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M E M O R A N D U M

DATE: **NOVEMBER 28, 2019**

TO: **JULIE CANDOW**

FROM: **CONRAD STANG / MIKE PETEPIECE**

RE: **CLARIDGE / UNIFORM DEVELOPMENTS**
MARCH ROAD STORM SERVICING OPTIONS

CC: **JOHN RIDDELL, MARC ST. PIERRE**

This memorandum provides an overview of the storm servicing options for the future and existing lands west of March Road based on comments received from the City of Ottawa July 29, 2019 and an email received September 16, 2019.

BACKGROUND:

March Road

Under existing conditions drainage from March Road is conveyed via roadside ditches to Tributary 2 of the Northwest Branch of Shirley's Brook. The western roadside ditch also receives drainage from the residential lots fronting Murphy Court and the undeveloped lands west of March Road. Refer to Figure 1 – Existing / Future Development Areas Included in March Road Storm Servicing Analysis.

The Master Servicing Study (MSS) for the Kanata North Urban Expansion Area (KNUEA) lands identified the future widening of March Road. The ultimate cross-section is a 44.5m right-of-way (ROW) including a central Bus-Rapid Transit corridor. Refer to attached excerpt, Figure No. 24 – March Rod – Ultimate Cross Section. Due to the width of the ROW, storm servicing will be provided by two (2) separate storm sewers for the northbound and southbound lanes:

- The storm sewer for the east side of the ROW (northbound lanes) will outlet to Pond 3.
- The storm sewer for the west side of the ROW (southbound lanes) will outlet to Pond 1.

Pond 1 is part of the CU Developments and Pond 3 is part of the Minto / Valecraft development (by others). Refer to the following attached excerpts for drainage areas tributary to Pond 1 and Pond 3:

- Drawing 112117-STM1: Storm Drainage Area Plan - Minor System Drainage
- Drawing 112117-STM2: Storm Drainage Area Plan - Major System Drainage

Existing / Future Development Lands

The existing / future development lands consist of residential Block 300, St. Isidore Catholic Church / Cemetery, St. Isidore School, future Claridge lands and residential Block 298. These lands are located between the existing homes on Murphy Court and the proposed Park & Ride. The MSS anticipated the future development of these lands and assumed the proposed land use would consist of commercial or mixed-use residential.

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As identified in the CU Developments Planning Rationale, the lands around St. Isidore Catholic Church and St. Isidore Catholic School have been accounted for in the development of the subject lands and are shown as Blocks on the Plan of Subdivision. No road pattern has been defined as these lands will be included in future development applications. These lands will also be subject to land exchange agreements.

MSS STORM SERVICING OPTIONS:

The MSS identified two (2) storm servicing options for the future development lands and March Road:

1) Storm drainage for future development lands conveyed to a storm sewer on Street 1 (preferred). Refer to attached excerpt from the MSS, Figure No. 5.3.2 – Proposed Storm Infrastructure.
2) Storm drainage from the future development lands conveyed to a storm sewer on March Road (alternative). Refer to attached excerpt from the MSS, Figure No. 5.3.3 – Storm Drainage – Area NW-2 (St. Isidore Church).

The existing topography slopes from Street 1 to March Road. It is acknowledged that the preferred storm servicing option from the MSS (conveying drainage to Street 1) would result in deep storm sewers and additional rock excavation.

CU DEVELOPMENTS STORM SERVICING OPTIONS:

Both storm servicing options presented in the MSS were based on Pond 1 as a single cell SWM Facility. To reduce rock excavation, Pond 1 is being proposed as a two-cell SWM facility; with the upper cell 2.5m higher than the lower cell. Based on the two-cell design approach for Pond 1, the servicing options from the MSS are no longer applicable and a revised storm sewer layout was developed:

- Storm sewers on Street 1 & Street 12 will be directed to the upper cell.
- March Road and the existing / future development lands will outlet to the lower cell, either by a storm sewer on March Road or a storm sewer through the St. Isidore Church lands, cemetery lands, future Claridge lands, Block 298 and the Park & Ride.

To address serviceability comments provided by the City regarding March Road and the existing / future development lands, Novatech has developed new storm servicing options for these areas based on the two-cell pond layout.

Preferred Storm Servicing Option

The preferred storm servicing option is to keep March Road drainage separate from the CU Developments / future development lands. Refer to the following figures and design sheets for details on the preferred servicing option:

- Figure 2 – Preferred Storm Servicing Layout for Future and Existing Lands;
- Design Sheets – CU Developments - Preferred Option – Storm Sewers Through Existing / Future Lands
- Design Sheets – March Road Design Sheet, West Side, Ultimate Design – Independent Inlet to SWM Pond 1, 10 year

A summary of the preferred storm servicing option is as follows:

- A storm sewer servicing the CU Developments and the existing / future development lands would run through the St. Isidore Church lands, cemetery lands, future Claridge lands, Block 298 and the Park & Ride. The storm sewer would outlet to the forebay within the lower cell of

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Pond 1 and would require inlet controls, as there would be basement connections (residential Blocks 298 and 300). This option is preferred for servicing residential Block 300 as it results in a more direct route to the pond and lowers HGL elevations.

- A storm sewer on March Road would be designed to convey the 10-year storm event based on the ultimate build-out of March Road. This storm sewer could then surcharge during larger storm events and would have sufficient capacity to convey the 100-year peak flows under surcharged conditions. There would be no concerns with the hydraulic grade line (HGL) since there are no basement connections. The March Road storm sewer would outlet into the main lower cell of Pond 1.
- Under existing conditions, a ditch-inlet catchbasin (DICB) would be installed within the western March Road roadside ditch. This DICB would outlet to the main lower cell of Pond 1. Having an independent outlet to Pond 1 for March Road provides additional flexibility as March Road can be widened independent of the proposed CU Developments.

Alternative Storm Servicing Option

The alternative storm servicing option is to provide a storm sewer on March Road that services March Road and the existing / future development lands. This storm sewer would outlet into the forebay within the lower cell of Pond 1. The future Park & Ride and fire hall would connect to this storm sewer immediately upstream Pond 1.

Refer to the following figures and design sheets for details on the alternative servicing option:

- Figure 3 – Alternative Storm Servicing Layout for Future and Existing Lands;
- Design Sheets – March Road Design Sheet, West Side, Ultimate Design – Alternative Option

Due to the low-grades of March Road adjacent the pond this option would require elliptical pipe to provide sufficient cover. The storm sewer on March Road will need to be sized to convey the 100-year storm event. Inlet controls may also be required to maintain HGL elevations. This is due to connecting local storm sewers that have basement connections to an arterial road storm sewer.

A small portion of March Road, between Street 1 and Tributary 2, is lower than the estimated 100-year water level in the pond. It is recommended that this area be directed to Pond 3; however, the hydrologic analysis indicates that this area can outlet directly to Tributary 2 without exceeding the pre-development peak flows.

The proposed storm sewer for this alternative has been oversized to provide a 100-year level of service for the existing / future development lands under both existing and full-build out conditions. The full-build out of the existing / future development lands produces the most conservative results.

DISCUSSION:

The following discussion points provide a rationale for the preferred storm servicing option:

- It is preferable to keep the storm sewers servicing the CU Developments lands separate from March Road:
    - The CU Developments storm sewers will service residential units with basement connections (Blocks 298 & 300).
    - If the CU Developments storm sewers were to outlet to March Road, the storm sewer would require inlet controls to prevent surcharging. This would limit the ability of the sewer to convey additional flow during large storm events and the sewer may need to be upsized to manage major system flows in the ROW.

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  - If there are no residential connections to the March Road storm sewer, the sewer can be allowed to surcharge during larger storm events, reducing the amount of overland flow in the ROW.
  - Independent storm sewers for March Road and the CU Developments lands would also provide better hydraulics (shorter pipe runs / lower HGL).
- An independent storm sewer for March Road, which outlets separately to the lower cell of Pond 1, provides greater flexibility:
  - Allows March Road and proposed developments to be independent.
  - Allows the widening of March Road and the development to proceed in phases.
  - The storm sewer servicing only March Road may be sized for a 10-year storm, which can surcharge during the 100-year storm event as there would be no basement connections.

CONCLUSIONS:

- The preferred drainage option is to provide an independent storm sewer through the existing / future development lands and Park & Ride. This approach will provide greater flexibility in terms of design considerations / constraints and timing.
- The alternative servicing option is to provide a storm sewer on March Road to service the existing / future lands, but this would require larger storm sewers on March Road in areas with limited pipe cover. This option would also require more restrictive inlet controls on March Road to ensure the HGL does not adversely impact basements in the residential areas.

ATTACHMENTS:

- Figures
  - Figure 1: Areas Included in March Road Storm Servicing Analysis
  - Figure 2: Preferred Storm Servicing Layout for Future and Existing Lands
  - Figure 3: Alternative Storm Servicing Layout for Future and Existing Lands
- Report Excerpts (KNUEA MSS)
  - Figure No. 24: March Road – Ultimate Cross-Section
  - Drawing 112117-STM1: Storm Drainage Area Plan – Minor System Drainage
  - Drawing 112117-STM2: Storm Drainage Area Plan – Major System Drainage
  - Figure No. 5.3.2 - Proposed Storm Infrastructure
  - Figure No. 5.3.3 - Storm Drainage - Area NW-2 (St. Isadore Church)
- Storm Sewer Design Sheets
  - Design Sheets – CU Developments - Preferred Option – Storm Sewers Through Existing / Future Lands
  - Design Sheets – March Road Design Sheet, West Side, Ultimate Design – Independent Inlet to SWM Pond 1, 10 year
  - Design Sheets – March Road Design Sheet, West Side, Ultimate Design – Alternative Option

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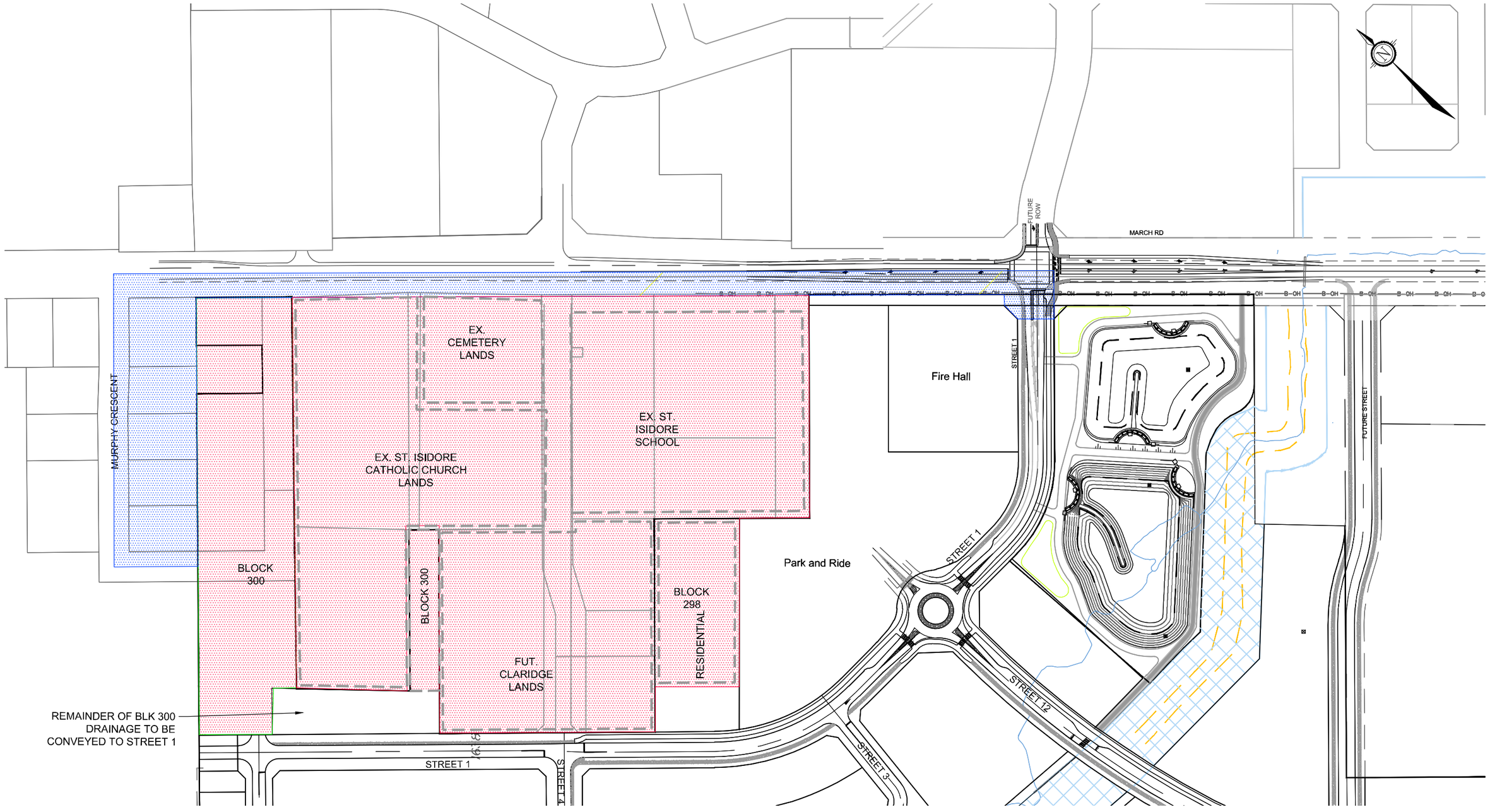

LEGEND

EXISTING / FUTURE LANDS DRAINAGE INCLUDED IN STORM SERVICING ANALYSIS

EX. DRAINAGE TRIBUTARY TO MARCH RD. TO SWM POND

LAND BOUNDARY FOR DRAINAGE TO MARCH ROAD

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CITY OF OTTAWA
CU DEVELOPMENTS INC.
1053, 1075 and 1145 MARCH ROAD

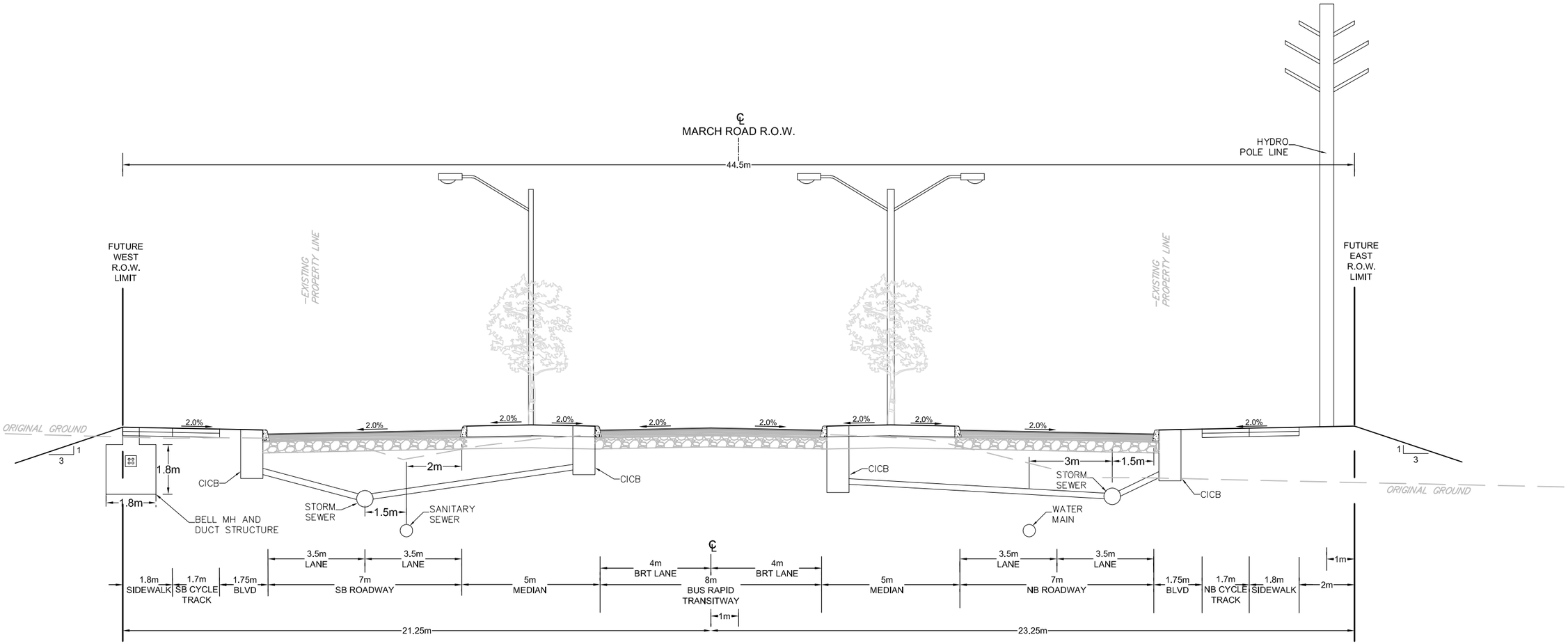
EXISTING / FUTURE DEVELOPMENT AREAS INCLUDED IN MARCH ROAD STORM SERVICING ANALYSIS

SCALE 1 : 2500 (0, 25, 50, 75, 100)

DATE NOV 2019 | JOB 116132 | FIGURE FIGURE 1

M:\2016\116132\CAD\Design\Figures\March Rd\Fig1-Full Dev Area.dwg, DRAINAGE AREAS, Nov 08, 2019 - 9:47am, szorgel

SHT11X17.DWG 279mmX432mm



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 24

MARCH ROAD - ULTIMATE
CROSS SECTION

DATE
MAR 2016

JOB
112117

SCALE
1:150

0 1m 2m 4m

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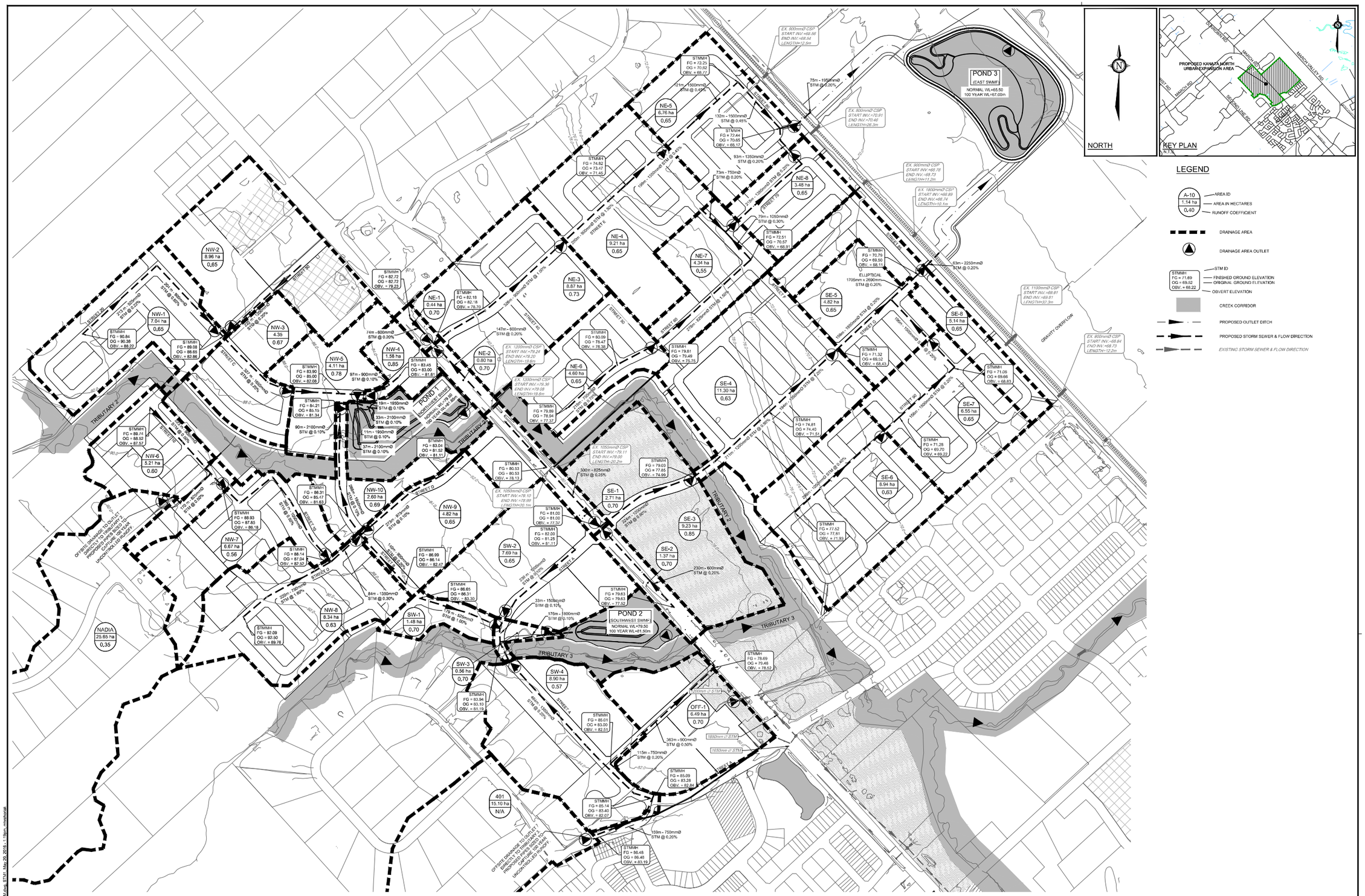
M:\2012\112117\CADDesign\Figures\Traffic\TMP\FINAL\112117 - March sections - 20160212.dwg, ULTIMATE (TMP), Mar 14, 2016 - 1:27pm, tbrooks

SHT11x17.DWG - 279mmx432mm



NOTE:
THE POSITION OF ALL POLE LINES, CONDUITS, WATERMAINS, SEWERS AND OTHER UNDERGROUND AND OVERGROUND UTILITIES AND STRUCTURES IS NOT NECESSARILY SHOWN ON THE CONTRACT DRAWINGS, AND WHERE SHOWN, THE ACCURACY OF THE POSITION OF SUCH UTILITIES AND STRUCTURES IS NOT GUARANTEED. BEFORE STARTING WORK, DETERMINE THE EXACT LOCATION OF ALL SUCH UTILITIES AND STRUCTURES AND ASSUME ALL LIABILITY FOR DAMAGE TO THEM.

No.	REVISION	DATE	BY
3.	ISSUED WITH DRAFT MASTER SERVICING STUDY	MAY 20/16	JLS
2.	ISSUED WITH DRAFT MASTER SERVICING STUDY	APR 4/16	JLS
1.	ISSUED WITH DRAFT MASTER SERVICING STUDY	FEB 26/16	JLS

SCALE 1:3000 (1:3000, 0 30 60 90 120)

DESIGN ARM / TB
CHECKED ARM
DRAWN TB
CHECKED CJR
APPROVED JLS

FOR REVIEW ONLY

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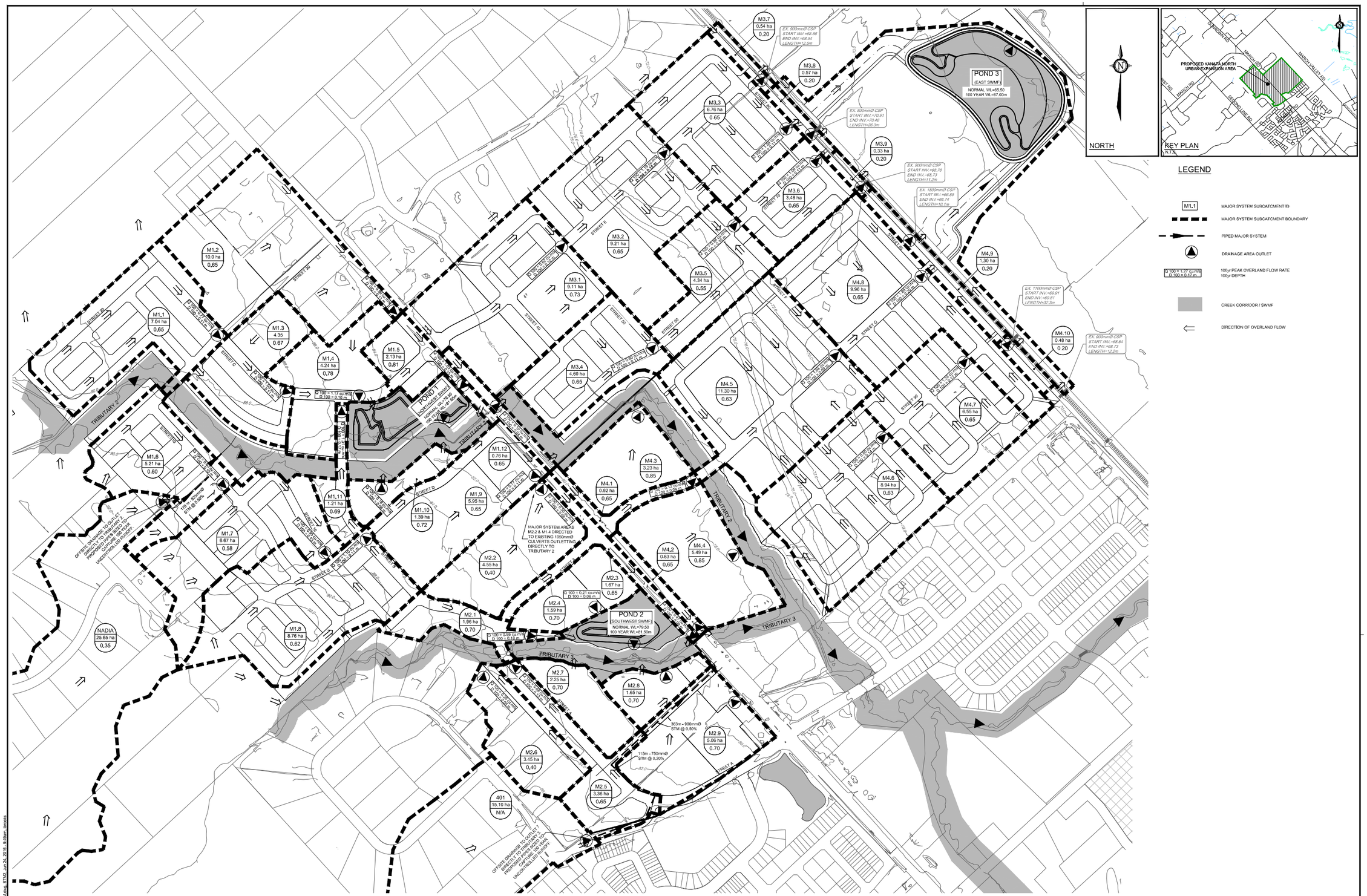
LOCATION
KANATA NORTH URBAN EXPANSION AREA
COMMUNITY DESIGN PLAN

DRAWING NAME
STORM DRAINAGE AREA PLAN
MINOR SYSTEM DRAINAGE

PROJECT No. 112117-04
REV REV # 3
DRAWING No. 112117-STM1



NOTE:
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No.	REVISION	DATE	BY
4.	ISSUED WITH DRAFT MASTER SERVICING STUDY	JUN 28/16	JLS
3.	ISSUED WITH DRAFT MASTER SERVICING STUDY	MAY 20/16	JLS
2.	ISSUED WITH DRAFT MASTER SERVICING STUDY	APR 4/16	JLS
1.	ISSUED WITH DRAFT MASTER SERVICING STUDY	FEB 26/16	JLS

SCALE
1:3000
1:3000
0 30 60 90 120

DESIGN ARM / TB
CHECKED ARM
DRAWN TB
CHECKED CJR
APPROVED JLS

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LOCATION
KANATA NORTH
COMMUNITY DESIGN PLAN

DRAWING NAME
STORM DRAINAGE AREA PLAN
MAJOR SYSTEM DRAINAGE

PROJECT No. 112117-04
REV REV # 4
DRAWING No. 112117-STM2

J:\2012\112117-CAD\Design_MSS\112117-STM.dwg, STM2, Jun 24, 2016 - 9:49am, tbrooks

HILLSVIEW ESTATES SUBDIVISION

POND 3

SHIRLEY'S BROOK

MARCH VALLEY ROAD

CN RAILWAY CORRIDOR (± 30m)

POND 1

TRIBUTARY 2

MARCH ROAD

TRIBUTARY 3

POND 2

BROOKSIDE SUBDIVISION

MAXWELL BRIDGE ROAD

MARCHBROOK CIRCLE

MORGAN'S GRANT SUBDIVISION

MORGAN'S GRANT SWMF

SHIRLEY'S BROOK SWMF

525mmØ
900mmØ
1200mmØ
1650mmØ
600mmØ
2100mmØ
825mmØ
975mmØ
1950mmØ
1050mmØ
750mmØ
1350mmØ
1500mmØ
2250mmØ
2100mmØ OR EQUIVALENT
1800mmØ
450mmØ

LEGEND

- KANATA NORTH URBAN EXPANSION AREA (KNUEA)
- PROPOSED MAINLINE STORM SEWER
- PROPOSED SWM FACILITY
- CREEK CORRIDOR
- *EXISTING CULVERTS*
- *EXISTING MAINLINE STORM SEWER*
- *EXISTING SWM FACILITY*

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 5.3.2
PROPOSED STORM INFRASTRUCTURE

DATE MAY 2016
JOB 112117
SCALE N.T.S.

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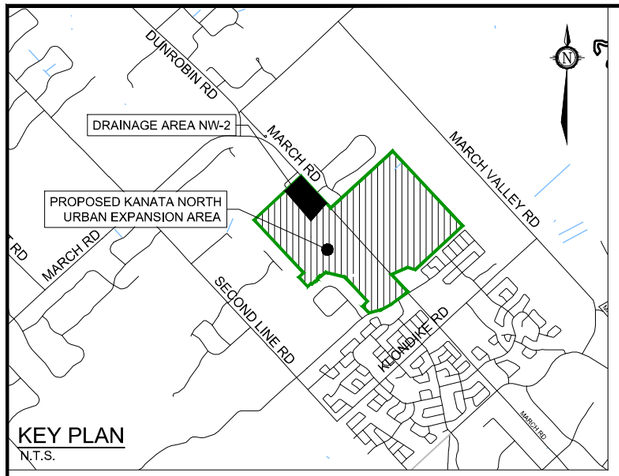
M:\2012\11211\CAD\Design_MSS\FIGURES\Figure 5.3.2-PROP STORM INFRASTRUCTURE.dwg, FIG 5, May 18, 2016 - 3:15pm, mhreh

SHT11x17.DWG 279mmx432mm



MARCH ROAD
MURPHY COURT
HEDGE DRIVE
HOUSTON CRESCENT
MAXWELL ROAD
ST. ISIDORE CATHOLIC CHURCH
CEMETERY
ST. ISIDORE CATHOLIC SCHOOL
DRAINAGE AREA NW-2 = 8.96ha
DRAINAGE AREA NW-2 (EXTENDED) = 2.22ha
STREET C
STREET 30
STREET B
POND 1
TRIBUTARY 2
MARCH ROAD

LEGEND

- KANATA NORTH URBAN EXPANSION AREA (KNUEA)
- PROPOSED TRUNK STORM SEWER ROUTE
- ALTERNATE TRUNK STORM SEWER ROUTE
- PROPOSED SWM FACILITY
- CREEK CORRIDOR
- DRAINAGE AREA BOUNDARY

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 5.3.3

STORM DRAINAGE
- AREA NW-2
(ST ISADORE CHURCH)

DATE JUNE 2016 JOB 112117

SCALE N.T.S.

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M:\2012\112117\CAD\Design_MSS\FIGURES\Figure 5.3.3.dwg, FIG 5.3, Jun 23, 2016 - 12:25pm, tbrooks

SHT11x17 DWG 279mmx432mm

EXISTING MARCH RD.
ROADSIDE DITCH

INV.DOWN = 83.23
OBV. = 83.75
T/G FUT. = 85.85

INV.DOWN = 82.28
OBV. = 82.81
T/G FUT. = 84.90

INV.DOWN = 79.88
OBV. = 80.63
T/G FUT. = 83.40

INTERIM DICB
(PRIOR TO MARCH ROAD BUILDOUT)
INV = 79.70
T/G = 82.00

PREFERRED OPTION FOR
U1-TRIB IS TO OUTLET TO
POND 3 THROUGH FUTURE
ROW

ALTERNATE OPTION FOR
U1-TRIB IS TO OUTLET
DIRECTLY TO TRIBUTARY 2

FUTURE ROW

M2
0.19 ha
0.65

MH M3

MH M4

MH M5

MH 1400
INV = 83.35
OBV = 84.10
T/G = 86.21

MH 1520

MH 1604

MH 1410

MH 1408
INV. down = 80.96
OBV = 82.01
T/G = 84.96

MH 1400

MH 1404

MH 1600

MH 1500
INV = 85.70
OBV = 86.15
T/G = 88.70

INV = 88.15
OBV = 88.35
T/G = 90.45

INV.down = 82.61
OBV = 83.51
T/G = 88.50

INV. down = 81.82
OBV = 82.79
T/G = 86.19

INV.down = 79.44
INV. up = 80.17
OBV. down= 80.79
OBV. up = 81.37
T/G = 84.22

INV = 79.50
NWL = 79.50
100yr = 82.00

INV = 79.25

525mmØ CEMETERY LANDS

525mmØ

750mmØ

675mmØ

900mmØ

975mmØ

1200mmØ

1200mmØ

1350mmØ

375mmØ

250mmØ

450mmØ

1500mmØ

EX. ST. ISIDORE CATHOLIC CHURCH LANDS

EX. ST. ISIDORE SCHOOL

BLOCK 300

BLOCK 298

FUT. CLARIDGE LANDS

STREET 1

STREET 10

STREET 12

C.E.P.E.O.

NW-105 0.18 ha 0.65
M3 0.24 ha 0.65
M4 0.27 ha 0.65
NW-110 2.58 ha 0.65
M5 0.31 ha 0.65
M1 0.98 ha 0.55
NW-104 0.31 ha 0.65
NW-104B1 1.72 ha 0.65
NW-104B2 0.65 ha 0.65
NW-107 0.31 ha 0.65
NW-106 0.28 ha 0.65
NW-110A 0.64 ha 0.20
NW-109 1.98 ha 0.67
NW-111 0.83 ha 0.70
NW-108 0.86 ha 0.65
NW-103 0.17 ha 0.65
NW-102 0.35 ha 0.65
NW-101 0.20 ha 0.65

USF=84.55 HGL = 83.79 MUSF=84.40
USF=86.25 HGL = 83.72 MUSF=84.04
USF=88.70 HGL = 87.81 MUSF=88.65

LEGEND

- PROPOSED DEVELOPMENT
- AREA IDENTIFICATION
- DRAINAGE AREA (hectares)
- RUN-OFF COEFFICIENT (NW-1 / 0.16 ha / 0.65)
- PROPOSED STORM SEWER C/W FLOW DIRECTION - MARCH ROAD
- PROPOSED STORM SEWER C/W FLOW DIRECTION
- EXISTING ROADSIDE DITCH
- EXISTING / FUTURE LANDS DRAINAGE INCLUDED IN STORM SERVICING ANALYSIS
- EX. MARCH RD. DRAINAGE TO SWM POND

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CITY OF OTTAWA
CU DEVELOPMENTS INC.
1053, 1075 and 1145 MARCH ROAD

PREFERRED STORM SERVICING LAYOUT FOR FUTURE AND EXISTING LANDS

SCALE 1 : 4000 (0 40 80 120 160)
DATE NOV 2019
JOB 116132
FIGURE FIGURE 2

M:\2016\116132\CAD\Design\Figures\March Rd\Fig 2-PreferredSTMServOption.dwg, FIGURE 2 -STM, Nov 29, 2019 - 11:27am, szorgel

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET
CU Developments - Preferred Option - Storm Sewers Through Existing / Future Lands
FLOW RATES BASED ON RATIONAL METHOD

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LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
					0.00	0.000	0.000	10.00															
NW-101	1600	1602	0.20	0.65	0.13	0.361	0.361	10.00		104.19			38	38	0.254	250	PVC	1.34	107.9	71.7	1.42	1.27	52%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	11.27															
NW-102			0.35	0.65	0.23	0.632	0.994	11.27		97.93			97										
	1602	1400			0.00	0.000	0.000	11.27						127	0.381	375	PVC	2.00	31.5	258.5	2.27	0.23	49%
					0.00	0.000	0.000	11.27															
NW-103			0.17	0.65	0.11	0.307	1.301	11.27		97.93			127										
					0.00	0.000	0.000	11.27															
								11.50															
					0.00	0.000	0.000	10.00															
NW-104A			0.31	0.65	0.20	0.560	0.560	10.00		104.19			58										
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
NW-104B			2.37	0.65	1.54	4.283	4.843	10.00		104.19			505										
	1606	1604			0.00	0.000	0.000	10.00						597	0.762	750	Conc	0.40	76.6	734.1	1.61	0.79	81%
					0.00	0.000	0.000	10.00															
NW-105			0.18	0.65	0.12	0.325	5.168	10.00		104.19			538										
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
NW-107			0.31	0.65	0.20	0.560	5.728	10.00		104.19			597										
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.79															
NW-106	1604	1400	0.28	0.65	0.18	0.506	6.234	10.79		100.18			625	625	0.762	750	Conc	0.40	69.9	734.1	1.61	0.72	85%
					0.00	0.000	0.000	10.79															
								11.52															
					0.00	0.000	0.000	11.52															
NW-108	1400	1402	0.66	0.65	0.43	1.193	8.728	11.52		96.81			845	845	0.914	900	Conc	0.38	110.1	1,163.6	1.77	1.04	73%
					0.00	0.000	0.000	11.52															
					0.00	0.000	0.000	12.55															
	1402	1404			0.00	0.000	8.728	12.55		92.40			806	806	0.914	900	Conc	0.38	74.0	1,163.6	1.77	0.70	69%
					0.00	0.000	0.000	12.55															
								13.25															
					0.00	0.000	0.000	15.00															
NW-109	1500	1404	1.98	0.67	1.33	3.688	3.688	15.00		83.56			308	308	0.457	450	Conc	1.71	120.0	388.7	2.37	0.84	79%
					0.00	0.000	0.000	15.00															
								15.84															
					0.00	0.000	0.000	15.00															
NW-110A			0.64	0.20	0.13	0.356	0.356	15.00		83.56			30										
	1502	1404			0.00	0.000	0.000	15.00						390	0.686	675	Conc	0.30	110.5	480.0	1.30	1.42	81%
					0.00	0.000	0.000	15.00															
NW-110B			2.58	0.65	1.68	4.662	4.662	15.00		83.56			390										
					0.00	0.000	0.000	15.00															
								16.42															

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET
CU Developments - Preferred Option - Storm Sewers Through Existing / Future Lands
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
FUTURE BLOCK / EXISTING LANDS ACCOUNTED FOR IN STORM SEWER SYSTEM OUTLETTING TO THE SWM POND THROUGH OUTLET #2																							
	1404	1406			0.00	0.000	0.000	16.42															
					0.00	0.000	17.078	16.42		79.24			1,353	1,353	0.991	975	Conc	0.50	69.2	1,652.4	2.14	0.54	82%
					0.00	0.000	0.000	16.42															
NW-111	1406	1408			0.00	0.000	0.000	16.96															
			0.63	0.70	0.44	1.226	18.304	16.96		77.73			1,423	1,423	1.219	1200	Conc	0.43	103.3	2,666.0	2.28	0.75	53%
					0.00	0.000	0.000	16.96															
	1408	1410			0.00	0.000	0.000	17.71															
					0.00	0.000	18.304	17.71		75.72			1,386	1,386	1.219	1200	Conc	0.30	43.6	2,226.9	1.91	0.38	62%
					0.00	0.000	0.000	17.71															
					0.00	0.000	0.000	18.09															
NW-112	1410	1412	2.58	0.85	2.19	6.097	24.400	18.09		74.74			1,824	1,824	1.219	1200	Conc	0.30	75.1	2,226.9	1.91	0.66	82%
					0.00	0.000	0.000	18.09															
					0.00	0.000	0.000	18.75															
	1412	1220			0.00	0.000	24.400	18.75		73.13			1,784	1,784	1.219	1200	Conc	0.30	74.7	2,226.9	1.91	0.65	80%
					0.00	0.000	0.000	18.75															
								19.40															

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET

CU Developments - Preferred Option - Storm Sewers Through Existing / Future Lands

FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
					0.00	0.000	0.000	10.00															
NW-114			0.89	0.85	0.76	2.103	2.103	10.00		104.19			219										
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
NW-115	1222	1220	0.23	0.70	0.16	0.448	2.551	10.00		104.19			266	280	0.686	675	Conc	0.15	90.8	339.4	0.92	1.65	82%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
NW-116			0.07	0.70	0.05	0.136	2.687	10.00		104.19			280										
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
								11.65															
					0.00	0.000	0.000	19.40															
	1220	345			0.00	0.000	27.087	19.40		71.60			1,939	1,939	1.372	1350	Conc	0.15	57.8	2,155.8	1.46	0.66	90%
					0.00	0.000	0.000	19.40															
					0.00	0.000	0.000	19.40															
					0.00	0.000	0.000	20.06															
	345	INLET 2			0.00	0.000	27.087	20.06		70.12			1,899	1,899	1.372	1350	Conc	0.15	11.3	2,155.8	1.46	0.13	88%
					0.00	0.000	0.000	20.06															
					0.00	0.000	0.000	20.06															
								20.19															

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET
CU Developments - Preferred Option - Storm Sewers Through Existing / Future Lands
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
FUTURE BLOCK / EXISTING LANDS ACCOUNTED FOR IN STORM SEWER SYSTEM OUTLETTING TO THE SWM POND THROUGH OUTLET #2																							
	920	351			0.00	0.000	0.000	17.01						998	0.914	900	Conc	0.36	69.5	1,132.6	1.72	0.67	88%
					0.00	0.000	10.621	17.01		77.58			824										
					0.00	0.000	0.000	17.01															
					0.00	0.000	1.292	17.01				134.92	174										
	351	349			0.00	0.000	0.000	17.68						975	0.914	900	Conc	0.36	34.0	1,132.6	1.72	0.33	86%
					0.00	0.000	10.621	17.68		75.79			805										
					0.00	0.000	0.000	17.68															
					0.00	0.000	1.292	17.68				131.80	170										
	349	INLET 2			0.00	0.000	0.000	18.01						964	0.914	900	Conc	0.36	11.2	1,132.6	1.72	0.11	85%
					0.00	0.000	10.621	18.01		74.95			796										
					0.00	0.000	0.000	18.01															
					0.00	0.000	1.292	18.01				130.34	168										
								18.12															
NADIA LANE			26.11	0.35	9.14	25.405	25.405	132.00				30.53	776	776	0.914	900	Conc	0.35	259.6	1,116.8	1.70	2.54	69%

Q = 2.78 AIC, where	**Consultant:**		**Novatech**	
Q = Peak Flow in Litres per Second (L/s)	**Issued Date:**		November 28, 2019	
A = Area in hectares (ha)	**Design By:**		Steve Zorgel	
I = Rainfall Intensity (mm/hr), 5 year storm	**Client:**		**Dwg. Reference:**	**Checked By:**
C = Runoff Coefficient	CU Developments Inc.		Figure 2	DDB

Legend:

10.00	Storm sewers designed to the 2 year event (without ponding) for local roads
10.00	Storm sewers designed to the 5 year event (without ponding) for collector roads
10.00	Storm sewers designed to the 10 year event (without ponding) for arterial roads
10.00	Storm sewers designed to the 100 year event (without ponding)

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET
March Road Storm Design Sheet - West Side - Ultimate Design
Independent Inlet to SWM Pond 1, 10 Year
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA							
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
					0.00	0.000	0.000	10.00														
					0.00	0.000	0.000	10.00														
MARCH ROAD	M1	M2	0.98	0.55	0.54	1.498	1.498	10.00			122.14		183	183	0.457	450	Conc	0.60	180.0	230.2	1.40	2.14	79%
					0.00	0.000	0.000	10.00														
					0.00	0.000	0.000	12.14														
					0.00	0.000	0.000	12.14														
MARCH ROAD	M2	M3	0.19	0.65	0.12	0.343	1.842	12.14			110.26		203	203	0.457	450	Conc	0.60	118.0	230.2	1.40	1.40	88%
					0.00	0.000	0.000	12.14														
					0.00	0.000	0.000	13.54														
					0.00	0.000	0.000	13.54														
MARCH ROAD	M3	M4	0.24	0.65	0.16	0.434	2.275	13.54			103.77		236	236	0.533	525	Conc	0.58	165.0	341.5	1.53	1.80	69%
					0.00	0.000	0.000	13.54														
					0.00	0.000	0.000	15.34														
					0.00	0.000	0.000	15.34														
MARCH ROAD	M4	M5	0.27	0.65	0.18	0.488	2.763	15.34			96.57		267	267	0.533	525	Conc	1.22	178.0	495.2	2.22	1.34	54%
					0.00	0.000	0.000	15.34														
					0.00	0.000	0.000	16.68														
					0.00	0.000	0.000	16.68														
MARCH ROAD	M5	INLET	0.31	0.65	0.20	0.560	3.323	16.68			91.90		305	305	0.762	750	Conc	0.15	232.0	449.6	0.99	3.92	68%
					0.00	0.000	0.000	16.68														
								20.60														

Q = 2.78 AIC, where	**Consultant:**		**Novatech**	
Q = Peak Flow in Litres per Second (L/s)	**Issued Date:**		November 28, 2019	
A = Area in hectares (ha)	**Design By:**		Steve Zorgel	
I = Rainfall Intensity (mm/hr), 5 year storm	**Client:**		**Dwg. Reference:**	**Checked By:**
C = Runoff Coefficient	CU Developments Inc.		Figure 2	DDB

Legend:

10.00	Storm sewers designed to the 2 year event (without ponding) for local roads
10.00	Storm sewers designed to the 5 year event (without ponding) for collector roads
10.00	Storm sewers designed to the 10 year event (without ponding) for arterial roads
10.00	Storm sewers designed to the 100 year event (without ponding)

INV.DOWN = 82.93
OBV. = 83.75
T/G FUT. = 85.85

INV.DOWN = 81.81
OBV. = 82.78
T/G FUT. = 84.90

INV.DOWN = 80.00
OBV. = 81.09
T/G FUT. = 83.40

REQUIRED TO ENTER FOREBAY
INV. = 79.71
OBV. = 80.93
T/G FUT. = 82.10

PREFERRED OPTION FOR U1-TRIB IS TO OUTLET TO POND 3 THROUGH FUTURE ROW

ALTERNATE OPTION FOR U1-TRIB IS TO OUTLET DIRECTLY TO TRIBUTARY 2

MH M3
MH M4
MH M5
MH 1604
MH 1400
MH 1602
MH 1404
MH 1600
MH 1500

M2 0.19 ha 0.65
M3 0.24 ha 0.65
M4 0.27 ha 0.65
M5 0.31 ha 0.65
M1 0.98 ha 0.55
NW-105 0.18 ha 0.65
NW-104 0.31 ha 0.65
NW-107 0.31 ha 0.65
NW-106 0.28 ha 0.65
NW-104A1 1.72 ha 0.65
NW-104A2 0.64 ha 0.20
NW-104B1 0.65 ha 0.65
NW-104B2 0.65 ha 0.65
NW-110B 2.58 ha 0.65
NW-102 0.35 ha 0.65
NW-108 0.66 ha 0.65
NW-103 0.17 ha 0.65
NW-101 0.20 ha 0.65
NW-109 1.98 ha 0.67
NW-111 0.63 ha 0.70
NW-112 2.58 ha 0.85
NW-116 0.07 ha 0.70
NW-114 0.89 ha 0.85
NW-115 0.23 ha 0.70
U1-Trib 0.57 ha 0.50

825mmØ STM
975mmØ STM
1090x1730mmØ STM
675mmØ STM
750mmØ STM
450mmØ STM
450mmØ STM
600mmØ STM
250mmØ STM
1220mmx1920Ø STM
1220x1920mmØ STM

CEMETERY LANDS
EX. ST. ISIDORE CATHOLIC CHURCH LANDS
EX. ST. ISIDORE SCHOOL
FUT. CLARIDGE LANDS
BLOCK 300
BLOCK 298
RESIDENTIAL
Park and Ride
Fire Hall
INLET
INV. = 79.23
OBV. = 80.45
NWL = 79.50
100yr = 82.00

INV.= 87.68
OBV. = 87.93
T/G FUT. = 90.45

INV.= 85.70
OBV. = 86.30
T/G FUT. = 88.70

MURPHY CRESCENT
MARCH RD
FUTURE ROW
FUTURE STREET
STREET 1
STREET 11
STREET 12
STREET 3

USF=84.94
HGL = 84.64
MUSF=84.94

USF=86.35
HGL = 85.80
MUSF=86.28

USF=88.40
HGL = 87.81
MUSF=88.23

LEGEND

- PROPOSED DEVELOPMENT
- AREA IDENTIFICATION
- NW-1 / 0.16 ha / 0.65 — DRAINAGE AREA (hectares) / RUN-OFF COEFFICIENT
- PROPOSED PIPE AND DIRECTION OF FLOW
- EXISTING / FUTURE LANDS DRAINAGE INCLUDED IN STORM SERVICING ANALYSIS
- EX. MARCH RD. DRAINAGE TO SWM POND

NOVATECH
Engineers, Planners & Landscape Architects
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Ottawa, Ontario, Canada K2M 1P6
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Facsimile (613) 254-5867
Website www.novatech-eng.com

CITY OF OTTAWA
CU DEVELOPMENTS INC.
1053, 1075 and 1145 MARCH ROAD

ALTERNATIVE STORM SERVICING LAYOUT FOR FUTURE AND EXISTING LANDS

SCALE 1 : 2500 (0 25 50 75 100)
DATE NOV 2019
JOB 116132
FIGURE FIGURE 3

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET

CU Developments & March Road Storm Design Sheet - West Side - Ultimate Design

Alternative Option

FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.00															
MARCH ROAD	M1	M2			0.00	0.000	0.000	10.00						272	0.533	525	Conc	0.60	180.0	347.3	1.55	1.93	78%
			0.98	0.55	0.54	1.498	1.498	10.00				181.20	272										
					0.00	0.000	0.000	11.93															
					0.00	0.000	0.000	11.93															
MARCH ROAD	M2	M3			0.00	0.000	0.000	11.93						304	0.533	525	Conc	0.60	118.0	347.3	1.55	1.27	88%
			0.19	0.65	0.12	0.343	1.842	11.93				165.20	304										
								13.20															
					0.00	0.000	0.000	10.00															
NW-101	1600	1602	0.20	0.65	0.13	0.361	0.361	10.00		104.19			38	38	0.254	250	PVC	1.40	107.9	73.3	1.45	1.24	51%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	11.24															
NW-102			0.35	0.65	0.23	0.632	0.994	11.24		98.06			97										
					0.00	0.000	0.000	11.24															
					0.00	0.000	0.000	11.24															
NW-108	1602	1400	0.66	0.65	0.43	1.193	2.186	11.24		98.06			214	245	0.457	450	Conc	1.40	31.5	351.7	2.14	0.25	70%
					0.00	0.000	0.000	11.24															
					0.00	0.000	0.000	11.24															
NW-103			0.17	0.65	0.11	0.307	2.494	11.24		98.06			245										
					0.00	0.000	0.000	11.24															
					0.00	0.000	0.000	11.49															
NW-106	1400	1604	0.28	0.65	0.18	0.506	3.000	11.49		96.94			291	291	0.457	450	Conc	1.40	69.9	351.7	2.14	0.54	83%
					0.00	0.000	0.000	11.49															
					0.00	0.000	0.000	12.03															
NW-104A			0.31	0.65	0.20	0.560	3.560	12.03		94.56			337										
					0.00	0.000	0.000	12.03															
					0.00	0.000	0.000	12.03															
NW-104B-1			1.42	0.65	0.92	2.566	6.126	12.03		94.56			579										
	1604	M3			0.00	0.000	0.000	12.03						663	0.686	675	Conc	1.40	76.6	1,037.0	2.81	0.45	64%
					0.00	0.000	0.000	12.03															
NW-105			0.18	0.65	0.12	0.325	6.451	12.03		94.56			610										
					0.00	0.000	0.000	12.03															
					0.00	0.000	0.000	12.03															
NW-107			0.31	0.65	0.20	0.560	7.011	12.03		94.56			663										
					0.00	0.000	0.000	12.03															
								12.49															
					0.00	0.000	0.000	13.20															
MARCH ROAD	M3	M4			0.00	0.000	7.011	13.20		89.88			630	986	0.838	825	Conc	0.53	165.0	1,089.6	1.97	1.39	90%
					0.00	0.000	0.000	13.20															
			0.24	0.65	0.16	0.434	2.275	13.20				156.30	356										
								14.59															

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET
CU Developments & March Road Storm Design Sheet - West Side - Ultimate Design
Alternative Option
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full
					0.00	0.000	0.000	10.00															
NW-109			1.98	0.67	1.33	3.688	3.688	10.00		104.19			384										
	1500	1404			0.00	0.000	0.000	10.00						512	0.610	600	Conc	1.17	120.0	692.4	2.37	0.84	74%
					0.00	0.000	0.000	10.00															
NW-111			0.63	0.70	0.44	1.226	4.914	10.00		104.19			512										
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.84															
NW-104B-2			0.95	0.65	0.62	1.717	6.631	10.84		99.94			663										
					0.00	0.000	0.000	10.84															
					0.00	0.000	0.000	10.84															
NW-110A	1404	M4	0.64	0.20	0.13	0.356	6.986	10.84		99.94			698	1,164	0.762	750	Conc	1.17	160.0	1,255.6	2.75	0.97	93%
					0.00	0.000	0.000	10.84															
					0.00	0.000	0.000	10.84															
NW-110B			2.58	0.65	1.68	4.662	11.648	10.84		99.94			1,164										
					0.00	0.000	0.000	10.84															
								11.81															
					0.00	0.000	0.000	14.59															
MARCH ROAD	M4	M5			0.00	0.000	18.660	14.59		84.91			1,584	1,992	0.991	975	Conc	1.00	178.0	2,336.9	3.03	0.98	85%
					0.00	0.000	0.000	14.59															
			0.27	0.65	0.18	0.488	2.763	14.59				147.66	408										
					0.00	0.000	0.000	15.57															
MARCH ROAD	M5	INLET			0.00	0.000	18.660	15.57		81.77			1,526	1,998	1.372	1350	Conc	0.15	232.0	2,155.8	1.46	2.65	93%
					0.00	0.000	0.000	15.57															
			0.31	0.65	0.20	0.560	3.323	15.57				142.20	473										
								18.22															
					0.00	0.000	0.000	10.00															
NW-112	1410	1412	2.58	0.85	2.19	6.097	6.097	10.00		104.19			635	635	0.762	750	Conc	0.41	75.1	743.3	1.63	0.77	85%
					0.00	0.000	0.000	10.00															
					0.00	0.000	0.000	10.77															
	1412	1220			0.00	0.000	6.097	10.77		100.30			612	612	0.762	750	Conc	0.39	74.7	724.9	1.59	0.78	84%
					0.00	0.000	0.000	10.77															
								11.55															
					0.00	0.000	0.000	18.22															
NW-114			0.89	0.85	0.76	2.103	26.859	18.22		74.42			1,999										
					0.00	0.000	0.000	18.22															
					0.00	0.000	3.323	18.22				129.43	430										
					0.00	0.000	0.000	18.22															
NW-115	1222	1220	0.23	0.70	0.16	0.448	27.307	18.22		74.42			2,032	2,473	1.524	1500	Conc	0.15	200.0	2,855.2	1.57	2.13	87%
					0.00	0.000	0.000	18.22															
					0.00	0.000	3.323	18.22				129.43	430										
					0.00	0.000	0.000	18.22															
NW-116			0.07	0.70	0.05	0.136	27.443	18.22		74.42			2,042										
					0.00	0.000	0.000	18.22															
					0.00	0.000	3.323	18.22				129.43	430										
								20.35															

1053, 1075 and 1145 March Road
CU Developments Inc.
Project No.: 116132

STORM SEWER DESIGN SHEET
CU Developments & March Road Storm Design Sheet - West Side - Ultimate Design
Alternative Option
FLOW RATES BASED ON RATIONAL METHOD

NOVATECH
Engineers, Planners & Landscape Architects

LOCATION			AREA (ha)			FLOW								TOTAL FLOW	SEWER DATA								
Catchment ID	From Manhole	To Manhole	Area (ha)	C	AC (ha)	Indiv 2.78 AC	Accum 2.78 AC	Time of Concentration	Rainfall Intensity 2 Year (mm/hr)	Rainfall Intensity 5 Year (mm/hr)	Rainfall Intensity 10 Year (mm/hr)	Rainfall Intensity 100 Year (mm/hr)	Peak Flow (L/s)	Total Peak Flow, Q (L/s)	Dia. (m) Actual	Dia. (mm)	Type	Slope (%)	Length (m)	Capacity (L/s)	Velocity (m/s)	Flow Time (min)	Ratio Q/Q full

Q = 2.78 AIC, where	**Consultant:**		**Novatech**	
Q = Peak Flow in Litres per Second (L/s)	**Issued Date:**		November 28, 2019	
A = Area in hectares (ha)	**Design By:**		Steve Zorgel	
I = Rainfall Intensity (mm/hr), 5 year storm	**Client:**		**Dwg. Reference:**	**Checked By:**
C = Runoff Coefficient	CU Developments Inc.		Figure 3	DDB

Legend:

10.00	Storm sewers designed to the 2 year event (without ponding) for local roads
10.00	Storm sewers designed to the 5 year event (without ponding) for collector roads
10.00	Storm sewers designed to the 10 year event (without ponding) for arterial roads
10.00	Storm sewers designed to the 100 year event (without ponding)