000	\$5,000	\$5,000					
Bioswale	LF	196	\$90	\$0	\$17,640					
Rain Garden	EA	3	\$10,000	\$0	\$30,000					
Subtotal Total Benefit Points Individual Benefit Point Ratio Estimated Increased Property	o y Values			\$82,647 95 0.55 \$24,000	\$130,287 135 0.49 \$40,000					
Total				\$82,647	\$130,287					
Ittilites Dela sector			2004	¢16.500	¢26.057					
Charging			20%	\$16,529	\$26,057					
Clearing			5%	\$4,132 \$2,206	\$0,514 \$5,211					
Modilization			4%	\$3,306	\$5,211					
Total with Percent Allowance	es			\$106,615	\$168,071					
Contingency			25%	\$26,654	\$42,018					
Probable Construction Cost I	Estimate			\$133,269	\$210,088					
Design Engineering and Geoted	chnical		30%	\$39,981	\$63,027					
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio	ate			\$174,000 100 0.57	\$274,000 170 0.62					

**Additional Comments:** 

PROJECT NAME: Figure 4-3 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ВV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 4-3 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Pc
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
3		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
FLO	<u>n</u>	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
<b>DN</b>		Attached Garage (1 lot per structure)	100	0	75		25		
M SEWER / OVERLA	FLOC	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
	2.1.	Address: Yard Flooding (1 per lot) Address: Q193-1688 Frontenac Woods; Q80-5 Chipper; Q282-15 Huntleigh Wods; Q280-11 Huntleight Downs; Q281-9 Huntleigh Downs; Q411-451 Tregaron; Q408-436 Tregaron; Q407-424 Tregaron; Q148-10 Country Estate; Q409-411 Tregaron; Q278-2 Huntleigh Downs	10	6	6		0		60
STO!		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway							
2.0 9		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: 0146-9 Country Estates: 0414-423 Tregaron	No.	Lots:	2	Point	s/lot:	10	20
	2.4.	Age of Existing System		yrs pts)	26-50 yrs		/rs <25 y		
		Points for Age	<u> </u>			. /			15
	1		тот	AL PR	OBLE	EM PC	INTS		95

PROJECT NAME: Figure 4-3 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	4	PER 1	100 LF	10		40
R QL	Forebays AC					200		
ATEI	Wet Ponds AC					100		
M /		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 100 LF		10		
IN	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						
	5.2.	Recreational/Educational	Ye n	es = 100 b = 0 pt	0, s			35
			т	TAL	SOLU		TS	75
			т	OTAL	BEN	EFIT POINT	S	170

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

274

0.62

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 4-3 CHANNEL FDCT1			D 4 775	10/10	12012
Solutions By:	EDM INC.			DATE:	10/18	3/2013
Problem:	Erosion in unmaintained area MSD17 - 1 H erosion Q278 - 2 Huntleigh Downs.	Huntleigh	Downs, 10	600 Clayton	Road. Yard flo	oding and
Strategy:	1) Install bank protection on FDTC1 from	station 0-	+00 to 3+00	) (300 LF) an	d from 3+50 to	7+00 (350 LF)
	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (S)	LF	650	\$225	\$146,250	\$0
	Soft stabilization (S)	LF	650	\$125	\$0	\$81,250
	Geomorphic Study	EA	2	\$10,000	\$0	\$20,000
	Total				\$146,250	\$101,250
					\$146,250	\$101,250
	Utility Relocation					
	Clearing			20%	\$29,250	\$20,250
	Mobilization			5%	\$7,313	\$5,063
				4%	\$5,850	\$4,050
	Total with Percent Allowances				\$188,663	\$130,613
	Contingency					
				25%	\$47,166	\$32,653
	Probable Construction Cost Estimate					
					\$235,828	\$163,266
	Design Engineering and Geotechnical			200	¢70 749	¢ 4 9 0 9 0
	Total Concentual Cost Estimate			30%	\$70,748	\$48,980
	Total Conceptual Cost Estimate				\$307,000	\$213,000
	Benefit Points				130	345
	Benefit/Cost Ratio				0.42	1.62
Additional Comme	ents:				0.12	1.02

PROJECT NAME: Figure 4-3 Channel FDCT1, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infree (>1 Floc	quent 5-Yr) oding	ints
		_	PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
		-	Attached Garage (1 lot per structure)	100		50		8		
	ŊĠ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	<u>н</u>		Yard Flooding (1 per lot) Address:	10	1	5		0		10
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) <i>Address:</i>	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 4-3 Channel FDCT1, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
AND FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.		Existing System Y/N					
ERL		Attached Garage (1 lot per structure)	100		75		25		
ER / OVI	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
S M S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		L					
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Address: Address:		Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	o yrs ots)	
		Points for Age		-					
			тот		OBLE		INTS		10

PROJECT NAME: Figure 4-3 Channel FDCT1, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
ΙΑLITY		Bioswales		PER 1	100 LF 10			
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	C	C 100		
N /		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	13	PER 1	00 LF	10		130
NNOF		Riffle Pool Complex	7	PER 1	00 LF	10		70
INN	4.2.	Eliminates combined sewer (per project)	EA		A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1. Ease of Implementation (No. of Easements)		0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						20
	5.2.	Recreational/Educational	Ye	es = 100 o = 0 pt	), s	Yes		15
			т		SOLU		TS	335
			т	OTAL	BEN		S	345

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.62

Place "X" in one box below:

MSD Project Project by Others





Project Name:	FIGURE	5-1 OVERL	AND FLOW							
Solutions By:	EDM INC	С.		DATE: 10/18/2013						
Problem:	Yard eros	ion at Q372 ·	- 42 Portland	Dr, Q352 - 39 Portlan	d Dr and Q356 - 41					
	Portland I	Dr and yard p	onding at Q1	91 - 13- Frontenac Fo	rest and Q374 - 47					
	Portland I	Dr.								
Strategy:	1) Install	inlet and pipe	e system to co	ollect water. Replace	undersized storm					
	sewer pip	es. Resize di	riveway culve	erts at 37 and 39 Portla	and Dr. Reshape					
	driveway	s at 49 and 51	l Portland Dr.	2) Add Rain Garder	n and Bioswale to					
	infiltrate	runoff and pr	otect natural o	channels.						
		-		1) Alternative 1	2) Alternative 1					
Description	Unit	<b>Ouantity</b>	Unit Cost	Without BMP's	With BMP's					
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750					
Single Inlet	EA	5	\$1,850	\$9,250	\$9,250					
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150					
New Berm	LF	271	\$25	\$6,775	\$6,775					
New Swale	LF	107	\$18	\$1,926	\$1,926					
12" RCP CLASS III	LF	448	\$116	\$51,995	\$51,995					
18" RCP CLASS III	LF	121	\$129	\$15.643	\$15.643					
21" RCP CLASS III	LF	21	\$137	\$2,875	\$2,875					
21" FES	EA	1	\$1.500	\$1,500	\$1,500					
27" RCP CLASS III	LF	89	\$150	\$13,360	\$13,360					
27" FES	EA	8	\$1 700	\$13,600	\$13,600					
Reshape Driveway	LS	1	\$3,000	\$3,000	\$3,000					
Rain Garden	EA	2	\$10,000	\$0	\$20,000					
Bioswale	LF	240	\$90	\$0 \$0	\$21,600					
Dioswale	21	210	φ,σ	<b>4</b> 0	<i><b>\$21,000</b></i>					
Subtotal				\$124,823	\$166.423					
Total Benefit Points				φ12 <del>4</del> ,025 75	109					
Individual Benefit Point Ratio	n			0.29	0.31					
Estimated Increased Property	v Values			\$15,000	\$25,000					
Problem:	Vard eros	tion at $0.189$ .	124 Fronten	ac Forest and O187 -	120 Frontenac Forest					
Strategy:	1) Install	a turf reinfor	cement mat to	minimize channel en	osion					
Strategy:	i) motun	u turr rennor		1) Alternative 1	2) Alternative 1					
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's					
Turf Reinforcement Mat	LF	202	\$20	\$4.040	\$4,040					
Regrade around inlets	LS	1	\$2.000	\$2.000	\$2.000					
			+_,							
Subtotal				\$6.040	\$6.040					
Total Benefit Points				40	40					
Individual Benefit Point Ratio	n			3.16	3.16					
Estimated Increased Property	v Values			\$3.000	\$3.000					
<u></u>	, , undes			40,000	<i><i><i>qc</i>,<i>ooo</i></i></i>					
Total				\$130.863	\$172,463					
					, ,					
Utility Relocation			20%	\$26,173	\$34,493					
Clearing			5%	\$6,543	\$8.623					
Mobilization			4%	\$5,235	\$6,899					
					·					
<b>Total with Percent Allowance</b>	s			\$168,814	\$222,478					
Contingency			25%	\$42,203	\$55,619					
Probable Construction Cost F	Estimate			\$211.017	\$278.097					
resource construction Cost I	25 mare			Ψ <b>#11,01</b> /	ψ <b>ω</b> / 0307 /					
Design Engineering and Geotec	chnical		30%	\$63,305	\$83,429					
Total Conceptual Cost Estima	ate			\$275,000	\$362,000					
Total Benefit Points				120	164					
Total Benefit Point Ratio				0.44	0.45					

**Additional Comments:** 

PROJECT NAME: Figure 5-1 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ЭV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 5-1 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
MO	(1)	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
DFL	DINO	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N			N			
LANI	L00	Attached Garage (1 lot per structure) Address:	100	0	75		25		
EWER / OVERI	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q191-130 Frontenac Forest; Q374-47 Portland	10	2	6		0		20
M SI		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
0 STORI		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
2.		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q372-42 Portland; Q352-39 Portland; Q356-41 Portland; Q189-124 Frontenac Forest; Q187-120 Frontenac Forest		Point	s/lot:	10	50		
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age						· · · · ·	0
	TOTAL PROBLEM POINTS 7								70

PROJECT NAME: Figure 5-1 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	3.4	PER 1	100 LF	10		34
R QL		Forebays		А	C	200		
Wet Ponds					C	100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 100 LF		10		
RONM		Riffle Pool Complex		PER 100 LF		10		
IN	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						
	5.2.	Recreational/Educational	Ye	es = 100 b = 0 pt	0, s			10
			тс	TAL	SOLU	TION POIN	TS	94
			т	OTAL	BEN	EFIT POINT	S	164

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

362

0.45

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 5-1 OVERLAND FLOW STRUCTURAL FLOODING								
Solutions By:	EDM INC	2.		DATE:	10/18/2013				
-									
Problem:	Yard pon	ding and base	ement floodin	g at Q184 - 107 Front	enac Forest and yard				
	erosion at	Q185 - 108	Frontenac For	rest.					
Strategy:	1) Install	inlet and pipe	e system to co	ollect water. Add Rair	Gardens to infiltrate				
	runoff and	l protect natu	ral channels.						
				1) Alternative 1	2) Alternative 1				
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's				
Single Area Inlet	EA	4	\$1,750	\$7,000	\$7,000				
Manhole	EA	1	\$1,500	\$1,500	\$1,500				
New Swale	LF	131	\$18	\$2,358	\$2,358				
New Asphalt Curb	LF	297	\$20	\$5,940	\$5,940				
12" RCP CLASS III	LF	90	\$116	\$10,445	\$10,445				
15" RCP CLASS III	LF	164	\$124	\$20,382	\$20,382				
15" FES	EA	1	\$1,200	\$1,200	\$1,200				
Rain Garden	EA	3	\$10,000	\$0	\$30,000				
Subtotal				\$48,825	\$78.825				
Total Benefit Points				290	305				
Individual Benefit Point Ratio				2.83	1.85				
Estimated Increased Property	Values			\$6.000	\$10.000				
Total				\$48,825	\$78,825				
Utility Relocation			20%	\$9,765	\$15,765				
Clearing			5%	\$2,441	\$3,941				
Mobilization			4%	\$1,953	\$3,153				
Total with Percent Allowance	5			\$62,985	\$101,685				
Contingency			25%	\$15,746	\$25,421				
Probable Construction Cost E	stimate			\$78,731	\$127,106				
Design Engineering and Geotec	hnical		30%	\$23,619	\$38,132				
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio	ite			\$103,000 270 2.62	\$166,000 300 1.81				

**Additional Comments:** 

PROJECT NAME: Figure 5-1 Structural with BMP's

			Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		nts	
PROBLEM CATEGORY				Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
1.0 STREAM	1.1. FLOODING		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
			Traffic obstruction (> 6" of water) on collector street	25		12		2		
			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
	1.2. EROSION	1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
			Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
		1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	10 points per lot				
		1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		
PROJECT NAME: Figure 5-1 Structural with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic P-Yr) ding	Freq (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q184-107 Frontenac Forest	250	1	200		50		250
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	//N	N		
'ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot) Address: Q184-107 Frontenac Forest	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
2		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q185-108 Frontenac Forest	No.	Lots:	1	Point	s/lot:	10	10
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE		INTS		270

PROJECT NAME: Figure 5-1 Structural with BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1.5	PER 1	100 LF	10		15
R QL		Forebays		А	C	200		
ATEI		Wet Ponds		A	C	100		
M -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			15
			тс	TAL	SOLU		TS	30
			т	OTAL	BEN	EFIT POINT	S	300

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

166

1.81

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

## City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 5-1 CHANNEL FTMNW					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Damage to property due to erosion MSD-12. erosion Q186 - 113 Frontenac Forest. Bank Frontenac Forest. Exposed VCP SR-4.	Floodi erosion	ng Q184 - SR-5-102,	107 Frontena 104, 107, 10	c Forest. Yard 9, 111,114, 115	flooding and , and 116
Strategy:	1) Install bank protection on FTMNW from	station 4	44+50 to 50	6+00 (1,150 1	LF). Encase exp	bosed VCP.
	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L)	LF	1,150	\$300	\$345,000	\$0
	Soft stabilization (L)	LF	1,150	\$200	\$0	\$230,000
	Geomorphic Study	Ea.	2	\$10,000	¢1.200	\$20,000
	Concrete encasement	CY	3	\$260	\$1,300	\$1,300
	Total				\$340,300	\$231,300
					\$346,300	\$251,300
	Utility Relocation				+ · · · · · · ·	
	Clearing			20%	\$69,260	\$50,260
	Mobilization			5%	\$17,315	\$12,565
	T-4-1			4%	\$13,852	\$10,052
	Total with Percent Allowances				\$446,727	\$324,177
	Contingency					
				25%	\$111,682	\$81,044
	Probable Construction Cost Estimate					
	Design Engineering and Geotechnical				\$558,409	\$405,221
				30%	\$167,523	\$121,566
	Total Conceptual Cost Estimate				\$726,000	\$527,000
	Benefit Points				575	985
	Benefit/Cost Ratio				0.79	1.87
Additional Comment	s:					

PROJECT NAME: Figure 5-1 Channel FTMNW, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infree (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1. \$	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) <i>Address:</i>	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŊĊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	н. Н		Yard Flooding (1 per lot) Address:107 and 113 Frontenac Forest	10	2	5		0		20
	-	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1. <sup>-</sup>	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

\_\_\_\_

## PROJECT NAME: Figure 5-1 Channel FTMNW, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)* Address:	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem Y	′/N			
/ERL	FL0(	Attached Garage (1 lot per structure) Address:	100		75		25		
ER / O/	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWI		Yard Flooding (1 per lot) Address:	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	1	Į	<u> </u>	<u> </u>			
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	o yrs ots)	
		Points for Age							
			тот	AL PR	OBLE	EM PC	INTS		20

PROJECT NAME: Figure 5-1 Channel FTMNW, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	11	Points per Add'l Proj.:	50	550
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	100 LF	10		
R QU		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
<b>N</b>		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	23	PER 1	100 LF	10		230
RONM		Riffle Pool Complex	12	PER 1	100 LF	10		120
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						5
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, s	Yes		60
			т		SOLU		TS	965
			т	OTAL	BEN	EFIT POINT	S	985

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.87

Place "X" in one box below:

MSD Project Project by Others





	City of	<sup>*</sup> Frontena	с		
Stormwate	r System N	Aaster Im	provement	Plan	
CO	NCEPTUAL	LEVEL AN	NALYSIS		
Project Name:	FIGURE	5-2 OVERL	AND FLOW		
Solutions By:	EDM INC	2.	DATE:	10/18/2013	
Problem:	Yard pon	ding at Q165	-15 Devondal	le and Q164-16 Devoi	ndale Place
Strategy:	1) Remov	ve brush and	reestablish sw	ale at 16 Devondale I	Lane and install pipe
	and inlet	system to pre	event yard por	nding at 15 Devondale	e Lane. 2) Add Rain
	Garden a	nd Bioswale	to infiltrate ru	noff and protect natur	al channels.
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850
Manhole	EA	1	\$1,500	\$1,500	\$1,500
12" RCP CLASS III	LF	234	\$116	\$27,158	\$27,158
15" RCP CLASS III	LF	90	\$124	\$11,185	\$11,185
Remove Brush	LS	1	\$4,000	\$4,000	\$4,000
Grading	LS	1	\$5,000	\$5,000	\$5,000
Reestablish Swale	LS	1	\$3,000	\$3,000	\$3,000
Rain Garden	LS	1	\$10,000	\$0	\$10,000
Subtotal				\$58,943	\$68,943
<b>Total Benefit Points</b>				40	45
Individual Benefit Point Ra	tio			0.32	0.31
<b>Estimated Increased Proper</b>	rty Values			\$2,000	\$4,000
Total				\$58.943	\$68.943
1.000				<i>\$20,9</i> 10	<i><b>400</b></i> , <i>10</i>
Utility Relocation			20%	\$11,789	\$13,789
Clearing			5%	\$2,947	\$3,447
Mobilization			4%	\$2,358	\$2,758
Total with Percent Allowan	ces			\$76,037	\$88,937
Contingency			25%	\$19,009	\$22,234
Probable Construction Cost	t Estimate			\$95,046	\$111,171
Design Engineering and Geot	echnical		30%	\$28,514	\$33,351
Total Conceptual Cost Estin	nate			\$124,000	\$145,000
Total Benefit Points Total Benefit Point Ratio				40 0.32	45 0.31

Additional Comments:

PROJECT NAME: Figure 5-2 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	Q		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	LOODIN		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) Address:	300		150		25		
	 		Yard Flooding (1 per lot)	10		5		0		
	<del>~</del>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	1						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street	50		25		4		
AΜ			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 5-2 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
FLOW	Q	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	//N	N		
ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot) Address: Q165-15 Devondale and Q164-16 Devondale	10	2	6		0		20
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	ō yrs pts)	
		Points for Age	(- )			. /			0
			тот	AL PR	OBLE	EM PO	INTS		20

PROJECT NAME: Figure 5-2 with BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0.5	PER 1	100 LF	10		5
R QL		Forebays		A	C	200		
ATEI		Wet Ponds		A	C	100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						20
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, s			
			тс	TAL	SOLU	TION POIN	TS	25
			т	OTAL	BEN	EFIT POINT	S	45

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

145

0.31

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

City of Frontenac										
S	Stormwat	er System	Master Impr	rovement Plan						
	C	ONCEPTUA	AL LEVEL ANA	LYSIS						
Project Name:	FIGURE	5-2 OVERLA	AND FLOW STR	RUCTURAL FLOODING						
Solutions By:	EDM INC		DATE: 10/	/18/2013						
Problem:	Yard pone	ding and base	ement flooding at	Q183 - 101 Frontenac Forest						
Strategy:	Install a d	iversion pipe	to reduce flow to	o existing undersized culvert.						
Description	Unit	Quantity	Unit Cost	Alternative 1						
48" RCP CLASS III	LF	230	\$254	\$58,310						
48" FES	EA	2	\$3,200	\$6,400						
Manhole	EA	3	\$1,500	\$4,500						
Erosion Protection	LS	1	\$10,000	\$10,000						
Restoration	LS	1	\$10,000	\$10,000						
Subtotal				\$89,210						
Total Benefit Points				270						
Individual Benefit Point Ratio2/01.44										
<b>Estimated Increased Propert</b>	y Values			\$10,000						
Total				\$89,210						
Utility Relocation			20%	\$17,842						
Clearing			5%	\$4,460						
Mobilization			4%	\$3,568						
Total with Percent Allowance	es			\$115,080						
Contingency			25%	\$28,770						
Probable Construction Cost	Estimate			\$143,850						
Design Engineering and Geote	Design Engineering and Geotechnical30%\$43,155									
Total Conceptual Cost Estim	ate			\$188,000						
<b>Total Benefit Points</b>				270						
Total Benefit Point Ratio				1.44						
Additional Comments:										

PROJECT NAME: Figure 5-2 Stucture without BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т.		Yard Flooding (1 per lot)	10		5		0		
	<u>~</u> .	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	L						
			Impacted & 2 lots per intersection impacted) Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 5-2 Stucture without BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q183-101Frontenac Forest	250	1	200		50		250
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	(/N	N		
'ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot) Address: Q183-101Frontenac Forest	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
~		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	. Age of Existing System		yrs pts)	26-50 yrs		<25 (0	5 yrs pts)	
		Points for Age			· ·	,	``````````````````````````````````````	·	0
			тот	AL PR	OBLE		INTS		260

PROJECT NAME: Figure 5-2 Stucture without BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
JALITY		Bioswales*	0	PER 1	100 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
∧ _		Wetlands		A	C	50		
ENTAL	Biostabilization of banks (per bank) PER 100 LF 10							
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, s			
			тс	TAL	SOLU		TS	10
			т	OTAL	BEN	EFIT POINT	S	270

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

188

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.44

Place "X" in one box below:

MSD Project
Project by Others

## City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 5-2 CHANNEL FIMNW, FIMN	W-2, FII	MNW-2-1			
Solutions By:	EDM INC.			DATE:	10/18	3/2013
Problem:	Yard erosion Q188 & 192 at 129 &141 From	itenac Fo	rest also EI	DM-146, 127	7, 150, 152,	103
	Frontenac Forest and 137, 139, 141, 143, an	d 145 Fro	ontenac For	est, Yard Flo	ooding Q192	2 141
_	Frontenac Forest, Q188, Street Flooding Q1	92 141 Fi	rontenac Fo	orest		
Strategy:	Install Bank Protection on FTMNW from St	ation 59+	-00 to $67+5$	0 (850 LF),	on FTMNW	-2 from
	2+00 to $5+25$ (325 LF), and on F1MINW-2-	1 from 0-	+00 to 4+50	) (430 LF).		
	Description	Unit	Ouantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (S)	LF	1,625	\$225	\$365,625	\$0
	Soft stabilization (S)	LF	1,625	\$125	\$0	\$203,125
	Geomorphic Study	Ea.	4	\$10,000		\$40,000
	Total				\$365,625	\$243,125
					\$365,625	\$243,125
	Utility Relocation					
	Clearing			20%	\$73,125	\$48,625
	Mobilization			5%	\$18,281	\$12,156
				4%	\$14,625	\$9,725
	Total with Percent Allowances				ф <b>АВ1</b> (БС	<b>\$212 (21</b>
	Contingonory				\$471,656	\$313,631
	Contingency			25%	\$117 914	\$78.408
	Probable Construction Cost Estimate			2370	ψ117,214	φ/0,+00
	Trobuble Construction Cost Estimate				\$589.570	\$392.039
	Design Engineering and Geotechnical				1 ).	1 )
				30%	\$176,871	\$117,612
	<b>Total Conceptual Cost Estimate</b>					
					\$767,000	\$510,000
	Benefit Points				560	1,105
	Benefit/Cost Ratio				0.73	2.17

**Additional Comments:** 

# PROJECT NAME: Figure 5-2 Channel FTMNW, FTMNW-2, FTMNW-2-1, Alternate 2

				Chro (<=2 Floor	onic P-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infree (>15 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	NG		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	т. Т		Yard Flooding (1 per lot) Address:129 & 141 Frontenac Forest	10	2	5		0		20
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	1						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
АM			Ardress:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address: 141 Frontenac Forest	10	1	5		1		10
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per lo	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

# PROJECT NAME: Figure 5-2 Channel FTMNW, FTMNW-2, FTMNW-2-1, Alternate 2

DATE: 10/18/13

			Chro (<=2 Floo	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)* Address:	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIDC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	vstem Y	′/N			
ĒRL		Attached Garage (1 lot per structure)	100		75		25		
ER / OV	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address	50		35		12		
EWI		Yard Flooding (1 per lot) 141 Frontenac Forest	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Addre 141 Frontenac Forest	No.	Lots:	1	Point	ts/lot:	10	10
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	o yrs ots)	
		Points for Age							
			тот	AL PR	OBLE		INTS		50

#### PROJECT NAME: Figure 5-2 Channel FTMNW, FTMNW-2, FTMNW-2-1, Alternate 2

DATE: 10/18/13

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	10	Points per Add'l Proj.:	50	500
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	100 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	33	PER 1	100 LF	10		330
NNOF		Riffle Pool Complex	16	PER 1	100 LF	10		160
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, s	Yes		55
			т		SOLU		rs	1055
			Т	OTAL	BEN		s	1105

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.17

Place "X" in one box below:

MSD Project Project by Others



# City of Frontenac Stormwater System Master Improvement Plan

	CONCE	PTUAL LE	VEL ANALY	SIS
Project Name:	FIGURE	6-1 OVERL	AND FLOW	
Solutions By:	EDM IN	Ζ.	DATE: 1	0/18/2013
Problem:	Yard eros	sion at Q92 -	9 Clayton Dov	vns
Strategy:	1) Rip Ra	p existing ch	annel to preve	nt erosion.
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Rip Rap Channel	LF	116	\$67	\$7,772
Subtotal				\$7,772
Total Benefit Points				30
Individual Benefit Point Ratio				1.84
<b>Estimated Increased Property Value</b>	s			\$3,000
Problem:	Yard eros	sion at Q94 -	13 Clayton Do	owns
Strategy:	1) Install	turf reinforce	ement mat to p	revent erosion.
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Turf Reinforcement Mat	LF	279	\$20	\$5,580
Subtotal				\$5,580
Total Benefit Points				30
Individual Benefit Point Ratio				2.56
<b>Estimated Increased Property Value</b>	es			\$2,000
Problem:	Yard eros	sion by Clayt	on Rd. at Q97	- 11161 Clayton Rd.
Strategy:	1) Rip Ra	p existing ch	annel to preve	nt erosion.
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Rip Rap Channel	LF	150	\$67	\$10,050
Subtotal				\$10,050
<b>Total Benefit Points</b>				30
Individual Benefit Point Ratio Estimated Increased Property Value	es			1.42 \$3,000
Total				\$23,402
Utility Relocation			20%	\$4,680
Clearing			5%	\$1,170
Mobilization			4%	\$936
Total with Percent Allowances				\$30,189
Contingency			25%	\$7,547
Probable Construction Cost Estimat	te			\$37,736
Design Engineering and Geotechnical			30%	\$20,000
Total Conceptual Cost Estimate				\$58,000
Total Benefit Points				140
Total Benefit Point Ratio				2.41
Additional Comments:				

PROJECT NAME: Figure 6-1 without BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŋN		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Address:	50		25		4		
AM			Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISOX		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-1 without BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
M01=	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
I DN	NIDC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
RLA	FLO(	Attached Garage (1 lot per structure) Address:	100	0	75		25		
WER / OVE	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot)	10	0	6		0		
I SE		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway							
) STORN		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
2.(		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q92-9 Clayton Downs; Q94-13 Clayton Downs; Q97- 11161 Clayton	No.	Lots:	3	Point	ts/lot:	10	30
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 (0	i yrs ots)	
		Points for Age							0
			тот	AL PR	OBLE		INTS		30

PROJECT NAME: Figure 6-1 without BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3 REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0	PER 1	100 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	2 100		
N		Wetlands		A	C	C 50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF 10			
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2.	Recreational/Educational	Ye ne	es = 100 b = 0 pt	0, s			
			тс	TAL	SOLU		TS	110
			т	OTAL	BEN		s	140

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

58

2.41

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

## City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE	6-1 OVERL	AND FLOW	STRUCTURAL FLO	ODING
Solutions By:	EDM INC	2.		DATE:	10/18/2013
•					
Problem:	Basement	flooding and	d yard erosior	n at Q68 - 6 Carole Ln	., garage flooding and
	yard erosi	ion at Q67 - 5	5 Carole Ln.,	and yard ponding at Q	63 - 7 Carole Ln.
Strategy:	1) Install	berm to catch	n overland flo	w and direct to inlet a	nd pipe system.
	Connect t	o existing bo	x culvert. Ac	ld Rain Garden to infi	ltrate runoff and
	protect na	tural channe	ls.2) Add Bio	swale to infiltrate rund	off and protect natural
	channels.				
	<b>T</b> T •/			1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Cost	Without BMP's	With BMP's
Single Inlet	EA	2	\$1,850	\$3,700	\$3,700
Now Porm	LE	3 122	\$1,500	\$4,300 \$2,225	\$4,500 \$2,225
New Berni	LF	155	\$23	\$5,525	\$5,525
12" RCP CLASS III	LF	435	\$116	\$50,486	\$50,486
Yard Drain	EA	1	\$500	\$500	\$500
Box Culvert Connection	LS	1	\$2,000	\$2,000	\$2,000
Rain Garden	EA	2	\$10,000	\$20,000	\$20,000
New Swale	LF	106	\$18	\$0	\$1,908
Subtotal				\$84,511	\$86,419
Total Benefit Points				455	484
Individual Benefit Point Ratio				2.57	2.67
Estimated Increased Property Value	es			\$9,000	\$16,000
Total				¢Q/ 211	¢96 110
Totai				\$84,511	\$80,419
Utility Relocation			20%	\$16,902	\$17,284
Clearing			5%	\$4,226	\$4,321
Mobilization			4%	\$3,380	\$3,457
Total with Percent Allowances				\$109,019	\$111,481
Contingency			25%	\$27,255	\$27,870
Probable Construction Cost Estimat	te			\$136,274	\$139,351
Design Engineering and Geotechnical			30%	\$40,882	\$41,805
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio				\$178,000 400 2.25	\$182,000 439 2.41

**Additional Comments:** 

PROJECT NAME: Figure 6-1 Structure with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŰZ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	1.1	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ë.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-1 Structure with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic P-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q68 - 6 Carole	250	1	200		50		250
FLOW	<u>U</u>	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.		Existing System Y/			N		
'ERL	FLO	Attached Garage (1 lot per structure) Address: Q67-5 Carole	100	1	75		25		100
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot) Address: Q63-7 Carole	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q68-6 Carole; Q67-5 Carole	No.	Lots:	2	Point	s/lot:	10	20
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE		INTS		380

PROJECT NAME: Figure 6-1 Structure with BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	3.38	PER 1	100 LF	10		34
R QL		Forebays		AC		200		
ATE		Wet Ponds		A	C	100		
N -		Wetlands		A	C	C 50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			15
			тс	TAL	SOLU		тѕ	59
			т	OTAL	BEN		S	439

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

182

2.41

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

# City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 6-1 CHANNEL FDCST-1					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Open ditch in front yard is deteriorating 11	155 Clayt	on Road, Y	ard Flooding	g and Erosio	n Q63-7
	Carole Lane					
Strategy:	1) Install bank protection on FDCST-1 from (280 LF).	n station 7	+50 to 8+0	0 (50 LF) an	d behind 7 G	Carole Lane
	<b>Description</b>	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (S)		330 330	\$225 \$125	\$74,250 \$0	\$U \$41.250
	Geomorphic Study	Ea.	2	\$10.000	Ф <b>О</b>	\$20,000
	Subtotal	24	-	¢10,000	\$74,250	\$61,250
	Total				\$74,250	\$61,250
	Utility Relocation			20%	\$14,850	\$12,250
	Clearing			5%	\$3,713	\$3,063
	Mobilization			4%	\$2,970	\$2,450
	<b>Total with Percent Allowances</b>				40 <b>5 5</b> 02	<b>450 013</b>
	Contingency				\$95,783	\$79,013
	Contingency			25%	\$23,946	\$19,753
	Probable Construction Cost Estimate			20 /0	<i><i>q</i><b>2</b><i>0,)</i> 10</i>	<i><i><i>q</i>1),ioo</i></i>
					\$119,728	\$98,766
	Design Engineering and Geotechnical					
				30%	\$35,918	\$29,630
	Total Conceptual Cost Estimate				\$156,000	\$129,000
	Benefit Points				80	175
	Benefit/Cost Ratio				0.51	1.36

**Additional Comments:** 

PROJECT NAME: Figure 6-1 Channel FDCST-1, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infree (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
		-	Attached Garage (1 lot per structure) Address:	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1.1. F		Yard Flooding (1 per lot) Address: 7 Carole Lane	10	1	5		0		10
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	•						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) <i>Address:</i>	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-1 Channel FDCST-1, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic -Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
ER / OVERLAND FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem Y	′/N			
		Attached Garage (1 lot per structure)	100		75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
S MRO		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Į					<u> </u>
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures		Lots:		Point	ts/lot:	20	
	2.3.	3. Yard Erosion (1 per lot) Address:		Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age				ř			
			тот		OBLE	EM PC	INTS		10

PROJECT NAME: Figure 6-1 Channel FDCST-1, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 DNAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	100 LF	10		
R QU		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
<b>N</b>		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	6	PER 1	100 LF	00 LF 10		60
RONM		Riffle Pool Complex	2	PER 1	100 LF	10		20
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	¥ 100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						20
	5.2.	Recreational/Educational	Ye	Yes = 100, no = 0 pts		Yes		15
			тс		SOLU		TS	165
			Т	OTAL	BEN		S	175

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.36

Place "X" in one box below:

MSD Project Project by Others



## City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE	6-2 OVERL	AND FLOW		
Solutions By:	EDM IN	2.		DATE:	10/18/2013
Problem	Vard non	ding and eros	sion at 095 -	11319 Clayton Rd	
Strategy:	1) Install	swale to exis	ting inlet 2	Add Bioswale to infi	iltrate runoff and protect
Strategy.	natural ch	annels	ting intet. 2)	Tidd Bloswale to him	function and protect
	flatul al Cl	laimeis.		1) Altomativa 1	2) Alternative 1 With
Description	T	0	U	1) Alternative 1	2) Alternative 1 with DMD-
Description	Umt	Quantity		without DMP's	DMP S
New Swale		19	\$18	\$1,422	¢2,000
Regrade Y and		1	\$2,000	\$2,000	\$2,000
Bioswale	LF	110	\$90	\$0	\$9,900
6" PVC	LF	165	\$24	\$3,960	\$3,960
Yard Drain	EA	1	\$500	\$500	\$500
Subtotal				\$7.882	\$16.360
<b>Total Benefit Points</b>				40	51
Individual Benefit Point Rat	io			2.42	1.49
Estimated Increased Propert	y Values	l'as et 0100	11222 Cha	<b>\$0</b>	\$2,000
Froblem:	1) I are pon	ung at Q100	- 11522 Clay	ton Ku, and yard eros	sion at Q101 - 11342
Strategy:	1) Install	an 8 wide co	ncrete swale	along property line to	existing culvert going
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
8 Wide Concrete Swale		238	\$66	\$15,708	\$15,708
New Berm		393	\$25	\$9,825	\$9,825
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$25,533	\$35,533
<b>Total Benefit Points</b>				40	45
Individual Benefit Point Rat	io			0.75	0.60
Estimated Increased Propert	v Values			\$0	\$2,000
Problem:	Yard pon	ding at Q103	- 11420 Clay	rton Rd. and Q104 - 1	1440 Clayton Rd.
Strategy:	1) Install	inlet and pip	e system to co	ollect water. Tie prop	osed system into existing
Description	Unit	Quantity	Unit Cost	1) Alternative 1	2) Alternative 1 With
Single Area Inlet	EA	5	\$1,750	\$8,750	\$8,750
12" RCP CLASS III	LF	151	\$116	\$17,525	\$17,525
18" RCP CLASS III	LF	360	\$129	\$46,541	\$46,541
21" RCP CLASS III	LF	226	\$137	\$30,937	\$30,937
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Bioswale	LF	238	\$90	\$0	\$21,420
Subtotal				\$103,753	\$135,173
<b>Total Benefit Points</b>				40	69
Individual Benefit Point Rat	io			0.18	0.24
Estimated Increased Propert	v Values			\$3,000	\$6,000
Problem:	Yard pon	ding at Q50 -	7 Bridle Ln.	,	
Strategy	1) Add D	aingarden to	infiltrate runs	off and protect natural	channels
Strattgy.	i) Auu K	angaiden to	minuate runc	1) Alternative 1	2) Alternative 1 With
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$10.000	\$10,000
<b>Total Benefit Points</b>				35	35
Individual Benefit Point Rat	io			1.67	1.67
Estimated Increased Propert	y Values			\$2,000	\$2,000

\$147,168

\$197,066

Utility Relocation	20%	\$29,434	\$39,413
Clearing	5%	\$7,358	\$9,853
Mobilization	4%	\$5,887	\$7,883
Total with Percent Allowances		\$189,847	\$254,215
Contingency	25%	\$47,462	\$63,554
Probable Construction Cost Estimate		\$237,308	\$317,769
Design Engineering and Geotechnical	30%	\$71,193	\$95,331
Total Conceptual Cost Estimate		\$309,000	\$414,000
Total Benefit Points		240	305
Total Benefit Point Ratio		0.78	0.74

**Additional Comments:**
PROJECT NAME: Figure 6-2 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
	Ű		Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1.1. FI		Yard Flooding (1 per lot) Address	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-2 with BMP's

DATE: 10/18/2013

				onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
LOW		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
ND F	DNIC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.			/stem \	′/N	N		
RLAI	00	Attached Garage (1 lot per structure) Address:	100	0	75		25		
SEWER / OVEF	2.1. FL	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q95-11319 Clayton; Q100-11322 Clayton; Q103- 11420 Clayton; Q104-11440 Clayton; Q50-7 Birdle	10	5	6		0		50
ORN		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)					1		
2.0 ST		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q101-11342 Clayton, Q95-11319 Clayton	No.	Lots:	2	Point	ts/lot:	10	20
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE				70

PROJECT NAME: Figure 6-2 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	3	Points per Add'l Proj.:	50	150
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	4.98	PER 1	100 LF	10		50
R QL		Forebays		А	C	200		
ATEI	Wet Ponds					100		
N/	Wetlands					50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex PER 100 L		00 LF	10			
IN	4.2.	Eliminates combined sewer (per project)	EA			100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	ducational Yes = 100, no = 0 pts					25
			тс	TAL	SOLU		TS	235
			т	OTAL	BEN	EFIT POINT	S	305

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

414

0.74

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others







### City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE	6-3 OVERL									
Solutions By:	EDM ING	2.		DATE: 10/18/2013							
			10 5		10.5						
Problem:	Yard eros	sion at Q176	- 10 Frontena	c Estates Dr and Q178	- 18 Frontenac						
	Estates D	r and yard po	onding at Q17	7 - 57 Frontenac Estat	es Dr and $Q175 - 61$						
G4 4	Frontenac	Estates Dr	11								
Strategy:	I) Add in	let and pipe s	system to coll	ect water and connect	to storm sewer						
	system. I	Resized under	rsized storm s	ewer pipes. Add Rair	Gardens to infiltrate						
	runoff and	d protect nati	iral channels.	2) Add Rain Gardens	s to infiltrate runoff						
	and prote	ct natural cha	innels.	1) Alternative 1	2) Alternative 1						
Description	Unit	Quantity	Unit Cost	Without RMP's	With RMP's						
Single Area Inlet	FA	<b>Quantity</b> 14	\$1.750	\$24 500	\$24 500						
12" RCP CLASS III	LF	266	\$116	\$30,872	\$30,872						
15" RCP CLASS III	LF	127	\$124	\$15,784	\$15,784						
18" RCP CLASS III	LF	915	\$129	\$118.291	\$118.291						
21" RCP CLASS III	LF	275	\$137	\$37.645	\$37.645						
24" RCP CLASS III	LF	309	\$144	\$44,342	\$44,342						
30" RCP CLASS III	LF	84	\$163	\$13,712	\$13,712						
30" RCP CLASS III	LF	72	\$163	\$11,753	\$11,753						
33" RCP CLASS III	LF	345	\$174	\$60,178	\$60,178						
33" FES	EA	1	\$2,000	\$2,000	\$2,000						
New Berm	LF	62	\$25	\$1,550	\$1,550						
Rain Garden	EA	2	\$10,000	\$20,000	\$20,000						
Rain Garden	EA	2	\$10,000	\$0	\$20,000						
Subtotal				\$380,627	\$400,627						
Total Benefit Points				135	145						
Individual Benefit Point Ratio	0			0.17	0.17						
Estimated Increased Property	y Values			\$9,000	\$17,000						
Problem:	Erosion a	t entrance to	Frontenac Est	tates Drive.							
Strategy:	I) Provid	e erosion pro	tection around	1) Alternative 1	2) Altomativa 1						
Description	I Init	Quantity	Unit Cost	Without BMD's	2) Alternative 1 With BMD's						
Line existing 8" CMP			\$30	\$2 250	\$2 250						
Creding		1	\$300	\$2,250	\$2,230						
Concrete Aprop		1	\$2,000	\$2,000	\$2,000						
Concrete Apron	Lo	1	\$750	\$750	\$750						
Subtotal				\$5 000	\$5 000						
Total Benefit Points				30	30						
Individual Benefit Point Ratio	n			2.86	2.86						
Estimated Increased Property	v Values			\$0	\$0						
<u></u>	, , , , , , , , , , , , , , , , , , , ,			φ0	Ψ						
Total				\$385,627	\$405,627						
Utility Relocation			20%	\$77,125	\$81,125						
Clearing			5%	\$19,281	\$20,281						
Mobilization			4%	\$15,425	\$16,225						
Total with Percent Allowance	s			\$497,459	\$523,259						
Contingency			25%	\$124,365	\$130,815						
Probable Construction Cost I	Estimate			\$621,823	\$654,073						
Design Engineering and Geotec	chnical		30%	\$186,547	\$196,222						
Total Concentual Cost Estima	ate			\$809.000	\$851.000						
Total Benefit Points				155	175						
Total Benefit Point Ratio				0.19	0.21						

**Additional Comments:** 

PROJECT NAME: Figure 6-3 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
	Ű		Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1.1. FI		Yard Flooding (1 per lot) Address	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ë.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-3 with BMP's

DATE: 10/18/2013

				onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
	(1)	Basement (1 lot per structure)*	250	0	200		50		
LOW		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
ND F	DINC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.		sting Sy	/stem \	′/N	N		
RLAI	LOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
R / OVEF	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWEF		Yard Flooding (1 per lot) Address: Q177-57 Frontenac Estates; Q175-61 Frontenac Estates	10	2	6		0		20
RM (		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q176-10 Frontenac Estates; Q178-18 Frontenac Estates	No.	Lots:	3	Point	s/lot:	10	30
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							30
			тот	AL PR	OBLE		INTS		80

PROJECT NAME: Figure 6-3 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	2	PER 1	100 LF	10		20
R QL		Forebays		А	C	200		
ATEI	Wet Ponds					100		
N/	Wetlands AC							
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex PER 100		100 LF	10			
IN	4.2.	Eliminates combined sewer (per project)	EA			100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						5
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			20
			тс	TAL	SOLU		TS	95
			т	OTAL	BEN	EFIT POINT	s	175

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

851

0.21

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

			City of	Frontenac
		Storm	water System M	Iaster Improvement Plan
			CONCEPTUAL	LEVEL ANALYSIS
Project Name:	FIGURE	6-3 OVERL	AND FLOW STRU	CTURAL FLOODING
Solutions By:	EDM INC	2.	DATE: 10/18/2	2013
Problem:	Garage fl	ooding at Q1	74 - 9 Frontenac Es	tates Dr.
Strategy:	1) Regrad	e existing sw	ale to direct water a	away from garage.
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
New Swale	LF	237	\$18	\$4,266
Additional Grading and Restoration	LS	1	\$3,500	\$3,500
Subtotal				\$7,766
<b>Total Benefit Points</b>				120
Individual Benefit Point Ratio				7.37
Estimated Increased Property Value	ies			\$1,000
Total				\$7,766
Utility Relocation			20%	\$1,553
Clearing			5%	\$388
Mobilization			4%	\$311
Total with Percent Allowances				\$10,018
Contingency			25%	\$2,505
Probable Construction Cost Estimate	ate			\$12,523
Design Engineering and Geotechnica	1		30%	\$20,000
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio				\$33,000 120 3.64

**Additional Comments:** 

PROJECT NAME: Figure 6-3 Structural without BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т.		Yard Flooding (1 per lot)	10		5		0		
	<u>~</u> .	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	L						
			Impacted & 2 lots per intersection impacted) Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-3 Structural without BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floc	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
	U	Basement (1 lot per structure)*	250	0	200		50		
FLOW		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	(/N	N		
ERL	FLO	Attached Garage (1 lot per structure) Address: Q174-9 Frontenac Estates	100	1	75		25		100
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot) Address:	10	0	6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)					1	1	
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE	EM PC	INTS		100

PROJECT NAME: Figure 6-3 Structural without BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
JALITY		Bioswales*	0	flowrate :       I       Points per Add'I Proj.:       50         No. Add'I Projects:       0       Points per Add'I Proj.:       50         No. Units       Points per Unit       10         0       PER 100 LF       10         AC       200         AC       50         PER 100 LF       100         PER 100 LF       10         PER 100 LF       10         PER 100 LF       10         PER 100 LF       10         PER 100 LF       10				
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
∧ _		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						20
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			
			тс	TAL	SOLU		TS	20
			т	OTAL	BEN		s	120

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

33

3.64

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others



#### City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

D		STDEAM CE		
Project Name:	FIGURE 6-4	- STREAM CR	COSSING	10/10/2012
Solutions By:	EDM INC.			10/18/2013
Problem:	Undersized c	ulvertes under I	Lynnbrook Rd	
Strategy:	Replace exis	ting twin 60" R	CP with new C	Conspan Culverts
Description	Unit	Quantity	Unit Cost	Alternative 1
24x6 Conspan Culvert	LF	60	\$3,900	\$234,000
Associated Erosion Protection	LS	1	\$25,000	\$25,000
18x6 Conspan Culvert	LF	60	\$3,900	\$234,000
Associated Erosion Protection	LS	1	\$25,000	\$25,000
Subtotal				\$518,000
Total Benefit Points				60
Individual Benefit Point Ratio	0			0.06
<b>Estimated Increased Property</b>	y Values			\$0
Problem:	Yard Pondin	g at Q294 - 3 Ly	nnbrook Rd.	
Strategy:	Add yard dra	ins to collect w	ater and pipe u	inder driveway.
Description	Unit	Quantity	Unit Cost	Alternative 1
Yard Drain	EA	2	\$500	\$1,000
6" PVC	LF	129	\$24	\$3,096
Restoration	LS	1	\$2,000	\$2,000
Subtotal				\$6,096
Total Benefit Points				30
<b>Individual Benefit Point Ratio</b>	0			2.35
Estimated Increased Property	y Values			\$3,000
Total				\$524,096
Utility Relocation			20%	\$104,819
Clearing			5%	\$26,205
Mobilization			4%	\$20,964
Total with Percent Allowance	es			\$676,084
Contingency			25%	\$169,021
Probable Construction Cost I	Estimate			\$845,105
Design Engineering and Geotec	chnical		30%	\$253,531
Total Conceptual Cost Estima	ate			\$1,099,000
Total Benefit Points				120
Total Benefit Point Ratio				0.11

Additional Comments:

PROJECT NAME: Figure 6-4 without BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ÐN		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Е		Yard Flooding (1 per lot) Address:	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISOS		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-4 without BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic P-Yr) ding	Freq (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIDC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	(/N	N		
ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWI		Yard Flooding (1 per lot) Address: Q294-3 Lvnnbrook	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)					1		
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Lynnbrook Road (2 Locations)	No. P	onds:	2	Points	/pond:	5	10
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age	(- )			. /			30
			тот	AL PR	OBLE	EM PC	INTS		50

PROJECT NAME: Figure 6-4 without BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0	owrate :     I     Points per Add'l Proj.:     50       No. Units     Points per Unit     50       No. Units     Points per Unit     10       AC     200       AC     100       AC     50       PER 100 LF     10       AC     50       PER 100 LF     10       PER 100 LF     10       PER 100 LF     10       PER 100 LF     10				
R al		Forebays		A	С	200		
ATE		Wet Ponds		A	C	100		
N / -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						20
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			
			тс	TAL	SOLU		TS	70
			т	OTAL	BEN		s	120

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1099

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.11

Place "X" in one box below:

MSD Project
Project by Others

## City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 6-4 CHANNEL FDCST					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Creek erosion MSD 20 - 25 Lynnbrook, MSD	21 - 31	Lynnbrool	k. Creek inc	ision SR-9,	Q297,
	Q298, Q299, Q295 - 10, 12, 21, 23, 25, 18, 29	, 31 Ly	nnbrook.FI	K-21, Q297	- 31 Lynnbr	DOK.
Strategy:	1) Install bank protection on FDCST from stati 28+00 (750 LF).	on 15+	50 to 19+0	0 (350 LF) a	and from 20	+50 to
	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L)		1,100	\$300	\$330,000	\$0
	Geomorphic Study	Ea	3	\$200 \$10.000	φŪ	\$220,000
	Subtotal	Dui	0	<i><b>Q</b></i> 10,000	\$330,000	\$250,000
	Total				\$330,000	\$250,000
	Utility Relocation					
	Clearing			20%	\$66,000	\$50,000
	Mobilization			5%	\$16,500	\$12,500
				4%	\$13,200	\$10,000
	Total with Percent Allowances				\$425 700	\$322 500
	Contingency				φ <b>-2</b> 5,700	<i>\$322,300</i>
	g,			25%	\$106,425	\$80,625
	Probable Construction Cost Estimate					
					\$532,125	\$403,125
	Design Engineering and Geotechnical			200	¢150 629	\$120.029
	Total Concentual Cost Estimate			30%	\$139,038	\$120,938
					\$692,000	\$525,000
	Benefit Points				360	730
	Benefit/Cost Ratio				0.52	1.39
Additional Comments:						

PROJECT NAME: Figure 6-4 Channel FDCST, Alternate 2

				Chro	onic	Fred	went	Infre	quent	
				(<=2	-Yr)	(>2<=	15-Yr)	(>15	5-Yr)	(0
				Floo	ding	Floo	ding	Floc	oding	oints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŊŨ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	<u>-</u> -		Yard Flooding (1 per lot) Address:	10		5		0		
	÷	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	1	1					
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	NOISOF		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-4 Channel FDCST, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
ELOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
ERL	-LO(	Attached Garage (1 lot per structure)	100		75		25		
ER / OV	ER / OV	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
S M S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					<u> </u>
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures <i>Address:</i>	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	ō yrs pts)	
		Points for Age							
			тот		OBLE		INTS		

PROJECT NAME: Figure 6-4 Channel FDCST, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flow	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. Proj	Add'l ects:	7	Points per Add'l Proj.:	50	350
	4.1.	Addresses pollutants:	Ν	Io. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	100 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
<b>N</b>		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	22	PER 100 L		10		220
RONMI		Riffle Pool Complex	11	PER 1	100 LF	10		110
INVI	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements		1	В			10
	5.2.	Recreational/Educational	Y n	es = 10 o = 0 pt	0, s	Yes		40
			т		SOLU		TS	730
			г	OTAL	BEN		S	730

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.39

Place "X" in one box below:

MSD Project Project by Others CITY OF FRONTENAC CONCEPTUAL SOLUTIONS



#### City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 6-5	- STREAM CH	ROSSING					
Solutions By:	EDM INC	5 TREA IN CI	10	/18/2013				
	221111(0)		10	10/2010				
Problem:								
	Yard erosion	at Q114 - 19 C	layton Terrace and	l street ponding at the intersection of				
	Lindbergh Blvd. and Clayton Terrace (Q116)							
Strategy:	Add culvert under Clayton Terrace and grade swale along 18 Clayton Terrace. Add							
	Rain Garden	o infiltrate run	off and protect nat	ural channels.				
Description	Unit	Quantity	Unit Cost	Alternative 1				
New Swale	LS	1	\$5,000	\$5,000				
Additional Clearing and Grading	LS	1	\$3,000	\$3,000				
12" RCP CLASS III	LF	14	\$116	\$1,625				
12" FES	EA	2	\$1,100	\$2,200				
Rain Garden	EA	1	\$10,000	\$10,000				
Subtotal				\$21 825				
Total Benefit Points				¢21,625 40				
				••				
Individual Benefit Point Ratio				0.87				
Estimated Increased Property Val	ues			\$2,000				
Problem:	Undersized cu	ilvert under Li	ndbergh Blvd and	an undersized bridge under Clayton				
	Terrance., (Q	116)						
Strategy:	Replace exist	ing bridge and	culvert with new C	Conspan Culverts				
Description	Unit	Quantity	Unit Cost	Alternative 1				
28x7 Conspan Culvert	LF	130	\$4,000	\$520,000				
Associated Erosion Protection	LS	1	\$25,000	\$25,000				
24x7 Conspan Culvert	LF	15	\$4,500	\$67,500				
Associated Erosion Protection	LS	1	\$25,000	\$25,000				
Associated Pavement Replacement	LS	1	\$20,000	\$20,000				
Subtotal				\$657 500				
Fotal Benefit Points				34				
Individual Benefit Point Ratio				0.02				
Estimated Increased Property Val	ues			\$0				
Problem:	Yard erosion	at Q110 - 6 Cla	yton Terrace					
Strategy:	Add culvert u	nder driveway.	Add Rain Garder	n to infiltrate runoff and protect natura				
	channels.							
Description	Unit	Quantity	Unit Cost	Alternative 1				
Additional Grading	LS	1	\$2,000	\$2,000				
2" RCP CLASS III	LF	10	\$116	\$1,161				
12" FES	EA	2	\$1,100	\$2,200				
Rain Garden	EA	1	\$10,000	\$10,000				
				\$15.361				
Subtotal								
Subtotal Total Benefit Points				35				
Subtotal Total Benefit Points Individual Benefit Point Ratio				35				

Total

\$694,685

Utility Relocation	20%	\$138,937
Clearing	5%	\$34,734
Mobilization	4%	\$27,787
Total with Percent Allowances		\$896,144
Contingency	25%	\$224,036
Probable Construction Cost Estimate		\$1,120,180
Design Engineering and Geotechnical	30%	\$336,054
Total Conceptual Cost Estimate		\$1,457,000
Total Benefit Points		169
Total Benefit Point Ratio		0.12
Additional Comments:		

PROJECT NAME: Figure 6-5 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ЫG		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:1131Lindbergh	50		25		4	1	4
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISOX		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ë.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 6-5 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
MO1-	(7)	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
UN I	DING	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem Y	′/N	N		
ERLA	LOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
R / OVE	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
ME		Yard Flooding (1 per lot)	10	0	6		0		
I SE		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway							
RN		impacted & 2 lots per intersection impacted) Emergency Access restricted (>12" water over only access							
0 STC		route to habitable structure), pts per structure Address:	200		150		25		
ъ.		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Lindbergh and Clayton Terrace; Lindbergh; Clayton Terrace	No. P	onds:	3.8	Points	/pond:	5	19
	2.2.	Moderate Risk Erosion of misc. structures Address:	No. I	_ots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q114-19 Clayton Terrace; Q110-6 Clayton Terrace	No. I	Lots:	2	Point	s/lot:	10	20
	2.4.	Age of Existing System		yrs ots)	3 26-50 yrs ) (15 pts)		/rs <25 yrs s) (0 pts)		
		Points for Age							0
			тоти	AL PR	OBLE		INTS		43

PROJECT NAME: Figure 6-5 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1	PER 1	100 LF	10		10
R QL		Forebays		A	C	200		
ATE		Wet Ponds	AC			100		
N -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	EA 10			
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s			10
			т	TAL	SOLU	TION POIN	TS	130
TOTAL BENEFIT POINTS 17						173		

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1457

0.12

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:



## City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Froject Name:	FIGURE 6-5 CHANNEL FDCST					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Creek erosion in unmaintained area Q108, M	1SD9 - 3	Clayton Te	rrace. Incisi	on and unsta	able banks
	SR-6, yard hooding Q108.					
Strategy:	1) Install bank protection on FDCST from st	ation 2+0	00 to 5+50	(350 LF).		
	Description	Unit	Quantity	Unit Cost	A T TT 1	ALT 2
	Hard stabilization (L)		350	\$300	\$105.000	ALI 2 \$0
	Soft stabilization (L)	LF	350	\$200	\$105,000 \$0	\$70,000
	Geomorphic Study	Ea.	1	\$10.000	ψΟ	\$10,000
	Subtotal		-	+,	\$105,000	\$80,000
	Total				\$105,000	\$80,000
	Utility Relocation					
	Clearing			20%	\$21,000	\$16,000
	Mobilization			5%	\$5,250	\$4,000
				4%	\$4,200	\$3,200
	Total with Percent Allowances				<b>*125150</b>	
	Continuous				\$135,450	\$103,200
	Contingency			250%	\$22.962	\$25 800
	Probable Construction Cost Estimate			23%	\$33,003	\$23,800
	Trobable Constituction Cost Estimate				\$169.313	\$129.000
	Design Engineering and Geotechnical				<i>q</i> 10, <i>y</i> 010	<i><i><i>q</i><sup>2</sup><i>2</i>,0000</i></i>
				30%	\$50,794	\$38,700
	<b>Total Conceptual Cost Estimate</b>					
					\$221,000	\$168,000
	Benefit Points				180	320
	Benefit/Cost Ratio				0.81	1.90

**Additional Comments:** 

PROJECT NAME: Figure 6-5 Channel FDCST, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	juent 15-Yr) oding	Infre (>1 Floo	quent 5-Yr) oding	nts
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	.1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address: 3 Clayton Terrace	10	1	5		0		10
	÷.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

\_\_\_\_

PROJECT NAME: Figure 6-5 Channel FDCST, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem Y	′/N			
/ERL	2.1. FLO0	Attached Garage (1 lot per structure) Address:	100		75		25		
ER / OV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address	50		35		12		
EWI		Yard Flooding (1 per lot)	10		6		0		
S M S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		ļ					<u> </u>
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures <i>Address:</i>	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System		yrs pts)	26-5 (15	0 yrs pts)	) yrs <25 pts) (0 r		
		Points for Age		· ·					
			тот		OBLE		INTS		10

PROJECT NAME: Figure 6-5 Channel FDCST, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY																					
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000																
REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. A Proje	Add'l ects:	3	Points per Add'l Proj.:	50	150															
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit																
ΙΑLITY		Bioswales		PER 1	100 LF	10																	
R QL		Forebays		A	C	200																	
ATE		Wet Ponds		A	C	100																	
N /		Wetlands		AC		50																	
ENTAL		Biostabilization of banks (per bank)	7	PER 100 LF		PER 100 LF		PER 100 LF		PER 100 LI	PER 100 LF		PER 100 LF		PER 100 LF		PER 100 LF		7 PER 100	100 LF	10		70
NNOF		Riffle Pool Complex	3	PER 1	100 LF	10		30															
INN	4.2.	Eliminates combined sewer (per project)		E	A	. 100																	
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		EA		EA		EA		EA		EA		10							
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	0-5 (20 pts) 6-10 (10 pts)		11-15 (5 pts)	>15 (0 pts)																
5.01		Points for Easements	4					20															
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s	Yes		40															
			т		SOLU		TS	310															
TOTAL BENEFIT POINTS 32								320															

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.90

Place "X" in one box below:

MSD Project Project by Others

### City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 6-5 CHANNEL STRUCTURAL FL	OODIN	NG FDCST		
Solutions By:	EDM INC.			DATE:	10/18/2013
Problem:	17 Clayton Terrace has first floor flooding and	11 Cla	yton Terra	ce has pool h	ouse flooding.
Strategy:	1) Flood proof 17 Clayton Terrace and pool ho	ouse at 1	11 Clayton	Terrace.	
	Description	Unit	Quantity	Unit Cost	ALT 1
	Flood Proof (17 Clayton Terrace)	Ea.	1	\$60,000	\$60,000
	Subtotal	Ea.	1	\$20,000	\$20,000 \$80,000
	Total				\$80,000
	Utility Relocation				
	Clearing			20%	\$16,000
	Mobilization			5%	\$4,000
				4%	\$3,200
	Total with Percent Allowances				\$103.200
	Contingency				¢100,200
				25%	\$25,800
	Probable Construction Cost Estimate				
					\$129,000
	Design Engineering and Geotechnical			30%	\$38 700
	Total Conceptual Cost Estimate			50 %	\$50,700
					\$168,000
	Benefit Points				245
	Benefit/Cost Ratio				1.46
Additional Comments:					

PROJECT NAME: Figure 6-5 Structural Flooding Channel FDCST, Alternate 1

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infree (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address: 17 Clayton Terrace	300		150	1	25		150
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	1.1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:11 Clayton Terrace	50		25	1	4		25
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	1						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
АM			Ardress:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
	_		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	-	10 poin	ts per lo	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12	<u> </u>	3		

## PROJECT NAME: Figure 6-5 Structural Flooding Channel FDCST, Alternate 1

DATE: 10/18/2013

			Chro (<=2 Floor	onic 2-Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem Y	′/N			
ERL	2.1. FLOO	Attached Garage (1 lot per structure)	100		75		25		
ER / OV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
EWE		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					<u> </u>
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures <i>Address:</i>	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System		yrs pts)	26-50 yrs (15 pts)		<25 (0	ō yrs pts)	
		Points for Age							
			тот		OBLE		INTS		175

#### PROJECT NAME: Figure 6-5 Structural Flooding Channel FDCST, Alternate 1

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000	
REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
ΙΑLITY		Bioswales		PER 1	00 LF	10		
R QU		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
N / -		Wetlands		AC		50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	0 LF 10		
NNOF		Riffle Pool Complex		PER 1	00 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements	2					20
	5.2.	Recreational/Educational	Ye n	es = 100 o = 0 pt	), s			
			т		SOLU		TS	70
TOTAL BENEFIT POINTS 24								245

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.46

Place "X" in one box below:

MSD Project Project by Others


Project Name:	FIGURE 7-1 CHANNEL FDC and FDCW	R				
Solutions By:	EDM INC.			DATE:	10/18/	2013
Problem:	Creek erosion, yard flooding, loosing fence Q-35 816 Bluespring. Yard flooding and er erosion Q427 - 28 Vouga Lane. Meanderin Creek Erosoin MSD 14 - 44 Villa Coublay.	Q38 N osion g creel	ISD 22 - 80 Q33 - 824 1 <, yard eros	)2 Blue Spri Blue Spring. ion SR7 - 3(	ng Lane. Yar Yard floodir ) and 31 Voug	d flooding ng and ga Lane.
Strategy:	1) Install bank protection on FDC from stati on FDCWR station 0+00 to 3+20 (320 LF).	on 52-	+50 to 67+4	44 (1490 LF	). Install banl	c protection
	<b>Description</b> Hard stabilization (L) Soft stabilization (L) Geomorphic Study	Unit LF LF Ea.	<b>Quantity</b> 1,810 1,810 4	Unit Cost \$300 \$200 \$10,000	ALT 1 \$543,000 \$0	ALT 2 \$0 \$362,000 \$40,000
	Total				\$ <b>543,000</b>	\$402,000 \$402,000
	Utility Relocation Clearing Mobilization			20% 5% 4%	\$108,600 \$27,150 \$21,720	\$80,400 \$20,100 \$16,080
	Total with Percent Allowances				\$700,470	\$518,580
	Contingency			25%	\$175,118	\$129,645
	Probable Construction Cost Estimate				\$875,588	\$648,225
	Design Engineering and Geotechnical			30%	\$262,676	\$194,468
	Total Conceptual Cost Estimate				\$1,139,000	\$843,000
	Benefit Points Benefit/Cost Ratio				450 0.40	1,035 1.23

Additional Comments:

## PROJECT NAME: Figure 7-1 Channel FDC and FDCWR, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	t Infrequent (r) (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	NG		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	IDOO1:		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	н. Н		Yard Flooding (1 per lot) Address: 802, 816, 824 Bluesping Ln, 28 Vouga Ln	10	4	5		0		40
	-	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) <i>Address:</i>	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

## PROJECT NAME: Figure 7-1 Channel FDC and FDCWR, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* <i>Address:</i>	350		250		65		
		Basement (1 lot per structure)* Address:	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIQC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.		Existing System Y/N					
ER / OVERI	2.1. FLOO	Attached Garage (1 lot per structure) Address:	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWI		Yard Flooding (1 per lot) Address	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	. Age of Existing System		yrs ots)	26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							
			тот	AL PR	OBLE		INTS		40

PROJECT NAME: Figure 7-1 Channel FDC and FDCWR, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	8	Points per Add'l Proj.:	50	400
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
JALITY		Bioswales		PER 1	00 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
N /		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	36	PER 1	00 LF	10		360
NNOF		Riffle Pool Complex	18	PER 1	00 LF	10		180
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	), s	Yes		45
			т		SOLU		TS	995
	TOTAL BENEFIT POINTS 103							

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.23

Place "X" in one box below:

MSD Project Project by Others



City of Frontenac										
Stor	mwater	System Ma	aster Impro	vement Plan						
	CON	CEPTUAL I	LEVEL ANAL	_YSIS						
Project Name:	FIGURE	7-2 OVERL⊿ ¬	AND FLOW	0/18/2012						
Solutions By:	EDM ING	<i>.</i> .	DATE: I	0/18/2013						
Problem	Yard eros	sion at O500	- 7 Jaccard Ln							
Strategy:	1) Install	new inlet and	l pipe system t	o catch water.						
	,		11 5							
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's						
15" RCP CLASS III	LF	25	\$124	\$3,107						
15" FES	EA	1	\$1,200	\$1,200						
Single Area Inlet	EA	1	\$1,750	\$1,750						
Asphalt Curb	LS	224	\$32	\$7,168						
Slope Protection	LS	1	\$3,000	\$3,000						
				¢1< >>=						
Subtotal				\$16,225						
Total Benefit Points				<u> </u>						
Individual Benefit Point Ratio	<b>X</b> 7 - <b>I</b>			0.88						
Estimated Increased Property	Values	, nondina of (	052 051 Dres	<b>5U</b>						
Problem:	11155 Co	ponding at t	255 - 951 Brow	whood Dr., yard ponding at Q138 -						
Stuatogra	1) Commo	niway Ku., ar	to evicting inle	at Q43-945 Bluesprings Ln.						
Strategy:	1) Conne	ct yard drain	long drivery	et at 951 Brownwood Dr and remove						
	portion o	of 045 Plue	uong uriveway	at 11155 Bluespring Ln. Provide erosion						
protection at 945 Bluesprings Ln										
Description	Unit	Ouantity	Unit Cost	1) Alternative 1 Without BMP's						
Remove Portion of Block Curb	LS	1	\$300	\$300						
New Berm	LF	32	\$25	\$800						
Yard Drain	EA	1	\$500	\$500						
6" PVC	LF	20	\$24	\$480						
Restoration	LS	1	\$1,000	\$1,000						
Bank Protection	LF	270	\$100	\$27,000						
Connect to Existing Inlet	LS	1	\$500	\$500						
C C										
Subtotal				\$30,580						
<b>Total Benefit Points</b>				50						
<b>Individual Benefit Point Ratio</b>				0.78						
Estimated Increased Property	Values			\$0						
Total				\$46,805						
			2004	¢0.261						
Classing			20%	\$9,301						
Clearing			5%	\$2,340 \$1,972						
Modifization			4%	\$1,672						
Total with Percent Allowances				\$60.378						
Total with Percent Anowances				<i>400,378</i>						
Contingency			25%	\$15.095						
Contingency			2070	410,070						
Probable Construction Cost Es	timate			\$75,473						
Design Engineering and Geotech	nical		30%	\$22,642						
<b>Total Conceptual Cost Estimat</b>	e			\$99,000						
Total Benefit Points			110							
Total Benefit Point Ratio				1.11						

**Additional Comments:** 

PROJECT NAME: Figure 7-2 without BMP's

						Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	oints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ŋN		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Address:	50		25		4		
AM			Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISOX		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-2 without BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic P-Yr) ding	Freq (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints	
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po	
		2.1.1. Structure Flooding								
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65			
		Basement (1 lot per structure)*	250	0	200		50			
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50			
AND	NIDC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	(/N	N			
ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25			
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12			
EWI		Yard Flooding (1 per lot) Address: Q53-951 Brownwood; Q138-11155 Conway	10	2	6		0		20	
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)								
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25			
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6			
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2			
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1			
		Ponding (per ponding area) Address: Q53-951 Brownwood	No. P	onds:	0	Points	/pond:	5		
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20		
	2.3.	Yard Erosion (1 per lot) Address: Q500 - 7 Jaccard, Q43-945 Bluesprings	No.	Lots:	2	Point	ts/lot:	10	20	
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 (0	5 yrs pts)		
		Points for Age							0	
Т.					TOTAL PROBLEM POINTS					

PROJECT NAME: Figure 7-2 without BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0	PER 1	100 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
∧ _		Wetlands	AC					
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						20
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			
			тс	TAL	SOLU		TS	70
TOTAL BENEFIT POINTS						110		

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

99

1.11

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:



Project Name:	FIGURE	7-2 OVERL	AND FLOW	STRUCTURAL FLO	ODING		
Solutions By:	EDM INC	, <u> </u>		DATE:	10/18/2013		
Solutions Dj.	201110			DATE.	10,10,2010		
Problem:	Yard floo	ding at Q425	- 9 Vouga Li	n, yard erosion at Q41	- 890 Bluespring Ln		
	and baser	nent and yard	l flooding at (	Q42 - 925 Bluespring	Ln		
Strategy:	1) Install	berm to catch	n overland flo	w and direct to inlet a	nd pipe system.		
	Resize un	dersized syst	ems. 2) Add	Bioswale to infiltrate	runoff and protect		
	natural ch	annels.					
				1) Alternative 1	2) Alternative 1		
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's		
Single Area Inlet	EA	7	\$1,750	\$12,250	\$12,250		
12" RCP CLASS III	LF	151	\$116	\$17,525	\$17,525		
18" RCP CLASS III	LF	18	\$129	\$2,327	\$2,327		
Rock Blanket	SY	138	\$52	\$7,176	\$7,176		
27" RCP CLASS III	LF	0	\$150	\$0	\$0		
30" RCP CLASS III	LF	0	\$163	\$0	\$0		
18" FES	EA	1	\$1,300	\$1,300	\$1,300		
24" FES	EA	2	\$1,600	\$3,200	\$3,200		
27" FES	EA	1	\$1,700	\$1,700	\$1,700		
30" FES	EA	1	\$1,900	\$1,900	\$1,900		
New Berm	LF	150	\$25	\$3,750	\$3,750		
Rain Garden	EA	1	\$10,000	\$0	\$10,000		
Subtotal				\$51,128	\$61,128		
Estimated Increased Property	Values			\$10,000	\$12,000		
Total				\$51,128	\$61,128		
Utility Relocation			20%	\$10,226	\$12,226		
Clearing			5%	\$2,556	\$3,056		
Mobilization			4%	\$2,045	\$2,445		
Total with Percent Allowances				\$65,955	\$78,855		
Contingency			25%	\$16,489	\$19,714		
Probable Construction Cost Es	timate			\$82,444	\$98,569		
Design Engineering and Geotech	nical		30%	\$24,733	\$29,571		
Hydraulic Study And Geomorphi	ic Study			\$20,000	\$20,000		
<b>Total Conceptual Cost Estimat</b>	e			\$128,000	\$149,000		
Total Benefit Points				305	342		
<b>Total Benefit Point Ratio</b>				2.38	2.30		

**Additional Comments:** 

PROJECT NAME: Figure 7-2 Structure with BMP's

						Frec (>2<= Floc	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		oints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ÐN		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address:	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-2 Structure with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	) Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q42-925 Bluespring	250	1	200		50		250
FLOW	Q	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem Y	′/N	N		
ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
EWE		Yard Flooding (1 per lot) Address: Q425-9 Vouga: Q42-925 Bluespring	10	2	6		0		20
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
n		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q41-890 Bluespring	No.	Lots:	1	Point	s/lot:	10	10
	2.4.	. Age of Existing System		yrs pts)	26-50 yrs (15 pts)		<25 (0	5 yrs pts)	
		Points for Age							15
			тот	AL PR	OBLE		INTS		295

PROJECT NAME: Figure 7-2 Structure with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	o. Unit	S	Points per	Unit	
IALITY		Bioswales*	2.74	PER 1	00 LF	10		27
R QL		Forebays		A	С	200		
ATEI		Wet Ponds		A	С	100		
N/		Wetlands	С	50				
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex	PER					
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0	Points for Easements							10
	5.2.	Recreational/Educational	Ye	es = 100 b = 0 pt	), s			10
			тс	TAL	SOLU		TS	47
TOTAL BENEFIT POINTS 34						342		

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

149

2.30

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 7-2 CHANNEL FDCT5					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Yard flooding and erosion Q36 - 896 Blu Erosion EDM 915 Bluespring Lane, Q34	espring	g Lane. Erc	osion Q52 - 9	02 Bluesprir	ng Lane.
Strategy:	1) Install bank protection on FDCT5 from	n statio	n 11+00 to	13+00 (200	LF).	
	<b>Description</b> Hard stabilization (S) Soft stabilization (S) Geomorphic Study	Unit LF LF Fa	<b>Quantity</b> 200 200	Unit Cost \$225 \$125 \$10,000	<b>ALT 1</b> \$45,000 \$0	ALT 2 \$0 \$25,000 \$10,000
	Subtotal	Ea.	1	\$10,000	\$45,000 <b>\$45,000</b>	\$35,000 \$35,000
	Utility Relocation Clearing Mobilization			20% 5% 4%	\$9,000 \$2,250 \$1,800	\$7,000 \$1,750 \$1,400
	Total with Percent Allowances				\$58,050	\$45,150
	Contingency			25%	\$14,513	\$11,288
	Probable Construction Cost Estimate				\$72,563	\$56,438
	Design Engineering and Geotechnical			30%	\$21,769	\$20,000
	Total Conceptual Cost Estimate				\$95,000	\$77,000
	Benefit Points Benefit/Cost Ratio				130 1.37	205 2.66

**Additional Comments:** 

PROJECT NAME: Figure 7-2 Channel FDCT5, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	Frequent (>2<=15-Yr) Flooding		quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
	1. FLOODING		Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address: 896 Bluespring Lane	10	1	5		0		10
	÷.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-2 Channel FDCT5, Alternate 2

DATE: 10/18/2013

				onic 2-Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)* Address:	250		200		50		
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	2.1. FLOODIN	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
ER / OVERL		Attached Garage (1 lot per structure) Address:	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWI		Yard Flooding (1 per lot) Address:	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	I	Į	Į	<u> </u>			I
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	. Moderate Risk Erosion of misc. structures		Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	4. Age of Existing System		yrs pts)	26-50 yrs (15 pts)		<25 (0	o yrs ots)	
		Points for Age							
			тот		OBLE		INTS		10

PROJECT NAME: Figure 7-2 Channel FDCT5, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	100 LF	10		
R QU		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
<b>N</b>		Wetlands		AC		50		
ENTAL		Biostabilization of banks (per bank)	4	PER 1	100 LF	10		40
RONM		Riffle Pool Complex	2	PER 1	100 LF	10		20
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	A 100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	-5 (20 pts) 6-10 (10 pts)		11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						20
	5.2.	Recreational/Educational	Ye	Yes = 100, no = 0 pts		Yes		15
			тс		SOLU		TS	195
			Т	OTAL	BEN		S	205

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.66

Place "X" in one box below:

MSD Project Project by Others



Project Name:	FIGURE	7-3 OVERL	AND FLOW				
Solutions By:	EDM IN	С.		DATE: 10/18/2013			
Problem:	Yard eros	sion at Q220	and Q217 - 25	5 and 23 Glen Abbey	Dr.		
Strategy:	1) Install	new inlet and	d pipe system	to collect water. 2) A	Add Rain Gardens to		
	infiltrate	runoii and pr	otect natural o	1) Alternative 1	2) Alternative 1 With		
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's		
Single Inlet	EA	1	\$1,850	\$1,850	\$1,850		
18" RCP CLASS III	LF	171	\$129	\$22,107	\$22,107		
18" FES	EA	1	\$1,300	\$1,300	\$1,300		
Erosion Protection	LS	1	\$2,000	\$2,000	\$2,000		
Rain Garden	EA	1	\$10,000	\$0	\$10,000		
Subtotal				\$27,257	\$37,257		
Total Benefit Points				30	35		
Individual Benefit Point Ratio				0.53	0.45		
Estimated Increased Property Valu	ues			\$10.000	\$12,000		
Problem:	Yard eros	sion at O212	- 14 Glen Abl	pev Dr 0218 - 16 Gl	en Abbey Dr 0216 - 21		
	Glen Abb	Non at $2212$	17 Glei Het	$\Delta bbey Dr$	Cirribbey Di., Q210 21		
Stratage	1) Install	now inlot on	d nine system	to collect water 2)	dd Pain Cardons to		
Strategy:	infiltente	new fillet and	u pipe system	to conect water. 2) F	Add Kalli Galdelis to		
	inititrate	runon and pr	otect natural o		<b>a) b</b> 14 <b>1 b</b> 7/41-		
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's	2) Alternative 1 with BMP's		
Single Area Inlet	EA	2	\$1,750	\$3.500	\$3.500		
Manhole	EA	1	1 \$1,500 \$1,500		\$1.500		
18" RCP CLASS III	LE	296	\$129	\$38,267	\$38,267		
18" FES	ΕΔ	1	\$1.300	\$1,300	\$1 300		
Freesion Protection		1	\$3,000	\$3,000	\$3,000		
Rain Garden	EA	1	\$10,000	\$0 \$0	\$10,000		
Subtatal				\$A7 567	\$ <b>57 5</b> 67		
				\$47,507	\$57,507		
Total Benefit Points				6U	05		
Individual Benefit Point Ratio				0.60	0.54		
Estimated Increased Property Valu	ues			\$8,000	\$10,000		
Problem:	Yard eros	sion at Q219	- 8 Glen Abbe	ey Dr. and Q213 - 10	Glen Abbey Dr.		
Strategy:	1) Install	new inlet and rupoff and pr	d pipe system	to collect water. 2) A	Add Rain Gardens to		
	mmuute	runon und pr	oteet haturar	1) Alternative 1	2) Alternative 1 With		
Decerintian	Unit	Quantity	Unit Cost	Without BMD's	2) Alternative 1 With RMD's		
Single Area Inlet					DIVIE 8 00.750		
Manhala	EA	2	\$1,/3U \$1,500	φο,/ <i>Ο</i> Ο	φο,/3U \$2.000		
	EA	2	\$1,500	\$3,000	\$3,000 \$1,072		
12" KCP CLASS III	LF	17	\$116	\$1,973	\$1,973		
18 KCP CLASS III		279	\$129	\$36,069	\$36,069		
21" KCP CLASS III	LF	288	\$137	\$39,424	\$39,424		
21" FES	EA	1	\$1,500	\$1,500	\$1,500		
Erosion Protection	LS	1	\$3,000	\$3,000	\$3,000		
Rain Garden	EA	3	\$10,000	\$0	\$30,000		
Subtotal				\$93,716	\$123,716		
Total Benefit Points				40	55		
Individual Benefit Point Ratio				0.20	0.21		
<b>Estimated Increased Property Value</b>	ues			\$5,000	\$9,000		
Total				\$168,540	\$218,540		

Utility Relocation	20%	\$33,708	\$43,708
Clearing	5%	\$8,427	\$10,927
Mobilization	4%	\$6,742	\$8,742
Total with Percent Allowances		\$217,417	\$281,917
Contingency	25%	\$54,354	\$70,479
Probable Construction Cost Estimate		\$271,771	\$352,396
Design Engineering and Geotechnical	30%	\$81,531	\$105,719
Total Conceptual Cost Estimate		\$354,000	\$459,000
Total Benefit Points		180	230
Total Benefit Point Ratio		0.51	0.50

Additional Comments:

PROJECT NAME: Figure 7-3 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
	<del>,</del>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-3 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
MO		Basement (1 lot per structure)*	250	0	200		50		
	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
D FL	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N			N			
SEWER / OVERLAN	FLOC	Attached Garage (1 lot per structure) Address:	100	0	75		25		
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q199-10459 Garibaldi	10	0	6		0		
		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
STORM		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
2.0		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q217-25 Glen Abbey; Q215-23 Glen Abbey; Q212-14 Glen Abbey; Q218-16 Glen Abbey; Q216-21 Glen Abbey; Q223-31 Glen Abbey; Q219-8 Glen Abbey; Q213-10 Glen Abbey	No. Lots: 8		8	Points/lot:		10	80
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0)	i yrs ots)	
		Points for Age				/			0
			тот	AL PR	OBLE	EM PO	INTS		80

PROJECT NAME: Figure 7-3 with BMP's

DATE: 10/18/2013

### **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3 REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	2	Points per Add'l Proj.:	50	100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	2.5	PER 1	100 LF	10		25
R QL		Forebays		А	C	200		
ATEI		Wet Ponds		A	C	100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						
	5.2.	Recreational/Educational	Ye	es = 100 b = 0 pt	0, s			25
			тс	TAL	SOLU		TS	150
			т	OTAL	BEN	EFIT POINT	S	230

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

459

0.50

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 7-3 CHANNEL FDCMS					
Solutions By:	EDM INC.			DATE:	10/18	8/2013
Problem:	Yard erosion Q211 - 19 Glen Abbey; Q2	15 - 23	Glen Abbe	ey; Q216 - 21	Glen Abbey	; Q217 - 25
	Glen Abbey. Creek incision and erosion	SR10 -	- 11, 15, 17	Glen Abbey	. First Floor	Flooding 16
	Glell Abbey.					
Strategy:	Install bank protection on FDCMS from	Station	8+00 to 17	7+50 (950 LI	F). Conduct p	roject in
80	coordination with Creve Coeur. Project is	s in Cre	eve Coeur fr	om Station 1	4+00 to 17+5	50.
	Floodproof 16 Glen Abbey.					
	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L)	LF	950	\$300	\$285,000	\$0
	Soft stabilization (L)	LF	950	\$200	\$0	\$190,000
	Geomorphic Study	Ea.	1	\$10,000		\$10,000
	Floodproof (16 Glen Abbey)	Ea.	1	\$20,000	\$20,000	\$20,000
	Subtotal				\$305,000	\$220,000
	Total				\$305,000	\$220,000
	Utility Relocation			20%	\$61,000	\$44,000
	Clearing			5%	\$15,250	\$11,000
	Mobilization			4%	\$12,200	\$8,800
	Total with Percent Allowances				\$393,450	\$283,800
	Contingency					
	Contingency			25%	\$98,363	\$70,950
	Probable Construction Cost Estimate				\$491,813	\$354,750
	Design Engineering and Geotechnical			30%	\$147,544	\$106,425
	Total Conceptual Cost Estimate				\$640,000	\$462,000
	Benefit Points Benefit/Cost Ratio				385 0.60	895 1.94

Additional Comments:

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 2

				Chro (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	nts
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address: 16 Glen Abbey	300		150		25	1	25
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	NG		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	1. FLOODII		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
	÷	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	1	1	1				
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
	_		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

## PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 2

DATE: 10/18/2013

				Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po	
		2.1.1. Structure Flooding								
ER / OVERLAND FLOW		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65			
		Basement (1 lot per structure)*	250		200		50			
	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50			
	NIDC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N							
		Attached Garage (1 lot per structure)	100		75		25			
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12			
EWI		Yard Flooding (1 per lot)	10		6		0			
S MRO		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		Į					<u> </u>	
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25			
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6			
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2			
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1			
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5		
	2.2.	Moderate Risk Erosion of misc. structures <i>Address:</i>	No.	Lots:		Point	ts/lot:	20		
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10		
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)			
		Points for Age				ř				
					TOTAL PROBLEM POINTS					

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flow	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. Proj	Add'l ects:	7	Points per Add'l Proj.:	50	350
	4.1.	Addresses pollutants:	Ν	Io. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	100 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
N / -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	31	PER 1	100 LF	10		310
RONM		Riffle Pool Complex	15	PER 1	100 LF	00 LF 10		150
INVI	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2.	Recreational/Educational	Y n	es = 10 o = 0 pt	0, s	Yes		50
			т		SOLU		TS	870
			Г	OTAL	BEN		S	895

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.94

Place "X" in one box below:

MSD Project Project by Others

Project Name:	FIGURE 7-3 CHANNEL STRUCTURAL FLOODING - Monsanto Sunswept Creek											
Solutions By:	EDM INC.			DATE:	10/18	8/2013						
Problem	Undersized arch culvert under Glen Abbey	v Dr Unde	ersized cha	nnel Creek f	loods house (	0214 12 and						
Troolem.	21 Glen Abbey Drive, Creek Erosion Thre	atens 10 G	len Abbey	intel, creek i	loods house (	2214 12 und						
Strategy:	1) Install flood protection at 12 and 21 Glen Abbey Drive											
Strating, 1	2) Restore Streambank by regrading from station $5+25$ to station $8+00$ and replace the existing arch											
	culvert under Glen Abbey Dr. with new 15' x 8' Triple Box Culvert. Design for 15 YR Storm.											
	Description	Unit	Quantity	Unit Cost		ALT 2						
	Flood protection	Ea.	200	\$80,000	\$160,000	\$160,000						
	Replace Arch under Glen Abbey Dr.		290	\$000	\$174,000	\$174,000						
	Construct 2 Store Channel		1	\$20,000	\$20,000	\$20,000						
	Hord stabilization (L)		225	\$10,000	\$10,000	\$10,000						
	Soft stabilization (L)		235	\$200	\$70,500	50 \$47.000						
	Flood Study	E	235	\$200 \$15.000	\$U \$15,000	\$15,000						
	Plood Study	Ľa.	1	\$15,000	\$15,000	\$15,000						
	Subtotal				\$449,500	\$426,000						
	Total				\$449,500	\$426,000						
	Utility Relocation			20%	\$89,900	\$85,200						
	Clearing			5%	\$22,475	\$21,300						
	Mobilization			4%	\$17,980	\$17,040						
	Total with Percent Allowances				\$579,855	\$549,540						
	Contingency			25%	\$144,964	\$137,385						
	Probable Construction Cost Estimate				\$724,819	\$686,925						
	Design Engineering and Geotechnical			30%	\$217,446	\$206,078						
	Total Conceptual Cost Estimate				\$943,000	\$894,000						
	Benefit Points Benefit/Cost Ratio				1690 1.79	1790 2.00						

Additional Comments:

PROJ	ECT N	NAME:	Figure 7-3S Channel - Monsanto Sunswept Creek , Alternat	e 2		-		DATE:	10/18	8/2013
				Chro	onic	Frec	quent	Infre	quent	
				(<=2	-Yr)	(>2<=	15-Yr)	) (>15-Yr)		(0
				Floo	ding	Floc	oding	Floc	oding	ints
			PROBLEM CATEGORY							Ъо
				∠ ĕ	ω <del>-</del>	, ∠	ω <del>-</del>	ry	ω <del>-</del>	tal
				g i g	te ot:	g is	te ot:	goi	te ot:	Ê
				ate	o. L fec	ate	o. L fec	ate	o. L fec	
				дü	Ϋ́ξ	ч	ΫĘ	ч	βĘ	
		1.1.1.	Structure Flooding							
			Liebiteble 1et fleer, residential, includes anoses with							
			Habitable TSt lloor, residential, includes spaces with	000		150		05		150
				300		150	I	25		150
			Address: 12 Glen Abbey							
			Basement (1 lot per structure)	200		100	1	15		100
			Address: 21 Glen Abbey							
			Attached Garage (1 lot per structure)	100		50		8		
			Address:							
			Misc. structures including patio/decks, pools, sheds, tennis							
	വ		courts, detached garages, etc.(1 lot per structure)	50		25		4		
	Ž		Address:							
	0		Industrial, office, commercial and warehouse							
	8		(1 lot per 2,500 sf of floor space flooded)	300		150		25		
	Ľ.		Address:							
	<u> </u>		Yard Flooding (1 per lot)	10		5		0		
	-		Address:			Ŭ		Ŭ		
	-	112	Roadway Flooding (allocate 1 lot per 250' of roadway							
		1.1.2.	impacted & 2 lots per intersection impacted)		-	-	-			-
			Emergency Access restricted (>12" water over only access							
			route to habitable structure), pts per structure	200		100	10	15		1000
			Address:							
			Traffic obstruction (> 6" of water) on arterial street	50		25		4		
			Address:	50		25		4		
Σ			Traffic obstruction (> 6" of water) on collector street	25		12		2		
A			Address:	25		12		2		
В			Traffic obstruction (> 6" of water) on residential street	10		5	10	1		50
5T			Address:	10		Ŭ	10	•		00
0				.9		.0		.0		
-				Rat		70 70		Rat 35		
				- 0 0	ots	- o-	ots	or   0.:	ots	
		1.2.1.	Threatening Structure	s. f 0.7		36. f		s. f 15-	. Г	
			(Ratio=Height of bank / distance from structure)	ť ^	Ň	Pt: 0.0	Ň	Dţ.	Ň	
			Habitable structures, residential (1 lot per structure)	300		200	1	50		200
			Address: 10 Glen Abbey (8/20.3)=0.39	000		200		00		200
			Misc structures including pools, patio/decks, sheds, tennis							
			courts, detached garages, etc.(1 lot per structure)	150		100		25		
	7		Address:							
	ō		Industrial, office, commercial and warehouse							
	S		(1 lot per structure)	300		200		50		
	õ		Address:							
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend	2	lots		10 poin	ts per lo	ot	20
	N.						- 1			_
	 			tio		tio		tio		
				Ra	6	Ra .70	6	Ra 35	6	
				o fo	ot	- 0	-ot	for - 0.	ot	
		1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway	ts. 0.7	0.1	ts. 36	<u>.</u>	ts. 15	0.1	
			Impacted & 2 lots per intersection impacted)	ġ v	Ž	é o	Ž	ē o	Ž	
			Arterial Road:	75		50		12		
			Address:			-				
			Collector Road:	35		25		6		
			Address:	<b> </b>						
			Residential Road:	20		12		3		
			Address:							

PROJECT NAME: Figure 7-3S Channel - Monsanto Sunswept Creek , Alternate 2

DATE: 10/18/2013

				Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding			
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Pc		
		2.1.1. Structure Flooding									
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65				
		Basement (1 lot per structure)*	250		200		50				
) FLOW	വ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50				
AND-	NIDO	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \						
er / overi	Ď	Attached Garage (1 lot per structure)	100		75		25				
	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12				
E V		Yard Flooding (1 per lot)	10		6		0				
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	I		l				1		
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25				
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6				
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2				
		Traffic obstruction (> 6" of water) on residential street	10		6		1				
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5			
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20			
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10			
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)				
		Points for Age									
	1				TOTAL PROBLEM POINTS						

#### PROJECT NAME: Figure 7-3S Channel - Monsanto Sunswept Creek , Alternate 2

DATE: 10/18/2013

### CONTINUED:

		SOLUTION CATEGORY						
.0 DNAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	3	Points per Add'l Proj.:	50	150
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	00 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
× -		Wetlands		A	С	50		
ENTAL		Biostabilization of banks (per bank)	5	PER 100 LF		10		50
NNOF		Riffle Pool Complex		PER 100 LF		10		30
IN	4.2.	Eliminates combined sewer (per project)		EA		100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	5.1. Ease of Implementation (No. of Easements)		(10 pts)	(10 pts) 11-15 (5 pts)			
5.0		Points for Easements	20					20
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	), s			20
			тс		SOLU		TS	270
			Т	OTAL	BEN		S	1790

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=

894

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.00

Place "X" in one box below:

MSD Project Project by Others



		UNCEFIUA		0
Project Name:	FIGURE	7-4 OVERLA	AND FLOW	
Solutions By:	EDM INC	•	DATE: 10/18/2	013
Problem:	Yard Pond	ling at 10333	Garibaldi Place	
Strategy:	Install inle	t and pipe sy	stem to collect water.	
Description	Unit	Quantity	Unit Cost	Alternative 1
Single Inlet	EA	1	\$1,850	\$1,850
Single Area Inlet	EA	1	\$1,750	\$1,750
Manhole	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	97	\$116	\$11,258
Subtotal Total Benefit Points				\$16,358 50
Individual Danafit Daint Datia				1 46
Estimated Increased Property	Values			\$0
Droblom:	Street pop	ding along D	1044	بون Arthur Dl
Problem:	Install inle	ung along D	wyel Ave. Q20 - 1044.	Attach to aviating system and rankas
Description	Instan Inte	Quantity	Unit Cost	Alternative 1
Single Inlet	EA		\$1.850	\$18 500
Double Inlet	EA	10	\$1,650	\$18,500
Monholo	EA	1	\$3,130 \$1,500	\$3,130 \$1,500
	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	83	\$116	\$9,633
15" RCP CLASS III	LF	194	\$124	\$24,110
18" RCP CLASS III	LF	295	\$129	\$38,138
21" RCP CLASS III	LF	450	\$137	\$61,601
27" RCP CLASS III	LF	89	\$150	\$13,360
27" FES	EA	1	\$1,700	\$1,700
Erosion Protection	LS	1	\$4,000	\$4,000
Subtotal				\$175,691
Total Benefit Points				35
<b>Individual Benefit Point Ratio</b>	1			0.10
Estimated Increased Property	Values			\$3,000
Problem:	Yard pond	ling at Q10 -	10321 Arthur Pl.	
Strategy:	Add Rain	Gardens to ir	nfiltrate runoff and prot	ect natural channels.
Description	Unit	Quantity	Unit Cost	Alternative 1
Rain Garden	EA	1	\$10,000	\$10,000
Subtotal				\$10,000
Total Benefit Points				35
Individual Benefit Point Ratio				1.67
Estimated Increased Property	Values			\$2,000
Problem:	Street and	Yard Floodi	ng at 10469 Arthur	
Strategy:	Install rair	i garden, inle	t and pipe system to co	llect water.
Description	Unit	Quantity	Unit Cost	Alternative 1
Yard Drain	EA	1	\$500	\$500
Single Area Inlet	EA	1	\$1,750	\$1,750
Manhole	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	180	\$116	\$20,891
Rain Garden	EA LE	1 72	\$10,000 \$24	\$10,000 \$1.728
		, 2	ΨΖ.	ψι,, 20
Subtotal				\$36,369
Total Benefit Points Individual Benefit Point Patio				45
maividuai Denenit I Onit Källö				
Total				\$202,049

Utility Relocation Clearing Mobilization	20% 5% 4%	\$40,410 \$10,102 \$8,082
Total with Percent Allowances		\$260,643
Contingency	25%	\$65,161
Probable Construction Cost Estimate		\$325,804
Design Engineering and Geotechnical	30%	\$97,741
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio		\$424,000 230 0.54
Additional Comments:		

PROJECT NAME: Figure 7-4 with BMP's

					onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infrequent (>15-Yr) Flooding		ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
	1. FLOODING		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		
PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
LOW		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
ID FI	<b>NING</b>	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	⁄/N	N		
RLAN		Attached Garage (1 lot per structure) Address:	100	0	75		25		
SEWER / OVER	2.1. FL	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q14-Q10-10321 Arthur; 10333 Garibaldi Place, Q199-10469 Arthur	10	3	6		0		30
rorn		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:Q199 10469 Arthur	10	1	6		1		10
		Ponding (per ponding area) Address: Dwyer (3 locations)	No. P	onds:	3	Points	/pond:	5	15
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs ots)	26-5 (15	0 yrs pts)	<25 (0	ō yrs pts)	
		Points for Age				. /			0
			тот	AL PR	OBLE		INTS		55

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flow	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. Proj	Add'l ects:	3	Points per Add'l Proj.:	50	150
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1	PER 1	00 LF	10		10
R QL		Forebays		A	C	200		
ATEI		Wet Ponds		A	C	100		
N/		Wetlands	C	50				
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	1. Ease of Implementation (No. of Easements)		(10 pts)	11-15 (5 pts)	>15 (0 pts)		
5.0	Points for Easements					13		5
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s			10
			т	TAL	SOLU	TION POIN	TS	175
			т	OTAL	BEN	EFIT POINT	S	230

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

424

0.54

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

		EI IUAL LI	EVEL ANAL I	515					
Project Name:	FIGURE	7-4 OVERL	AND FLOW S	TRUCTURAL FLOODING B					
Solutions By:	EDM IN	EDM INC. DATE: <u>10/18/2013</u>							
-									
Problem:	Main lev	el flooding at	Q379-10469 S	avannah Pl and yard erosion at Q382-					
	10485 Sa	wannah Place	e. 08-10466 An	zeiger, and O9-10472 Anzeiger Ave. Yard					
	erosion a	t 0220 - 27 C	ilen Abbev Dr	Yard ponding at 0199 - 10459 Garibaldi					
	Pl	. 220 270	field Hobey Di.						
	11.								
Strategy:	Install sv	vale to direct	water away from	m structure and install inlet and pipe					
	system to	o collect wate	r. Attach to exi	isting system. Add Rain Gardens to					
	infiltrate	runoff and pr	otect natural ch	nannels					
Description	Unit	Quantity	Unit Cost	1) Alternative 1 With BMP's					
Single Inlet	EA	8	\$1.850	\$14.800					
Manhole	ΕA	10	\$1,500	\$15,000					
Nalillole Double Inlat		10	\$1,500	\$13,000					
	EA	1020	\$5,150 \$116	\$0,500 \$110,426					
12 RCP CLASS III		1029	\$110	\$119,420					
15" KCP CLASS III		326	\$124	\$40,515					
21" RCP CLASS III	LF	56	\$137	\$7,666					
Roll Curb	LF	585	\$40	\$23,400					
Asphalt Curb	LF	254	\$32	\$8,128					
Clearing	LS	1	\$3,000	\$3,000					
Grading	LS	1	\$6,000	\$6,000					
Rain Garden	EA	2	\$10,000	\$20,000					
Subtotal				\$264,235					
Total Benefit Points				580					
Individual Benefit Point Ratio				1.05					
Estimated Increased Property Va	lues			\$2.000					
Total				\$264.235					
1 otuli				<i>\</i>					
Utility Relocation			20%	\$52.847					
Clearing			2070	\$12,047					
Mahilipatian			J%	\$13,212					
Modifization			4%	\$10,309					
T-4-1				¢240.972					
Total with Percent Allowances				\$340,803					
Contingency			25%	\$85,216					
Probable Construction Cost Estin	nate			\$426,079					
	_								
Design Engineering and Geotechnic	cal		30%	\$127,824					
Total Conceptual Cost Estimate				\$554,000					
<b>Total Benefit Points</b>				590					
Total Benefit Point Ratio				1.06					
Additional Comments:									

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-4 Structural B without BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т.		Yard Flooding (1 per lot) Address:	10		5		0		
	<u>-</u>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
		1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per l	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-4 Structural B without BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infree (>18 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address: Q379-10469 Savannah	350	1	250		65		350
		Basement (1 lot per structure)*	250	0	200		50		
FLOW	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	NIDC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	(/N	Y	50	50
ERLA	FLO(	Attached Garage (1 lot per structure) Address: Q197-10471 Garibaldi	100	1	75		25		100
R / OVE	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
WE:		Yard Flooding (1 per lot) Address: Q197-10471 Garibaldi	10	1	6		0		10
A SE		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway	I						
0 STORN		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
2.		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3. Addre 27Gle	Yard Erosion (1 per lot) ss: Q9-10472 Anzeiger;Q382-10485Savannah;Q220- nAbbey;Q8-10466Anzeiger;Q197-10471,10469Garibaldi	No.	Lots:	6	Point	s/lot:	10	60
	2.4.	Age of Existing System	>50 (30	yrs ots)	26-50 yrs (15 pts)		<25 (0	i yrs ots)	
		Points for Age							0
			тот	AL PR	OBLE		INTS		570

PROJECT NAME: Figure 7-4 Structural B without BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1	PER 1	100 LF	10		10
R QL		Forebays		А	C	200		
ATEI		Wet Ponds		A	C	100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	0-5 (20 pts) 6-10 (10 pts)		11-15 (5 pts)	>15 (0 pts)	
5.0	Points for Easements							10
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s			
			т	TAL	SOLU		TS	20
			т	OTAL	BEN		S	590

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

554

1.06

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

	t	UNCEPTUA	LLEVEL AI	NAL I SIS	
Project Name:	FIGURE	7-4 OVERLA	ND FLOW		
Solutions By:	EDM INC	2.	DATE:	: 10/18/2013	
Problem:	Yard floo	ding at Q14 -	10420 Arthur	Place and Q54 - 10425 Cable Ave.	
Strategy:	Install inl	et and pipe sy	stem to collect	et water. Attach to existing system.	
Description	Unit	Quantity	Unit Cost	Alternative 1	
Single Area Inlet	EA	1	\$1,750	\$1,750	
Manhole	EA	1	\$1,500	\$1,500	
12" RCP CLASS III	LF	157	\$116	\$18,221	
Subtotal				\$21,471	
Total Benefit Points				140	
Individual Benefit Point Ratio	)			3.11	
<b>Estimated Increased Property</b>	Values			\$3,000	
Total				\$21,471	
Utility Relocation			20%	\$4,294	
Clearing			5%	\$1,074	
Mobilization			4%	\$859	
Total with Percent Allowances	S			\$27,698	
Contingency			25%	\$6,925	
Probable Construction Cost E	stimate			\$34,623	
Design Engineering and Geotec	hnical		30%	\$20,000	
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio			\$55,000 140 2.55		

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-4 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	SNIDOOL		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т. Т		Yard Flooding (1 per lot)	10		5		0		
	-	112	Roadway Flooding (allocate 1 lot per 250' of roadway							
			impacted & 2 lots per intersection impacted) Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
EAM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	rosion		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
NO-		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
ID FI	DING	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	(/N	N		
SLAP	00	Attached Garage (1 lot per structure) Address: Q56-10425 Cable	100	1	75		25		100
SEWER / OVER	2.1. FL	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot) Address: Q14-10420 Arthur; Q54-10425 Cable	10	2	6		0		20
<b>FORN</b>		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 S <sup>-</sup>		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE		INTS		120

PROJECT NAME: Figure 7-4 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	o. Unit	S	Points per	Unit	
JALITY		Bioswales*		PER 1	00 LF	10		
R al		Forebays		A	С	200		
ATE		Wet Ponds		A	С	100		
N / -		Wetlands	A	С	50			
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements	1					20
	5.2.	Recreational/Educational	Ye	es = 100 o = 0 pt	0, s			
			тс	TAL	SOLU		TS	20
			т	OTAL	BEN	EFIT POINT	S	140

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

424

0.33

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 7-4 CHANNEL FDCT5										
Solutions By:	EDM INC.			DATE:	10/18	/2013					
Problem:	Creek bank erosion north side of Deer Cr	eek Q3	93 - 825 S.	Lindbergh (	Forshaw). In	frequent					
	first floor flooding Forshaw warehouse a	nd freq	uent parkin	g lot flooding	g.						
Strategy:	Install bank protection on FDC from Station 2+00 to 6+40 (440 LF). Floodproof Forshaw warehouse.										
	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2					
	Hard stabilization (L)	LF	440	\$300	\$132,000	\$0					
	Soft stabilization (L)	LF	440	\$200	\$0	\$88,000					
	Geomorphic Study	Ea.	1	\$10,000		\$10,000					
	Flood Protection	EA	1	\$200,000	\$200,000	\$200,000					
	Flood Study	EA	1	\$20,000	\$20,000	\$20,000					
	Subtotal				\$352,000	\$200,000					
	Total				\$352,000	\$200,000					
	Utility Relocation			20%	\$70,400	\$40,000					
	Clearing			5%	\$17,600	\$10,000					
	Mobilization			4%	\$14,080	\$8,000					
	Total with Percent Allowances				\$454,080	\$258,000					
	Contingency			25%	\$113,520	\$64,500					
	Probable Construction Cost Estimate				\$567,600	\$322,500					
	Design Engineering and Geotechnical			30%	\$170,280	\$96,750					
	Total Conceptual Cost Estimate				\$738,000	\$420,000					
	Benefit Points Benefit/Cost Ratio				195 0.26	280 0.67					

Additional Comments: Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 1

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infree (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address: 16 Glen Abbey	300		150		25		
			Basement (1 lot per structure)	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	1.1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:Q-393 825 S. Lindbergh</i>	300		150		25	7	175
			Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway		1					
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure <i>Address:</i>	200		100		15		
		-	Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM		-	Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISOF		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

\_\_\_\_

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 1

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)* Address:	250		200		50		
ER / OVERLAND FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	NIDC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
	=LO(	Attached Garage (1 lot per structure) Address:	100		75		25		
	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address	50		35		12		
SEWI		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u> </u>					
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	o yrs ots)	
		Points for Age							
			тот		OBLE		INTS		175

PROJECT NAME: Figure 7-3 Channel FDCMS, Alternate 1

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
0 DNAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:		Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	Ν	Io. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	R 100 LF 10			
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
N / -		Wetlands		A	С	50		
ENTAI		Biostabilization of banks (per bank)	4	PER 1	00 LF	10		40
RONMI		Riffle Pool Complex	4 PER 100 LI			10		40
	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						20
	5.2.	Recreational/Educational	Ye n	es = 100 o <u>= 0 p</u> t	), s			5
			т		SOLU		TS	105
			Т	OTAL	BEN		S	280

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.67

Place "X" in one box below:

MSD Project Project by Others





Project Name:	FIGURE	7-5 OVER	LAND FLOW	/					
Solutions By:	EDM IN	C.		DATE:	10/18/2013				
Problem:	Yard Por	nding at Q222	2 - 10422 Gold	d Dust Ave and street	ponding along				
	Conway	Rd (Q124)							
Strategy:	1) Install	stall inlets and pipe system to collect water. Replace undersized storm							
	sewer pip	pes. 2) Add E	Bioswale to in	filtrate runoff and pro-	tect natural channels.				
				1) Alternative 1	2) Alternative 1				
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's				
Single Inlet	EA	7	\$1,850	\$12,950	\$12,950				
Manhole	EA	1	\$1,500	\$1,500	\$1,500				
12" RCP CLASS III	LF	312	\$116	\$36,211	\$36,211				
15" RCP CLASS III	LF	404	\$124	\$50,209	\$50,209				
18" RCP CLASS III		264	\$129	\$34,130	\$34,130				
Bioswale	LF	154	\$90	\$0	\$13,860				
Subtotal				\$135,000	\$148,860				
Total Benefit Points				35	50				
Individual Benefit Point Ratio				0.12	0.16				
<b>Estimated Increased Property Value</b>	ies			\$2,000	\$4,000				
Problem:	Street an	d yard pondir	ng at Q55 - 10	411 Capitol Place and	yard ponding at Q58 -				
	10403 Ca	apitol Place, (	Q56), (Q64)						
Strategy:	1) Regra	de asphalt ste	et towards ex	isting inlet.					
				1) Alternative 1	2) Alternative 1				
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's				
Regrade asphalt street toward inlet	LS	1	\$4,000	\$4,000	\$4,000				
Subtotal				\$4,000	\$4,000				
Total Benefit Points				45	45				
Individual Benefit Point Ratio				5.37	5.37				
Estimated Increased Property Value	ıes			\$3,000	\$3,000				
Problem:	Yard Ero	sion at Q74 -	978 Chapel G	Daks Dr. and Q77 -994	Chapel Oaks Dr.				
Strategy:	1) Regra	de around exi	sting inlet. A	dd Rain Garden to inf	iltrate runoff and				
	protect n	atural channe	ls.	1) 414	<ol> <li>A 14 4<sup>2</sup> 1</li> </ol>				
Degenintion	T India	Orrentiter	Unit Coat	1) Alternative 1 Without DMD's	2) Alternative 1 With DMDIa				
Description Begrade around inlet				\$2 000	\$2 000				
Regrade around met		1	\$3,000 \$10,000	\$5,000	\$3,000				
Kalli Galdeli	EA	1	\$10,000	\$10,000	\$10,000				
Subtotal				\$13,000	\$13,000				
Total Benefit Points				45	45				
Individual Benefit Point Ratio				1.65	1.65				
<b>Estimated Increased Property Value</b>	ies			\$3,000	\$3,000				
Problem:	Yard floo	oding at Q125	5 - 10504 Con	way Rd. and yard pon	ding at Q132 - 10534				
	Conway	Rd. Street an	d yard floodi	ng at Q73 - 977 Chape	el Oaks Dr.				
Strategy:	1) Install	inlets and pig	pe system to c	collect water. Replace	undersized				
				1) Alternative 1	2) Alternative 1				
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's				
Single Inlet	EA	3	\$1,850	\$5,550	\$5,550				
Manhole	EA	1	\$1,500	\$1,500	\$1,500				
New Berm	LF	161	\$25	\$4,025	\$4,025				
12" RCP CLASS III	LF	150	\$116	\$17,409	\$17,409				
15" RCP CLASS III	LF	139	\$124	\$17,275	\$17,275				
18" RCP CLASS III	LF	391	\$129	\$50,548	\$50,548				
Bioswale	LF	161	\$90	\$0	\$14,490				
Subtotal				\$96,307	\$110,797				
<b>Total Benefit Points</b>				60	76				
Individual Benefit Point Ratio				0.30	0.33				
<b>Estimated Increased Property Value</b>	ies			\$4,000	\$7,000				

Problem:	Yard pon	ding and eros	sion at Q71 - 9	907 Chapel Oaks, and	943 Chapel Oaks,
	(Q78).				
Strategy:	1) Install	inlets and pip	be system to c	collect water. Replace	undersized
	stormwat	er pipes 2) A	dd Rain Gard	lens to infiltrate runof	f and protect natural
	channels.				
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Single Inlet	EA	3	\$1,850	\$5,550	\$5,550
Double Inlet	EA	1	\$3,150	\$3,150	\$3,150
Manhole	EA	2	\$1,500	\$3,000	\$3,000
12" RCP CLASS III	LF	57	\$116	\$6,615	\$6,615
24" RCP CLASS III	LF	479	\$144	\$68,737	\$68,737
30" RCP CLASS III	LF	61	\$163	\$9,958	\$9,958
12" FES	EA	0	\$1,100	\$0	\$0
30" FES	EA	1	\$1,900	\$1,900	\$1,900
Erosion Protection	LS	1	\$6,000	\$6,000	\$6,000
Additional Regrading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	4	\$10,000	\$0	\$40,000
Subtotal				\$109.910	\$149.910
Total Benefit Points				55	\$0 \$0
Individual Benefit Point Ratio				0.24	0.25
Estimated Increased Property Value	s			\$5,000	\$9,000
Listimuted mercused i roperty value	5			φο,000	φ2,000
Total				\$358,217	\$426,567
Litility Relocation			20%	\$71.643	\$85 313
Clearing			5%	\$17,911	\$21,328
Mobilization			4%	\$14,329	\$17,063
Total with Percent Allowances				\$462,100	\$550 271
Total with Fercent Thiowances				φ <b>-102</b> ,100	<i>\$330,271</i>
Contingency			25%	\$115,525	\$137,568
Probable Construction Cost Estimat	e			\$577,624	\$687,839
Design Engineering and Geotechnical			30%	\$173,287	\$206,352
Total Conceptual Cost Estimate				\$751,000	\$895,000
Total Benefit Points				380	467
<b>Total Benefit Point Ratio</b>				0.51	0.52
Additional Comments:					

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-5 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	1.1. FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ë.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-5 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frec (>2<= Floc	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
_		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
FLOV	ŋ	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	(/N	N		
ND		Attached Garage (1 lot per structure)	100	0	75		25		
SEWER / OVERLA	FLOC	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure)	50		35		12		
	2.1.	Address: Yard Flooding (1 per lot) Address: Q222-10422 Gold Dust; Q55-10411 Capitol; Q58- 10403 Capitol; Q125-10504 Conway; Q132-10534 Conway; Q73-977 Chapel Oaks; Q71-907 Chapel Oaks; 943 Chapel Oaks	10	8	6		0		80
SRM (		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		I raffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Conway; Q55-10411 Capitol; Q73-977 Chapel Oaks	No. P	onds:	3	Points	/pond:	5	15
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q74-978 Chapel Oaks; Q77-994 Chapel Oaks; Q71-907 Chapel Oaks; 943 Chapel Oaks	No.	Lots:	4	Point	ts/lot:	10	40
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age					,		15
			тот		OBLE				150

PROJECT NAME: Figure 7-5 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3 REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	4	Points per Add'l Proj.:	50	200
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	6.65	PER 1	100 LF	10		67
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	C	100		
/ M		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye ne	es = 10 o = 0 pt	0, s			40
			тс	TAL	SOLU		TS	317
			т	OTAL	BEN	EFIT POINT	s	467

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

895

0.52

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE	7-5 OVERL	AND FLOW S	STRUCTURAL FLOODING
Solutions By:	EDM IN	с. С.	DATE: 1	.0/18/2013
·			· <u>-</u>	
Problem:	Garage fl 10349 Ca	ooding at Q6 pitol Pl, yard	2 - 10353 Cap l ponding at Q	bitol Pl, yard and street ponding at Q60 - 221 - 10350 Gold Dust Ave, and street &
Strategy:	yard pond 1) Install sewer pip	ling and base inlets and pip bes. 2) Add E	ment flooding be system to co Bioswale to inf	at Q57 - 10440 Capitol ollect water. Replace undersized storm filtrate runoff and protect natural channels.
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Single Inlet	EA	3	\$1,850	\$5,550
Manhole	EA	1	\$1,500	\$1,500
12" RCP CLASS III	LF	129	\$116	\$14,972
15" RCP CLASS III	LF	47	\$124	\$5,841
21" RCP CLASS III	LF	262	\$137	\$35,865
27" RCP CLASS III	LF	21	\$150	\$3,152
27" FES	EA	1	\$1,700	\$1,700
Erosion Protection	LS	1	\$4,000	\$4,000
Restoration	LS	1	\$10,000	\$10,000
Yard Drain	EA	1	\$500	\$500
6" PVC	LF	48	\$24	\$1,152
Subtotal				\$84,232
<b>Total Benefit Points</b>				395
Individual Benefit Point Ratio				2.24
Estimated Increased Property Value	es			\$4,000
Total				\$84,232
Utility Relocation			20%	\$16 846
Clearing			5%	\$4 212
Mobilization			4%	\$3,369
Total with Percent Allowances				\$108,660
Contingency			25%	\$27,165
Probable Construction Cost Estima	te			\$135,825
Design Engineering and Geotechnical			30%	\$40,747
Total Conceptual Cost Estimate Total Benefit Points Total Benefit Point Ratio				\$177,000 395 2.23

**Additional Comments:** 

Conceptual Cost are rounded to the nearest 1000

PROJECT NAME: Figure 7-5 Structural without BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	FLOODING		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т.		Yard Flooding (1 per lot) Address:	10		5		0		
	1.1	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	I						
			Impacted & 2 lots per intersection impacted) Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
<b>TRE</b>			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 5		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISO		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	,	10 poin	ts per l	ot	
	1.2.	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road:	35		25		6		
			Address: Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-5 Structural without BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infree (>18 Floc	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q57 - 10440 Capitol	250	1	200		50		250
MOJ	6	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
NDF	DING	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
RLA	00-	Attached Garage (1 lot per structure) Address: Q62-10353 Capitol	100	1	75		25		100
R / OVE	2.1. FI	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWE		Yard Flooding (1 per lot) Address: Q57 Capitol, Q60-10349 Capitol; Q221-10350 Gold Dust	10	1	6		0		10
ORM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Q57-10440 Capitol, Q60-10349 Capitol	No. P	onds:	2	Points	/pond:	5	10
	2.2.	Moderate Risk Erosion of misc. structures Address:	No. I	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No. I	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30 i	yrs pts)	26-5 (15	0 yrs pts)	<25 (0)	i yrs ots)	
		Points for Age						. ,	15
			тоти	AL PR	OBLE		INTS		385

PROJECT NAME: Figure 7-5 Structural without BMP's

DATE: 10/18/2013

## **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0	PER 1	00 LF	10		
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	С	100		
M -		Wetlands		A	С	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye ne	es = 100 o = 0 pt	0, s			
			тс	TAL	SOLU		TS	10
			т	OTAL	BEN	EFIT POINT	S	395

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

177

2.23

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

Project Name:	FIGURE 7-5 CHANNEL FDCT2					
Solutions By:	EDM INC.			DATE:	10/18/	/2013
Problem:	Yard flooding and erosion MSD-33 & 34 Oaks and Princess Avenue (paper street).	, Q76 -	830 Depot	, 906, 924, 9	38, 954, 966	Chapel
Strategy:	1) Install bank protection on FDCT2 from	n station	n 0+00 to 7	+20 (720 LF	<sup>7</sup> ).	
	<b>Description</b> Hard stabilization (S) Soft stabilization (S) Geomorphic Study <b>Subtotal</b>	Unit LF LF Ea.	<b>Quantity</b> 720 720 2	Unit Cost \$225 \$125 \$10,000	<b>ALT 1</b> \$162,000 \$0 \$162,000	ALT 2 \$0 \$90,000 \$20,000 \$110,000
	Total				\$162,000	\$110,000
	Utility Relocation Clearing Mobilization			20% 5% 4%	\$32,400 \$8,100 \$6,480	\$22,000 \$5,500 \$4,400
	Total with Percent Allowances Contingency			25%	<b>\$208,980</b> \$52,245	<b>\$141,900</b> \$35,475
	Probable Construction Cost Estimate				\$261,225	\$177,375
	Design Engineering and Geotechnical			30%	\$78,368	\$53,213
	Total Conceptual Cost Estimate				\$340,000	\$231,000
	Benefit Points Benefit/Cost Ratio				380 1.12	625 2.71

**Additional Comments:** 

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-5 Channel FDCT2, Alternate 2

				Chro (<=2 Floor	onic P-Yr) ding	Frec (>2<= Floo	juent 15-Yr) iding	Infree (>15	quent 5-Yr) oding	ıts
			PROBLEM CATEGORY	Points per Category	No. Lots	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poin
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŊĞ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	н. Н		Yard Flooding (1 per lot) Princess Avenue (Paper Street) Address:830 Depot; 906,924,938,954,966 Chapel Oaks	10	7	5		0		70
	- -	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

\_\_\_\_

PROJECT NAME: Figure 7-5 Channel FDCT2, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floor	onic P-Yr) ding	Frec (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)*	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	NIQC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	vstem Y	′/N			
ERL	-LO(	Attached Garage (1 lot per structure)	100		75		25		
EWER / OV	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		ļ					I
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 yrs (15 pts)		<25 (0	o yrs ots)	
	Points for Age								
			тот	AL PR	OBLE	EM PO	INTS		70

PROJECT NAME: Figure 7-5 Channel FDCT2, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak rate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. A Proje	Add'l ects:	6	Points per Add'l Proj.:	50	300
	4.1.	Addresses pollutants:	Ν	lo. Unit	S	Points per	Unit	
IALITY		Bioswales		PER 1	100 LF	10		
R QU		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
<b>N</b>		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	14	PER 1	100 LF	10		140
RONMI		Riffle Pool Complex	7	PER 1	100 LF	10		70
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	Ā	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements		1	8			10
	5.2.	Recreational/Educational	Ye	es = 10 o = 0 pt	0, s	Yes		35
			т		SOLU		TS	555
			Т	OTAL	BEN		S	625

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

2.71

Place "X" in one box below:

MSD Project Project by Others

#### CITY OF FRONTENAC CONCEPTUAL SOLUTIONS



Project Name:	FIGURE	7-6 OVERL	AND FLOW		
Solutions By:	EDM INC	2.		DATE	: 10/18/2013
		0.170	2022 5 111		
Problem:	Y ard eros	sion at $QI/0$	- 3033 Fallbro	ook Dr. and 11611 Fall	brook Dr., (Q168)
Strategy:	1) Install	inlet and pip	e system to co	llect water. Attach to	existing system. Resized
	undersize	d storm sewe	er pipe. Install	Rain Garden to infiltr	ate runoff and protect
	natural ch	annels. 2) A	dd Bioswale t	o infiltrate runoff and	protect natural channels.
Description	T	0	Uset Cast	1) Alternative 1	2) Alternative 1 With
	Unit	Quantity		without DMP's	BNIP S
Single Area Inlet	EA	2	\$1,750	\$3,500	\$3,500
15" RCP CLASS III		232	\$124	\$28,833	\$28,833
18" RCP CLASS III	LF	125	\$129	\$16,160	\$16,160
21" RCP CLASS III	LF	33	\$137	\$4,517	\$4,517
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Bioswale	LF	148	\$90	\$0	\$13,320
Subtotal				\$63.010	\$76.330
Total Benefit Points				60	75
Individual Benefit Point Ratio	)			0.45	0.47
Estimated Increased Property	Values			\$4.000	\$6.000
Problem:	Yard non	ding at 0133	-11318 Conv	vav Rd	<i><b>40</b>,000</i>
Strategy:	1) Install	vard drain ar	d nine system	to collect water $2)$	dd Rain Garden to
strategy.	infiltrate	yard dram an	to pipe system	hannels	du Ram Garden to
Description	Unit	Ouentity	Unit Cost	1) Alternative 1	2) Alternative 1 With
Vord Drain			\$500	\$500	\$500
	LE	1	\$300	\$300 ¢1.750	\$300
O PVC		/3	\$24 ¢1.000	\$1,752 \$1,000	\$1,732
Regrade driveway	LS	1	\$1,000	\$1,000	\$1,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$3,252	\$13,252
<b>Total Benefit Points</b>				30	35
<b>Individual Benefit Point Ratio</b>	)			4.40	1.26
<b>Estimated Increased Property</b>	Values			\$1,000	\$3,000
Problem:	Yard pon	ding at Q30	- 1127 Bella	Vista Dr	
Strategy:	1) Install	Rain Garden	s to infiltrate	runoff and protect natu	ral channels.
				1) Alternative 1	2) Alternative 1 With
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's
Rain Garden	EA	1	\$10.000	\$10.000	\$10.000
Additional Grading	LS	1	\$4,000	\$4,000	\$4,000
	20	-	ų <b>.,</b> 000	4.,000	4.,000
Subtotal				\$14,000	\$14,000
<b>Total Benefit Points</b>				35	35
Individual Benefit Point Ratio	)			1.19	1.19
<b>Estimated Increased Property</b>	Values			\$2,000	\$2,000
Total				\$80,262	\$103,582

Utility Relocation	20%	\$16,052	\$20,716
Clearing	5%	\$4,013	\$5,179
Mobilization	4%	\$3,210	\$4,143
Total with Percent Allowances		\$103,538	\$133,621
Contingency	25%	\$25,885	\$33,405
Probable Construction Cost Estimate		\$129,423	\$167,027
Design Engineering and Geotechnical	30%	\$38,827	\$50,108
Total Conceptual Cost Estimate		\$169,000	\$218,000
Total Benefit Points		170	210
Total Benefit Point Ratio		1.01	0.96

**Additional Comments:** 

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-6 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floc	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-6 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
FLOW	Q	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50	0	35		12		
EWI		Yard Flooding (1 per lot) Address: Q133-11318 Conway: Q30-1127 Bella Vista	10	2	6		0		20
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) <i>Address:</i>	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q170-3033 Fall Brook; 11611 Fall Brook	No.	Lots:	2	Point	ts/lot:	10	20
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							0
			тот	AL PR	OBLE				40

PROJECT NAME: Figure 7-6 with BMP's

DATE: 10/18/2013

## **CONTINUED:**

SOLUTION CATEGORY								
3.0 REGIONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	% reduction of peak 0.0 flowrate :		Max points:	1000	
	3.2.	Combines smaller projects into regional solution (see note)	No. Add'l Projects:			2 Points per Add'l Proj.:		100
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per Unit		
IALITY		Bioswales*	2.98	PER 100 LF		00 LF 10		30
R QL		Forebays		A	C	200		
ATEI		Wet Ponds		A	C	100		
4.0 ENVIRONMENTAL / W		Wetlands		AC		50		
		Biostabilization of banks (per bank)	PER 100		100 LF	10		
		Riffle Pool Complex		PER 100 LF		10		
	4.2.	Eliminates combined sewer (per project)		EA		100		
	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		EA		10		
5.0 MISC.	5.1.	Ease of Implementation (No. of Easements)		(10 pts)	(10 pts) 11-15 (5 pts)			
	Points for Easements							10
	5.2.	5.2. Recreational/Educational		Yes = 100, no = 0 pts				30
	TOTAL SOLUTION POINTS							170
			т	OTAL	BEN		s	210

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

218

0.96

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project				
Project by Others				

Project Name:	FIGURE	FIGURE 7-6 OVERLAND FLOW STRUCTURAL FLOODING							
Solutions By:	EDM ING	Ξ.		DATE: 10/18/2013					
·									
Problem:	Yard Pon	ding and deta	ached garage f	flooding at Q172 - 205	0 Firethorn Dr				
Strategy:	1) Install	1) Install berm to catch overland flow and direct to inlet and pipe system. Resized							
	undersize	undersized storm sewer pipes. 2) Add Bioswale to infiltrate runoff and protect							
	natural ch	annels.							
				1) Alternative 1	2) Alternative 1 With				
Description	Unit	Quantity	Unit Cost	Without BMP's	BMP's				
Single Area Inlet	EA	3	\$1,750	\$5,250	\$5,250				
Single Inlet	EA	4	\$1,850	\$7,400	\$7,400				
New Berm	LF	730	\$25	\$18,250	\$18,250				
12" RCP CLASS III	LF	251	\$116	\$29,131	\$29,131				
15" RCP CLASS III	LF	224	\$124	\$27,839	\$27,839				
18" RCP CLASS III	LF	167	\$129	\$21,590	\$21,590				
24" RCP CLASS III	LF	215	\$144	\$30,853	\$30,853				
33" RCP CLASS III	LF	0	\$174	\$0	\$0				
36" RCP CLASS III	LF	0	\$186	\$0	\$0				
Bioswale	LF	509	\$90	\$0	\$45,810				
Subtatal				\$140 212	¢186 122				
Subiolal Total Danafit Dainta				\$140,512 95	\$180,122				
Le dini den l Den effe Deine De	4 <b>.</b> -			85 0.20	136				
Individual Benefit Point Ra				0.29	0.35				
Estimated Increased Proper	rty values			\$5,000	\$9,000				
Total				\$140,312	\$186,122				
Utility Relocation			20%	\$28,062	\$37,224				
Clearing			5%	\$7,016	\$9,306				
Mobilization			4%	\$5,612	\$7,445				
Total with Percent Allowan	ices			\$181,003	\$240,097				
Contingency			25%	\$45,251	\$60,024				
Probable Construction Cos	t Estimate			\$226,253	\$300,122				
Design Engineering and Geo	technical	\$67,876	\$90,037						
Total Conceptual Cost Estin Total Benefit Points Total Benefit Point Ratio	mate			\$295,000 85 0.29	\$391,000 136 0.35				

**Additional Comments:** 

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-6 Structural with BMP's

PROBLEM CATEGORY				Chronic (<=2-Yr) Flooding		Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		ints
				Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
	1.1. FLOODING		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
			Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
			Yard Flooding (1 per lot) Address:	10		5		0		
		1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
1.0 STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
	1.2. EROSION	1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
			Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
		1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	10 points per lot			ot	
		1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12	<u> </u>	3		
PROJECT NAME: Figure 7-6 Structural with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
N01⁼	(1)	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
	DINO	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	′/N	N		
RLA	L00	Attached Garage (1 lot per structure) Address:	100	0	75		25		
R / OVE	2.1. F	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address: Q172-2050 Fire Thorn	50	1	35		12		50
SEWE		Yard Flooding (1 per lot) Address: Q172-2050 Fire Thorn; Q133-11318 Conway; Q30- 1127 Bella Vista	10	1	6		0		10
DRM		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 ST(		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q170-3033 Fall Brook; 11611 Fall Brook	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							15
			тот	AL PR	OBLE		INTS		75

PROJECT NAME: Figure 7-6 Structural with BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	o. Unit	S	Points per	Unit	
IALITY		Bioswales*	5.09	PER 1	00 LF	10		51
R QL		Forebays		A	С	200		
ATE		Wet Ponds		A	С	100		
M -		Wetlands		A	С	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Y€ no	es = 100 o = 0 pt	0, s			
			тс	TAL	SOLU		TS	61
			т	OTAL	BEN		s	136

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

391

0.35

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

CITY OF FRONTENAC CONCEPTUAL SOLUTIONS



### City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE	7-7 OVERL	AND FLOW		
Solutions By:	EDM ING	с.		DATE:	10/18/2013
Problem:	Infrequen	t basement fl	ooding and ya	ard erosion at Q420 - 2	2 Villa Coublay Dr.
Strategy:	1) Regrac	le water away	from garage	. 2) Add Rain Garden	s to infiltrate runoff
	and prote	ct natural cha	innels.	1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With RMP's
Clear and Regrade Yard	IS		\$4 000	\$4 000	\$4 000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$4 000	\$14 000
Total Benefit Points				\$ <del>1</del> ,000 80	\$14,000 <b>85</b>
Individual Benefit Point Ratio	)			9.54	2.90
Estimated Increased Property	v Values			\$2,000	\$4,000
Problem:	Yard pon	ding at Q162	- 10 Cricklev	vood Ln. and Q159 -14	4 Cricklewood Ln.
Strategy:	1) Install	Curb along d	riveway at 12	Cricklewood Ln. to d	irect runoff away
	from 10 C	Cricklewood I	Ln. and instal	l Rain Gardens at 14 C	Cricklewood Ln.to
	infiltrate	runoff and pr	otect natural of	channels.	
		F-		1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Asphalt Curb	LF	101	\$32	\$3,232	\$3,232
Rain Garden	EA	1	\$10,000	\$10,000	\$10,000
Subtotal				\$13,232	\$13,232
Total Benefit Points				45	45
<b>Individual Benefit Point Ratio</b>	)			1.62	1.62
Estimated Increased Property	Values			\$1,000	\$3,000
Total				\$17,232	\$27,232
Utility Relocation			20%	\$3,446	\$5,446
Clearing			5%	\$862	\$1,362
Mobilization			4%	\$689	\$1,089
Total with Percent Allowance	s			\$22,229	\$35,129
Contingency			25%	\$5,557	\$8,782
Probable Construction Cost F	Estimate			\$27,787	\$43,912
Design Engineering and Geotec	hnical		30%	\$20,000	\$20,000
Total Conceptual Cost Estima	ite			\$48,000	\$64,000
Total Benefit Points				165	175
i otal Benefit Point Katio				3.44	2.13

**Additional Comments:** 

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-7 with BMP's

				Chro (<=2 Floor	onic -Yr) ding	Frec (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ЭV		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOOD!		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway	l						
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 \$		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-7 with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic P-Yr) ding	Freq (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q420 - 2 Villa Coublay Dr.	250	0	200		50	1	50
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	ODIN	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exis	sting Sy	/stem \	//N	N		
'ERL	FLO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot) Address: Q162-10 Cricklewood; Q159-14 Cricklewood	10	2	6		0		20
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address: Q420-2 Villa Coublay	No.	Lots:	1	Point	s/lot:	10	10
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	5 yrs pts)	
		Points for Age							15
			тот	AL PR	OBLE		INTS		95

PROJECT NAME: Figure 7-7 with BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	1	Points per Add'l Proj.:	50	50
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	1	PER 1	100 LF	10		10
R QL		Forebays		A	C	200		
ATEI		Wet Ponds		A	C	100		
N/		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	100 LF	10		
RONM		Riffle Pool Complex		PER 1	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						10
	5.2.	Recreational/Educational	Ye n	es = 10 o = 0 pt	0, s			10
			т	TAL	SOLU		TS	80
			т	OTAL	BEN	EFIT POINT	S	175

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

64

2.73

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:



### City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

		CELIUAL			
Project Name:	FIGURE	7-7 OVERL	AND FLOW	STRUCTURAL FLO	ODING
Solutions By:	EDM INC	С.		DATE:	10/18/2013
Problem:	Basement	t Flooding an	d yard pondir	ng at Q423-11 Villa Co	oublay Dr.
Strategy:	1) Regrac	le water away	from basem	ent and installed new a	area inlet and pipe to
	existing s	ystem. 2) Ac	ld Rain Garde	ens to infiltrate runoff	and protect natural
				1) Alternative 1	2) Alternative 1
Description	Unit	Quantity	Unit Cost	Without BMP's	With BMP's
Manhole	EA	1	\$1,500	\$1,500	\$1,500
Single Area Inlet	EA	1	\$1,750	\$1,750	\$1,750
12" RCP CLASS III	LF	143	\$116	\$16,597	\$16,597
Grading	LS	1	\$5,000	\$5,000	\$5,000
Rain Garden	EA	1	\$10,000	\$0	\$10,000
Subtotal				\$24,847	\$34,847
<b>Total Benefit Points</b>				330	335
Individual Benefit Point Ratio	)			6.34	4.59
<b>Estimated Increased Property</b>	Values			\$10,000	\$12,000
4					
Total				\$24.847	\$34,847
					+• ·,• ··
Utility Relocation			20%	\$4,969	\$6,969
Clearing			5%	\$1.242	\$1.742
Mobilization			4%	\$994	\$1.394
Total with Percent Allowance	s			\$32.052	\$44.952
				+,	+
Contingency			25%	\$8,013	\$11.238
Contangeney			2070	\$0,010	¢11,200
Probable Construction Cost H	Estimate			\$40.065	\$56,190
				4.0,000	<i>\$2.0,23.0</i>
Design Engineering and Geotec	hnical		30%	\$20,000	\$20,000
Design Engineering and Geotee	linical		5070	φ20,000	φ20,000
Total Concentual Cost Estima	ate			\$61,000	\$77.000
Total Benefit Points				330	335
Total Benefit Point Ratio				5 41	4 35
Four Denemi Four Adu				5.71	7.55
Additional Comments:					
- indiana commenta					

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-7 Structural with BMP's

				Chro (<=2 Floor	onic 2-Yr) ding	Frec (>2<= Floc	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	ÐN		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
			Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	1. Т		Yard Flooding (1 per lot) Address:	10		5		0		
	1.	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
TRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0 S		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure)	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	150		100		25		
	NOISON		Industrial, office, commercial and warehouse (1 lot per structure) Address:	300		200		50		
	Ш.	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots		10 poin	ts per le	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 7-7 Structural with BMP's

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floo	juent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address: Q423-11 Villa Coublay Dr.	250	1	200		50		250
FLOW	ŋ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND		* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Exi	sting Sy	/stem \	(/N	Y	50	50
/ERL	FLO	Attached Garage (1 lot per structure) Address: Q62-10353 Capitol	100	0	75		25		
ER / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEWE		Yard Flooding (1 per lot) Address: Q423-11 Villa Coublay Dr.	10	1	6		0		10
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
2		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address: Q60-10349 Capitol	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-5 (15	0 yrs pts)	<25 (0	ō yrs pts)	
		Points for Age				. ,			0
			тот	AL PR	OBLE		INTS		310

PROJECT NAME: Figure 7-7 Structural with BMP's

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	0.0%	Max points:	1000	
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
IALITY		Bioswales*	0.5	PER 1	100 LF	10		5
R QL		Forebays		А	C	200		
ATE		Wet Ponds		A	C	100		
N N		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)		PER 1	00 LF	10		
RONM		Riffle Pool Complex		PER 1	00 LF	10		
INN	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						20
	5.2.	Recreational/Educational	Ye	es = 100 b = 0 pt	0, s			
			тс	TAL	SOLU		TS	25
			т	OTAL	BEN		s	335

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

77

4.35

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others

### City of Frontenac Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS

Project Name:	FIGURE 7-7 CHANNEL FDC					
Solutions By:	EDM INC.			DATE:	10/18	/2013
Problem:	Yard erosion Q335-10674 Oakgate Lane, 10602 Chapel Oaks	Q70-8	41 Chapel	Oaks, and 10	0644, 10628,	10610, nad
Strategy:	Install bank protection on FDC from Stat	ion 21+	-50 to 33+0	0 (1,150 LF	).	
	Description	Unit	Quantity	Unit Cost	ALT 1	ALT 2
	Hard stabilization (L) Soft stabilization (L)	LF LF	1,150 1,150	\$300 \$200	\$345,000 \$0	\$0 \$230,000
	Geomorphic Study Subtotal	Ea.	2	\$10,000	\$345,000	\$20,000 \$250,000
	Total				\$345,000	\$250,000
	Utility Relocation			20%	\$69,000	\$50,000
	Clearing Mobilization			5% 4%	\$17,250 \$13,800	\$12,500 \$10,000
	Total with Percent Allowances				\$445,050	\$322,500
	Contingency					
				25%	\$111,263	\$80,625
	Probable Construction Cost Estimate				\$556,313	\$403,125
	Design Engineering and Geotechnical			30%	\$166,894	\$120,938
	Total Conceptual Cost Estimate				\$724,000	\$525,000
	Benefit Points Benefit/Cost Ratio				260 0.36	400 0.76

**Additional Comments:** 

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 7-7 Channel FDC, Alternate 2

				Chro (<=2 Floor	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infree (>15 Floo	quent 5-Yr) oding	ints
		PROBLEM CATE	GORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		1.1.1. Structure Flooding								
		Habitable 1st floor, residentia mechanical equipment (1 lo <i>Address:</i>	al; includes spaces with t per structure)	300		150		25		
		Basement (1 lot per structure Address:	e)	200		100		15		
		Attached Garage (1 lot per s Address:	tructure)	100		50		8		
	ŊĞ	Misc. structures including pa courts, detached garages, et Address:	tio/decks, pools, sheds, tennis tc.(1 lot per structure)	50		25		4		
		Industrial, office, commercia (1 lot per 2,500 sf of floor sp <i>Address:</i>	l and warehouse ace flooded)	300		150		25		
	т. Т	Yard Flooding (1 per lot) Address:		10		5		0		
	÷	1.1.2. Roadway Flooding (allocate impacted & 2 lots per interse	1 lot per 250' of roadway ection impacted)	1						
		Emergency Access restricted route to habitable structure), Address:	d (>12" water over only access pts per structure	200		100		15		
		Traffic obstruction (> 6" of wa	ater) on arterial street	50		25		4		
AM		Traffic obstruction (> 6" of wa	ater) on collector street	25		12		2		
STRE		Traffic obstruction (> 6" of wa Address:	ater) on residential street	10		5		1		
1.0 9		1.2.1. Threatening Structure (Ratio=Height of bank / dista	nce from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Habitable structures, resider	ntial (1 lot per structure)	300		200		50		
		Misc structures including por courts, detached garages, et Address:	ols, patio/decks, sheds, tennis tc.(1 lot per structure)	150		100		25		
	NOISO	Industrial, office, commercia (1 lot per structure) <i>Address:</i>	l and warehouse	300		200		50		
	Ш.	1.2.2. No. of lots (from 1.2.1) on ou	itside of bend		lots	1	10 poin	ts per lo	ot	
	1.2.	1.2.3. Threatening Roadway (allocation in the second second second second second second second second second se	ate 1 lot per 250' of roadway ection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
		Arterial Road:		75		50		12		
		Collector Road: Address:		35		25		6		
		Residential Road: Address:		20		12		3		

PROJECT NAME: Figure 7-7 Channel FDC, Alternate 2

DATE: 10/18/2013

			Chro (<=2 Floor	onic -Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350		250		65		
		Basement (1 lot per structure)* Address:	250		200		50		
FLOW	IJ	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND.	2.1. FLOODIN	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N						
ER / OVERL		Attached Garage (1 lot per structure) Address:	100		75		25		
		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
SEW		Yard Flooding (1 per lot)	10		6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)		<u>I</u>		<u> </u>			
2.0 STC		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
-		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:		Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	ts/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:		Point	ts/lot:	10	
	2.4.	Age of Existing System	>50 yrs (30 pts)		26-50 yrs (15 pts)		<25 yrs (0 pts)		
		Points for Age							
			тот		OBLE				

PROJECT NAME: Figure 7-7 Channel FDC, Alternate 2

DATE: 10/18/2013

# CONTINUED:

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :		Max points:	1000	
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	5	Points per Add'l Proj.:	50	250
	4.1.	Addresses pollutants:	N	lo. Unit	S	Points per	Unit	
ΙΑLITY		Bioswales		PER 1	00 LF	10		
R QL		Forebays		A	C	200		
ATE		Wet Ponds		A	C	100		
N / -		Wetlands		A	C	50		
ENTAL		Biostabilization of banks (per bank)	11	PER 1	00 LF	10		110
RONM		Riffle Pool Complex		PER 100 LF		10	10	
INVIE	4.2.	Eliminates combined sewer (per project)		E	A	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	A	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
5.2. Recreational/Educational $Yes = 100,$ no = 0 pts $Yes$							30	
			т		SOLU		rs	400
			т	OTAL	BEN		s	400

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

TOTAL COST IN THOUSANDS=



BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

0.76

Place "X" in one box below:

MSD Project Project by Others CITY OF FRONTENAC CONCEPTUAL SOLUTIONS





# City of Frontenac Stormwater System Master Improvement Plan

CONCEPTUAL LEVEL ANALYSIS										
Project Name:	FIGURE	8-1 - BASIN	1							
Solutions By:	EDM ING	2.	DATE: 10	0/18/2013						
Problem:	Yard flooding and creek erosion downstream of Spoede and Interstate 64									
Strategy:	1) Constr	uct detention	basins to redu	ce flow going through existing system						
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's						
Excavation - North Basin	CY	20000	\$18	\$360,000						
Outfall Structure - North Basin	LS	1	\$10,000	\$10,000						
Excavation - South Basin	CY	25000	\$18	\$450,000						
Outfall Structure - South Basin	LS	1	\$10,000	\$10,000						
Subtotal				\$830,000						
Total				\$830,000						
Utility Relocation			20%	\$166,000						
Clearing			5%	\$41,500						
Mobilization			4%	\$33,200						
Total with Percent Allowance	5			\$1,070,700						
Contingency			25%	\$267,675						
Probable Construction Cost E	stimate			\$1,338,375						
Design Engineering and Geotec	hnical		30%	\$401,513						
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio	te			\$1,740,000 320 0.18						

**Additional Comments:** 

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 8-1 - Basin 1

				Chro (<=2 Floo	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	nts
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	Ю И		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) Address:	300		150		25		
	<u>-</u>		Yard Flooding (1 per lot) Address:	10		5		0		
	<del>,</del>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
			Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
		1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	0 point	s per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 8-1 - Basin 1

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floor	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address:	250	0	200		50		
) FLOW	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIDC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing System Y/N			N			
ERL	FLOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
ER / OVI	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot)	10	0	6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
(1		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 yrs		26-50 (15)	) yrs pts)	<25 (0	5 yrs pts)	
		Points for Age				/			0
			тот	TAL PI	ROBLE	EM PC	INTS		

PROJECT NAME: Figure 8-1 - Basin 1

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	31.0%	Max points:	1000	310
3. REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	1	No. Unit	S	Points per	Points per Unit	
JALITY		Bioswales*	0	PER	100 LF	10		
r al		Forebays		A	AC	200		
ATE		Wet Ponds		A	AC	100		
N / -		Wetlands		A	AC	50		
ENTAL		Biostabilization of banks (per bank)		PER	100 LF	10		
RONM		Riffle Pool Complex		PER	100 LF	10		
IN	4.2.	2. Eliminates combined sewer (per project)		E	ĒA	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	ĒA	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						10
	5.2.	Recreational/Educational	Y n	es = 10 o = 0 p	l0, ts			
			Т	OTAL	SOLU		rs	320
TOTAL BENEFIT POINTS							S	320

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1740

0.18

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project Project by Others

# City of Frontenac Stormwater System Master Improvement Plan

	CON	CEPTUAL 1	LEVEL ANA	LYSIS
Project Name:	FIGURE	8-1 - BASIN	2	
Solutions By:	EDM INC	2.	DATE: 10	0/18/2013
Problem:	Yard floo	ding and cree	ek erosion dow	nstream of Huntleigh Downs Rd.
Strategy:	1) Constr	uct detention	basins to redu	ce flow going through existing system
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's
Excavation - North Basin	CY	10028	\$18	\$180,504
Outfall Structure - North Basin	LS	1	\$30,000	\$30,000
Subtotal				\$210,504
Total				\$210,504
Utility Relocation			20%	\$42,101
Clearing			5%	\$10,525
Mobilization			4%	\$8,420
Total with Percent Allowance	5			\$271,550
Contingency			25%	\$67,888
Probable Construction Cost E	stimate			\$339,438
Design Engineering and Geotec	hnical		30%	\$101,831
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio	te			\$442,000 570 1.29

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 8-1 - Basin 2

				Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	<u>-</u>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
	_		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	0 point	s per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 8-1 - Basin 2

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<=* Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address:	250	0	200		50		
) FLOW	Q	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIDC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Ex	Existing System Y/N			N		
ERL	2.1. FLOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
R / OVE		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot)	10	0	6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	1						
.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
(1		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	e of Existing System >50 yrs		26-50 (15)	) yrs ots)	<25 (0	5 yrs pts)	
		Points for Age		-·• <i>)</i>	(10	,		<u>- ••/</u>	0
			тот	TAL PI	ROBLE	EM PO	INTS		

PROJECT NAME: Figure 8-1 - Basin 2

DATE: 10/18/2013

# **CONTINUED:**

		SOLUTION CATEGORY						
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	55.0%	Max points:	1000	550
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	1	No. Uni	S	Points per	Unit	
IALITY		Bioswales*	0	PER	100 LF	10		
R QL		Forebays		ŀ	AC	200		
ATE		Wet Ponds		ŀ	AC	100		
N /		Wetlands		ŀ	AC	50		
ENTAL		Biostabilization of banks (per bank)		PER	100 LF	10		
RONM		Riffle Pool Complex		PER	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	ĒA	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	ĒA	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0	O Points for Easements							20
	5.2.	Recreational/Educational	Y n	es = 10 o <u>= 0</u> p	l0, ts			
TOTAL \$							rs	570
TOTAL BENI							S	570

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

442

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

1.29

Place "X" in one box below:

MSD Project
Project by Others

City of Frontenac										
Sto	rmwater	System M	aster Impro	ovement Plan						
CONCEPTUAL LEVEL ANALYSIS										
Project Name:	Project Name: FIGURE 8-1 - BASIN 3									
Solutions By:	EDM INC	2.	DATE: 10	0/18/2013						
Problem:	Yard floo	ding and cree	ek erosion dow	nstream of Sisters of Mercy						
<b>Strategy:</b> 1) Construct detention basins to reduce flow going through existing system										
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's						
Excavation	CY	27981	\$18	\$503,658						
Outfall Structure	LS	1	\$25,000	\$25,000						
Raise Existing Road	LS	1	\$25,000	\$25,000						
Subtotal				\$553,658						
Total				\$553,658						
Utility Relocation			20%	\$110,732						
Clearing			5%	\$27,683						
Mobilization			4%	\$22,146						
Total with Percent Allowanc	es			\$714,219						
Contingency			25%	\$178,555						
Probable Construction Cost	Estimate			\$892,774						
Design Engineering and Geote	chnical		30%	\$267,832						
Total Conceptual Cost Estim Total Benefit Points Total Benefit Point Ratio			\$1,161,000 170 0.15							

Additional Comments:Unit prices based on MSD Unit Prices January 2006 Construction Costs<br/>Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 8-1 - Basin 3

				Chro (<=2 Floo	onic -Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	nts
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure) Address:	100		50		8		
	Ŋ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	 Т		Yard Flooding (1 per lot) Address:	10		5		0		
	~	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street Address:	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
	_		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	sosion		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ë	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	0 point	s per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road: Address:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 8-1 - Basin 3

DATE: 10/18/2013

			Chro (<=2 Floo	onic PYr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Po
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)*	250	0	200		50		
FLOW	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIDC	If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Ex	isting S	ystem Y	/N	N		
ERL,		Attached Garage (1 lot per structure) Address:	100	0	75		25		
R / OVI	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot) Address:	10	0	6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
2.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
7		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	tructures No. Lots:				s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 (15)	) yrs ots)	<25 (0	o yrs ots)	
		Points for Age	(00		(10	,		,	0
			тот	AL PI	ROBLE	EM PO	INTS		

PROJECT NAME: Figure 8-1 - Basin 3

DATE: 10/18/2013

# **CONTINUED:**

SOLUTION CATEGORY								
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	15.0%	Max points:	1000	150
3. REGI	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	1	No. Uni	S	Points per	Unit	
IALITY		Bioswales*	0	PER	100 LF	10		
R QL		Forebays		Å	AC	200		
ATEI		Wet Ponds		Å	AC	100		
N /		Wetlands		ŀ	AC	50		
ENTAL		Biostabilization of banks (per bank)		PER	100 LF	10		
RONM		Riffle Pool Complex		PER	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	ĒA	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	ĒA	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.01		Points for Easements						20
	5.2.	Recreational/Educational	Y n	es = 10 o = 0 p	0, ts			
			Т	OTAL	SOLU		rs	170
	TOTAL BENEFIT POINTS							

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

1161

0.15

BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project Project by Others

City of Frontenac										
Stormwater System Master Improvement Plan CONCEPTUAL LEVEL ANALYSIS										
Solutions By:	Solutions By: EDM INC. DATE: 10/18/2013									
Problem:	Yard flooding and creek erosion downstream of Villa Duchesne High School									
Strategy:	1) Constr	uct detention	basins to redu	ce flow going through existing system						
Description	Unit	Quantity	Unit Cost	1) Alternative 1 Without BMP's						
Excavation	CY	5585	\$18	\$100,530						
Outfall Structure	LS	1	\$10,000	\$10,000						
Subtotal				\$110,530						
Total				\$110,530						
Utility Relocation			20%	\$22,106						
Clearing			5%	\$5,527						
Mobilization			4%	\$4,421						
Total with Percent Allowance	es			\$142,584						
Contingency			25%	\$35,646						
Probable Construction Cost I	Estimate			\$178,230						
Design Engineering and Geotec	chnical		30%	\$53,469						
Total Conceptual Cost Estima Total Benefit Points Total Benefit Point Ratio	ate			\$232,000 340 1.47						

Additional Comments:

Conceptual Cost are rounded to the nearest \$1000

PROJECT NAME: Figure 8-1 - Basin 4

				Chro (<=2 Floo	onic 2-Yr) ding	Freq (>2<= Floo	uent 15-Yr) ding	Infre (>1 Floo	quent 5-Yr) oding	ints
			PROBLEM CATEGORY	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total Poi
		1.1.1.	Structure Flooding							
			Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure) Address:	300		150		25		
			Basement (1 lot per structure) Address:	200		100		15		
			Attached Garage (1 lot per structure)	100		50		8		
	ŊŊ		Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		25		4		
	LOODI		Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded) <i>Address:</i>	300		150		25		
	Т		Yard Flooding (1 per lot) Address:	10		5		0		
	<u>-</u>	1.1.2.	Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
			Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		100		15		
			Traffic obstruction (> 6" of water) on arterial street Address:	50		25		4		
AM			Traffic obstruction (> 6" of water) on collector street	25		12		2		
STRE			Traffic obstruction (> 6" of water) on residential street Address:	10		5		1		
1.0		1.2.1.	Threatening Structure (Ratio=Height of bank / distance from structure)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Habitable structures, residential (1 lot per structure) Address:	300		200		50		
	_		Misc structures including pools, patio/decks, sheds, tennis courts, detached garages, etc.(1 lot per structure) <i>Address:</i>	150		100		25		
	SOSION		Industrial, office, commercial and warehouse (1 lot per structure) <i>Address:</i>	300		200		50		
	Ш Ш	1.2.2.	No. of lots (from 1.2.1) on outside of bend		lots	1	0 point	s per lo	ot	
	1.2	1.2.3.	Threatening Roadway (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)	Pts. for Ratio > 0.70	No. Lots	Pts. for Ratio 0.36 - 0.70	No. Lots	Pts. for Ratio 0.15- 0.35	No. Lots	
			Arterial Road:	75		50		12		
			Collector Road: Address:	35		25		6		
			Residential Road: Address:	20		12		3		

PROJECT NAME: Figure 8-1 - Basin 4

DATE: 10/18/2013

			Chro (<=2 Floo	onic 2-Yr) ding	Frequent (>2<=15-Yr) Flooding		Infrequent (>15-Yr) Flooding		oints
		PROBLEM CATEGORY, CONT.	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Points per Category	No. Lots Affected	Total P
		2.1.1. Structure Flooding							
		Habitable 1st floor, residential; includes spaces with mechanical equipment (1 lot per structure)* Address:	350	0	250		65		
		Basement (1 lot per structure)* Address:	250	0	200		50		
FLOW	U	Industrial, office, commercial and warehouse (1 lot per 2,500 sf of floor space flooded)* Address:	300		200		50		
AND	NIDC	* If there is an existing public system and points are taken for any of the 3 items above, add 50 points.	Existing S		ystem Y	′/N	N		
ERL	FLOO	Attached Garage (1 lot per structure) Address:	100	0	75		25		
R / OV	2.1.	Misc. structures including patio/decks, pools, sheds, tennis courts, detached garages, etc.(1 lot per structure) Address:	50		35		12		
EWE		Yard Flooding (1 per lot)	10	0	6		0		
RM S		2.1.2. Roadway Flooding (allocate 1 lot per 250' of roadway impacted & 2 lots per intersection impacted)							
.0 STO		Emergency Access restricted (>12" water over only access route to habitable structure), pts per structure Address:	200		150		25		
(1		Traffic obstruction (> 6" of water) on arterial street Address:	50		35		6		
		Traffic obstruction (> 6" of water) on collector street Address:	25		15		2		
		Traffic obstruction (> 6" of water) on residential street Address:	10		6		1		
		Ponding (per ponding area) Address:	No. P	onds:	0	Points	/pond:	5	
	2.2.	Moderate Risk Erosion of misc. structures Address:	No.	Lots:		Point	s/lot:	20	
	2.3.	Yard Erosion (1 per lot) Address:	No.	Lots:	0	Point	s/lot:	10	
	2.4.	Age of Existing System	>50 (30	yrs pts)	26-50 (15)	) yrs pts)	<25 (0	5 yrs pts)	
		Points for Age				/			0
			тот	TAL PI	ROBLE	EM PC	INTS		

PROJECT NAME: Figure 8-1 - Basin 4

DATE: 10/18/2013

# **CONTINUED:**

SOLUTION CATEGORY								
.0 ONAL	3.1.	Reduction of flowrate leaving site	% red of p flowr	uction eak ate :	32.0%	Max points:	1000	320
REGIO	3.2.	Combines smaller projects into regional solution (see note)	No. / Proje	Add'l ects:	0	Points per Add'l Proj.:	50	
	4.1.	Addresses pollutants:	1	No. Uni	S	Points per	Unit	
IALITY		Bioswales*	0	PER	100 LF	10		
R QL		Forebays		ŀ	AC	200		
ATE		Wet Ponds		ŀ	AC	100		
N /		Wetlands		ŀ	AC	50		
ENTAL		Biostabilization of banks (per bank)		PER	100 LF	10		
RONM		Riffle Pool Complex		PER	100 LF	10		
IN	4.2.	Eliminates combined sewer (per project)		E	ĒA	100		
4.0 E	4.3.	Eliminates inflow into sanitary system (1 each per basement flooded, yard vent overtopped, street inlet or driveway drain connected to sanitary/combined system, etc.)		E	ĒA	10		
MISC.	5.1.	Ease of Implementation (No. of Easements)	0-5 (20 pts)	6-10	(10 pts)	11-15 (5 pts)	>15 (0 pts)	
5.0		Points for Easements						20
	5.2.	Recreational/Educational	Y n	es = 10 o = 0 p	l0, ts			
			Т	OTAL	SOLU		rs	340
	TOTAL BENEFIT POINTS							

Note: A regional solution combines several smaller projects into a watershed or subwatershed solution.

\* Rain Gardens are equivalent to 50 LF of Bioswales

TOTAL COST IN THOUSANDS=

232

1.47

#### BENEFIT/ COST RATIO= TOTAL POINTS/ TOTAL COST IN THOUSANDS=

Place "X" in one box below:

MSD Project
Project by Others