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TECHNICAL MEMORANDUM

DATE: July 23, 2021

TO: **City of Ottawa – Jeff Shillington, P.Eng.**

FROM: Steve Pichette, P. Eng.

SUBJECT: **Barrhaven Conservancy East – Draft Plan Application**
Stormwater Management Design Approach

DSEL Job No. 16-891

ATTACHMENTS:

- Summary of Alternatives presented on July 19/21
- Oil/Grit Separator locations and Tributary area (preliminary)
- Preliminary OGS unit sizing @ 80% TSS removal
- CB Shield Details
- Infiltration trench (LID) detail

Jeff,

This memo is submitted as supplemental information to the functional design reporting for the Barrhaven Conservancy East development draft plan application as discussed at a meeting with City staff on July 19, 2021 and subsequent discussions/coordination with City staff.

At the July 19th meeting four distinct alternatives were presented for discussion with the group. Those alternatives as presented are provided in the attached summary issued to the City on July 16, 2021.

Subsequent to the meeting direction was provided by City staff that **Alternative 1: "*Oil and Grit Separators to Naturalized Wetlands*"** would be the preferred alternative. This stormwater management design approach would entail:

1. Oil/Grit Separator (OGS) units at multiple outlet locations to the Fraser-Clarke Watersourse at the north site boundary and multiple outlet locations to the proposed naturalized wetlands within the Jock River corridor which in turn drain to the Jock River. OGS units may be online or offline depending upon incoming peak flow rates and unit location/configuration;

2. Catchbasins with deeper (1.0m) sumps;

3. An additional catchbain insert such as CB Shield™ which are an Environmental Technology Verifiction (ETV) tested product (see attachments);

4. Infiltration trench installations as an on-site LID as part of the treatment train and to assist with water balance mitigation. Extents are to be determined at detailed design (see attached Figure for details).

If these proposed stormwater management treatment train elements are, in principle, acceptable to City staff we can work through location specific details through the detailed design process.

Kevin L. Murphy, P.Eng.

DSEL

david schaeffer engineering ltd.

Requested Materials for the July 19th meeting **July 16, 2021**

Barrhaven Conservancy (D07-16-20-0021)

Status:

- The City's engineer peer reviewer technical comments have been addressed including the Modified Exfiltration Infiltration System (MEFS).
    - City and Caivan had a meeting on April 12th (after receiving 2nd review comments) with Jeff S, Novatech as peer reviewer, Ryan Polkinghorne, Eva Spal (Operations invited but did not attend) to discuss the swm alternatives with general consensus on the MEFS.
    - The 2nd Submission from Caivan included an updated Master Infrastructure Review Report (March 2021) that presented an evaluation of the stormwater management alternatives (summarized below). Based on this analysis, the MEFS was selected as the preferred stormwater management solution as it addressed the full list of swm criteria applicable to this subdivision.

Stormwater Management Alternatives

(as presented in the Master Infrastructure Review (March 2021) previously submitted in support of the development application)

Alternative	Description	Pros	Cons
No. 1 **Oil and Grit Separators to Naturalized Wetlands**	➢ A storm sewer system designed to capture the required design capture events per guidelines; ➢ Multiple oil and grit separators (OGS) designed to provide an Enhanced Level of Protection per MECP guidelines, via treatment of the stormwater captured by the storm sewer network (**estimated to be ten units for Conservancy East and six units for Conservancy West**); ➢ OGS units will outlet to naturalized wetlands within the natural heritage corridor, connecting via channels to support hydration of the wetlands and ultimately outletting to the Jock River; ➢ In anticipation of future MECP requirements, wherein OGS units (unless Environmental Technology Verified (ETV)) will only be considered to be accounting for 50% TSS removal, additional treatment train requirements will need to be incorporated; ➢ Inverts of outlets of OGS units are set at, or above, the 2-year summer water levels of the Jock River; ➢ An on-site road network designed to maximize the available surface storage within ROWs for the 100-year design event, with controlled release of stormwater to the minor storm sewer system; ➢ An overland flow route designed to safely convey runoff to desired outlets.	➢ Common technology used throughout the City; ➢ Multiple outlets accommodates the grade raise constricted site and results in smaller sewer sizes; ➢ Maintenance is via typical procedures employed by the City; ➢ Accommodates the desired naturalized wetlands proposed within the floodplain; ➢ Efficient use of land.	➢ City has expressed concern with the number of units to be maintained; ➢ OGS units need to be ETV verified and if not will require additional treatment train measures to achieve required targets; ➢ Does not contribute to mitigation of water balance concerns. ➢ Conservation Authority has stated that OGS units only provide 50% TSS removal that will not meet current criteria of 80%. Natural wetlands can not form part of the treatment train.

Alternative	Description	Pros	Cons
No. 2 **Stormwater Management Wetland Facilities <u>within</u> the Floodplain**	➢ A storm sewer system designed to capture the required design capture events per guidelines; ➢ Multiple Stormwater Management (SWM) Wetland facilities, with traditional forebays, in the floodplain, designed to provide Enhanced Level of Protection per MECP guidelines (3 facilities for Conservancy East); ➢ An on-site road network designed to maximize the available surface storage within ROWs for the 100-year design event, with controlled release of stormwater to the minor storm sewer system; ➢ An overland flow route designed to safely convey runoff to desired outlets.	➢ Common technology used throughout the City; ➢ Can be designed to meet required TSS targets; ➢ Maintenance is via typical procedures employed by the City; ➢ Efficient use of land.	➢ Multiple facilities required due to site topography and grade raise constraints; ➢ Additional maintenance due to multiple facilities; ➢ Approval challenges with the SWM facilities proposed within the floodplain; ➢ Sediment management areas would have to be out of the floodplain; ➢ Does not contribute to mitigation of water balance concerns; ➢ Conflicts with the desired naturalized wetlands proposed within the floodplain.
No. 3 **Stormwater Management Wetland Facilities <u>outside</u> of the Floodplain**	➢ A storm sewer system designed to capture the required design capture events per guidelines; ➢ Multiple Stormwater Management (SWM) Wetland facilities, with traditional forebays, in the floodplain, designed to provide Enhanced Level of Protection per MECP guidelines (3 facilities for Conservancy East); ➢ Discharges to naturalized wetlands within the natural heritage corridor, connecting via channels to support hydration of the wetlands and ultimately outletting to the Jock River; ➢ An on-site road network designed to maximize the available surface storage within ROWs for the 100-year design event, with controlled release of stormwater to the minor storm sewer system; ➢ An overland flow route designed to safely convey runoff to desired outlets.	➢ Common technology used throughout the City; ➢ Can be designed to meet required TSS targets; ➢ Maintenance is via typical procedures employed by the City; ➢ Accommodates the desired naturalized wetlands proposed within the floodplain.	➢ Multiple facilities required due to site topography and grade raise constraints; ➢ Additional maintenance due to multiple facilities; ➢ Inefficient use of land; ➢ Does not contribute to mitigation of water balance concerns; ➢ Conflicts with the desired naturalized wetlands proposed within the floodplain.
No. 4 **Modified Etobicoke Filtration System Outletting to Naturalized Wetlands**	➢ A storm sewer system designed to capture the required design capture events per guidelines; ➢ A Modified Etobicoke Filtration System (MEFS) alongside all mainline storm sewers with multiple outlets along the southern boundary of the development area. Discharges to naturalized wetlands within the natural heritage corridor, connecting via channels to support hydration of the wetlands and ultimately outletting to the Jock River; ➢ Inverts of outlets are set at, or above, the 2-year summer water levels of the Jock River; ➢ An on-site road network designed to maximize the available surface storage within ROWs for the 100-year design event, with controlled release of stormwater to the minor storm sewer system; ➢ An overland flow route designed to safely convey runoff to desired outlets.	➢ Similar installations are found within the City of Ottawa (Barrhaven South Urban Expansion Area (BSUES), Deer Run (Stittsville) etc); ➢ Maintenance is via similar procedures reviewed/approved for the recent BSUEA Master Servicing Study; ➢ Contributes to the mitigation of water balance concerns; ➢ In line with the City's recently released "*Low Impact Development Technical Guidance*	➢ Additional maintenance procedures over standard storm sewer systems; ➢ Relatively new type of infrastructure approach for the City.

Alternative	Description	Pros	Cons
		Report" (February 2021); ➢ Accommodates the desired naturalized wetlands proposed within the floodplain; ➢ Efficient use of land. ➢ This system responds directly to the City of Ottawa and CA direction (provided specific to this and other recent developments, as well as drafted into proposed policy manuals) regarding the development of stormwater strategies designed to incorporate LIDs and provide a higher standard of water quality control. Traditional 'familiar' systems are no longer addressing these requirements. ➢ The system design is also an alternative within the Ontario Stormwater Management Planning and Design manual (Section 4.5.10, Etobicoke exfiltration System).	

cKENNA CASEY DRIVE

CEDARV ROAD

Ex. CULVERT

GREGORY CASEY SWM POND TO REMAIN

BARRHAVEN CONSERVANCY DEVELOPMENT CORPORATION LANDS

CITY LANDS

COMMERCIAL

3.92Ha 0.80

STRANDHERD DRIVE

Ex. FOSTER DITCH

Ex. CULVERT

FUTURE FRENCH PUBLIC SCHOOL

Ex. CHAPMAN MILLS DRIVE

KENNEDY-BURNETT POND

FUTURE TRANSIT CORRIDOR

REALIGNED FRASER CLARKE CREEK

PHASE 1 SUBMITTED SEPARATE AND COMPLETED

FUTURE CHAPMAN MILLS DRIVE

BARRHAVEN CONSERVANCY PHASE 1

Ex. FOSTER DITCH CULVERT

PARK 3

7.63Ha 0.64

STREET 5

STREET 6

STREET 7

STREET 8

STREET 9

STREET 10

STREET 11

STREET 12

STREET 13

STREET 14

STREET 15

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STREET 36

STREET 37

LANE 1

LANE 2

LANE 3

TRUNK 1

TRUNK 2

TRUNK 3

TRUNK 4

TRUNK 5

TRUNK 6

TRUNK 7

TRUNK 8

TRUNK 9

TRUNK 10

TRUNK 11

TRUNK 12

TRUNK 13

1.18Ha 0.69

6.50Ha 0.73

5.32Ha 0.69

6.05Ha 0.52

PARK 2

6.38Ha 0.65

6.23Ha 0.65

1.98Ha 0.65

5.33Ha 0.65

5.82Ha 0.65

2.33Ha 0.65

PARK 1

RIDEAU FRONT

FUTURE CULVERT

Ex. FRASER CLARKE CREEK

CLARIDGE BURNETT LANDS

JOCK RIVER OPEN SPACE

SILVER MAPLE SWAMP

WETLAND 3

WETLAND 1

WETLAND 2

Ex. BRIDGE

JOCK RIVER

BORRISOKANE ROAD

REALIGNED CHANNEL

HALF MOON BAY WEST

LEGEND

- SITE BOUNDARY
- STORM TRUNK SEWER
- STORM LOCAL SEWER
- STORM TRUNK TRIBUTARY AREA
- 7.63Ha / 0.64 — AREA IN HECTARES / RUNOFF COEFFICIENT
- STORM MAHOLE

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BARRHAVEN CONSERVANCY EAST
STORM TRIBUTARY AREA
CITY OF OTTAWA

PROJECT No. :	16-891
SCALE:	1:2000
DATE:	JULY 2021
DRAWING No.	3

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 1

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	5.82	ha	**Rainfall Station #**	215	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	10.5	10.5	6.2	97.1	10.3
1.5	9.9%	29.7%	15.8	15.8	9.3	96.2	9.5
2.0	8.4%	38.1%	21.0	21.0	12.4	95.3	8.0
2.5	7.7%	45.8%	26.3	26.3	15.5	94.4	7.3
3.0	5.9%	51.7%	31.6	31.6	18.6	93.5	5.6
3.5	4.4%	56.1%	36.8	36.8	21.7	92.6	4.0
4.0	4.7%	60.7%	42.1	42.1	24.8	91.8	4.3
4.5	3.3%	64.0%	47.3	47.3	27.9	90.9	3.0
5.0	3.0%	67.1%	52.6	52.6	30.9	90.0	2.7
6.0	5.4%	72.4%	63.1	63.1	37.1	88.2	4.8
7.0	4.4%	76.8%	73.6	73.6	43.3	86.4	3.8
8.0	3.5%	80.3%	84.1	84.1	49.5	84.7	3.0
9.0	2.8%	83.2%	94.7	94.7	55.7	82.9	2.3
10.0	2.2%	85.3%	105.2	105.2	61.9	81.1	1.8
15.0	7.0%	92.3%	157.8	157.8	92.8	72.2	5.0
20.0	4.5%	96.9%	210.3	169.9	100.0	56.7	2.6
25.0	1.4%	98.3%	262.9	169.9	100.0	45.4	0.7
30.0	0.7%	99.0%	315.5	169.9	100.0	37.8	0.3
35.0	0.5%	99.5%	368.1	169.9	100.0	32.4	0.2
40.0	0.5%	100.0%	420.7	169.9	100.0	28.4	0.2
45.0	0.0%	100.0%	473.3	169.9	100.0	25.2	0.0
50.0	0.0%	100.0%	525.8	169.9	100.0	22.7	0.0
							88.1

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 81.6%

Predicted Annual Rainfall Treated = 97.7%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 2

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	5.33	ha	**Rainfall Station #**	215	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	9.6	9.6	5.7	97.2	10.3
1.5	9.9%	29.7%	14.4	14.4	8.5	96.4	9.5
2.0	8.4%	38.1%	19.3	19.3	11.3	95.6	8.0
2.5	7.7%	45.8%	24.1	24.1	14.2	94.8	7.3
3.0	5.9%	51.7%	28.9	28.9	17.0	94.0	5.6
3.5	4.4%	56.1%	33.7	33.7	19.8	93.2	4.1
4.0	4.7%	60.7%	38.5	38.5	22.7	92.4	4.3
4.5	3.3%	64.0%	43.3	43.3	25.5	91.5	3.0
5.0	3.0%	67.1%	48.2	48.2	28.3	90.7	2.7
6.0	5.4%	72.4%	57.8	57.8	34.0	89.1	4.8
7.0	4.4%	76.8%	67.4	67.4	39.7	87.5	3.8
8.0	3.5%	80.3%	77.1	77.1	45.3	85.9	3.0
9.0	2.8%	83.2%	86.7	86.7	51.0	84.2	2.4
10.0	2.2%	85.3%	96.3	96.3	56.7	82.6	1.8
15.0	7.0%	92.3%	144.5	144.5	85.0	74.5	5.2
20.0	4.5%	96.9%	192.6	169.9	100.0	61.9	2.8
25.0	1.4%	98.3%	240.8	169.9	100.0	49.5	0.7
30.0	0.7%	99.0%	288.9	169.9	100.0	41.3	0.3
35.0	0.5%	99.5%	337.1	169.9	100.0	35.4	0.2
40.0	0.5%	100.0%	385.3	169.9	100.0	31.0	0.2
45.0	0.0%	100.0%	433.4	169.9	100.0	27.5	0.0
50.0	0.0%	100.0%	481.6	169.9	100.0	24.8	0.0
							89.1

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 82.6%

Predicted Annual Rainfall Treated = 98.2%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 3
Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	6.23	ha	**Rainfall Station #**	215	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	11.3	11.3	6.6	97.0	10.3
1.5	9.9%	29.7%	16.9	16.9	9.9	96.0	9.5
2.0	8.4%	38.1%	22.5	22.5	13.3	95.1	8.0
2.5	7.7%	45.8%	28.1	28.1	16.6	94.1	7.2
3.0	5.9%	51.7%	33.8	33.8	19.9	93.2	5.5
3.5	4.4%	56.1%	39.4	39.4	23.2	92.2	4.0
4.0	4.7%	60.7%	45.0	45.0	26.5	91.3	4.3
4.5	3.3%	64.0%	50.7	50.7	29.8	90.3	3.0
5.0	3.0%	67.1%	56.3	56.3	33.1	89.4	2.7
6.0	5.4%	72.4%	67.5	67.5	39.8	87.5	4.7
7.0	4.4%	76.8%	78.8	78.8	46.4	85.6	3.7
8.0	3.5%	80.3%	90.1	90.1	53.0	83.7	3.0
9.0	2.8%	83.2%	101.3	101.3	59.6	81.8	2.3
10.0	2.2%	85.3%	112.6	112.6	66.3	79.9	1.7
15.0	7.0%	92.3%	168.9	168.9	99.4	70.4	4.9
20.0	4.5%	96.9%	225.2	169.9	100.0	53.0	2.4
25.0	1.4%	98.3%	281.4	169.9	100.0	42.4	0.6
30.0	0.7%	99.0%	337.7	169.9	100.0	35.3	0.2
35.0	0.5%	99.5%	394.0	169.9	100.0	30.3	0.1
40.0	0.5%	100.0%	450.3	169.9	100.0	26.5	0.1
45.0	0.0%	100.0%	506.6	169.9	100.0	23.5	0.0
50.0	0.0%	100.0%	562.9	169.9	100.0	21.2	0.0
							87.4

Removal Efficiency Adjustment[2] = 6.5%
Predicted Net Annual Load Removal Efficiency = 80.9%
Predicted Annual Rainfall Treated = 97.4%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 4

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	2.33	ha	**Rainfall Station #**	215	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	3025		**CDS Treatment Capacity**	68	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	4.2	4.2	6.2	97.1	10.3
1.5	9.9%	29.7%	6.3	6.3	9.3	96.2	9.5
2.0	8.4%	38.1%	8.4	8.4	12.4	95.3	8.0
2.5	7.7%	45.8%	10.5	10.5	15.5	94.4	7.3
3.0	5.9%	51.7%	12.6	12.6	18.6	93.5	5.6
3.5	4.4%	56.1%	14.7	14.7	21.7	92.6	4.0
4.0	4.7%	60.7%	16.8	16.8	24.8	91.8	4.3
4.5	3.3%	64.0%	18.9	18.9	27.9	90.9	3.0
5.0	3.0%	67.1%	21.1	21.1	31.0	90.0	2.7
6.0	5.4%	72.4%	25.3	25.3	37.2	88.2	4.8
7.0	4.4%	76.8%	29.5	29.5	43.4	86.4	3.8
8.0	3.5%	80.3%	33.7	33.7	49.6	84.7	3.0
9.0	2.8%	83.2%	37.9	37.9	55.8	82.9	2.3
10.0	2.2%	85.3%	42.1	42.1	61.9	81.1	1.8
15.0	7.0%	92.3%	63.2	63.2	92.9	72.2	5.0
20.0	4.5%	96.9%	84.2	68.0	100.0	56.7	2.6
25.0	1.4%	98.3%	105.3	68.0	100.0	45.3	0.7
30.0	0.7%	99.0%	126.3	68.0	100.0	37.8	0.3
35.0	0.5%	99.5%	147.4	68.0	100.0	32.4	0.2
40.0	0.5%	100.0%	168.4	68.0	100.0	28.3	0.2
45.0	0.0%	100.0%	189.5	68.0	100.0	25.2	0.0
50.0	0.0%	100.0%	210.5	68.0	100.0	22.7	0.0
							88.1

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 81.6%

Predicted Annual Rainfall Treated = 97.7%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 5

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	6.38	ha	**Rainfall Station #**	215	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	11.5	11.5	6.8	96.9	10.3
1.5	9.9%	29.7%	17.3	17.3	10.2	95.9	9.5
2.0	8.4%	38.1%	23.1	23.1	13.6	95.0	8.0
2.5	7.7%	45.8%	28.8	28.8	17.0	94.0	7.2
3.0	5.9%	51.7%	34.6	34.6	20.4	93.0	5.5
3.5	4.4%	56.1%	40.4	40.4	23.7	92.1	4.0
4.0	4.7%	60.7%	46.1	46.1	27.1	91.1	4.2
4.5	3.3%	64.0%	51.9	51.9	30.5	90.1	3.0
5.0	3.0%	67.1%	57.6	57.6	33.9	89.1	2.7
6.0	5.4%	72.4%	69.2	69.2	40.7	87.2	4.7
7.0	4.4%	76.8%	80.7	80.7	47.5	85.2	3.7
8.0	3.5%	80.3%	92.2	92.2	54.3	83.3	2.9
9.0	2.8%	83.2%	103.8	103.8	61.1	81.4	2.3
10.0	2.2%	85.3%	115.3	115.3	67.8	79.4	1.7
15.0	7.0%	92.3%	172.9	169.9	100.0	69.0	4.8
20.0	4.5%	96.9%	230.6	169.9	100.0	51.7	2.4
25.0	1.4%	98.3%	288.2	169.9	100.0	41.4	0.6
30.0	0.7%	99.0%	345.9	169.9	100.0	34.5	0.2
35.0	0.5%	99.5%	403.5	169.9	100.0	29.6	0.1
40.0	0.5%	100.0%	461.1	169.9	100.0	25.9	0.1
45.0	0.0%	100.0%	518.8	169.9	100.0	23.0	0.0
50.0	0.0%	100.0%	576.4	169.9	100.0	20.7	0.0
							87.1

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 80.6%

Predicted Annual Rainfall Treated = 97.1%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 6

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	6.05	ha	**Rainfall Station #**	215	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	10.9	10.9	6.4	97.0	10.3
1.5	9.9%	29.7%	16.4	16.4	9.7	96.1	9.5
2.0	8.4%	38.1%	21.9	21.9	12.9	95.2	8.0
2.5	7.7%	45.8%	27.3	27.3	16.1	94.2	7.2
3.0	5.9%	51.7%	32.8	32.8	19.3	93.3	5.5
3.5	4.4%	56.1%	38.3	38.3	22.5	92.4	4.0
4.0	4.7%	60.7%	43.7	43.7	25.7	91.5	4.3
4.5	3.3%	64.0%	49.2	49.2	29.0	90.6	3.0
5.0	3.0%	67.1%	54.7	54.7	32.2	89.6	2.7
6.0	5.4%	72.4%	65.6	65.6	38.6	87.8	4.7
7.0	4.4%	76.8%	76.5	76.5	45.0	85.9	3.7
8.0	3.5%	80.3%	87.5	87.5	51.5	84.1	3.0
9.0	2.8%	83.2%	98.4	98.4	57.9	82.3	2.3
10.0	2.2%	85.3%	109.3	109.3	64.3	80.4	1.8
15.0	7.0%	92.3%	164.0	164.0	96.5	71.2	5.0
20.0	4.5%	96.9%	218.6	169.9	100.0	54.6	2.5
25.0	1.4%	98.3%	273.3	169.9	100.0	43.6	0.6
30.0	0.7%	99.0%	328.0	169.9	100.0	36.4	0.2
35.0	0.5%	99.5%	382.6	169.9	100.0	31.2	0.1
40.0	0.5%	100.0%	437.3	169.9	100.0	27.3	0.1
45.0	0.0%	100.0%	492.0	169.9	100.0	24.2	0.0
50.0	0.0%	100.0%	546.6	169.9	100.0	21.8	0.0
							87.7

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 81.2%

Predicted Annual Rainfall Treated = 97.5%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 7

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	5.32	ha	**Rainfall Station #**	215	
Weighted C	0.70		**Particle Size Distribution**	FINE	
CDS Model	4040		**CDS Treatment Capacity**	170	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	10.4	10.4	6.1	97.1	10.3
1.5	9.9%	29.7%	15.5	15.5	9.1	96.2	9.5
2.0	8.4%	38.1%	20.7	20.7	12.2	95.4	8.0
2.5	7.7%	45.8%	25.9	25.9	15.2	94.5	7.3
3.0	5.9%	51.7%	31.1	31.1	18.3	93.6	5.6
3.5	4.4%	56.1%	36.2	36.2	21.3	92.7	4.0
4.0	4.7%	60.7%	41.4	41.4	24.4	91.9	4.3
4.5	3.3%	64.0%	46.6	46.6	27.4	91.0	3.0
5.0	3.0%	67.1%	51.8	51.8	30.5	90.1	2.7
6.0	5.4%	72.4%	62.1	62.1	36.6	88.4	4.8
7.0	4.4%	76.8%	72.5	72.5	42.6	86.6	3.8
8.0	3.5%	80.3%	82.8	82.8	48.7	84.9	3.0
9.0	2.8%	83.2%	93.2	93.2	54.8	83.1	2.3
10.0	2.2%	85.3%	103.5	103.5	60.9	81.4	1.8
15.0	7.0%	92.3%	155.3	155.3	91.4	72.7	5.1
20.0	4.5%	96.9%	207.1	169.9	100.0	57.6	2.6
25.0	1.4%	98.3%	258.8	169.9	100.0	46.1	0.7
30.0	0.7%	99.0%	310.6	169.9	100.0	38.4	0.3
35.0	0.5%	99.5%	362.3	169.9	100.0	32.9	0.2
40.0	0.5%	100.0%	414.1	169.9	100.0	28.8	0.2
45.0	0.0%	100.0%	465.9	169.9	100.0	25.6	0.0
50.0	0.0%	100.0%	517.6	169.9	100.0	23.0	0.0
							88.3

Removal Efficiency Adjustment[2] = 6.5%
Predicted Net Annual Load Removal Efficiency = 81.8%
Predicted Annual Rainfall Treated = 97.8%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 8

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	3.92	ha	**Rainfall Station #**	215	
Weighted C	0.80		**Particle Size Distribution**	FINE	
CDS Model	4030		**CDS Treatment Capacity**	127	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	8.7	8.7	6.8	96.9	10.3
1.5	9.9%	29.7%	13.1	13.1	10.3	95.9	9.5
2.0	8.4%	38.1%	17.4	17.4	13.7	94.9	8.0
2.5	7.7%	45.8%	21.8	21.8	17.1	94.0	7.2
3.0	5.9%	51.7%	26.2	26.2	20.5	93.0	5.5
3.5	4.4%	56.1%	30.5	30.5	23.9	92.0	4.0
4.0	4.7%	60.7%	34.9	34.9	27.4	91.0	4.2
4.5	3.3%	64.0%	39.2	39.2	30.8	90.0	3.0
5.0	3.0%	67.1%	43.6	43.6	34.2	89.1	2.7
6.0	5.4%	72.4%	52.3	52.3	41.0	87.1	4.7
7.0	4.4%	76.8%	61.0	61.0	47.9	85.1	3.7
8.0	3.5%	80.3%	69.7	69.7	54.7	83.2	2.9
9.0	2.8%	83.2%	78.5	78.5	61.6	81.2	2.3
10.0	2.2%	85.3%	87.2	87.2	68.4	79.2	1.7
15.0	7.0%	92.3%	130.8	127.4	100.0	68.4	4.8
20.0	4.5%	96.9%	174.4	127.4	100.0	51.3	2.3
25.0	1.4%	98.3%	218.0	127.4	100.0	41.0	0.6
30.0	0.7%	99.0%	261.5	127.4	100.0	34.2	0.2
35.0	0.5%	99.5%	305.1	127.4	100.0	29.3	0.1
40.0	0.5%	100.0%	348.7	127.4	100.0	25.7	0.1
45.0	0.0%	100.0%	392.3	127.4	100.0	22.8	0.0
50.0	0.0%	100.0%	435.9	127.4	100.0	20.5	0.0
							87.0

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 80.5%

Predicted Annual Rainfall Treated = 97.0%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 9

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	6.50	ha	**Rainfall Station #**	215	
Weighted C	0.75		**Particle Size Distribution**	FINE	
CDS Model	4045		**CDS Treatment Capacity**	212	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	13.6	13.6	6.4	97.0	10.3
1.5	9.9%	29.7%	20.3	20.3	9.6	96.1	9.5
2.0	8.4%	38.1%	27.1	27.1	12.8	95.2	8.0
2.5	7.7%	45.8%	33.9	33.9	16.0	94.3	7.2
3.0	5.9%	51.7%	40.7	40.7	19.1	93.4	5.5
3.5	4.4%	56.1%	47.4	47.4	22.3	92.5	4.0
4.0	4.7%	60.7%	54.2	54.2	25.5	91.5	4.3
4.5	3.3%	64.0%	61.0	61.0	28.7	90.6	3.0
5.0	3.0%	67.1%	67.8	67.8	31.9	89.7	2.7
6.0	5.4%	72.4%	81.3	81.3	38.3	87.9	4.7
7.0	4.4%	76.8%	94.9	94.9	44.7	86.1	3.7
8.0	3.5%	80.3%	108.4	108.4	51.0	84.2	3.0
9.0	2.8%	83.2%	122.0	122.0	57.4	82.4	2.3
10.0	2.2%	85.3%	135.5	135.5	63.8	80.6	1.8
15.0	7.0%	92.3%	203.3	203.3	95.7	71.4	5.0
20.0	4.5%	96.9%	271.1	212.4	100.0	55.0	2.5
25.0	1.4%	98.3%	338.8	212.4	100.0	44.0	0.6
30.0	0.7%	99.0%	406.6	212.4	100.0	36.7	0.2
35.0	0.5%	99.5%	474.3	212.4	100.0	31.4	0.1
40.0	0.5%	100.0%	542.1	212.4	100.0	27.5	0.2
45.0	0.0%	100.0%	609.9	212.4	100.0	24.4	0.0
50.0	0.0%	100.0%	677.6	212.4	100.0	22.0	0.0
							87.8

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 81.3%

Predicted Annual Rainfall Treated = 97.6%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 10

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	7.63	ha	**Rainfall Station #**	215	
Weighted C	0.66		**Particle Size Distribution**	FINE	
CDS Model	4045		**CDS Treatment Capacity**	212	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	14.0	14.0	6.6	97.0	10.3
1.5	9.9%	29.7%	21.0	21.0	9.9	96.0	9.5
2.0	8.4%	38.1%	28.0	28.0	13.2	95.1	8.0
2.5	7.7%	45.8%	35.0	35.0	16.5	94.1	7.2
3.0	5.9%	51.7%	42.0	42.0	19.8	93.2	5.5
3.5	4.4%	56.1%	49.0	49.0	23.1	92.2	4.0
4.0	4.7%	60.7%	56.0	56.0	26.4	91.3	4.3
4.5	3.3%	64.0%	63.0	63.0	29.7	90.4	3.0
5.0	3.0%	67.1%	70.0	70.0	33.0	89.4	2.7
6.0	5.4%	72.4%	84.0	84.0	39.5	87.5	4.7
7.0	4.4%	76.8%	98.0	98.0	46.1	85.6	3.7
8.0	3.5%	80.3%	112.0	112.0	52.7	83.7	3.0
9.0	2.8%	83.2%	126.0	126.0	59.3	81.9	2.3
10.0	2.2%	85.3%	140.0	140.0	65.9	80.0	1.7
15.0	7.0%	92.3%	210.0	210.0	98.9	70.5	4.9
20.0	4.5%	96.9%	280.0	212.4	100.0	53.2	2.4
25.0	1.4%	98.3%	350.0	212.4	100.0	42.6	0.6
30.0	0.7%	99.0%	420.0	212.4	100.0	35.5	0.2
35.0	0.5%	99.5%	490.0	212.4	100.0	30.4	0.1
40.0	0.5%	100.0%	560.0	212.4	100.0	26.6	0.1
45.0	0.0%	100.0%	630.0	212.4	100.0	23.7	0.0
50.0	0.0%	100.0%	700.0	212.4	100.0	21.3	0.0
							87.4

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 80.9%

Predicted Annual Rainfall Treated = 97.4%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 12

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	1.98	ha	**Rainfall Station #**	215	
Weighted C	0.65		**Particle Size Distribution**	FINE	
CDS Model	3020		**CDS Treatment Capacity**	57	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	3.6	3.6	6.3	97.0	10.3
1.5	9.9%	29.7%	5.4	5.4	9.5	96.1	9.5
2.0	8.4%	38.1%	7.2	7.2	12.6	95.2	8.0
2.5	7.7%	45.8%	8.9	8.9	15.8	94.3	7.3
3.0	5.9%	51.7%	10.7	10.7	19.0	93.4	5.6
3.5	4.4%	56.1%	12.5	12.5	22.1	92.5	4.0
4.0	4.7%	60.7%	14.3	14.3	25.3	91.6	4.3
4.5	3.3%	64.0%	16.1	16.1	28.4	90.7	3.0
5.0	3.0%	67.1%	17.9	17.9	31.6	89.8	2.7
6.0	5.4%	72.4%	21.5	21.5	37.9	88.0	4.7
7.0	4.4%	76.8%	25.0	25.0	44.2	86.2	3.7
8.0	3.5%	80.3%	28.6	28.6	50.5	84.4	3.0
9.0	2.8%	83.2%	32.2	32.2	56.9	82.6	2.3
10.0	2.2%	85.3%	35.8	35.8	63.2	80.8	1.8
15.0	7.0%	92.3%	53.7	53.7	94.8	71.7	5.0
20.0	4.5%	96.9%	71.6	56.6	100.0	55.6	2.5
25.0	1.4%	98.3%	89.4	56.6	100.0	44.4	0.6
30.0	0.7%	99.0%	107.3	56.6	100.0	37.0	0.2
35.0	0.5%	99.5%	125.2	56.6	100.0	31.7	0.1
40.0	0.5%	100.0%	143.1	56.6	100.0	27.8	0.2
45.0	0.0%	100.0%	161.0	56.6	100.0	24.7	0.0
50.0	0.0%	100.0%	178.9	56.6	100.0	22.2	0.0
							87.9

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 81.4%

Predicted Annual Rainfall Treated = 97.6%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CDS ESTIMATED NET ANNUAL SOLIDS LOAD REDUCTION
BASED ON THE RATIONAL RAINFALL METHOD
BASED ON A FINE PARTICLE SIZE DISTRIBUTION

Project Name: 891 Conservancy East
Location: Ottawa, ON
OGS #: 13

Engineer: DSEL
Contact: K. Murphy
Report Date: 22-Jul-21

Area	1.18	ha	**Rainfall Station #**	215	
Weighted C	0.70		**Particle Size Distribution**	FINE	
CDS Model	2025		**CDS Treatment Capacity**	45	l/s

Rainfall Intensity[1] (mm/hr)	Percent Rainfall Volume[1]	Cumulative Rainfall Volume	Total Flowrate (l/s)	Treated Flowrate (l/s)	Operating Rate (%)	Removal Efficiency (%)	Incremental Removal (%)
1.0	10.6%	19.8%	2.3	2.3	5.1	97.4	10.3
1.5	9.9%	29.7%	3.4	3.4	7.6	96.7	9.6
2.0	8.4%	38.1%	4.6	4.6	10.1	96.0	8.0
2.5	7.7%	45.8%	5.7	5.7	12.7	95.2	7.3
3.0	5.9%	51.7%	6.9	6.9	15.2	94.5	5.6
3.5	4.4%	56.1%	8.0	8.0	17.7	93.8	4.1
4.0	4.7%	60.7%	9.2	9.2	20.3	93.0	4.3
4.5	3.3%	64.0%	10.3	10.3	22.8	92.3	3.1
5.0	3.0%	67.1%	11.5	11.5	25.3	91.6	2.8
6.0	5.4%	72.4%	13.8	13.8	30.4	90.1	4.9
7.0	4.4%	76.8%	16.1	16.1	35.5	88.7	3.9
8.0	3.5%	80.3%	18.4	18.4	40.5	87.2	3.1
9.0	2.8%	83.2%	20.7	20.7	45.6	85.8	2.4
10.0	2.2%	85.3%	23.0	23.0	50.7	84.3	1.8
15.0	7.0%	92.3%	34.4	34.4	76.0	77.1	5.4
20.0	4.5%	96.9%	45.9	45.3	100.0	69.3	3.1
25.0	1.4%	98.3%	57.4	45.3	100.0	55.4	0.8
30.0	0.7%	99.0%	68.9	45.3	100.0	46.2	0.3
35.0	0.5%	99.5%	80.4	45.3	100.0	39.6	0.2
40.0	0.5%	100.0%	91.9	45.3	100.0	34.6	0.2
45.0	0.0%	100.0%	103.3	45.3	100.0	30.8	0.0
50.0	0.0%	100.0%	114.8	45.3	100.0	27.7	0.0
							90.2

Removal Efficiency Adjustment[2] = 6.5%

Predicted Net Annual Load Removal Efficiency = 83.7%

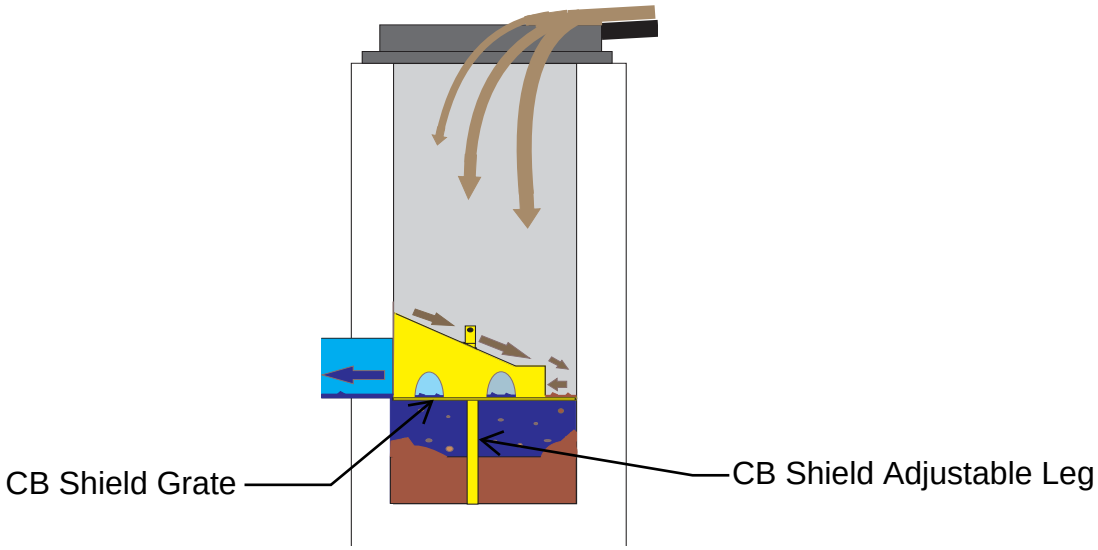
Predicted Annual Rainfall Treated = 98.9%

1 - Based on 42 years of hourly rainfall data from Canadian Station 6105976, Ottawa ON
2 - Reduction due to use of 60-minute data for a site that has a time of concentration less than 30-minutes.
3 - CDS Efficiency based on testing conducted at the University of Central Florida
4 - CDS design flowrate and scaling based on standard manufacturer model & product specifications

CB Shield Operations Manual

Installing CB Shield

It is important the catch basin frame and cover is aligned properly with the catch basin below
If it is misaligned it may be difficult to install the CB Shield insert
Determine the depth of the sump (i.e. the distance from the invert of the outlet pipe to the bottom of the catch basin). If the catch basin is in service the sump depth will be the depth of the water. The grate section of the CB Shield insert should be the same elevation as the water depth in the sump.



Adjust the leg of the CB Shield to achieve the appropriate elevation
The CB Shield is lowered into place with the rope attached to the top of the leg. The high side of the sloped plate should face the wall with the outlet pipe. (The incoming water should be directed to the wall furthest from the outlet)
The flexible plastic skirt around the outer edges of the CB Shield insert may interfere with some misaligned frame and grates. If so a slice can be cut into the skirt with a utility knife at the point of interference.
Make sure the grate is at the desired level or remove CB Shield and re-adjust the leg length.

Inspecting a CB Shield Enhanced Catch Basin

Open grate
A lifting rope is attached to the top of the centered leg of the CB Shield insert. Lift and remove the insert.
Inspect CB Shield for any possible damage. Quite often leaves will accumulate on the grate. This can actually improve the Shield's ability to capture sediment and assist in preventing leave litter from being washed down stream.
Use a Sludge Judge to measure the sediment depth in 4 - 6 locations of the sump.
If the sediment depth is 300mm – 600mm deep it is recommended that the unit be cleaned.

Cleaning a CB Shield Enhanced Catch Basin

Open grate and remove CB Shield with lift rope.
Clean catch basin as usual with a Vacuum truck.
Clean CB Shield (if needed) and re-install into catch basin.
If there is any significant damage to a CB Shield please send a picture and its location to CB Shield Inc. (info@cbshield.com).

Executive Summary

The CB Shield Technology was subjected to verification in accordance with the Canadian ETV Program General Verification Protocol, and taking into account the current draft of the proposed FDIS ISO 14034.

The verification process was mutually agreed upon by GLOBE Performance Solutions, the Verification Body, and Toronto and Region Conservation Authority ("TRCA"), the subcontracted Verification Expert. The purpose of this verification is to provide objective and quality-assured performance data on environmental technologies, so that users, developers, regulators, and consultants can make informed decisions about purchasing and applying these technologies.

This report, prepared by TRCA according to the criteria and guidelines set out in the Canadian ETV Program General Verification Protocol (GVP) of June 2012, is an official audit of the testing report generated through the performance testing of the CB Shield technology. The report is based on the Canadian ETV Program.

In addition, through guidance provided by GPS, the TRCA completed its verification of the CB Shield technology performance taking into account the principles and requirements of FDIS ISO 14034.

Performance testing for this verification took place at Good Harbour Laboratories in Mississauga, Ontario, Canada. Good Harbour Laboratories conducted the testing and followed the test sediment particle size distribution and many of the methods outlined in the *Procedure for Laboratory Testing of Oil-Grit Separators* developed by Toronto and Region Conservation Authority for the Canadian ETV Program.

CB Shield Technology is based on established scientific and technical principles in the field of fluid dynamics, sedimentation/settling, hydrology and sediment transport.

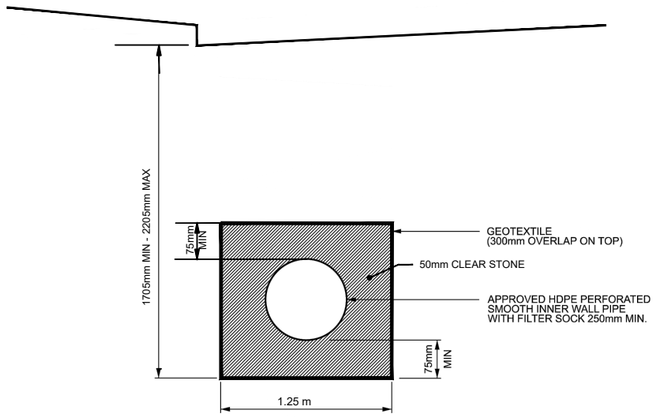
The technology incorporates an insert for catchbasins that aims to deflect and reduce the energy of inflows and thereby increase capture and reduce scour of sediment found in stormwater runoff.

After examination and audit of the test report and based on the test data submitted, the TRCA has concluded that _the CB Shield insert provides an environmental benefit related to capture and scour prevention of suspended sediments in stormwater runoff.

Accordingly, the TRCA recommends that the performance claims be worded as follows:

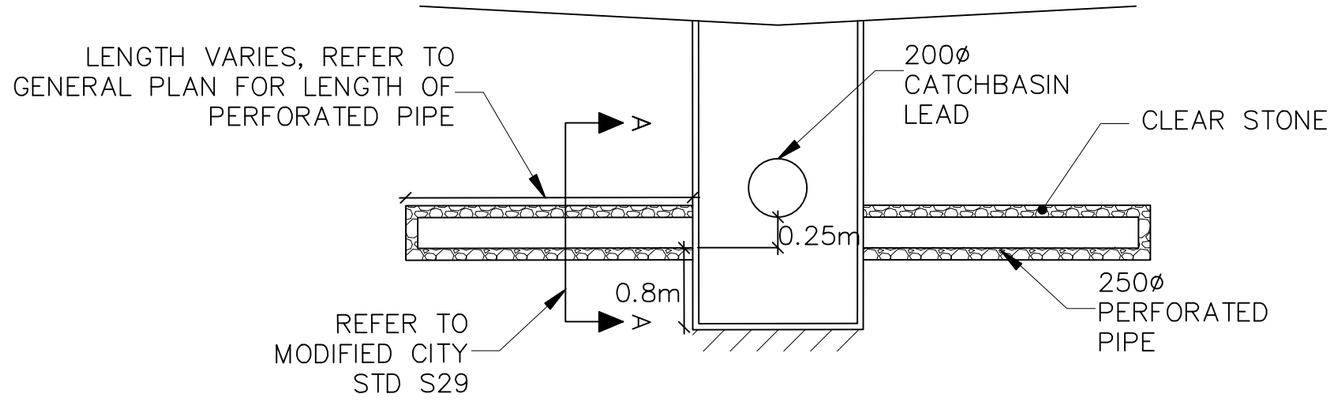
1. During the sediment capture test, for a catch basin with a false floor set to 50% of the manufacturer's recommended maximum sediment storage depth and a constant influent sediment concentration of 200 mg/L, the catch basin with a CB Shield insert removed 64, 59.9, 52.4, 42.6, 25.2, and 26.7 percent of influent sediment by mass at inflow rates of 0.24, 0.48, 1.20, 2.40, 6.00, and 8.40 L/s, respectively.

2. For a catchbasin filled to three quarters of the manufacturer's recommended maximum sediment storage depth, with the CB Shield™ insert, scouring of test sediment is at most 8% of the control catchbasin during a continuous 30 minute scour test run with 5 minute duration inflows of 1.2, 4.8, 8.4, 12.0, and 15.6 L/s.



SECTION A–A: MODIFIED CITY STD S29

SCALE: N.T.S.



INFILTRATION TRENCH DETAIL

SCALE: N.T.S.

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BARRHAVEN CONSERVANCY

CITY OF OTTAWA

INFILTRATION TRENCH DETAIL

SCALE:	NTS	PROJECT No.:	891
DATE:	JULY 2021	FIGURE:	1