4) There appear to be a number of locations within the March Road corridor where details of the major and minor storm drainage system requirements appear to be incomplete / insufficient to guide implementation of the MSS in subsequent planning approval stages;

5) Storm drainage servicing requirements for the entirety of lands located south of Tributary 3, west of March Road should be completed in sufficient detail to streamline future development approvals. This should include an evaluation of an alternate drainage strategy described below.

Changes in storm servicing to be investigated:

1. **Minor System:**

- Storm servicing of lands immediately west of March Road (and runoff from March Road): the MSS indicates runoff in this area is to be directed to SWM Ponds 1 and 2 – into sewers that are to drain against grade and require deep excavation into rock. Is it feasible to direct drainage from this area to SWM Pond 3 instead, to avoid or minimize rock removal requirements?
- Servicing of St. Isadore area (NW-2 Catchment) by SWM Pond 1 forces a deep storm sewer constructed in bedrock. Can an alternative major-minor system design be investigated in this area, i.e., directing runoff from this area to SWM Pond 3?

2. **SWM Ponds 1 and 2**

During the evaluation of the alternative CDP Concepts, the following considerations were to be factored into the selection of the preferred CDP concept plan:

The depth of excavation should be considered when selecting the location of any future SWM facilities:

- *Deep excavations can result in potential issues with groundwater inflow;*
- *Where possible, the bottom of the pond should be situated above the bedrock;*
- *Deep excavations require a larger pond footprint to tie back into the surrounding grade and can be more difficult to integrate as a feature into the community.*

Based on information included in Appendix 2 of the MSS, the recommended storm servicing strategy will require 42,000 m^3 of rock removal to construct Pond 1, and 7,500 m^3 of rock removal to construct Pond 2. From a review of the MSS, it appears that much of the requirement for rock removal is created by the choice to construct 1800mm and 1350mm storm sewers ***under*** Tributaries 1 and 2, rather than to employ a conventional drainage strategy in which storm drainage is designed to follow the existing topography (rock removal volumes noted do not include the rock removal required to construct storm services below bedrock, just the ponds). Concerns were previously raised about these under-crossings in September 2015: "*Why not drain southern portion of Pond 1 catchment to Pond 2 (and avoid undercrossing)*?

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Given the extent of rock removal, are there other alternatives available that can avoid the substantial rock removal requirements associated with the current MSS/EMP (i.e., by investigating the feasibility of expanding the capture area of SWM Pond 3 to include a portion of lands west of March Road, and if necessary, construction of temporary SWM controls until SWM Pond 3 is in operation?)

Description of Alternative Drainage Options for Consideration:

1 – Alternative option for drainage west of March Road

The City requests alternatives be developed that would implement the conceptual catchment areas of SWM Ponds 1 and 2 and revised outlet for the lands south of Tributary 3 and the lands to the west of March Road as illustrated in the figure that follows below (the boundary to the west of March Road is conceptual, and needs refinement based on a review of grading and servicing plans in the area).

To facilitate implementation of the alternative servicing strategy, the cost of employing interim stormwater drainage systems / controls (until the outlet to SWM Pond 3 becomes available) should be compared against the cost of constructing deep trunk sewers through bedrock on the west side of March Road that would be required if the April 2016 stormwater strategy was to be implemented.

Response:

The above comments appear to be primarily focused on quantity of rock removal. It should be noted that the estimated rock quantities noted above have been taken from an earlier draft of the MSS (February 2016). The April 4, 2016 Draft MSS, as circulated for review, has lower estimated quantities of rock excavation (37,000m^3 and 2,000m^3 respectively for Ponds 1 and 2).

Consideration was given to minimize rock but as the site is located in Kanata, rock is close to the surface in many areas. The rock excavation required for the ponds is a direct function of the pond location (low points adjacent to tributaries) and size (based on drainage areas). During the detailed design, alternate servicing options and detailed pond grading could be considered to minimize rock excavation.

The impacts of rock excavation within the proposed development have been extensively studied and presented in the Paterson Report (provided in Volume 3 of the EMP). The conclusion is that construction techniques, precautions, and mitigation measures can be applied to minimize the risks associated with rock removal on the groundwater in this area.

The following key considerations were made with respect to the location and elevations of Ponds 1 and 2.

1. The recommended locations for Ponds 1 and 2 and the proposed tributary crossings will allow the post development drainage areas to closely follow pre-development drainage patterns.
    - The proposed sewer crossings have some influence on the depth of the proposed

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storm sewers, but do not significantly impact the proposed pond elevations or volume of rock excavation required.

- The proposed crossings will only influence the depth of the sewers between the crossings and the SWM facilities, which are relatively short runs in comparison to the overall length of the storm sewer system.
- With respect to the proposed crossings, Tributary 2 will be realigned and construction of sewers and water will be coordinated with the proposed realignment to minimize the amount of in-water work. Both Tributaries 2 and 3 are ephemeral and construction can be timed to proceed during periods of no flow.

2. The Normal Water Levels in Ponds 1 and 2 have been set at the 2-year water levels of their receiving watercourses, as per City and MOECC recommendations. The proposed storm sewer elevations have been set to ensure the upstream sewers will not be submerged under normal conditions.
   - The recommended pond locations are at the lowest points of their respective drainage areas. The recommended locations also represent the areas with the lowest rock elevations west of March Road.
   - Given the shallow nature of the rock for this development (typically 1-3m below grade west of March Road), rock removal is to be expected.
   - Moving the ponds further west, away from March Road will require increasing the operating levels in the ponds and raising all of the upstream sewers by a corresponding amount.
   - The topography of the site is quite varied and the elevations climb rapidly west of March Road. As the rock elevation follows the ground surface, the amount of rock excavation would remain relatively the same, if not greater – **see attached sketches**.
3. March Road represents a logical drainage boundary between the east and west portion of the KNUEA for a variety of reasons. The pond locations adjacent to March Road will allow the ponds to service as much of the KNUEA lands to the west as possible.
   - The proposed pond locations will allow almost all major drainage for the areas west of March Road to be routed to the ponds.
   - Moving the ponds further west will either require major drainage crossings of March Road, or for major drainage to be routed uncontrolled into Tributaries 2 and 3.
   - Since the quantity control objective is to match pre-development flows for all storms up to and including the 100-year event, directing the major system flows to the tributaries would require the ponds to be oversized to offset the uncontrolled flows.
   - The proposed drainage areas to Ponds 1 and 2, provides the most flexibility for phasing of future development without the need for interim SWM solutions. As noted in the MSS, the SWM ponds would be constructed prior to any development in their respective drainage areas.
4. The proposed alternative solution would substantially reduce the onsite area draining to Tributary 2 and substantially increase the onsite area draining to Tributary 3. This would require increasing the size of Pond 2 to meet the quantity control objectives and require

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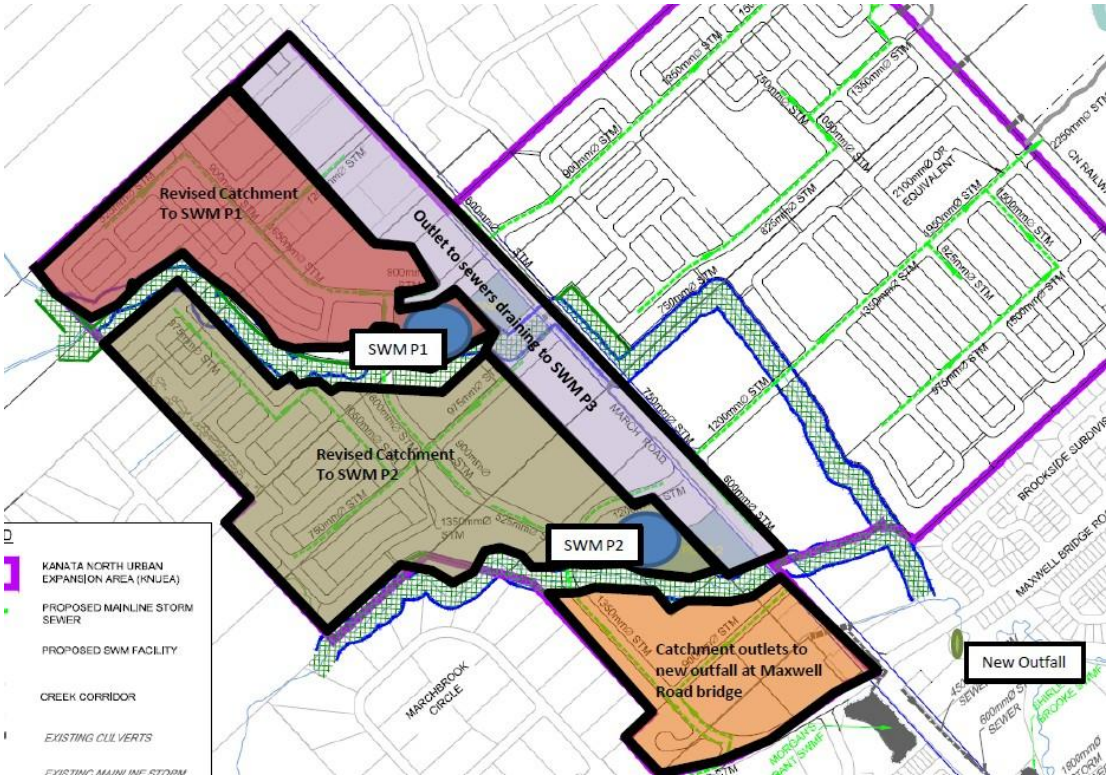
considerable revision to the conceptual land use plan potentially resulting in the relocation of a school and/or park block and the location of the collector road.

5. Any increase in drainage area to March Road, as proposed by the City, would have substantial implications from a phasing and infrastructure cost perspective. The proposed alternative solution would require upsizing of approximately 1800m of storm sewer between March Road and Pond 3 to accommodate the additional areas west of March Road.
6. With respect to servicing the St. Isadore area, an alternative solution would be to route the storm sewers to Pond 2 within the March Road right-of-way. This approach would result in two storm sewer systems in rock vs. our preferred solution of one deep storm sewer in rock. The MSS is intended to demonstrate the feasibility of servicing the KNUEA, and alternative sewer routes can be considered at the detailed design stage. The MSS will be revised to include a statement to this effect.



2 – Alternative option for drainage south of Tributary 3

The existing drainage patterns in the Southwest Quadrant – and at a broader scale - in the area west of Shirley's Brook north of Maxwell Bridge Road, have long been interrupted by the construction of March Road. This has necessitated the construction of a number of ad hoc

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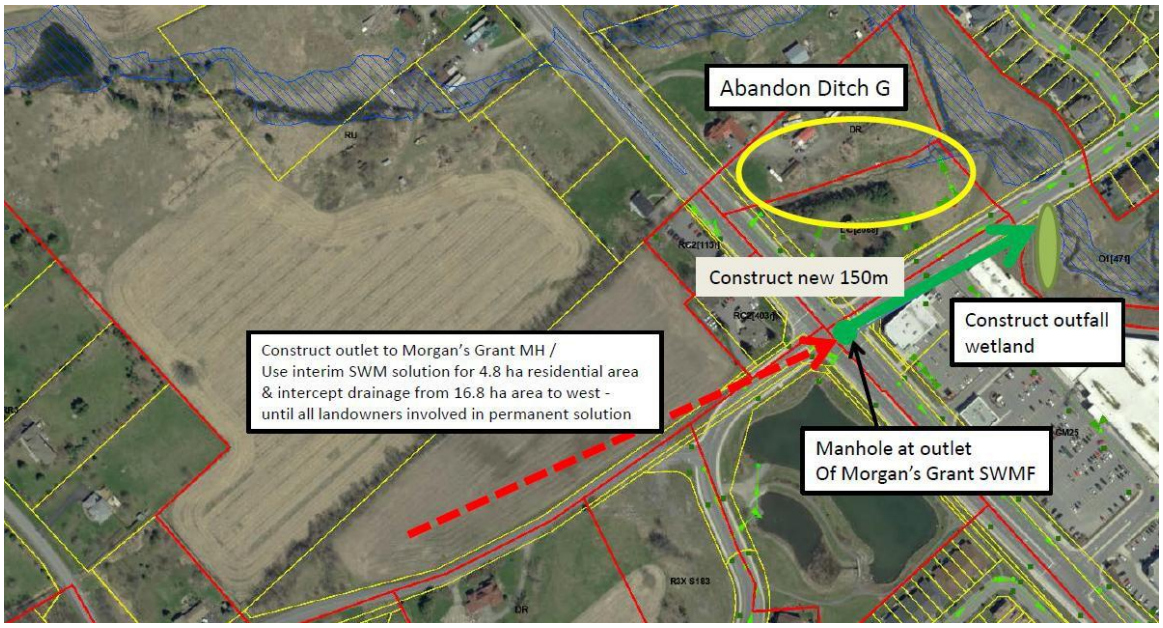
drainage solutions, including the outfall sewer from the Morgan's Grant SWMF which discharges into Ditch G, to which the City has no apparent maintenance access.

The preferred solution identified in the April 2016 EMP proposes construction of a lengthy interceptor sewer to collect drainage from the 16.8 ha area that includes the Marchbrook Circle subdivision, and construction of a storm sewer under tributary 3 to provide an outlet to SWM Pond 2 for the relatively small 4.8 ha residential area located south of tributary 3.

An alternative solution that warrants evaluation involves construction of a new outfall to the branch of Shirley's Brook on the southwest side of the Maxwell Bridge Road crossing. The alternative presented in the figure below would avoid the need to construct the lengthy interceptor sewer and sewer under tributary 3, and would provide an opportunity for improved maintenance access for the City to the Morgan's Grant outfall. Introducing the necessary infrastructure to intercept local drainage along March Road that outlets to Ditch G (while constructing the sanitary sewer and other infrastructure in this area) would allow for the eventual abandonment of Ditch G, with mitigation being provided at the storm outfall at the new Maxwell Bridge outfall.



A storm servicing / management system would need to be developed for the area south of Tributary 3 that would allow interim development to proceed, until all property owners become active in advancing development of their land, at which time a permanent solution would be required. If lands along March Road north of Tributary 3 can be successfully re-directed to the catchment area of SWM Pond 3 (hence removing some drainage from the branch of Shirley's Brook), there may be an opportunity to relax standard quantity control requirements that the lands south of Tributary 3 may otherwise need to provide. Quality control in this relatively small catchment area could likely achieved through the use of oil-grit separators and it would have to be confirmed that this approach did not exacerbate erosion.

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Response:

The following key considerations were made with respect to the recommended SWM solution for the southwest quadrant as documented in the Draft EMP.

1. The total drainage area south of Tributary 3, west of March Road is approximately 30.5ha, including approximately 16.8 ha of upstream drainage from Marchbrook Circle and Old Carp Road.
    - The recommended SWM solution from the Draft EMP will direct all runoff from this area to Tributary 3. No drainage from the KNUEA will be directed to Ditch G under post-development conditions.
2. The recommended SWM solution for the southwest quadrant from the Draft EMP includes an undercrossing of Tributary 3 to convey runoff from the proposed single family homes on Street 'A' adjacent to the Marchbrook Circle subdivision to Pond 2 for water quality and quantity control.
    - Runoff from the single family residential area could potentially be treated using an oil-grit separator in the right-of-way, but it is feasible to route the flows from this area to Pond 2 via the proposed undercrossing of Tributary 3 without significantly increasing rock excavation requirements.
    - The proposed crossing under Tributary 3 will minimize the area requiring an independent SWM solution. The land uses in the remaining areas are compatible with privately maintained oil-grit separators.
    - By maximizing the drainage area to Pond 2, it minimizes on-site the quantity control requirements for the remaining areas. Based on the results of the hydrologic analysis, areas with on-site SWM controls would be allowed to release the 5-year post-development peak flows uncontrolled without increasing peak flows in Tributary 3.
3. The comments provided by the City indicate that the recommended SWM solution from the Draft EMP will require a lengthy interceptor sewer to convey runoff from the upstream rural areas through the KNUEA. This is not correct - upstream flows in Ditch G would be captured by a ditch inlet catchbasin and routed through the proposed storm sewers to Tributary 3.
    - The recommended alternative would only require a short distance (approximately 50m) of parallel storm sewers along Street 'A'.
    - Runoff from the upstream rural area should not require water quality treatment. The runoff from the KNUEA lands tributary to this sewer would be treated using private oil-grit separators.
    - The alternative solution proposed by the City would require the construction of an additional 300m of large diameter storm sewer within existing right-of-ways (along Halton Terrace, across March Road and down Maxwell Bridge). This alternative would require replacing existing sewers which have not been sized to accommodate the additional flows from this area, and the construction of a wetland treatment area on privately owned lands outside the limits of the KNUEA.

Conclusion

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Based on the foregoing, we are confident that the recommended SWM strategy as outlined in the EMP represents the best alternative for servicing the KNUEA.

Yours truly,

NOVATECH

Michael Petepiece, P.Eng
Project Manager

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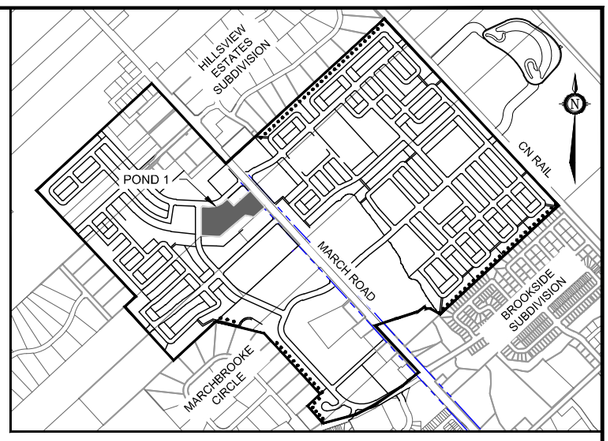
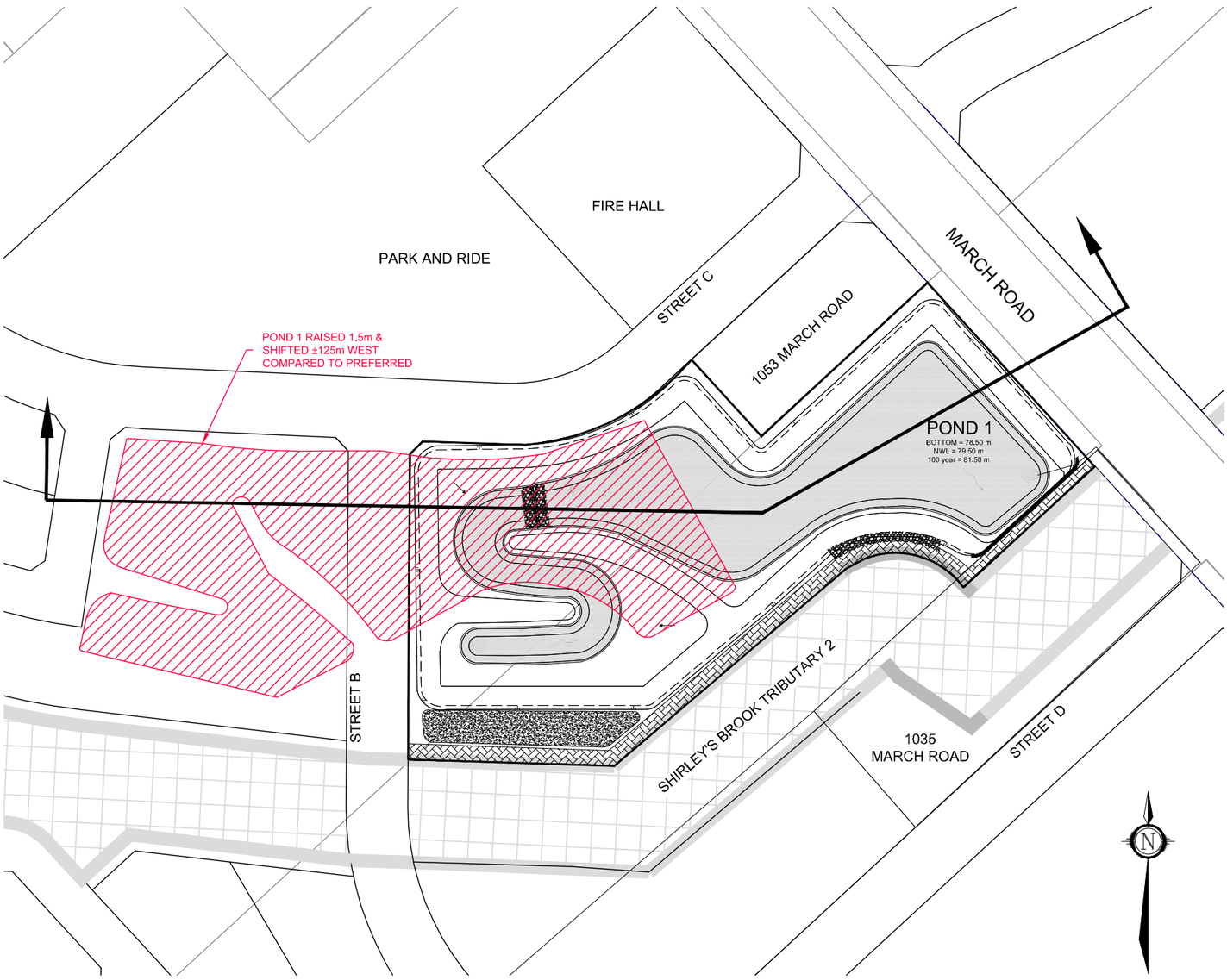
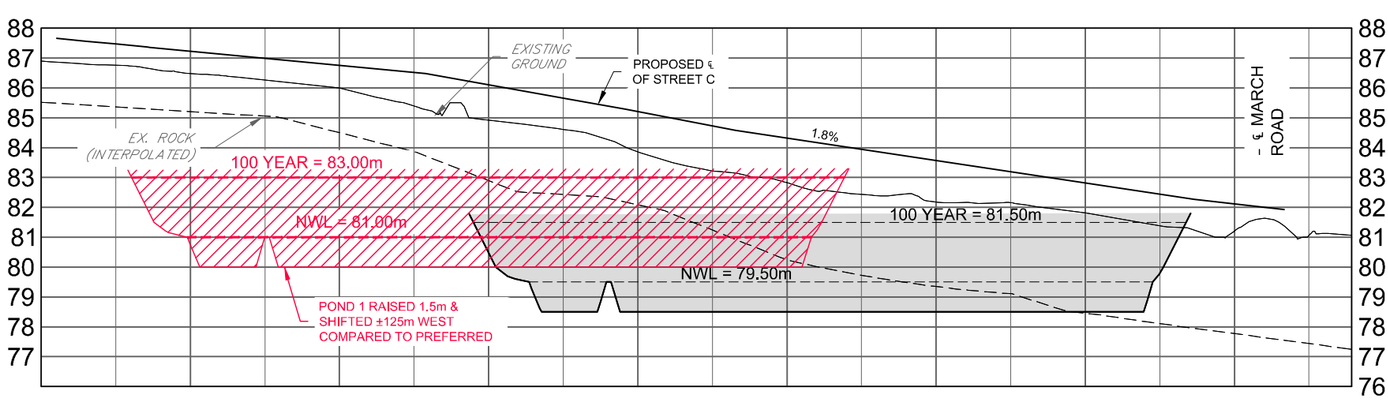


KEY PLAN
N.T.S.





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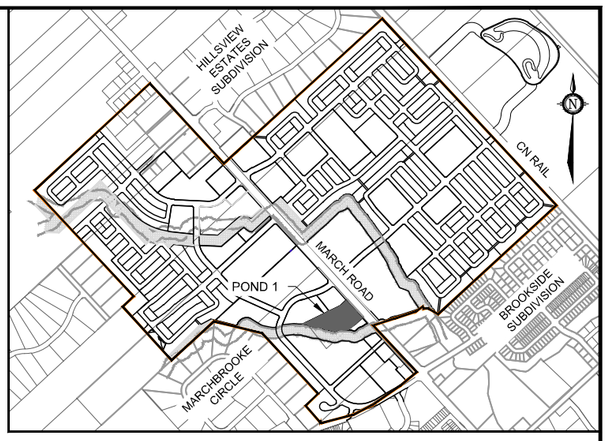
KANATA NORTH URBAN EXPANSION AREA

POND 1 SECTION

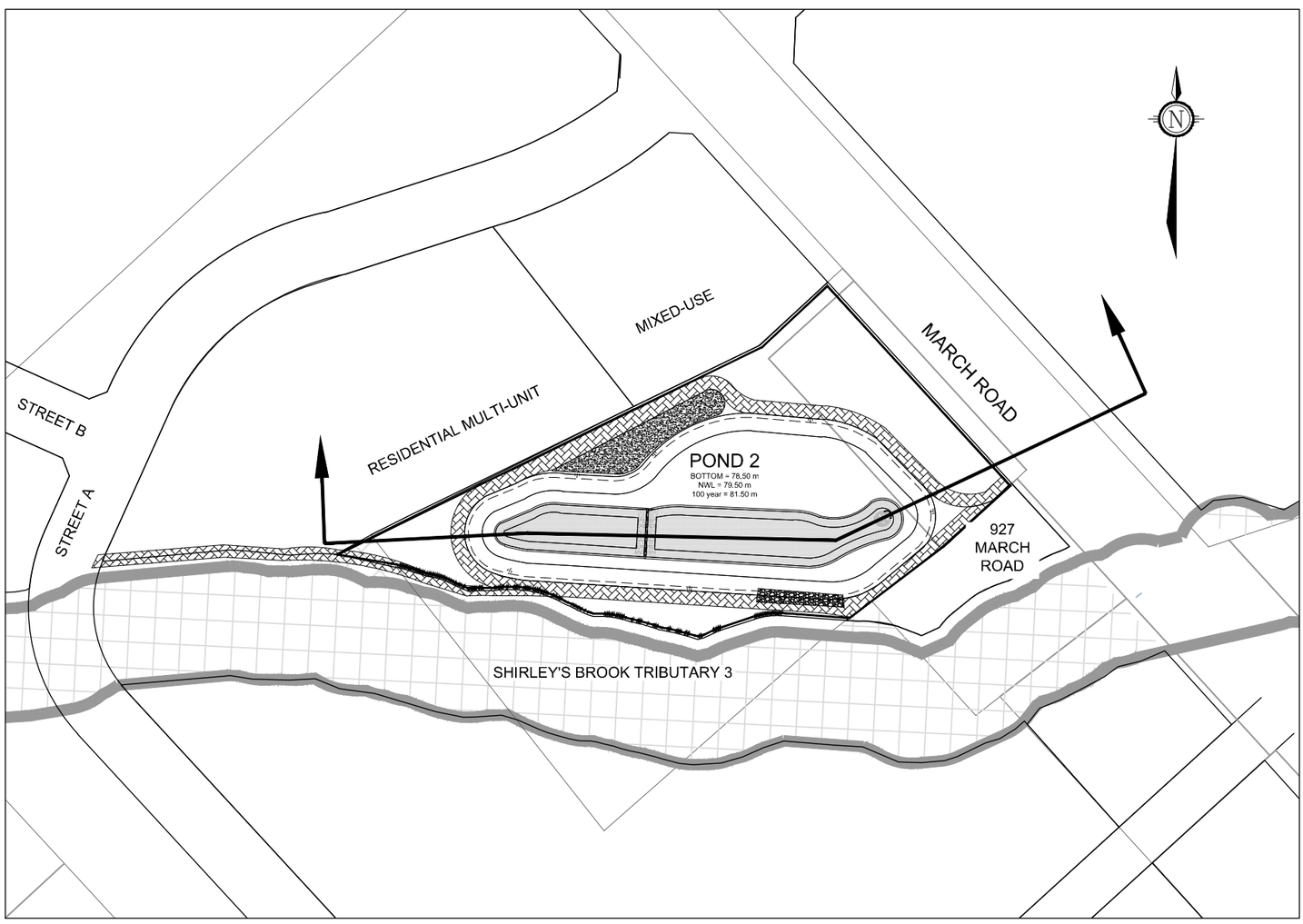
SCALE 1 : 2000 (0, 20, 40, 60, 80)
DATE MAY 2016
JOB 112117
FIGURE CSK-1A

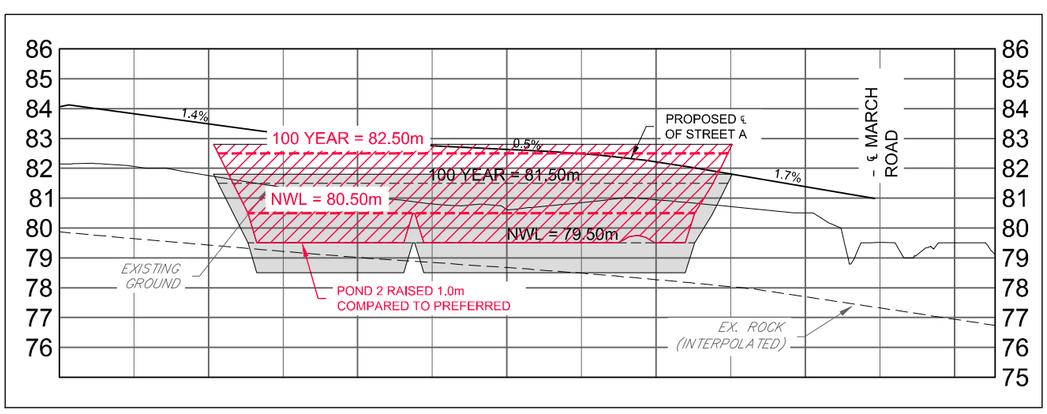
SHT11X17.DWG - 279mmX432mm

M:\2012\112117\CAD\Design_EMP\MEMO (KJA)\Figure 9.1 Pond 1 Functional.dwg, POND1 - MSS SKETCH, May 09, 2016 - 3:29pm, tbrooks



KEY PLAN
N.T.S.





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KANATA NORTH URBAN EXPANSION AREA

POND 2 SECTION

SCALE 1 : 2000 (0 20 40 60 80)
DATE MAY 2016 | JOB 112117 | FIGURE CSK-1B

SHT11X17.DWG - 279mmX432mm

M:\2012\112117\CAD\Design_EMP\MEMO (KJA)\Figure 9.2 Pond 2 Functional.dwg, POND2 MSS SKETCH, May 09, 2016 - 2:36pm, tbrooks

MEMO / NOTE DE SERVICE

To / Destinataire	Wendy Tse	File/N° de fichier:
From / Expéditeur	Ted Cooper, P. Eng. Darlene Conway, P. Eng.	
Subject / Objet	Additional Comments: Kanata North Community Design Plan EMP and MSS Final Drafts (Novatech, April 4, 2016)	Date: May 10, 2016

Further to previous comments dated May 2, 2016, the following additional comments are provided related to apparent inconsistencies between the conceptual design of SWM Ponds 1, 2, and 2A (Figures 9.1, 9.2, and 9.3 of the April 2016 EMP) and grading details presented in the Preliminary Grading Plan and Plan and Profile Drawings provided in the April 2016 MSS. Please refer also to the attached figures derived from the April 2016 EMP/MSS.

1. Pond 1:

- The proposed grades at the perimeter of the pond are up to 5m higher than the grade identified in the SWM Block (e.g., 86.48m vs. 81.50m); subject to confirmation of the proposed grades, please note the City will not accept retaining walls within the pond block (or ROW);
- Given the comparatively steep road grade, please demonstrate how major system flows will be fully captured by SWM Pond 1 and not continue on to March Road;
- Maintenance access is required around the entire SWM pond – not just on lands abutting the Shirley's Brook tributary;
- Additional detail is required to demonstrate construction of SWM Pond 1 will not impact existing development at 1053 March Road.

2. Pond 2:

- The SWM Block must be expanded to include the land required for the major and minor system outlets/maintenance access to the pond; provide conceptual details/grading for major and minor system inlets/outlets to pond to confirm required block requirements.
- Per the Preliminary Grading Plan, please demonstrate how major system flows are to be conveyed to Pond 2 through the Residential Multi-unit and the Mixed use blocks and identify any land requirements for this purpose.

3. Pond 2A:

- Given the comparatively steep road grade, please demonstrate how major system flows will be fully captured and not continue on to March Road;
- The direction of major system flow at March Road and the Collector Road illustrated on Figure 9.3 is inconsistent with Plan and Profile drawing PP3. Please clarify and/or revise as required.

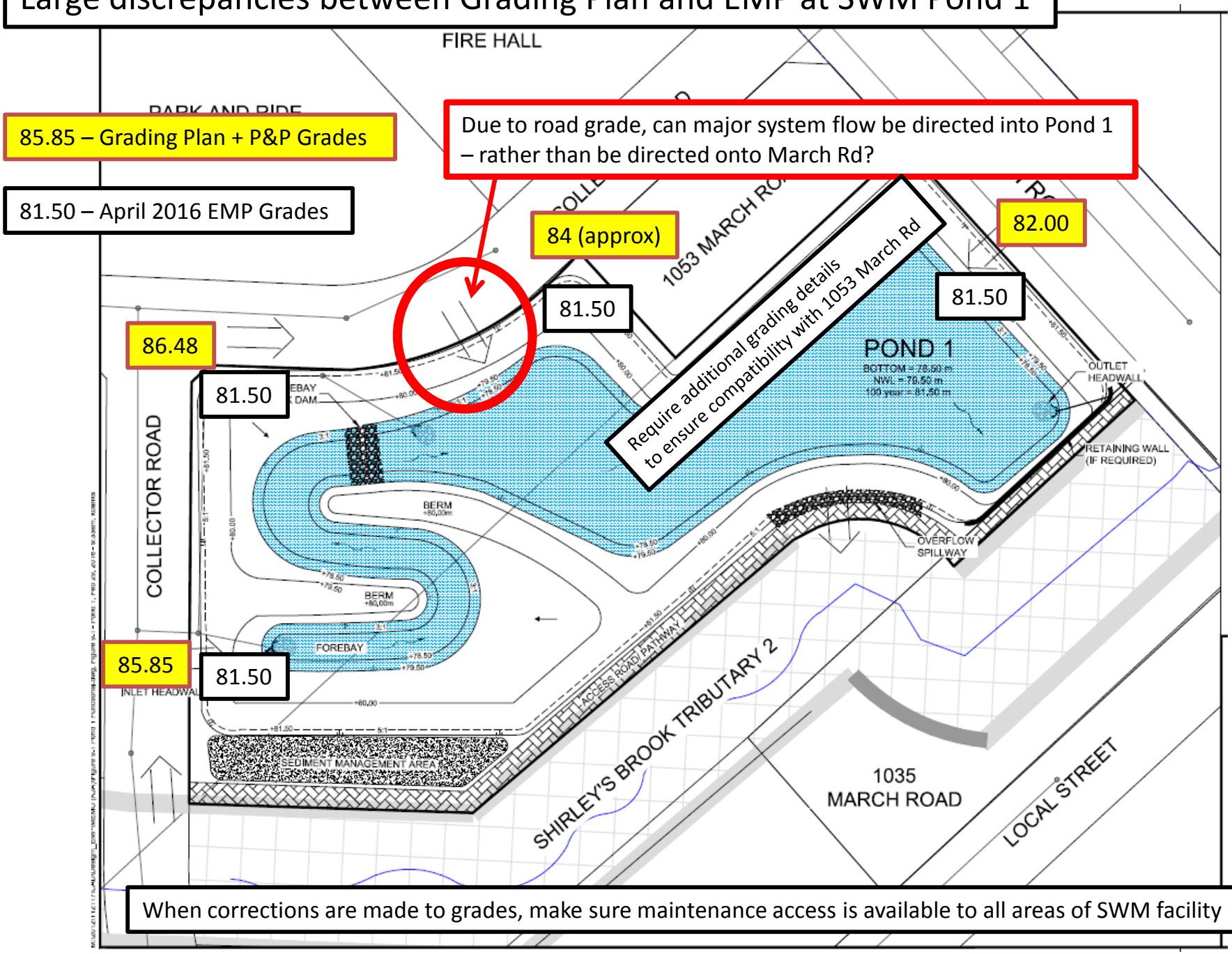
4. All Ponds: As requested in comments provided in September 2015, please provide X-sections that indicate side slopes and show adjacent constraints where appropriate (property/ROW limits, setback limits, edge of woods, etc.).

Ted Cooper, P. Eng.
Project Manager

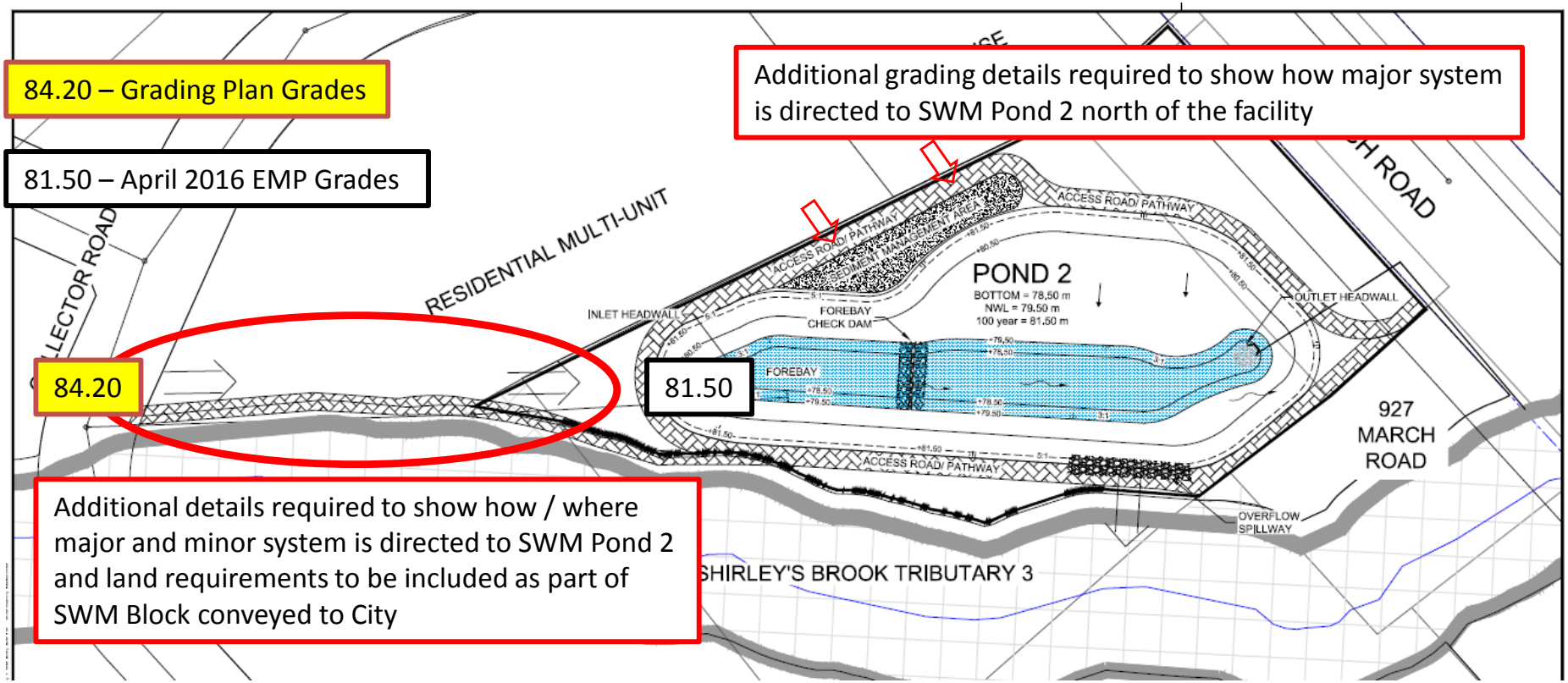
Darlene Conway, P. Eng.
Senior Project Manager

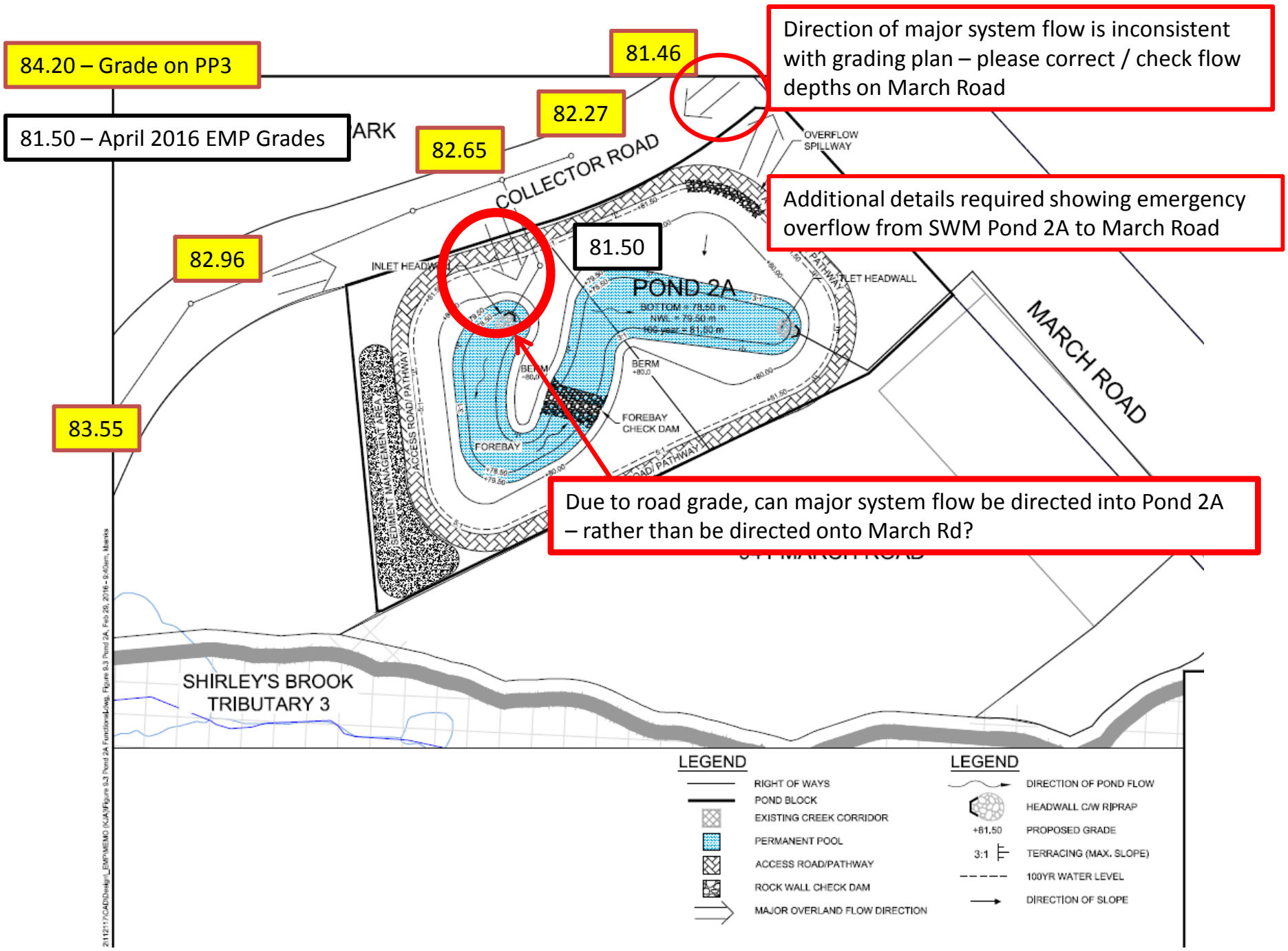
cc.
Joe Zagorski, P. Eng.
Michel Kearney, P. Eng.
Chris Rogers, P. Eng.
Tim Newton, P. Eng.
Amy MacPherson

Large discrepancies between Grading Plan and EMP at SWM Pond 1



When corrections are made to grades, make sure maintenance access is available to all areas of SWM facility


84.20 – Grading Plan Grades
81.50 – April 2016 EMP Grades
Additional grading details required to show how major system is directed to SWM Pond 2 north of the facility
RESIDENTIAL MULTI-UNIT
ACCESS ROAD/ PATHWAY
SEDIMENT MANAGEMENT AREA
POND 2
BOTTOM = 78.50 m
NWL = 79.50 m
100 year = 81.50 m
INLET HEADWALL
FOREBAY
CHECK DAM
OUTLET HEADWALL
84.20
81.50
927
MARCH
ROAD
OVERFLOW
SPILLWAY
Additional details required to show how / where major and minor system is directed to SWM Pond 2 and land requirements to be included as part of SWM Block conveyed to City
SHIRLEY'S BROOK TRIBUTARY 3


84.20 – Grade on PP3
81.50 – April 2016 EMP Grades
83.55
81.46
82.27
82.65
82.96
81.50
Direction of major system flow is inconsistent with grading plan – please correct / check flow depths on March Road
Additional details required showing emergency overflow from SWM Pond 2A to March Road
Due to road grade, can major system flow be directed into Pond 2A – rather than be directed onto March Rd?
COLLECTOR ROAD
MARCH ROAD
OVERFLOW SPILLWAY
POND 2A
BOTTOM = 78.50 m
NWL = 79.50 m
100 year = 81.80 m
INLET HEADWALL
BERM
FOREBAY
FOREBAY CHECK DAM
ACCESS ROAD/ PATHWAY
SHIRLEY'S BROOK TRIBUTARY 3
LEGEND
RIGHT OF WAYS
POND BLOCK
EXISTING CREEK CORRIDOR
PERMANENT POOL
ACCESS ROAD/PATHWAY
ROCK WALL CHECK DAM
MAJOR OVERLAND FLOW DIRECTION
LEGEND
DIRECTION OF POND FLOW
HEADWALL C/W RIPRAP
+81.50
PROPOSED GRADE
3:1
TERRACING (MAX. SLOPE)
100YR WATER LEVEL
DIRECTION OF SLOPE

NOVATECH
Engineers, Planners & Landscape Architects

May 18, 2016

Wendy Tse
City of Ottawa
110 Laurier Street West
4th Floor Infrastructure Approvals Division
Ottawa, Ontario K1P 1J1

Attention:

Dear Ms. Tse:

Reference: Kanata North CDP - EMP and MSS Final Drafts – Additional Comments Response to Comments
Our File No. 112117

This letter is provided in response to comments provided by the City on May 12, 2016, based on final drafts of the Kanata North CDP EMP and MSS reports.

Responses to comments are provided in red.

1. Pond 1:

a) The proposed grades at the perimeter of the pond are up to 5m higher than the grade identified in the SWM Block (e.g., 86.48m vs. 81.50m); subject to confirmation of the proposed grades, please note the City will not accept retaining walls within the pond block (or ROW);

- The proposed grades shown on the conceptual design for Pond 1 have been revised to eliminate the retaining wall. The revised pond grading is shown on the updated Figure 9.1, which will be included with the Final EMP.

b) Given the comparatively steep road grade, please demonstrate how major system flows will be fully captured by SWM Pond 1 and not continue on to March Road;

- The major system flow route has been updated to reflect the revised grading in the vicinity of Pond 1, and shown on the updated Figure 9.1. The majority of runoff from the upstream area would be directed into Pond 1 at a low point on Street C adjacent to the pond. Downstream of this low point, a small amount of overland flow from Street C will be directed onto March Road and into Pond 1, as indicated on the updated figure.

c) Maintenance access is required around the entire SWM pond – not just on lands abutting the Shirley's Brook tributary;

- The City of Ottawa Stormwater Management Facility Design Guidelines & Standards document states that service roads must provide access to sediment forebays, and inlet & outlet structures. The location of service roads has been revised, as shown on Figure 9.1. The proposed access roads will provide access to both sides of the pond forebay, the sediment management area, and the inlet and outlet structures.

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d) Additional detail is required to demonstrate construction of SWM Pond 1 will not impact existing development at 1053 March Road.

- Additional detail has been provided on Figure 9.1 to demonstrate no impact to the existing development at 1053 March Road.

2. Pond 2:

a) The SWM Block must be expanded to include the land required for the major and minor system outlets/maintenance access to the pond; provide conceptual details/grading for major and minor system inlets/outlets to pond to confirm required block requirements.

- The overland flow route to Pond 2 will follow the proposed pathway/ access road adjacent to Tributary 3, as shown on revised Figure 9.2. The 6.0m wide pathway block will provide the required capacity to convey the overland flows from Street A to Pond 2 – supporting calculations will be provided in the MSS.

b) Per the Preliminary Grading Plan, please demonstrate how major system flows are to be conveyed to Pond 2 through the Residential Multi-unit and the Mixed use blocks and identify any land requirements for this purpose.

- Major system flows from upstream areas will not be conveyed through the Residential Multi-unit and Mixed Use blocks. Any overland flow from these blocks will be directed to Pond 2, but major overland flows from the surrounding areas will be confined to the right-of-ways and/or the defined overland flow routes shown on the Preliminary Grading Plan.

3. Pond 2A:

a) Given the comparatively steep road grade, please demonstrate how major system flows will be fully captured and not continue on to March Road;

- The proposed road grades shown on the grading plans provided as a part of the MSS have not been designed taking Pond 2A into consideration as Pond 2A is only intended as an alternative pond location within the Southwest Quadrant of the site.

  Notwithstanding the above, the grading design for Street A could easily be adjusted to provide a low point and route major system flows into Pond 2A.

b) The direction of major system flow at March Road and the Collector Road illustrated on Figure 9.3 is inconsistent with Plan and Profile drawing PP3. Please clarify and/or revise as required.

- As stated above, the proposed road grades have not been developed with Pond 2A in mind as it is intended as an alternative pond location. If Pond 2A is selected as the final location for the SWM facility, the proposed road grading will be adjusted as required.
- While not consistent with the Plan and Profile Drawing, Figure 9.3 has been revised to reflect the anticipated major drainage flow routes associated with this alternative.

4. **All Ponds:** As requested in comments provided in September 2015, please provide X-sections that indicate side slopes and show adjacent constraints where appropriate (property/ROW limits, setback limits, edge of woods, etc.).

- Pond cross-sections will be provided in the Final EMP. The conceptual pond designs for all ponds have been updated with additional grading details as requested.

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Based on the response to the City's questions presented above, we are confident we have demonstrated the feasibility of the proposed stormwater system.

Yours truly,

Michael Petepiece, P.Eng.
Project Manager

cc.
Ted Cooper, P. Eng. Project Manager
Darlene Conway, P. Eng. Senior Project Manager
Joe Zagorski, P. Eng.
Michel Kearney, P. Eng.
Chris Rogers, P. Eng.
Tim Newton, P. Eng.
Amy MacPherson

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FIRE HALL

PARK AND ROAD

STREET C

1053 MARCH ROAD

MARCH ROAD

A

A'

INLET HEADWALL
INV. = 79.25

OUTLET HEADWALL

POND 1
BOTTOM = 78.50 m
NWL = 79.50 m
100 year = 81.65 m

POND ACCESS ROAD

STREET D

FOREBAY

FOREBAY CHECK DAM

OVERFLOW SPILLWAY
ELEV = 81.65
100 yr WL = ±80.60m
TOP-OF-BANK = ±81.00m

1200mm X 1800mm
BOX CULVERT
REPLACE DURING
MARCH ROAD
WIDENING

SHIRLEY'S BROOK
TRIBUTARY 2

RECREATIONAL PATHWAY ±6.0m

SEDIMENT MANAGEMENT AREA

PROPOSED
BOX CULVERT -
1200mm x 1800mm
INV. = 84.00±

1035
MARCH ROAD

STREET D

LEGEND

- RIGHT OF WAYS
- POND BLOCK
- EXISTING CREEK CORRIDOR
- PROPOSED CREEK CORRIDOR
- PERMANENT POOL
- ACCESS ROAD/PATHWAY
- ROCK WALL CHECK DAM
- MAJOR OVERLAND FLOW DIRECTION
- DIRECTION OF POND FLOW
- HEADWALL C/W RIPRAP
- +81.50 PROPOSED GRADE
- 3:1 TERRACING (MAX. SLOPE)
- 100YR WATER LEVEL
- STORM SEWER
- PROPOSED CULVERT
- FLOODPLAIN LIMITS (APPROXIMATE)

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 9.1
POND 1
CONCEPTUAL LAYOUT

DATE
MAY 2016

JOB
112117

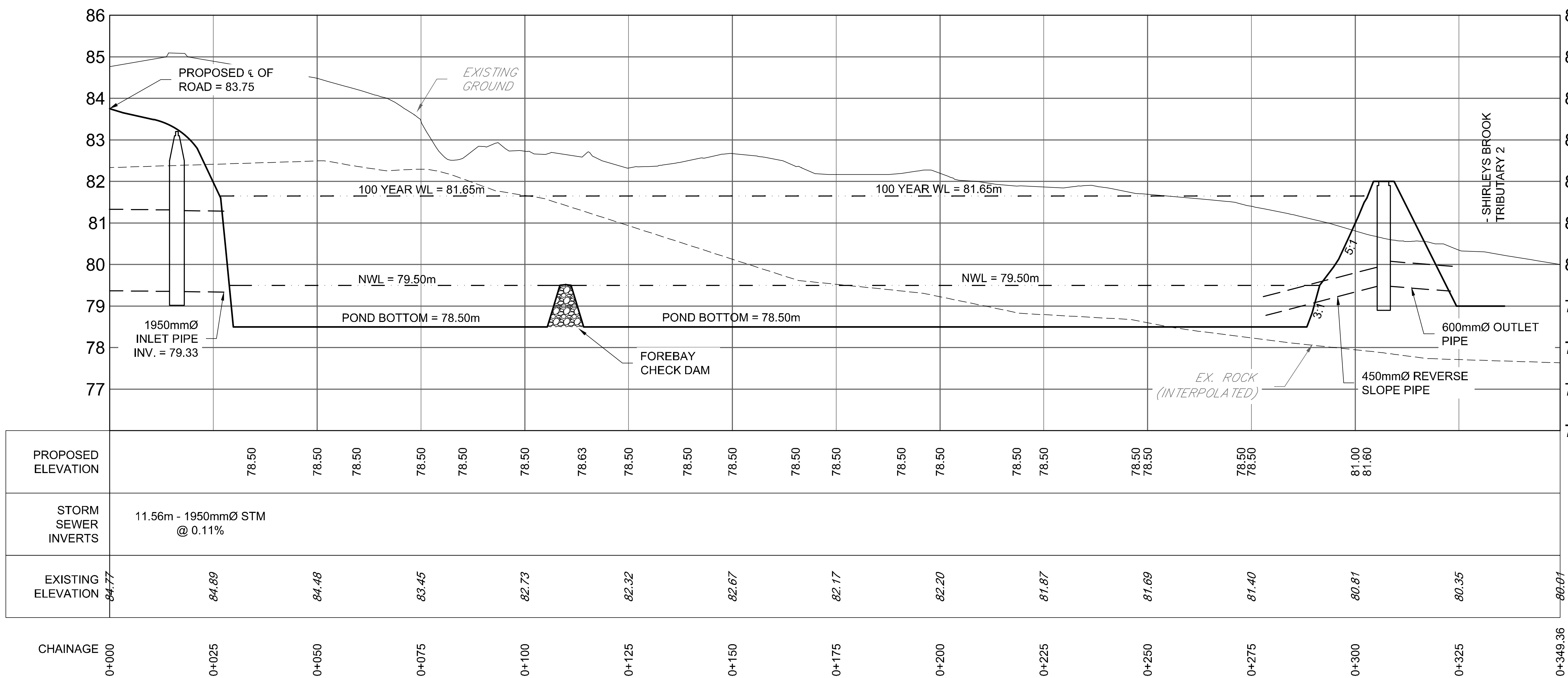
SCALE
1:1000

0 5m 10m 20m

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CADDesign_EMP\MEMO (KJA)\Figure 9.1 Pond 1 Functional.dwg, Figure 9.1 - Pond 1, May 18, 2016 - 1:09pm, kbanks

SHT11x17 DWG - 279mmx432mm



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 9.1A

POND 1
CROSS SECTION A-A'

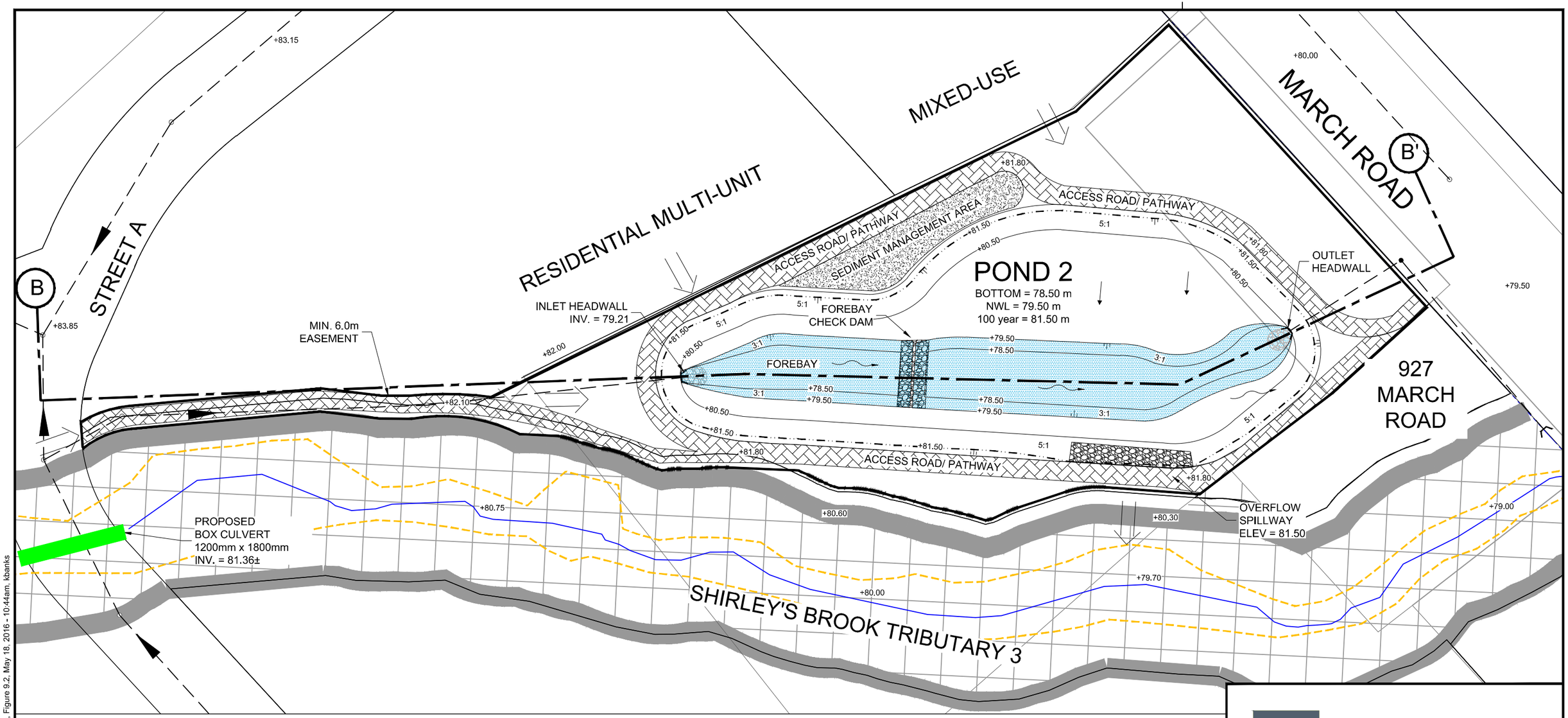
DATE
MAY 2016

JOB
112117

SCALE
1:1000

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design_EMP\MEMO (KJA)\Figure 9.1 Pond 1 Functional.dwg, Figure 9.1A - Pond 1, May 18, 2016 - 4:21pm, kbanks



LEGEND

- RIGHT OF WAYS
- POND BLOCK
- EXISTING CREEK CORRIDOR
- PERMANENT POOL
- ACCESS ROAD/PATHWAY
- ROCK WALL CHECK DAM
- MAJOR OVERLAND FLOW DIRECTION
- FLOODPLAIN LIMITS (APPROXIMATE)

LEGEND

- DIRECTION OF POND FLOW
- HEADWALL C/W RIPRAP
- +81.50 PROPOSED GRADE
- 3:1 TERRACING (MAX. SLOPE)
- 100YR WATER LEVEL

KANATA NORTH
COMMUNITY DESIGN PLAN

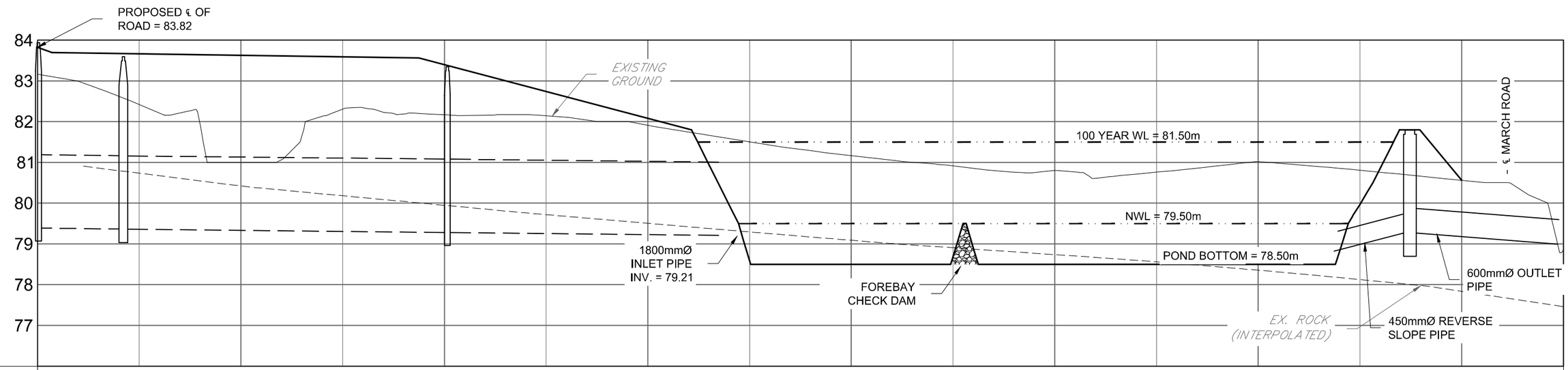
FIGURE NO. 9.2
POND 2 CONCEPTUAL LAYOUT

DATE: MAY 2016
JOB: 112117
SCALE: 1:1000
0 5m 10m 20m

NOVATECH
Engineers, Planners & Landscape Architects

SHT11x17.DWG 279mmx432mm

M:\2012\112117\CAD\Design_EMP\MEMO (KJA)\Figure 9.2 Pond 2 Functional.dwg, Figure 9.2, May 18, 2016 - 10:44am, kbanks



PROPOSED ELEVATION																
						81.15	78.59	78.50	78.50	78.50	78.68	78.50	78.50	78.50	78.50	78.50	78.65	78.61	79.97	
STORM SEWER INVERTS		79.61m - 1800mmØ STM @ 0.10%			E=79.28 W=79.28	66.84m - 1800mmØ STM @ 0.11%										
EXISTING ELEVATION	*83.16*	*82.42*	*81.00*	*82.31*	*82.17*	*82.14*	*81.91*	*81.50*	*81.17*	*80.92*	*80.80*	*80.76*	*81.02*	*80.81*	*80.56*	*78.85*
CHAINAGE	0+000	0+025	0+050	0+075	0+100	0+125	0+150	0+175	0+200	0+225	0+250	0+275	0+300	0+325	0+350	0+375

KANATA NORTH
COMMUNITY DESIGN PLAN

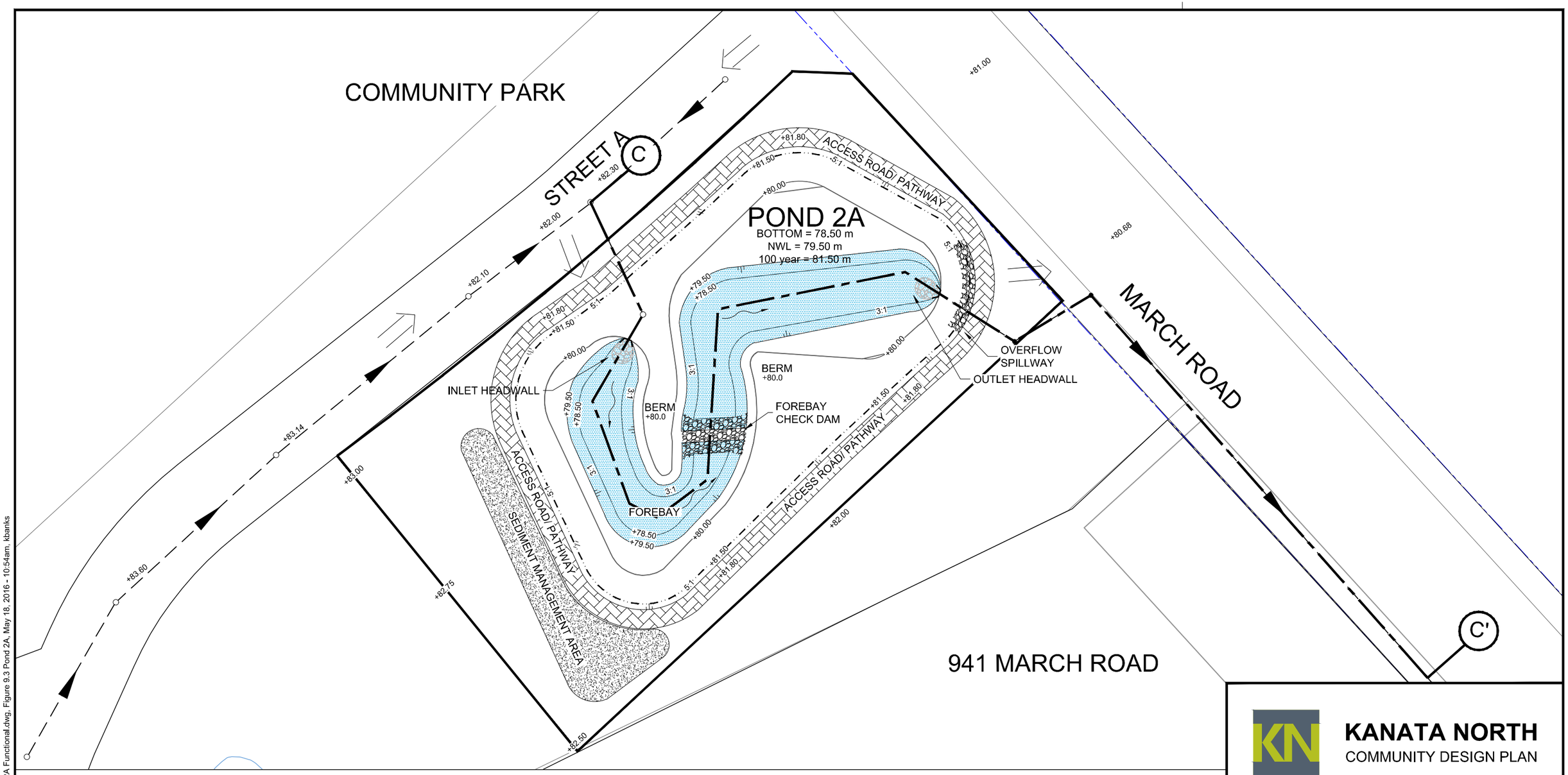
FIGURE NO. 9.2A
POND 2
CROSS SECTION B-B'

DATE MAY 2016
JOB 112117
SCALE 1:1000
0 5m 10m 20m

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design_EMP\MEMO (KJA)\Figure 9.2 Pond 2 Functional.dwg, Figure 9.2A, May 17, 2016 - 5:37pm, kbanks

SHT11x17 DWG - 279mm x 432mm



LEGEND

- RIGHT OF WAYS
- POND BLOCK
- EXISTING CREEK CORRIDOR
- PERMANENT POOL
- ACCESS ROAD/PATHWAY
- ROCK WALL CHECK DAM
- MAJOR OVERLAND FLOW DIRECTION
- STORM SEWER

LEGEND

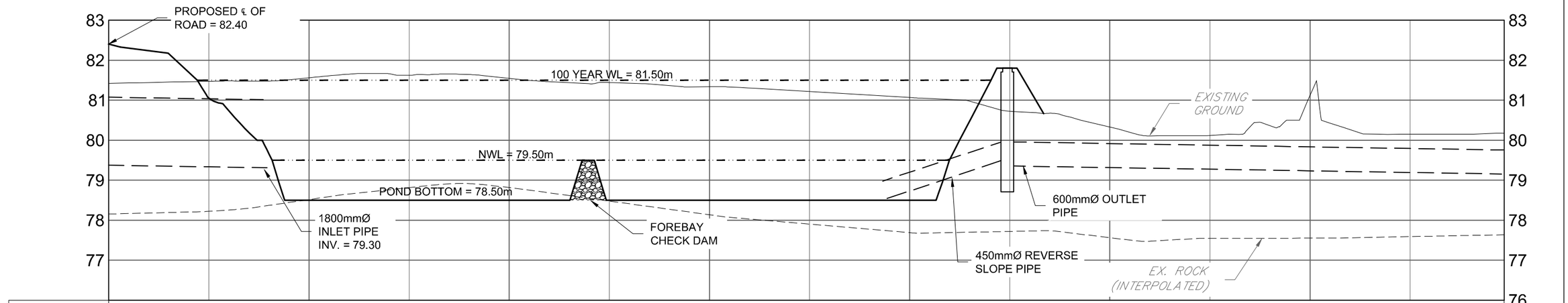
- DIRECTION OF POND FLOW
- HEADWALL C/W RIPRAP
- +81.50 PROPOSED GRADE
- 3:1 TERRACING (MAX. SLOPE)
- 100YR WATER LEVEL

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 9.3
POND 2A
CONCEPTUAL LAYOUT

DATE MAY 2016
JOB 112117
SCALE 1:1000
0 5m 10m 20m

NOVATECH
Engineers, Planners & Landscape Architects



CHAINAGE	0+000	0+025	0+050	0+075	0+100	0+125	0+150	0+175	0+200	0+225	0+250	0+275	0+300	0+325	0+348.46
EXISTING ELEVATION	81.42	81.47	81.56	81.62	81.55	81.44	81.34	81.22	81.07	80.73	80.33	80.12	81.13	80.15	80.17
PROPOSED ELEVATION	~~81.00~~ 81.42	~~81.00~~ 81.47	~~78.50~~ 81.56	~~78.50~~ 81.62	78.50	78.50	78.50	78.50	78.50	~~78.50~~ 80.73					

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 9.3A

POND 2A
CROSS SECTION C-C'

DATE
MAY 2016

JOB
112117

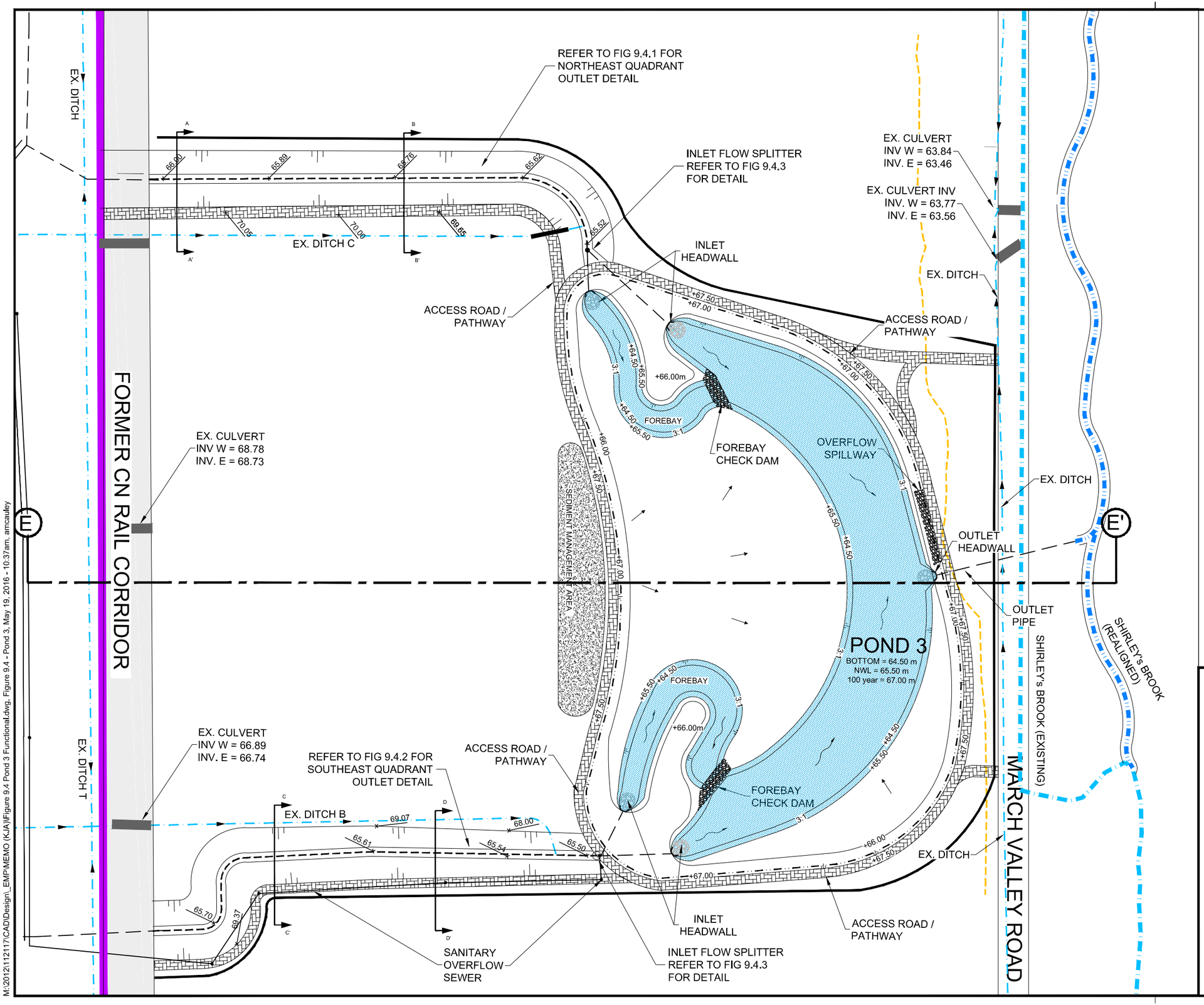
SCALE
1:1000

0 5m 10m 20m

NOVATECH
Engineers, Planners & Landscape Architects

SHT11x17 DWG - 279mmx432mm

M:\2012\112117\CAD\Design_EMP\MEMO (KJA)\Figure 9.3 Pond 2A Functional.dwg, Figure 9.3A Pond 2A, May 17, 2016 - 11:49am, tbrooks



LEGEND

- KNUEA
- POND BLOCK
- RIGHT OF WAYS
- SHIRLEY'S BROOK 100-YEAR FLOODPLAIN (~65.0m) (EXISTING - TO BE CONFIRMED FOLLOWING RE-ALIGNMENT OF SHIRLEY'S BROOK)
- EXISTING WATERCOURSES
- PROPOSED REALIGNED WATERCOURSE
- EXISTING CULVERT
- PERMANENT POOL
- ACCESS ROAD/PATHWAY
- ROCK WALL CHECK DAM
- DITCH SIDE SLOPES
- DIRECTION OF POND FLOW
- HEADWALL C/W RIPRAP
- +81.50 PROPOSED GRADE
- 3:1 TERRACING (MAX. SLOPE)
- 100YR WATER LEVEL
- ℄ FLOW IN DITCH
- DIRECTION OF SLOPE
- +69.07 ELEVATIONS ALONG INLET AND OUTLET DITCHES
- STORM SEWER

KANATA NORTH
COMMUNITY DESIGN PLAN

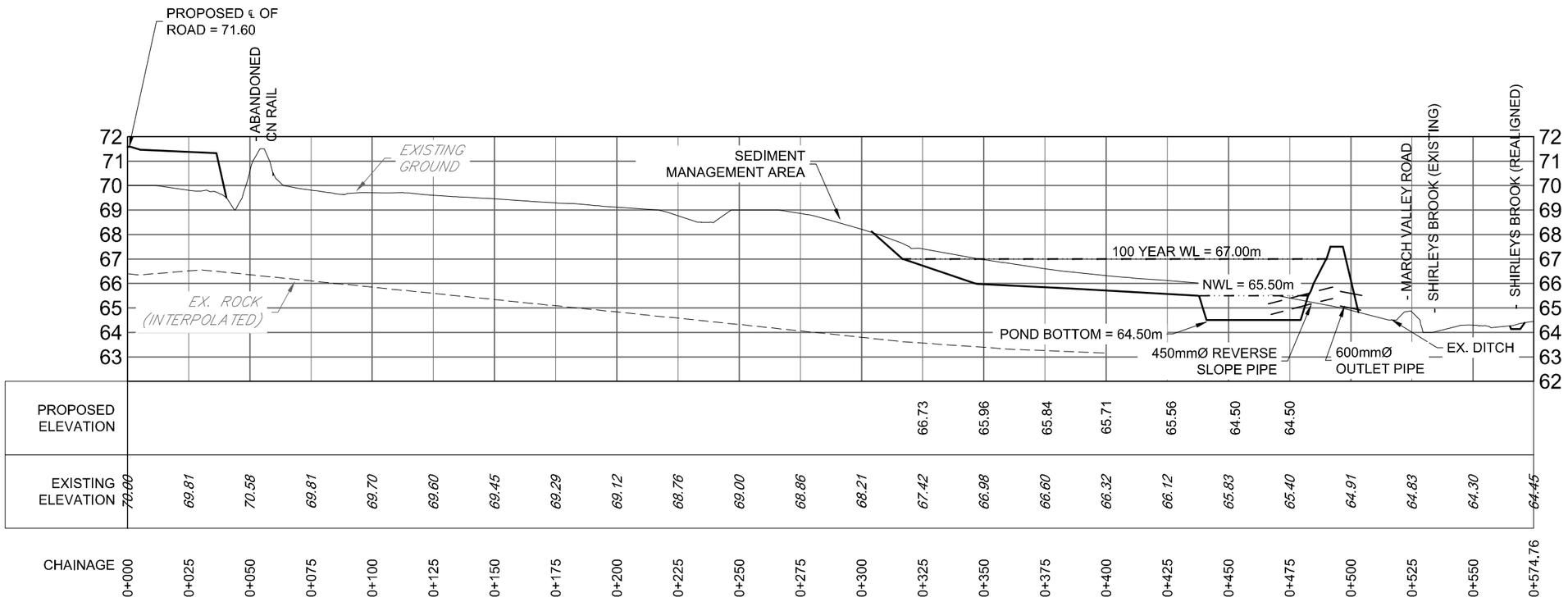
FIGURE NO. 9.4
POND 3
CONCEPTUAL LAYOUT

DATE MAY 2016
JOB 112117
SCALE 1:2000
0 10m 20m 40m

NOVATECH
Engineers, Planners & Landscape Architects

M:\2012\112117\CAD\Design_EMP\MEMO (KJA)\Figure 9.4 Pond 3 Functional.dwg, Figure 9.4 - Pond 3, May 19, 2016 - 10:37am, amcauley

SHT11x17 DWG - 279mmx432mm



KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 9.4A
POND 3
CROSS SECTION D-D'

DATE
MAY 2016

JOB
112117

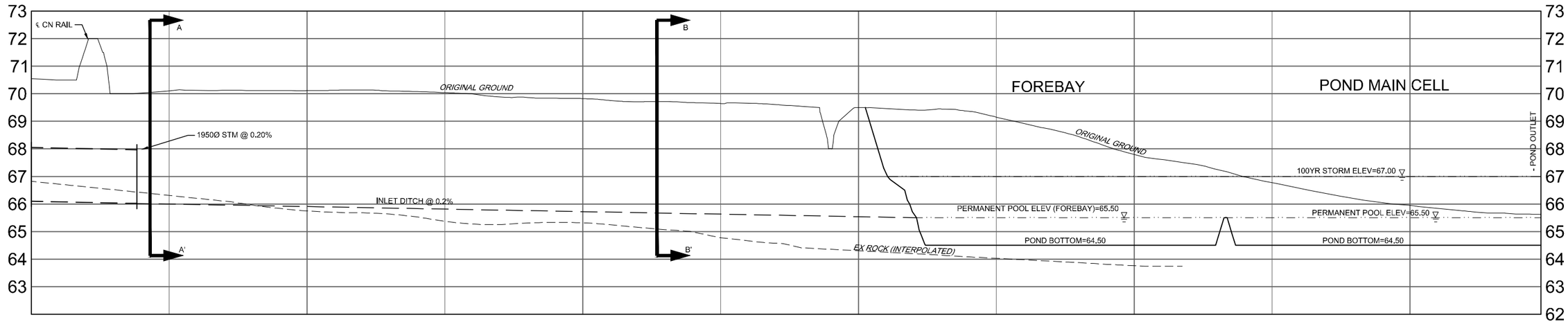
SCALE
1:2000

0 10m 20m 40m

NOVATECH
Engineers, Planners & Landscape Architects

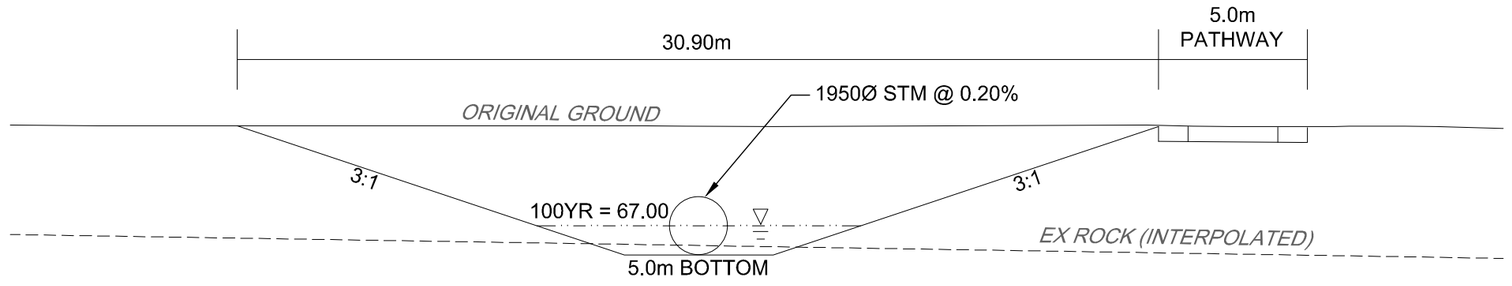
SHT11x17 DWG 279mmx432mm

M:\2012\112117\CADDesign_EMP\MEMO (KJA)\Figure 9.4 Pond 3 Functional.dwg, Figure 9.4a - Pond 3, May 18, 2016 - 9:56am, kbanks



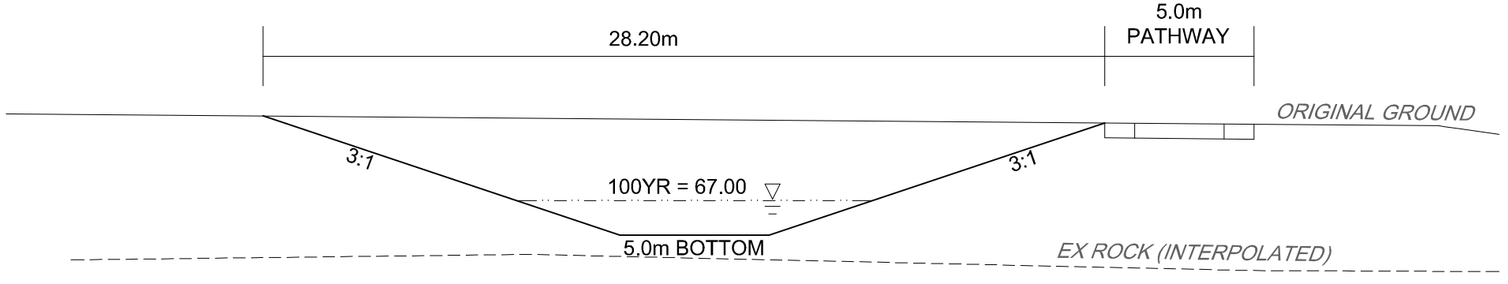
NORTH EAST QUADRANT OUTLET

SCALE 1:1500



SECTION A-A'

SCALE 1:200



SECTION B-B'

SCALE 1:200

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 9.4.1

NORTHEAST
QUADRANT OUTLET

DATE
MAY 2016

JOB
112117

SCALE
(AS NOTED)

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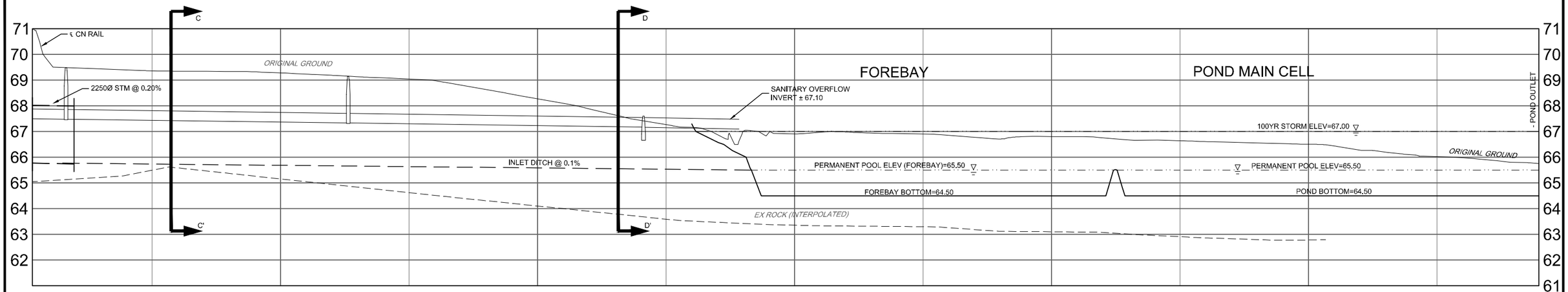
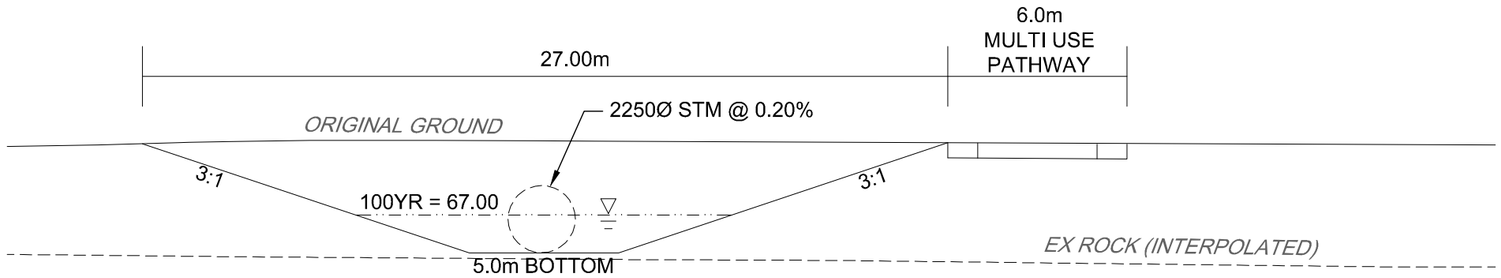


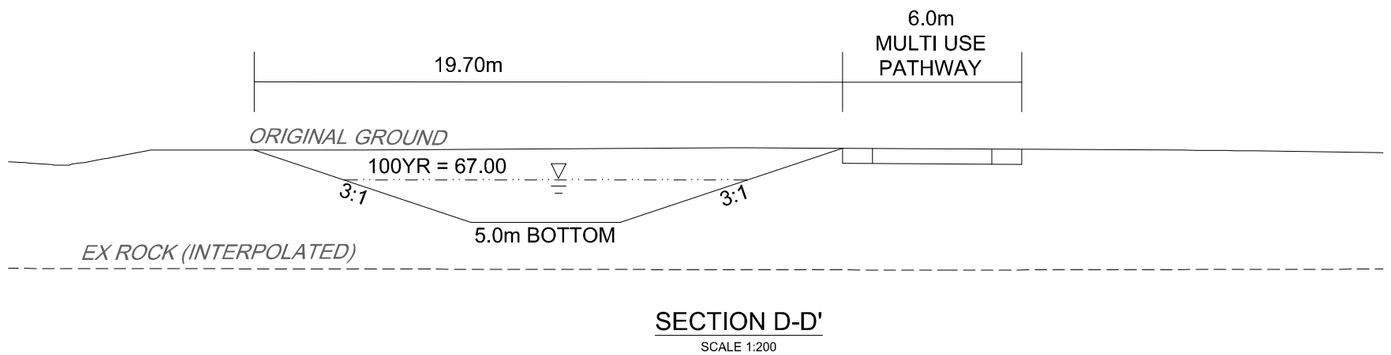
SOUTH EAST QUADRANT OUTLET

SCALE 1:1500



SECTION C-C'

SCALE 1:200



SECTION D-D'

SCALE 1:200

KANATA NORTH
COMMUNITY DESIGN PLAN

FIGURE NO. 9.4.2

SOUTHEAST
QUADRANT OUTLET

DATE
MAY 2016

JOB
112117

SCALE
(AS NOTED)

NOVATECH
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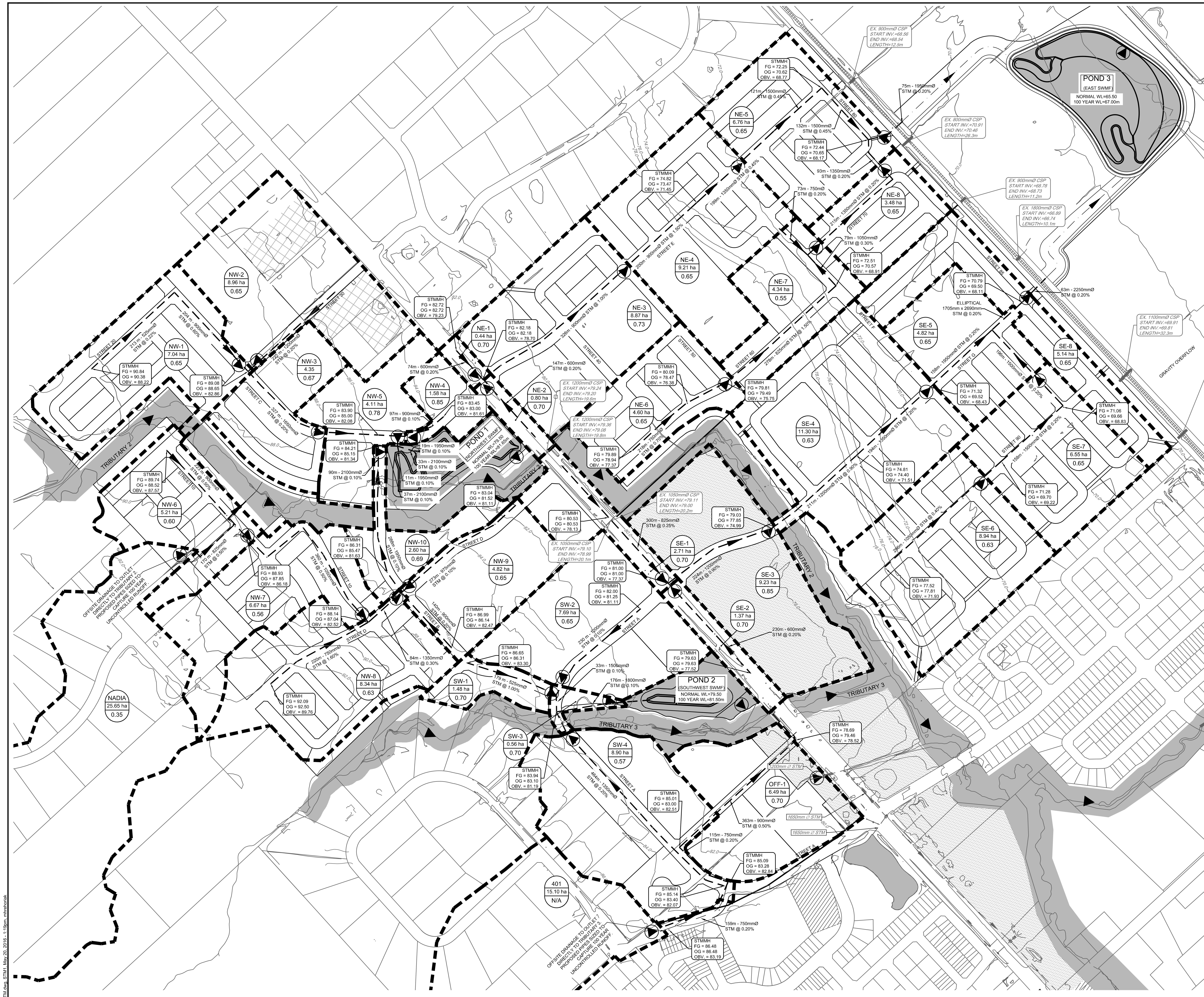
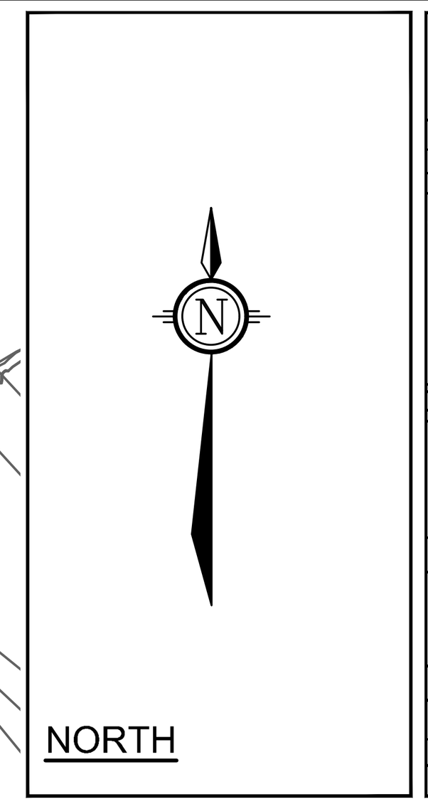
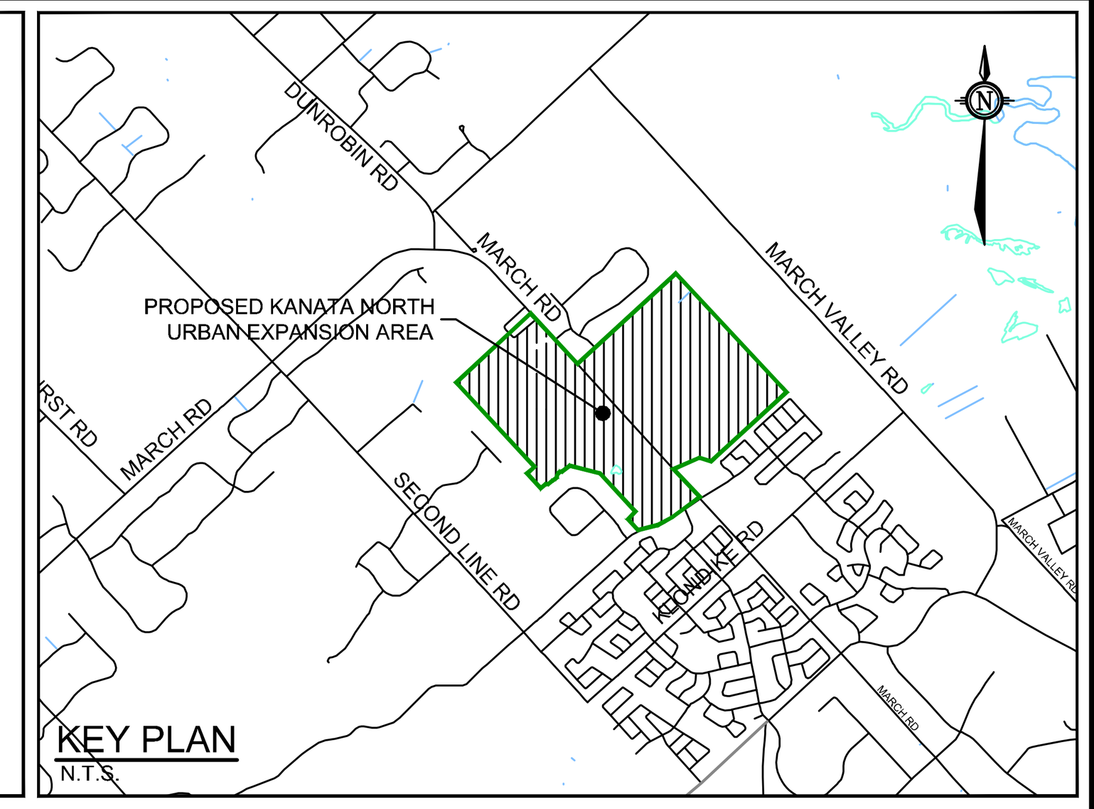






LEGEND

- A-10 / 1.14 ha / 0.40 — AREA ID; AREA IN HECTARES; RUNOFF COEFFICIENT
- DRAINAGE AREA
- DRAINAGE AREA OUTLET
- STMMH / FG = 71.69 / OG = 69.52 / OBV. = 68.22 — STM ID; FINISHED GROUND ELEVATION; ORIGINAL GROUND ELEVATION; OBVERT ELEVATION
- CREEK CORRIDOR
- PROPOSED OUTLET DITCH
- PROPOSED STORM SEWER & FLOW DIRECTION
- *EXISTING STORM SEWER & FLOW DIRECTION*

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

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

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

PLANB1.DWG - 1000mmx707mm

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
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

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

FOR REVIEW ONLY

NOVATECH
Engineers, Planners & Landscape Architects
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Website www.novatech-eng.com

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

APPENDIX C

Wastewater Collection

C-1: 2013 Infrastructure Master Plan Excerpts

- Page 202 – March Road Pumping Station Conversion Summary
- Page 203 – North Kanata Collector (Phase 2)
- Page 230 – Figure 2 Existing Wastewater Collection System: Schematic
- Page 233 – Figure 5 Growth Projects 2013-2031 – Wastewater Collection System: Schematic
- Page 235 – Figure 7 Public Service Areas
- Supplementary 2013 IMP Data (provided by City in email dated March 22, 2016)

C-2: West Urban Community (WUC) Wastewater Collection System Master Servicing Plan Excerpts

- Page 12 – Table ES5: WUC Flow Generation Summary
- Page 24 – Figure 3-1: Expansion/growth projection for 2060

C-3: Analysis of Existing Offsite Wastewater System

- Table C-3: East March Trunk (EMT) Sewer Capacity Analysis to March Pump Station (Buildout in 2031)
- Sanitary Sewer Design Sheet – Brookside Subdivision (NECL # 103106)
- Sanitary Drainage Plans (NECL 103106-SAN1 & 103106-SAN2)
- Sanitary Sewer Design Sheet – Morgan's Grant Subdivision (JL.Richards)
- East March Trunk Sanitary Analysis (NECL #108001)
    - EMT Sanitary Drainage Area Plan Proposed Catchment Boundaries(NECL #108001)
    - EMT Sanitary Drainage Area Plan Existing Catchment Boundaries(NECL #108001)

C-4: Briar Ridge Pump Station (BRPS) Information

- Table C-4: BRPS Capacity Analysis
- MOE Certificate of Authorization
- City of Ottawa SCADA Data (2013)
- CCL BRPS Design Report Excerpts
    - Pumping Capacities (Page 9)
    - BRPS and Forcemains – Site Plan (drawing 3345-LD–C1)

C-5: Wastewater Servicing Options

- Memo to City, April 9, 2014
    - Options Figures
    - Flow Summary
    - Cost Evaluation
    - Drawing List
        - Sanitary Trunk Preliminary Plan and Profiles
            - Option 1 (112117-PP SAN 1)
            - Option 2 (112117-PP SAN 2)
            - Option 3 (112117-PP SAN 3)
            - Option 4 (112117-PP SAN 4)
            - Option 5 (112117-PP SAN 5)
            - Option 5B (112117-PP SAN 5B)
- City Comments on Memo (email dated May 21, 2014)

C-6: Analysis of Preferred Wastewater Servicing Option – Option 2

- Memo: Unit Counts and Densities (Novatech Memo, May 13, 2016)
- Table C-6a: Global Wastewater Flows
- Table C-6b: Sanitary Sewer Design Sheet Tributary to Upper Reach of EMT
- MOE Industrial Peaking Factor Graph
- Table : Preliminary Sanitary Sewer Cost Estimate

- Drawing List
    - Sanitary Drainage Area Plan – Onsite (Drawing 112117-SAN1)
    - Sanitary Drainage Area Plan – Offsite (Drawing 112117-SAN2)

C-7: Hydraulic Grade Line Analysis

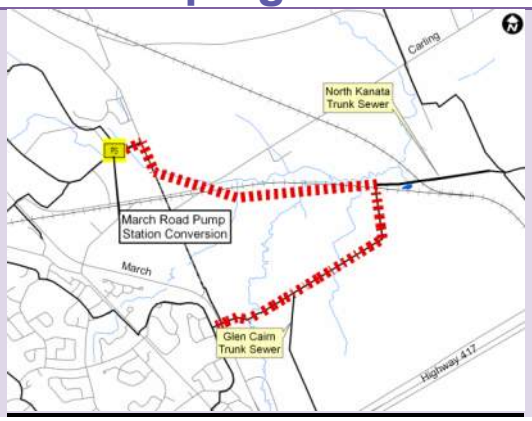
- Email to City regarding preliminary HGL Analysis (June 13, 2014)
    - Drawing: Sanitary Trunk Option 2 – HGL Analysis
- Table C-7: BRPS Trunk Sewer HGL Analysis with KNUEA Bypass
- HGL Analysis – Brookside Subdivision to BRPS (NECL #103106)

C-8: Sensitivity Analysis

- Table C-8a: Sensitivity Analysis Scenario 1 - to Upper Reach of EMT
- Table C-8b: Sensitivity Analysis Scenario 2 - to Upper Reach of EMT

APPENDIX C-1

March Road Pumping Station Conversion



Scope and Justification

The March Pump Station was built in 1972. Currently the firm capacity of the station with one pump being out of services is rated at 490 L/s. The station pumps wastewater to the 600 mm dia. 1300 m long forcemain discharging to the March Road Trunk Sewer. A Class EA was completed in 2001 for the North Kanata Sanitary Sewage Infrastructure Upgrade Study. It recommended building the Kanata North Gravity Collector Sewer including gravity connection of the March Collector Sewer bypassing the March PS and conversion of the March PS to a low lift station.

The existing March PS can be retrofit to a low lift station or a new wet well can be added and existing structure to be used to house a valve chamber, stand-by power, controls, etc… or alternatively new PS can be built and existing structure be decommissioned and removed. Since the constructing new PS is an alternative option there is a requirement to conduct the Schedule B of the Class Environmental Assessment (EA) planning process. The Class EA for the station is currently under way.

Timing

2013 - 2018: Complete EA, detailed design and build the station.

Action Item Funding

Construction Cost Estimate = $3.4 M
Capital Cost Estimate* = $6.0 M (100% Development Charges, 0% Rate)
**Including construction cost, engineering, city internal costs and contingency allowance. Funding split subject to review as part of 2014 Development Charges By-Law.*

EA Requirements and Consultation

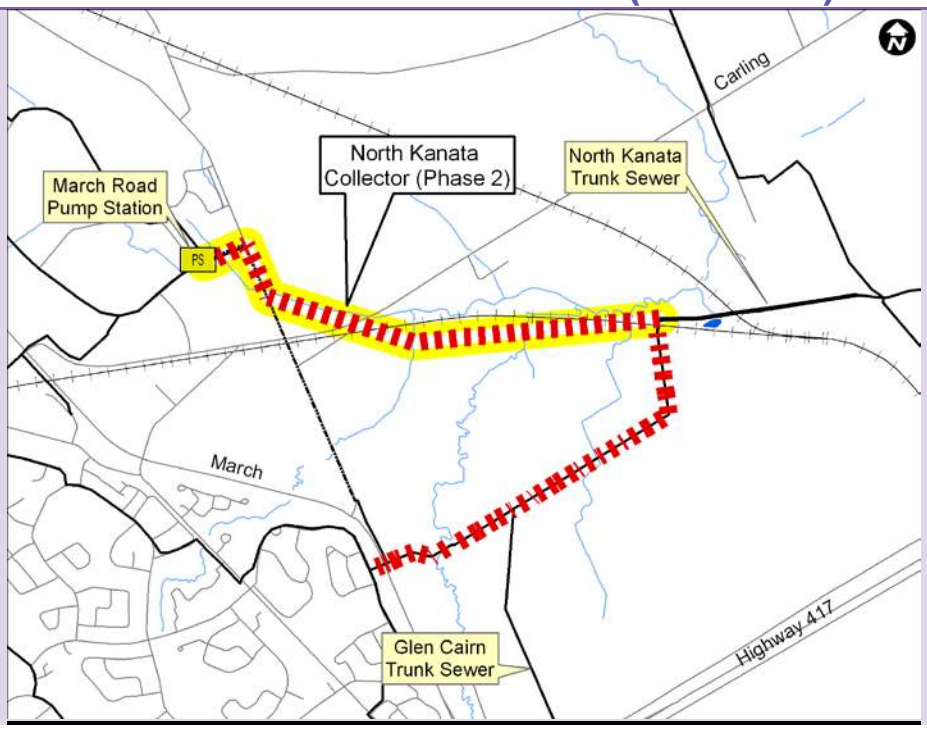
Class EA Schedule B project study is currently underway.

The EA recommendations will be presented to City Council for approval. Once approved by Council the 'Notice of Study Completion' will be posted for the 30 day review period.

Follow Up Actions

Coordinate with Kanata North Collector Sewer Phase 2 project.

North Kanata Collector (Phase 2)



Scope and Justification

Construct the North Kanata Phase 2 Sewer to provide capacity for the North Kanata growth area. This project was identified in the 1997 Wastewater Master Plan to provide infrastructure to convey the projected flows for the planning period. Follow up studies such as the Environmental Assessment (EA), Functional Design and Preliminary Design of sewers in the study area refined and confirmed the infrastructure, phasing, schedule and costing. The Phase 2 sewer will be 1200 mm dia. pipe and approximately 2100 m long.

Timing

2013-2018: Complete detailed design and construct the sewer.

Action Item Funding

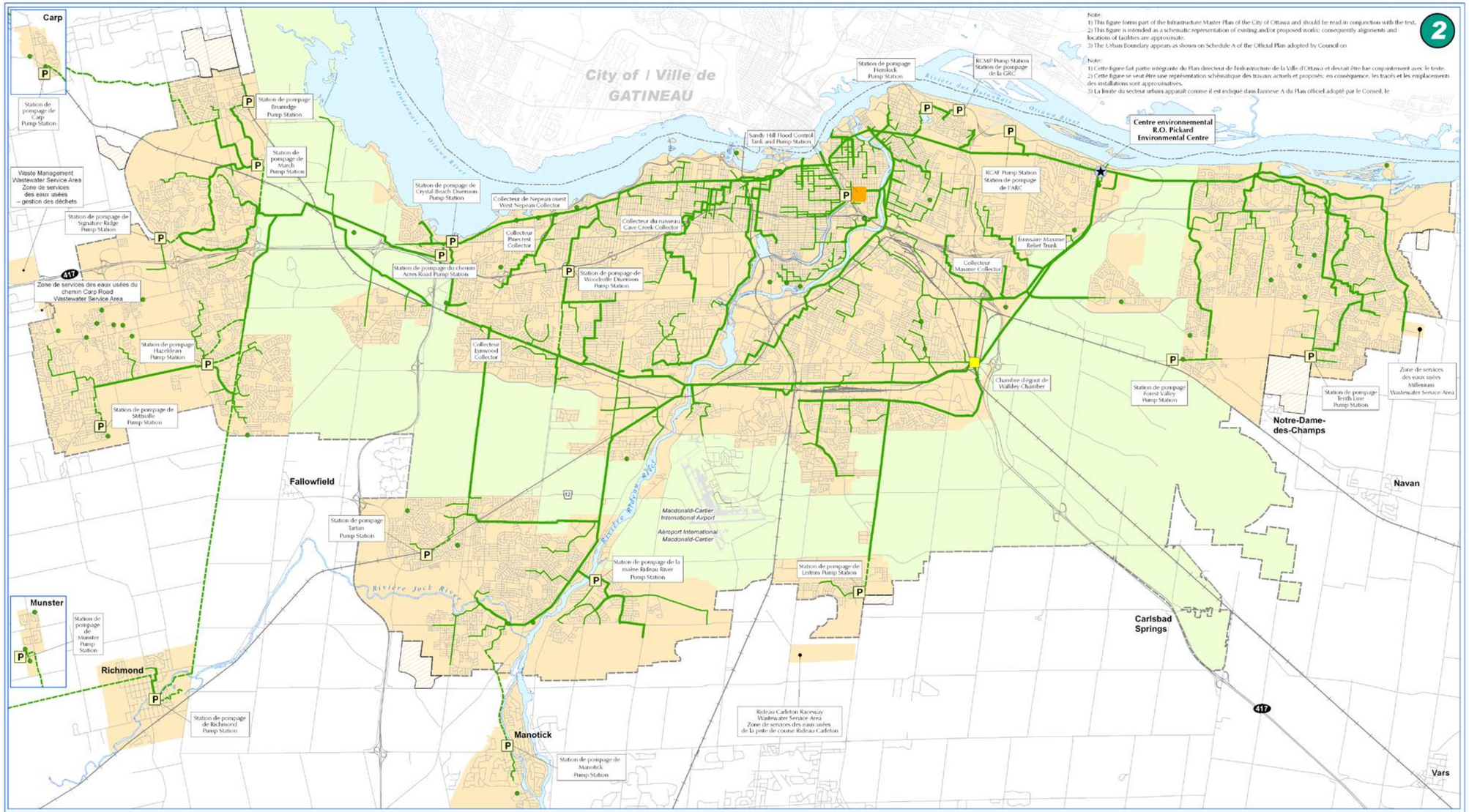
Construction Cost Estimate = $5.5 M
Capital Cost Estimate* = $8.7 M (90% Development Charges, 10% Rate)
**Including construction cost, engineering, city internal costs and contingency allowance.*

EA Requirements and Consultation

Schedule B Class EA has been completed and the project is approved.

Follow Up Actions

Tender and Construction


Note:
1) This figure forms part of the Infrastructure Master Plan of the City of Ottawa and should be read in conjunction with the text.
2) This figure is intended as a schematic representation of existing and/or proposed works; consequently alignments and locations of facilities are approximate.
3) The Urban Boundary appears as shown on Schedule A of the Official Plan adopted by Council on
Note:
1) Cette figure fait partie intégrante du Plan directeur de l'infrastructure de la Ville d'Ottawa et devrait être lue conjointement avec le texte.
2) Cette figure se veut être une représentation schématique des travaux actuels et proposés; en conséquence, les tracés et les emplacements des installations sont approximatifs.
3) La limite du secteur urbain apparaît comme il est indiqué dans l'annexe A du Plan officiel adopté par le Conseil, le
2
Carp
Station de pompage de Carp Pump Station
Waste Management Wastewater Service Area Zone de services des eaux usées – gestion des déchets
Station de pompage de Signature Ridge Pump Station
417
Zone de services des eaux usées du chemin Carp Road Wastewater Service Area
Station de pompage Hazeldean Pump Station
Station de pompage de Stittsville Pump Station
Station de pompage Bramidge Pump Station
Station de pompage de March Pump Station
Station de pompage de Crystal Beach Diversion Pump Station
Collecteur de Nepean ouest West Nepean Collector
Collecteur Pinecrest Collector
Station de pompage du chemin Acres Road Pump Station
Collecteur du ruisseau Cave Creek Collector
Station de pompage de Woodroffe Diversion Pump Station
Collecteur Entwood Collector
Fallowfield
Station de pompage Tartan Pump Station
Station de pompage de la rivière Rideau River Pump Station
Rivière Jock River
Munster
Station de pompage de Munster Pump Station
Richmond
Station de pompage de Richmond Pump Station
Manotick
Station de pompage de Manotick Pump Station
City of / Ville de GATINEAU
Rivière des Outaouais / Ottawa River
Station de pompage Hemlock Pump Station
RCMP Pump Station Station de pompage de la GRC
Sandy Hill Flood Control Tank and Pump Station
RCAF Pump Station Station de pompage de l'ARC
Collecteur Maxime Collector
Emissaire Maxime Relief Trunk
Centre environnemental R.O. Pickard Environmental Centre
Chambre d'égout de Wallley Chamber
Station de pompage Forest Valley Pump Station
Station de pompage Tenth Line Pump Station
Zone de services des eaux usées Millennium Wastewater Service Area
Notre-Dame-des-Champs
Navan
Macdonald-Cartier International Airport
Aéroport International Macdonald-Cartier
Station de pompage de Leitrim Pump Station
Carlsbad Springs
Rideau Carleton Raceway Wastewater Service Area Zone de services des eaux usées de la piste de course Rideau Carleton
Vars
INFRASTRUCTURE MASTER PLAN - Figure 2
Existing Wastewater Collection System: Schematic
PLAN DIRECTEUR DE L'INFRASTRUCURE Figure 2
Réseau de collecte des eaux usées existant : schéma
Local Pump Station / Stations de pompage locale
Treatment Plant / Usine de traitement
Main Pump Station / Stations de pompage principal
Chambers / Chambres
Storage Tank / Réservoir d'entreposage
Collector Sewer / Égout collecteur
Main Sewer / Égout principal
Forcemains / Conduites de refoulement
Urban Boundary / Limite urbaine
Greenbelt / Ceinture de verdure
Public Service Area / Zone de desserte
Urban Expansion Areas / Zones d'expansion urbaine
Ottawa
km
Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2013
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, 2013

Note:
1) This figure forms part of the Infrastructure Master Plan of the City of Ottawa and should be read in conjunction with the text.
2) This figure is intended as a schematic representation of existing and/or proposed works; consequently alignments and locations of facilities are approximate.
3) The Urban Boundary appears as shown on Schedule A of the Official Plan adopted by Council on

Note:
1) Cette figure fait partie intégrante du Plan directeur de l'infrastructure de la Ville d'Ottawa et devrait être lue conjointement avec le texte.
2) Cette figure se veut être une représentation schématique des travaux actuels et proposés; en conséquence, les tracés et les emplacements des installations sont approximatifs.
3) La limite du secteur urbain apparaît comme il est indiqué dans l'annexe A du Plan officiel adopté par le Conseil, le

5

Carp
Carp Pump Station and Forcemain Expansion
Agrandissement de la station de pompage et de la conduite de refoulement de Carp
Augmentation de la capacité de la station de pompage Briarridge Pump Capacity Increase
Conversion de la station de pompage du chemin March Road Pump Station Conversion
North Kanata Collector Sewer Phase 2
Égout collecteur de Kanata-Nord (phase 2)
Agrandissement de la station de pompage et de la conduite de refoulement de Signature Ridge Pump Station and Forcemain Expansion
Remplacement de l'égout collecteur Tri-Township / March Ridge Collector Replacement
Kanata West Sewers
Égouts de Kanata-Ouest
Kanata West Pump Station and Forcemain
Station de pompage et conduite de refoulement de Kanata-Ouest
Égout intercepteur Stittsville / Fernbank Interceptor Sewer
Égout collecteur de Fernbank Collector Sewer
Stittsville Pump Station Gravity Connection and Decommissioning
Raccordement de la circulation d'eau par gravité de la station de pompage de Stittsville et mise hors service
Fallowfield
Munster
Agrandissement de la station de pompage et de la conduite de refoulement de Richmond Pump Station and Forcemain Expansion
Richmond
Modernisation de la station de pompage du chemin Acres Road Pump Station Upgrade
City of / Ville de GATINEAU
CSO Control Storage Tunnel
Tunnel du système de captage et de stockage des eaux usées mixte
Travaux visant le contrôle des inondations à O'Connor
Flood Control Works
Remplacement de l'égout du chemin Tremblay Road Sewer Replacement
Jumelage de l'égout collecteur de la rivière Rideau River Collector Twinning
Modernisation de l'égout collecteur de la rivière Rideau River Collector Upgrade
Modernisation et agrandissement de l'usine de traitement des eaux usées R.O. Pickard WWTP Upgrades and Expansion
Augmentation de la capacité de la station de pompage Forest Valley Pump Capacity Increase
Augmentation de la capacité de la station de pompage Tenth Line Pump Capacity Increase
Notre-Dame-des-Champs
Navan
Carlsbad Springs
Vars
Macdonald-Cartier International Airport
Aéroport International Macdonald-Cartier
Jumelage de l'égout collecteur du chemin Conroy Road Collector Twinning
Augmentation de la capacité de la station de pompage de Leitrim Pump Capacity Increase
South Nepean Collector Extension
Prolongation de l'égout collecteur de Nepean-Sud
South Nepean Collector Phase 3
Égout collecteur de Nepean-Sud – Phase 3
South Nepean Collector Phase 2
Égout collecteur de Nepean-Sud – Phase 2
Augmentation de la capacité de la station de pompage de Manotick Pump Capacity Increase
Manotick
417
12

INFRASTRUCTURE MASTER PLAN - Figure 5
Growth Projects 2013-2031 - Wastewater Collection System: Schematic

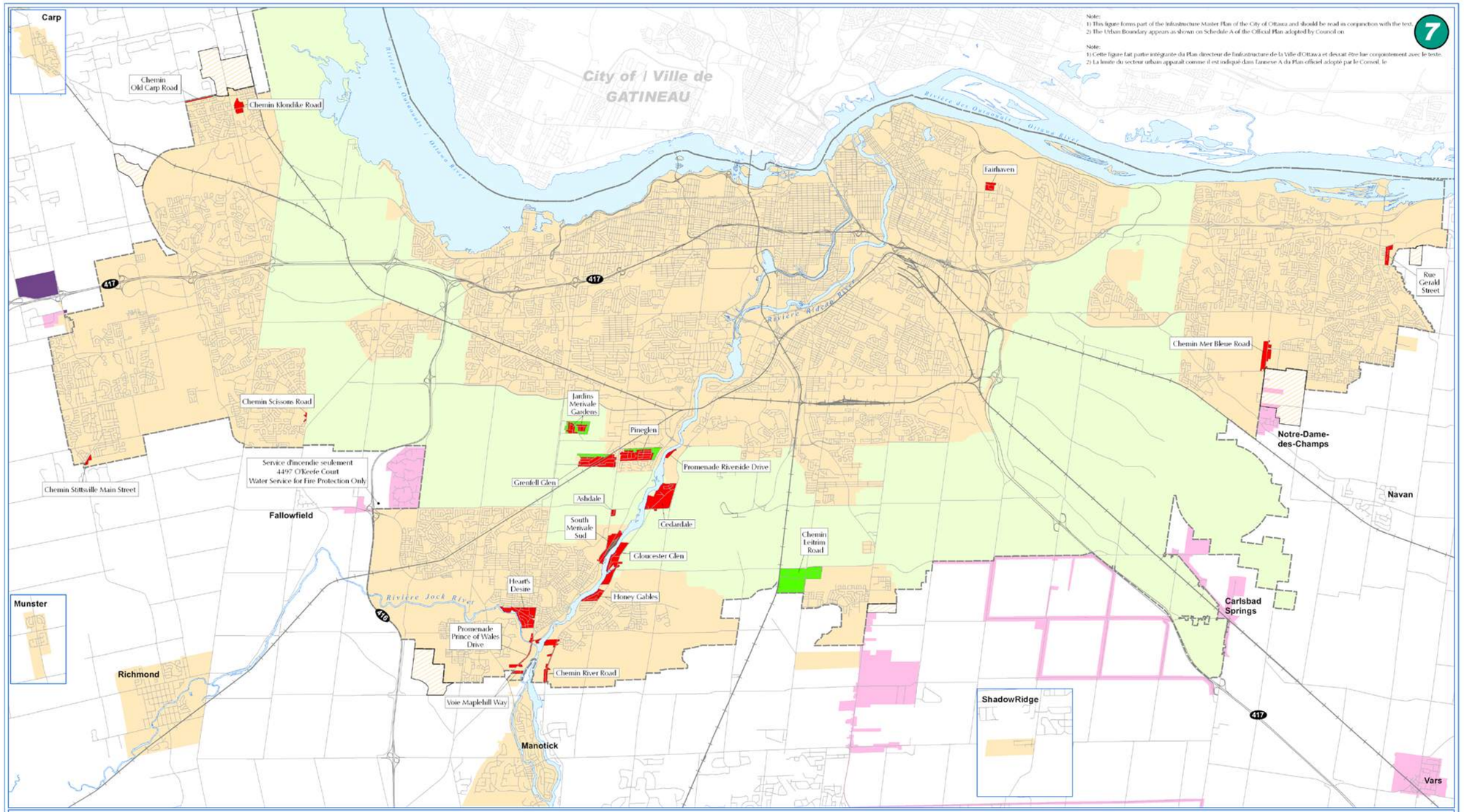
PLAN DIRECTEUR DE L'INFRASTRUCURE Figure 5
Projets de croissance 2013-2031 - Réseau de collecte des eaux usées : schéma

- Treatment Plant / Usine de traitement
- Main Pump Station / Stations de pompage principal
- Local Pump Station / Stations de pompage locale
- Storage Tank / Réservoir d'entreposage
- New Pump Station / Nouvelle station de pompage
- New Forcemain / Nouvelle conduite de refoulement
- New Sewer / Nouvel égout
- Twin Forcemain
- Collector Sewer / Égout collecteur
- Main Sewer / Égout principal
- Forcemain / Conduite de refoulement
- Urban Boundary / Limite urbaine
- Greenbelt / Ceinture de verdure
- Public Service Areas / Zone de desserte
- Urban Expansion Areas / Zones d'expansion urbaine

Ottawa

1 0.5 0 1 2 3 4 5 Km

Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2013
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, 2013


Note:
1) This figure forms part of the Infrastructure Master Plan of the City of Ottawa and should be read in conjunction with the text.
2) The Urban Boundary appears as shown on Schedule A of the Official Plan adopted by Council on
Note:
1) Cette figure fait partie intégrante du Plan directeur de l'infrastructure de la Ville d'Ottawa et devrait être lue conjointement avec le texte.
2) La limite du secteur urbain apparaît comme il est indiqué dans l'annexe A du Plan officiel adopté par le Conseil, le
7
City of / Ville de GATINEAU
Rivière des Outaouais / Ottawa River
Carp
Chemin Old Carp Road
Chemin Klondike Road
Fairhaven
Rue Gerald Street
Chemin Mer Bleue Road
Notre-Dame-des-Champs
Navan
Carlsbad Springs
Vars
417
Chemin Scissons Road
Service d'incendie seulement
4497 O'Keefe Court
Water Service for Fire Protection Only
Chemin Stittsville Main Street
Fallowfield
Jardins Merivale Gardens
Pineglen
Promenade Riverside Drive
Grenfell Glen
Ashdale
South Merivale Sud
Cedardale
Gloucester Glen
Heart's Desire
Honey Gables
Rivière Jock River
416
Promenade Prince of Wales Drive
Chemin River Road
Voie Maplehill Way
Manotick
Richmond
Munster
Chemin Leitrim Road
ShadowRidge
INFRASTRUCTURE MASTER PLAN - Figure 7
Public Service Areas
PLAN DIRECTEUR DE L'INFRASTRUCURE Figure 7
Zone de desserte
SERVICE AREAS / ZONE DE SERVICE
Water Service Area / Zone de service d'eau
Wastewater Service Area / Zone de service d'eaux usées
Water and Wastewater Service Area / Zone de service d'eau et d'eaux usées
PRIVATE SERVICES ENCLAVES IN URBAN AREA / ENCLAVES DE SERVICES PRIVÉS DANS LA ZONE URBAINE
Private Wells and Wastewater Systems / Puits privés, Systèmes d'eaux usées privés
Private Wells and Public Wastewater Systems / Puits privés, Système d'eaux usées public
Public Water and Private Wastewater Systems / Système d'aqueduc public, Systèmes d'eaux usées privés
Urban boundary / Limite urbaine
Greenbelt / Ceinture de verdure
Urban Expansion Areas / Zones d'expansion urbaine
Ottawa
Prepared by: Planning and Growth Management Department, Mapping & Graphics Unit, 2013
Préparé par: Service de l'urbanisme et de la gestion de la croissance, Unité de la cartographie et des graphiques, 2013

Alex McAuley

From: Cara Ruddle
Sent: March-22-16 5:17 PM
To: John Riddell; Murray Chown; Greg Winters
Cc: Mike Petepiece; Alex McAuley; Lee Sheets
Subject: FW: Kanata North Urban Expansion Area - DRAFT Master Servicing Study
Attachments: 2031IMPFlows.xlsx; BRPS_MonitoredFlows_2014to2016.xlsx

Please find below comments received for water and wastewater sections of the MSS.

Cara Ruddle, P.Eng.
Project Manager
NOVATECH Engineers, Planners & Landscape Architects
240 Michael Cowpland Drive, Suite 200, Ottawa, ON, K2M 1P6 | Tel: 613.254.9643 x 220 | Fax: 613.254.5867

From: Zagorski, Joseph [mailto:Joseph.Zagorski@ottawa.ca]
Sent: Tuesday, March 22, 2016 4:57 PM
To: Cara Ruddle <c.ruddle@novatech-eng.com>
Cc: Lee Sheets <l.sheets@novatech-eng.com>; Rogers, Christopher <Christopher.Rogers@ottawa.ca>; Bougadis, John <John.Bougadis@ottawa.ca>
Subject: Kanata North Urban Expansion Area - DRAFT Master Servicing Study

Hi Cara ,

Please find below water and wastewater comments related to Kanata North Urban Expansion Area Master Servicing Study Draft February 16 , 2016 Report:

Water Servicing

Comments on main report (water distribution):

1. P.53, end of 2nd paragraph. HGL incorrect.
2. P.53, 3rd paragraph. Campeau PS serves Zone 3W. Not relevant to the KNUEA.
3. P.53, 4th paragraph. Hazeldean watermain is complete. Serves 3W, not relevant to KNUEA.
4. Table 7.2 is not relevant. System sizing and layout is based on Stantec use of City's system model.
5. Provide table summarizing projected water demands (average, max day, peak hour, max day plus fire flow) and related pressures for the KNUEA.
6. Figure 7.1: Density of 305mm watermains in NW is excessive and there is a high likelihood that on-going flushing operations would be needed to keep water fresh in this area. The layout in this area does not reflect the preferred layout as presented in Appendix D (Stantec report). Sizing should be reduced in this area. Note that Stantec assumed a dead-end in this area which will not exist (or be much shorter), and local watermains will generally improve fire flows,

thus minimum available fire flows may be greater than suggested in Appendix D. Please refer to current City guidelines (including recent technical bulletin) and development conditions regarding sizing of local mains and fire protection measures.

7. Feedermains (300mm and larger) are not to be extended to the outer boundary of the KNUEA. Eliminate dead-end 300mm mains (as shown in Figure 7.1: in NW corner immediately south of the creek corridor; and to east of March Road, extending into the Hillsview rural subdivision).

8. City requests that both the Carp Road secondary connection and the Celtic Ridge connection be implemented. This will improve system resiliency and operational flexibility at low cost.

9. Please provide phasing plan for watermain network, demonstrating that looping and all LOS criteria are met at each phase.

10. As per the Stantec report, the main report must identify the ~310m March Road watermain upgrade (north of Richardson Side Road and south of railway corridor) from 406mm to 610mm as a KNUE related requirement, in addition to the upgrade on Solandt. The former is the most important of the two, in terms of boosting peak hour pressures in 2Ww.

11. Identify the specific future development threshold that would trigger construction of the March/Solandt watermain upgrades. Clarify assumptions, provide supporting calculations and analysis.

Comments on Appendix D:

1. Section 1.2 – review this section – suspected error in cardinal direction reference

2. Figures 3-1 and 3-2 are unclear – node and pipe ID's are illegible

3. In figure 3-3, node allocation unclear for a few demand areas. Demand area ID's are illegible.

4. Figure 3-4 title is confusing. Please confirm that the curves represent existing (2012) demands plus future build-out of the KNUE area.

5. Clarify if results presented in Figure 3-12 are with or without March/Solandt upgrades.

Wastewater Servicing

Comments on main report (wastewater servicing):

1. Section 6.2 Existing Wastewater Infrastructure, page 36-37: The flow rates below should be used in Table 6.2. Use the 2031 IMP flow rates over the 2010 WUC since the IMP flows were generated with the latest projections, inflow and infiltration estimation technique and produce more conservative values (see attached monitored flows data).

- 2031 Flows at the 750 mm East March Trunk upstream of the March Road Pump station is 255 l/s, which is higher than the flow rate of 172 l/s shown in the report.

- 2031 flows at the 900 mm Marchwood Trunk upstream of the March PS is 592 l/s, which is slightly above the 574 l/s written in the report..

- 2031 flows at the 600 mm Hines Road Trunk upstream of Solandt Road is 135 l/s.
- Wet weather flow should be shown for the Briar Ridge PS (see attached monitored flows data).
- 2031 flows at the Briarridge PS is 80 l/s.
- Replace “Design Flow at build-out” with “Design Flow” at Table 6.2.

2. Section 6.3 Planned Infrastructure , page 38: Remove statement “ With diversion of the Marchwood Trunk, there will be no urgency to complete this project”. The projected 2031 flow from the East March Trunk to the March PS is 255 l/s as per the 2013 IMP. The upgraded March station’s ultimate firm capacity of +/- 586 l/s should be mentioned as per March PS Class EA report. Section 6.4 Trunk Sewers, page 30: The inverts and capacities of trunk sewers should be determined with the review of as-built drawings. The 2013 Wastewater IMP model should be used to estimate flows for the 2031 period.

3. Section 6.4.2 Briar Ridge Pump Station, page 40: Please review more recent monitored flow data recorded at the station (please refer BRPS_MonitoredFlows_2014to2016.xlsx) and confirm the results in Table C-4 are still valid. Please revise the text in last three paragraphs since description of existing and future design flows to Briar Ridge PS is confusing.

4. Tables 6.5.1 and 6.5.2 It should be Option “5A”

5. Provide table summarizing the HGL in relation to the underside of proposed footing elevation for the KNUEA to demonstrate that minimum 0.3 m freeboard is provided

General comments

Complete remaining sections.

Provide typical ROW cross-sections for future March Road and typical arterial, collector and residential street in the KNUEA including all underground infrastructure.

Stormwater comments to follow.

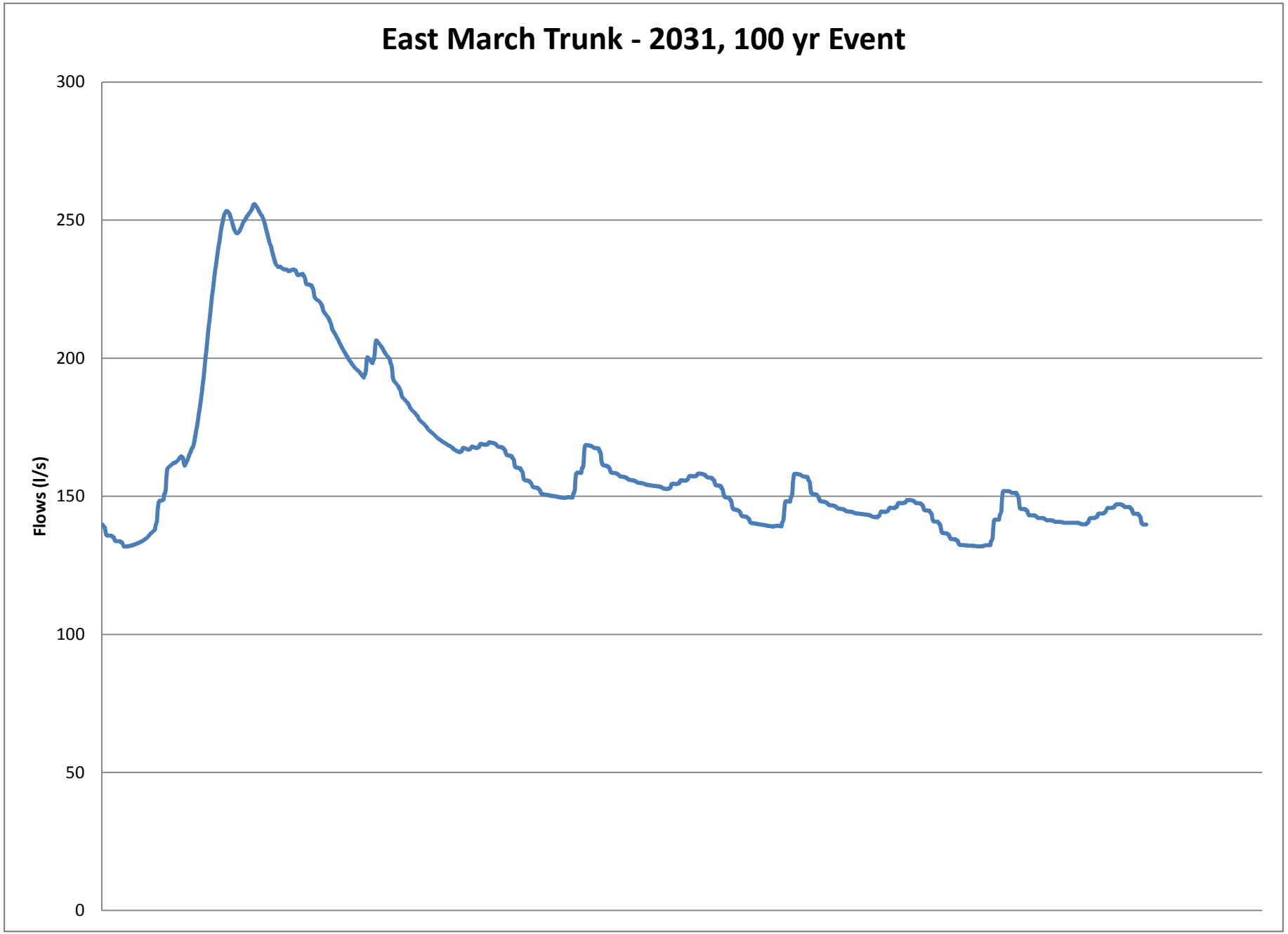
Call me if you have any questions. Thx.

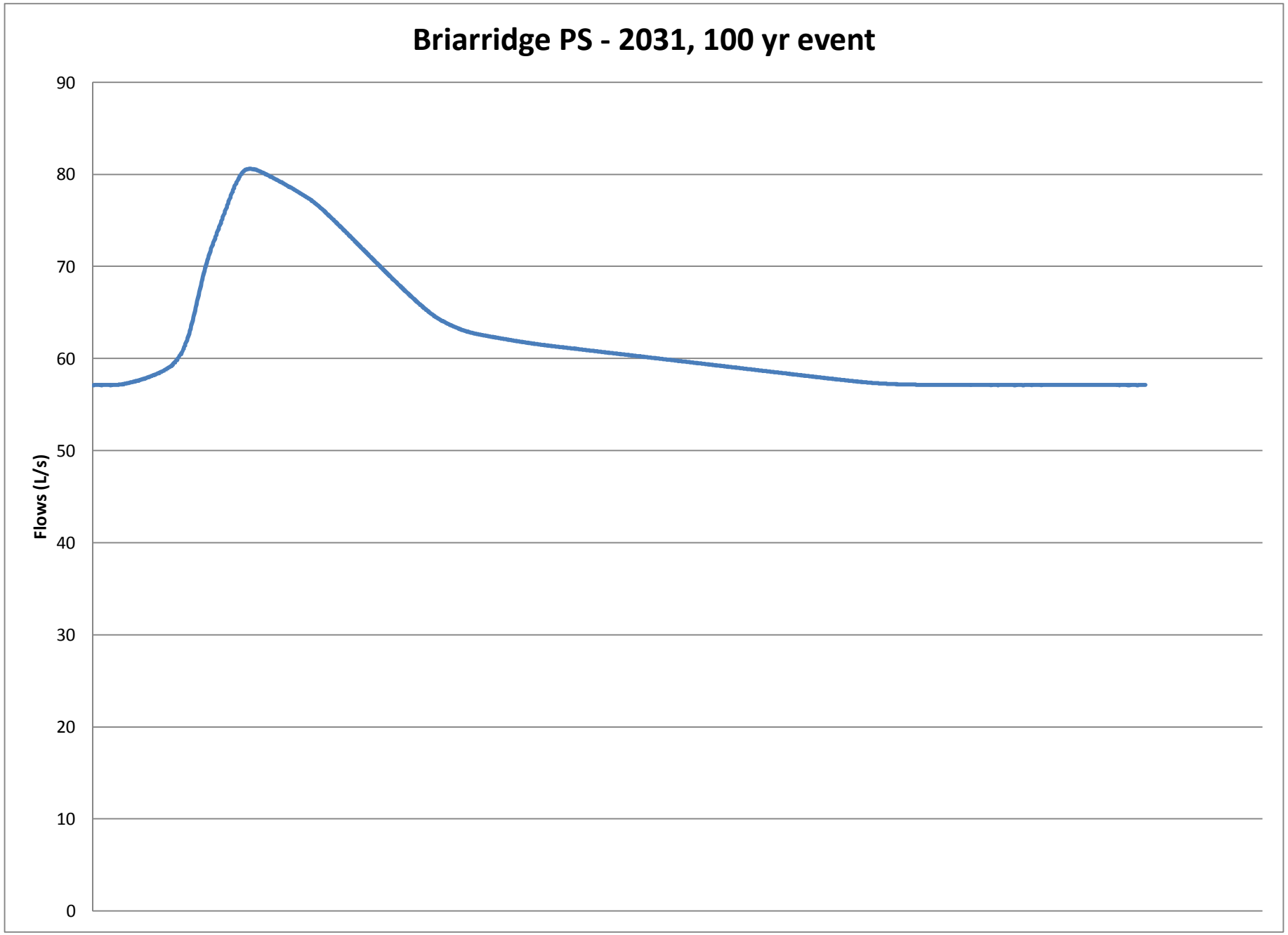
M.Joseph Zagorski, P.Eng.
Senior Project Manager
Policy Development and Urban Design Branch
Gestionnaire principal de projet
Direction de l'élaboration des politiques et de l'esthétique urbaine

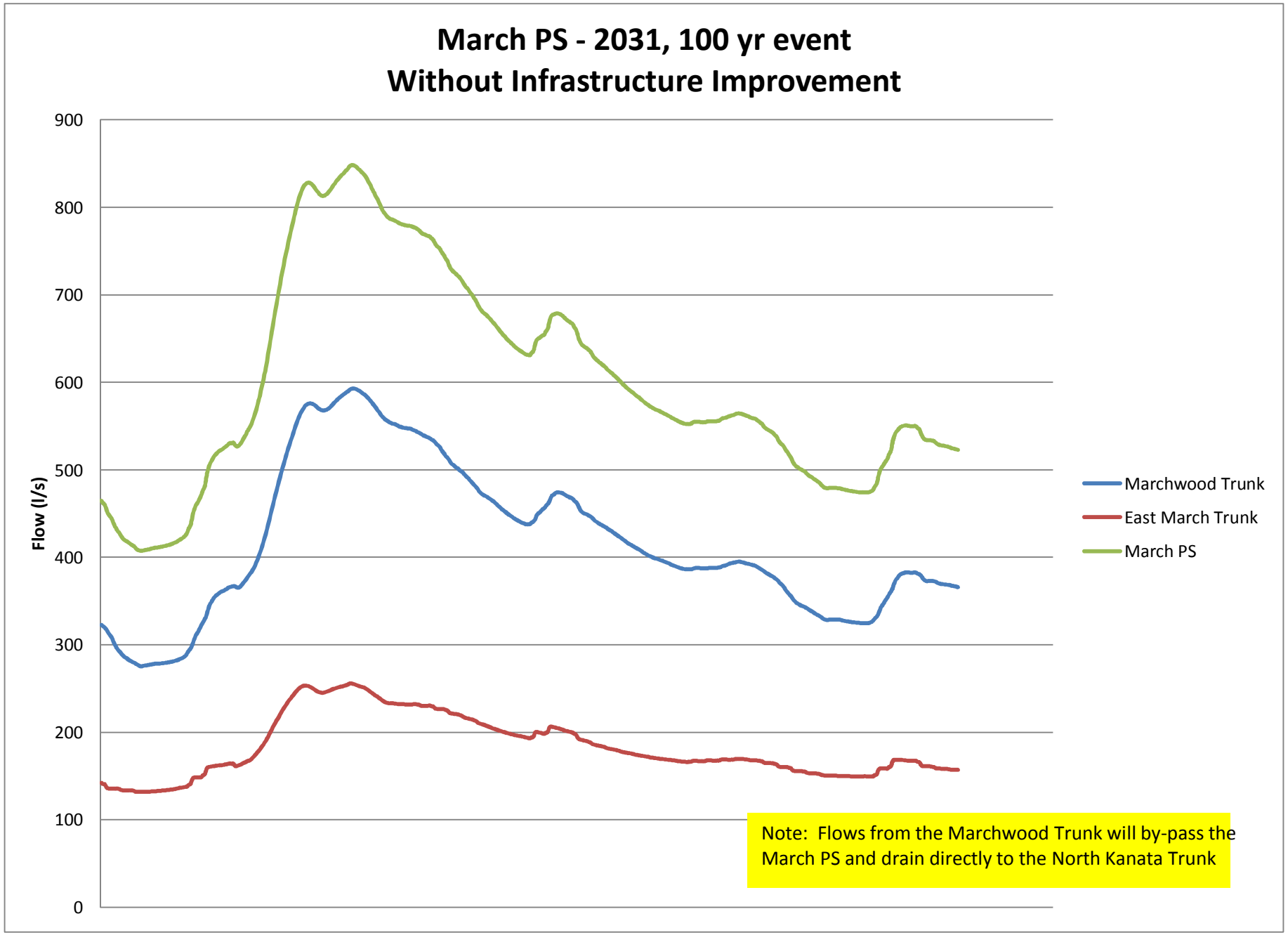
PLANNING AND GROWTH MANAGEMENT / URBANISME ET GESTION DE LA CROISSANCE

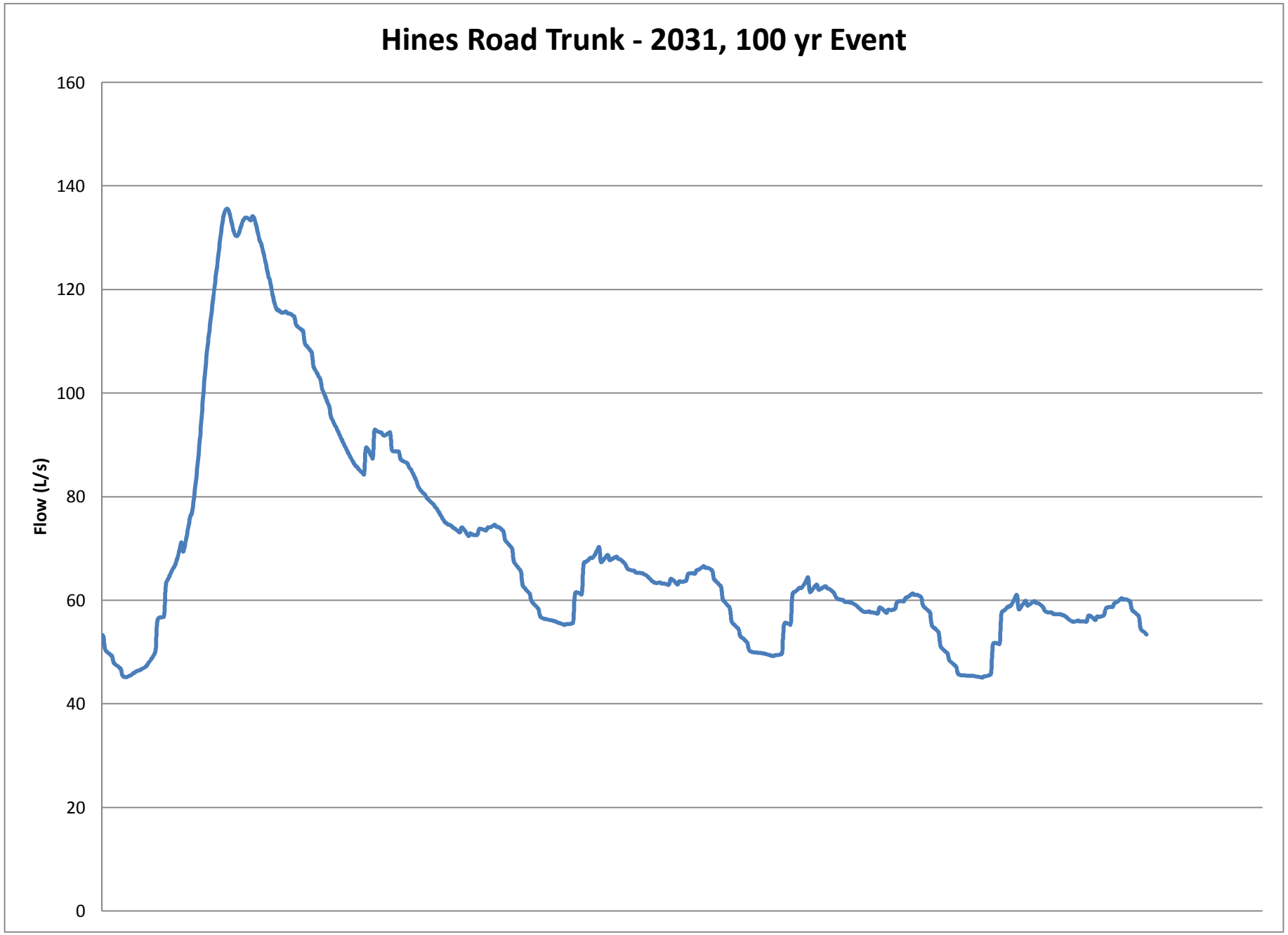
City of Ottawa | Ville d'Ottawa

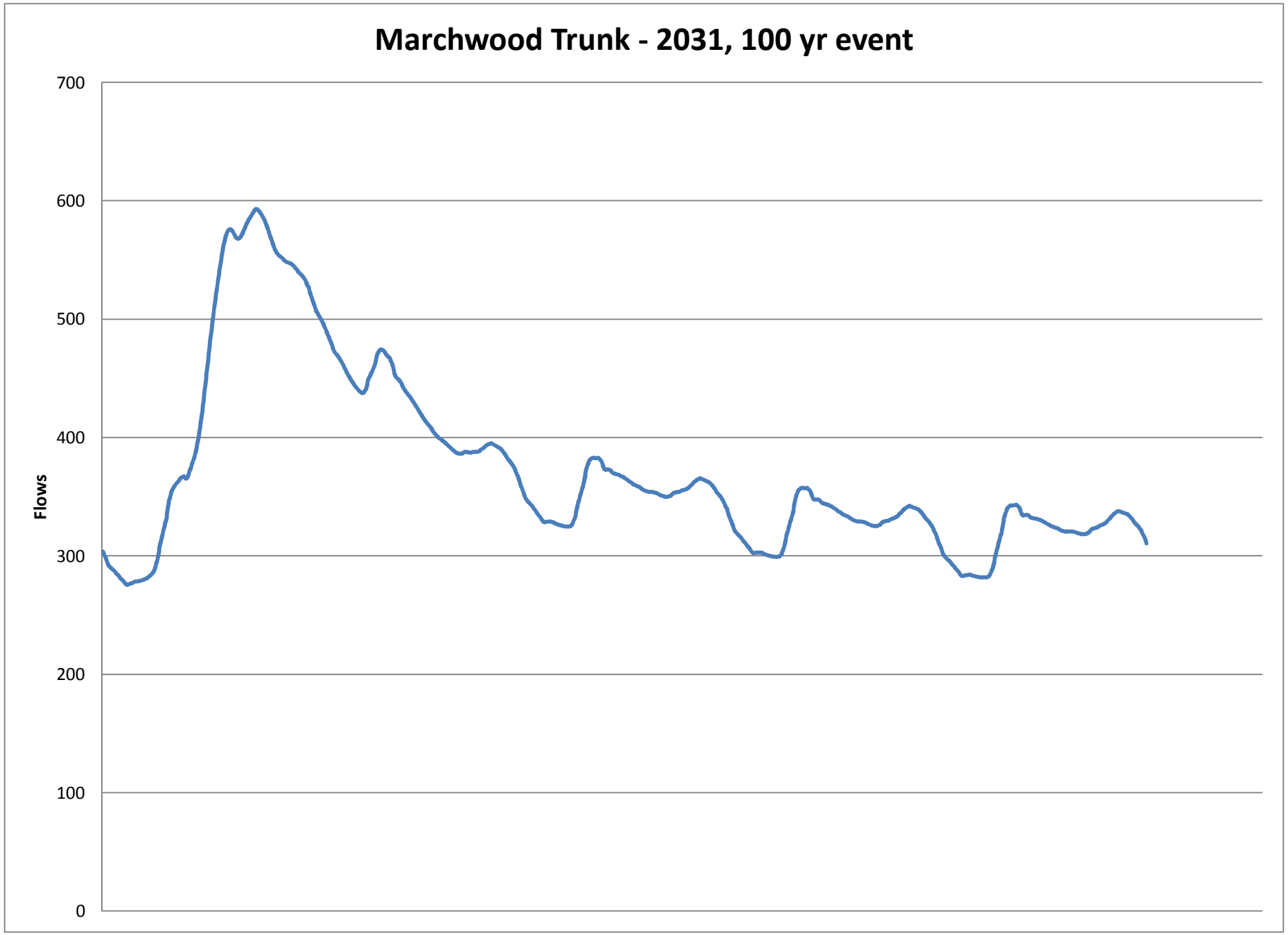
613.580.2424 ext./poste 22611
ottawa.ca/planning / ottawa.ca/urbanisme


East March Trunk - 2031, 100 yr Event
Flows (l/s)
300
250
200
150
100
50
0


Briarridge PS - 2031, 100 yr event
Flows (L/s)
90
80
70
60
50
40
30
20
10
0


March PS - 2031, 100 yr event
Without Infrastructure Improvement
Flow (l/s)
900
800
700
600
500
400
300
200
100
0
Marchwood Trunk
East March Trunk
March PS
Note: Flows from the Marchwood Trunk will by-pass the March PS and drain directly to the North Kanata Trunk


Hines Road Trunk - 2031, 100 yr Event
Flow (L/s)
160
140
120
100
80
60
40
20
0


Marchwood Trunk - 2031, 100 yr event
700
600
500
400
300
200
100
0
Flows

APPENDIX C-2

Table ES 5: WUC Flow Generation Summary /preferred servicing solution _ Option 1B

PUMPING STATION OR TRUNK SEWER	FIRM CAPACITY	FLOW	EXISTING CAPACITY	CURRENT SEWER CONFIGURATION				STRATEGY 1B			
				Scenario 1		Scenario 3		Scenario 1		Scenario 3	
(Year)		2010	2010	2031	2060	2031	2060	2031	2060	2031	2060
	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)	(L/s)
Richmond Pump Station	360	151		340	340	407	407	340	340	407	407
Stittsville PS	108	39		106	506	91	353	106	506	91	353
Hazeldean Pump Station	1225	832		1537	1937	1741	2003	1207	1277	1211	1343
Kanata West Pump Station *	760 (to be upgraded to 1250)	152		593	689	561	678	923	1349	1091	1338
Signature Ridge Pump Station	360	54		309	423	256	351	309	423	256	351
March Pump Station	490	326		771	941	820	1008	197	236	212	256
Acres Road Pump Station	4600	2119		4186	4966	4437	5099	4186	4966	4437	5099
Glen Cairn Trunk		1195	2815 to 2988	2512	3008	2758	3137	2512	3008	2758	3137
Stittsville Trunk		358	519 to 972	485	885	572	732	155	225	42	42
NEW Fernbank Trunk	designed capacity: 670L/s			383		388		383	383	388	388
NEW Interceptor Sewer form Stittsville/Fernbank Trunk to KW PS	designed capacity: 800L/s							330	660	530	660
Main Street Sewer		138	307 to 739	330	444	342	399	330	444	342	399
Penfield Sewer		170	398 to 734	360	474	342	437	360	474	342	437
March Ridge Trunk (Above March Forcemain)		245	1223	434	548	428	523	434	548	428	523
March Ridge Trunk (Below March Forcemain)		571	1016	1205	1489	1248	1531	434	548	428	523
Watts Creek Siphon		571	1014	1205	1489	1248	1531	434	718	477	640
Tri-Township Collector	proposed replacement 1650mm diam., 4700L/s capacity			3717	4497	4006	4668	2946	3726	3235	3777
March Wood Trunk		230	1100	574	705	608	752	574	705	608	752
East March Trunk		96	550	172	211	187	231	172	211	187	231
North Kanata Trunk - Phase II	designed capacity 1290L/s							771	941	820	1008
North Kanata Trunk-Phase 1		0	4047 to 4640	3717	4497	4006	4668	3717	4497	4006	4668
Nepean Collector		190		197	197	234	234	197	197	234	234
Watt's Creek Trunk		190		3914	4694	4240	4902	3914	4694	4240	4902

The coloured cells in the table identify the component of the current sewer system that is under capacity by the time of the projected growth in 2031 or 2060.

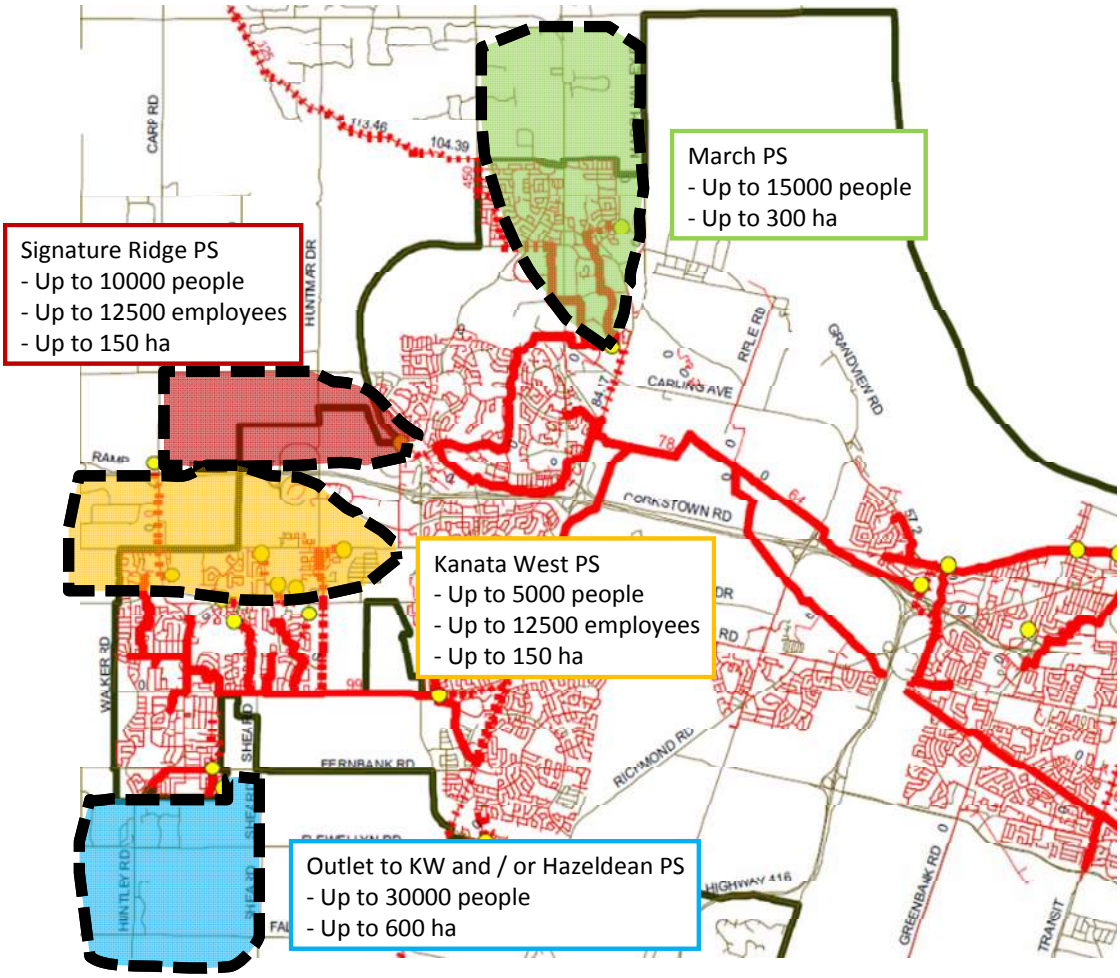


Figure 3-1: Expansion / growth projection for 2060

3.2 Design Scenario selection

The Technical Advisory Committee (TAC) meeting of November 2010 agreed that various flow generating scenarios would be modelled, with the results being considered in the model runs. These scenarios generation were to provide a solution envelope which would aid in establishing and assessing the sensitivity and robustness of a sanitary sewer servicing strategy. Different combinations of wastewater flow generation parameters including residential rates, ICI rates, extraneous I/I flows values for existing and future growth, as well as consideration of design flow rates from other municipalities were investigated.

These scenarios represent the following:

Scenario 1 – Use of monitored flows for existing and design values for future growth.

Scenario 2 – Monitored values for existing and future growth.

Scenario 3 – Monitored values of existing and future growth for residential and ICI and a 50% safety factor applied to existing and future growth for I/I rates.

Table 3-2 below presents the design criteria used to create the three design scenarios for the analysis of the development strategies. Each scenario was used to estimate the sanitary sewer

APPENDIX C-3

KANATA NORTH URBAN EXPANSION AREA

COMMUNITY DESIGN PLAN

Table C-3: East March Trunk Sewer Capacity Analysis to March Pump Station (Buildout in 2031)

NOVATECH
Engineers, Planners & Landscape Architects

PROJECT : 112117
DESIGNED BY: ARM
CHECKED BY: CJR
DATE: Mar-16

LOCATION					EXISTING SEWER PIPE								CHECK
Area [1]	FROM MH	TO MH	PEAK INFLOW Q(p) (L/s) [1]	CUUMUL. FLOW Q(d) (L/s)	LENGTH (m)[3]	DIA. (mm)	PIPE ID (mm)	TYPE OF PIPE	SLOPE (%)[3]	CAPACITY (L/s)	FULL FLOW VELOCITY (m/s)	AVAIL. CAPACITY (L/s)	Qpeak/ Qcap[3]
A1-a6 & KNUEA	1	2	255.00	255.00	115.6	750	762.0	CONC	0.27	603.5	1.32	348.5	42.3%
	2	3		255.00	97.8	750	762.0	CONC	0.10	367.3	0.81	112.3	69.4%
	3	4		255.00	89.6	750	762.0	CONC	0.08	328.5	0.72	73.5	77.6%
	4	5		255.00	92.3	750	762.0	CONC	0.05	259.7	0.57	4.7	98.2%
	5	6		255.00	68.9	750	762.0	CONC	0.15	449.8	0.99	194.8	56.7%
	6	7		255.00	126.0	750	762.0	CONC	0.06	284.5	0.62	29.5	89.6%
	7	8		255.00	74.8	750	762.0	CONC	0.13	418.8	0.92	163.8	60.9%
	8	9		255.00	92.5	750	762.0	CONC	0.16	464.6	1.02	209.6	54.9%
	9	10		255.00	234.7	750	762.0	CONC	0.07	307.3	0.67	52.3	83.0%
	10	11		255.00	132.6	750	762.0	CONC	0.12	402.3	0.88	147.3	63.4%
	11	12		255.00	67.6	750	762.0	CONC	0.25	580.7	1.27	325.7	43.9%
	12	13		255.00	67.0	750	762.0	CONC	0.15	449.8	0.99	194.8	56.7%
	13	14		255.00	75.0	750	762.0	CONC	0.13	418.8	0.92	163.8	60.9%
	14	15		255.00	70.2	750	762.0	CONC	0.13	418.8	0.92	163.8	60.9%
	15	16		255.00	56.5	750	762.0	CONC	0.18	492.7	1.08	237.7	51.8%
	16	17		255.00	65.4	750	762.0	CONC	0.14	434.6	0.95	179.6	58.7%
	17	18		255.00	58.3	750	762.0	CONC	0.34	677.2	1.48	422.2	37.7%
	18	19		255.00	46.1	750	762.0	CONC	0.41	743.7	1.63	488.7	34.3%
	19	20		255.00	69.6	750	762.0	CONC	0.10	367.3	0.81	112.3	69.4%
	20	21		255.00	54.9	750	762.0	CONC	0.10	367.3	0.81	112.3	69.4%
	21	22		255.00	56.7	750	762.0	CONC	0.35	687.1	1.51	432.1	37.1%
	22	23		255.00	71.7	750	762.0	CONC	0.28	614.6	1.35	359.6	41.5%
	23	24		255.00	48.8	750	762.0	CONC	0.18	492.7	1.08	237.7	51.8%
	24	25		255.00	57.0	750	762.0	CONC	0.18	492.7	1.08	237.7	51.8%
	25	26		255.00	51.0	750	762.0	CONC	0.18	492.7	1.08	237.7	51.8%
	26	27		255.00	53.1	750	762.0	CONC	0.17	478.9	1.05	223.9	53.3%
	27	28		255.00	58.8	750	762.0	CONC	0.10	367.3	0.81	112.3	69.4%
	28	29		255.00	51.4	750	762.0	CONC	0.31	646.6	1.42	391.6	39.4%
	29	30		255.00	88.2	750	762.0	CONC	0.19	506.2	1.11	251.2	50.4%
	30	31		255.00	25.7	750	762.0	CONC	0.27	603.5	1.32	348.5	42.3%
	31	32		255.00	6.4	750	762.0	CONC	0.10	367.3	0.81	112.3	69.4%
	Overall			255.00	2324.2	750	762.0	CONC	0.18	492.7	1.08	237.7	51.8%

Notes:

1. 255L/s in 2031 per 2013 IMP includes KNUEA build-out(as provided by City of Ottawa, email March 22, 2016) (Appendix C-2)

2. Lengths and slopes of EMT based on as-built elevations

3. Isolated sections may exceed 100% design capacity, and may temporarily surcharge. Due to the depth of the trunk sewer, general excess capacity and lack of direct connections, there should be no adverse impacts of localised surcharging.

BROOKSIDE SUBDIVISION
SANITARY SEWER DESIGN SHEET

LOCATION			RESIDENTIAL AREA AND POPULATION								IND			INST		ICI	INFILTRATION			FLOW	PIPE						
Street	From	To	Area	Dwellings		Pop.	Cumulative		Peak	Peak	Area	Accu.	Peak	Area	Accu.	Peak	Total	Accu.	Infiltration	Total	Length	Dia	Dia	Slope	Velocity	Capacity	Ratio
	Node	Node		SFH	TH		Area	Pop.	Factor	Flow		Area	Factor		Area	Flow	Area	Area	Flow	Flow		Act	Nom		(Full)	(Full)	Q/Qfull
			(ha)				(ha)			(l/s)	(ha)	(ha)		(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)	(mm)	(%)	(m/s)	(l/s)	(%)
Area 1 - March Road																											
	Offsite	MH 261	6.10			610	6.10	610.0	3.93	9.7							6.1	6.1	1.7	11.4							
	MH 261	MH 260	0.19				6.29	610.0	3.93	9.7							0.2	6.3	1.8	11.5	92.0	203	200	0.33	0.61	19.6	58%
	MH 260	MH 259	0.17				6.46	610.0	3.93	9.7							0.2	6.5	1.8	11.5	71.0	203	200	1.13	1.12	36.3	32%
	MH 259	MH 258	0.13				6.59	610.0	3.93	9.7							0.1	6.6	1.8	11.6	54.4	203	200	0.37	0.64	20.8	56%
Area 3 - Brookside Subdivision																											
Maxwell Bridge Rd	MH 258	MH 256	0.24	3		10.2	6.83	620.2	3.92	9.9							0.2	6.8	1.9	11.8	42.6	203	200	2.35	1.62	52.4	22%
Windance Cres	MH 249	MH 257	0.47	7		23.8	0.47	23.8	4.00	0.4							0.5	0.5	0.1	0.5	54.7	203	200	2.00	1.49	48.3	1%
	MH 257	MH 256	0.37	5		17.0	0.84	40.8	4.00	0.7							0.4	0.8	0.2	0.9	51.5	203	200	0.82	0.95	31.0	3%
Maxwell Bridge Rd	MH 256	MH 255	0.60	9		30.6	8.27	691.6	3.90	10.9							0.6	8.3	2.3	13.2	80.5	203	200	1.11	1.11	36.0	37%
	MH 255	MH 250	0.38	6		20.4	8.65	712	3.89	11.2							0.4	8.7	2.4	13.6	56.4	203	200	1.35	1.22	39.7	34%
Pendra Way	MH 246	MH 254	0.44	7		23.8	0.44	23.8	4.00	0.4							0.4	0.4	0.1	0.5	52.0	203	200	0.90	1.00	32.4	2%
	MH 254	MH 253	0.22	2		6.8	0.66	30.6	4.00	0.5							0.2	0.7	0.2	0.7	11.5	203	200	0.61	0.82	26.7	3%
	MH 253	MH 252	0.00			0.0	0.66	30.6	4.00	0.5							0.0	0.7	0.2	0.7	35.2	203	200	0.57	0.80	25.8	3%
	MH 252	MH 251	0.11	1		3.4	0.77	34.0	4.00	0.6							0.1	0.8	0.2	0.8	10.6	203	200	0.66	0.86	27.8	3%
	MH 251	MH 250	0.54	9		30.6	1.20	61.2	4.00	1.0							0.5	1.2	0.3	1.3	67.8	203	200	0.60	0.82	26.5	5%
Maxwell Bridge Rd	MH 250	MH 242	0.42	6		20.4	10.27	793.6	3.86	12.4							0.4	10.3	2.9	15.3	82.0	203	200	0.80	0.94	30.6	50%
Windance Cres	MH 249	MH 248	0.15	2		6.8	0.15	6.8	4.00	0.1							0.2	0.2	0.0	0.2	20.2	203	200	1.00	1.05	34.2	0%
	MH 248	MH 247	0.23	2		6.8	0.38	13.6	4.00	0.2							0.2	0.4	0.1	0.3	13.1	203	200	2.30	1.60	51.8	1%
	MH 247	MH 246	0.49	6		20.4	0.87	34.0	4.00	0.6							0.5	0.9	0.2	0.8	81.5	203	200	2.90	1.80	58.2	1%
	MH 246	MH 245	0.94	14		47.6	1.81	81.6	4.00	1.3							0.9	1.8	0.5	1.8	123.0	203	200	1.20	1.15	37.4	5%
	MH 245	MH 244	0.20		3	8.1	2.01	89.7	4.00	1.5							0.2	2.0	0.6	2.0	11.2	203	200	0.36	0.63	20.5	10%
	MH 244	MH 243	0.18		5	13.5	2.19	103.2	4.00	1.7							0.2	2.2	0.6	2.3	29.8	203	200	0.34	0.61	19.9	11%
	MH 243	MH 242	0.79	7	12	56.2	2.80	145.9	4.00	2.4							0.8	2.8	0.8	3.1	108.0	203	200	0.32	0.60	19.3	16%
Maxwell Bridge Rd	MH 242	MH 240	0.39	5		17.0	13.46	956.5	3.81	14.8							0.4	13.5	3.8	18.5	82.0	254	250	0.38	0.75	38.2	49%
Celtic Ridge Cres	MH 233	MH 241	0.63		20	54.0	0.63	54.0	4.00	0.9							0.6	0.6	0.2	1.1	73.3	203	200	0.33	0.61	19.6	5%
	MH 241	MH 240	0.45		13	35.1	1.08	89.1	4.00	1.4							0.5	1.1	0.3	1.7	63.7	203	200	1.21	1.16	37.6	5%
Maxwell Bridge Rd	MH 240	MH 238	0.40		9	24.3	14.94	1069.9	3.78	16.4							0.4	14.9	4.2	20.6	82.0	254	250	0.24	0.60	30.4	68%
Celtic Ridge Cres	MH 233	MH 232	0.19		3	8.1	0.19	8.1	4.00	0.1							0.2	0.2	0.1	0.2	12.4	203	200	0.65	0.85	27.6	1%
	MH 232	MH 231	0.46		12	32.4	0.65	40.5	4.00	0.7							0.5	0.7	0.2	0.8	73.3	203	200	0.40	0.67	21.6	4%
Celtic Ridge Cres	MH 230	MH 231	0.41		11	29.7	0.41	29.7	4.00	0.5							0.4	0.4	0.1	0.6	82.1	203	200	0.33	0.61	19.6	3%
Braecreek Ave	MH 231	MH 239	0.92		28	75.6	1.98	145.8	4.00	2.4							0.9	2.0	0.6	2.9	120.0	203	200	0.33	0.61	19.6	15%
	MH 239	MH 238	0.17		4	10.8	2.15	156.6	4.00	2.5							0.2	2.2	0.6	3.1	27.4	203	200	1.82	1.42	46.1	7%
Maxwell Bridge Rd	MH 238	MH 236	0.42		13	35.1	17.51	1261.6	3.73	19.1							0.4	17.5	4.9	24.0	82.0	254	250	0.24	0.60	30.4	79%
Fordell Ave	MH 230	MH 237	0.86		30	81.0	0.86	81.0	4.00	1.3							0.9	0.9	0.2	1.6	110.0	203	200	0.32	0.60	19.3	8%
	MH 237	MH 236	0.23		6	16.2	1.09	97.2	4.00	1.6							0.2	1.1	0.3	1.9	39.1	203	200	2.30	1.60	51.8	4%

BROOKSIDE SUBDIVISION
SANITARY SEWER DESIGN SHEET

LOCATION			RESIDENTIAL AREA AND POPULATION								IND			INST		ICI	INFILTRATION			FLOW	PIPE						
Street	From	To	Area	Dwellings		Pop.	Cumulative		Peak	Peak	Area	Accu.	Peak	Area	Accu.	Peak	Total	Accu.	Infiltration	Total	Length	Dia	Dia	Slope	Velocity	Capacity	Ratio
	Node	Node		SFH	TH		Area	Pop.	Factor	Flow		Area	Factor		Area	Flow	Area	Area	Flow	Flow		Act	Nom		(Full)	(Full)	Q/Qfull
			(ha)				(ha)			(l/s)	(ha)	(ha)		(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)	(mm)	(%)	(m/s)	(l/s)	(%)
Maxwell Bridge Rd	MH 236	MH 234	0.39		12	32.4	18.99	1391.2	3.70	20.9							0.4	19.0	5.3	26.2	82.0	305	300	0.24	0.68	49.4	53%
Arncliffe Ave	MH 229	MH 235	0.87		30	81.0	0.87	81.0	4.00	1.3							0.9	0.9	0.2	1.6	120.0	203	200	0.33	0.61	19.6	8%
	MH 235	MH 234	0.22		6	16.2	1.09	97.2	4.00	1.6							0.2	1.1	0.3	1.9	29.3	203	200	2.90	1.80	58.2	3%
Maxwell Bridge Rd	MH 234	MH 225	0.26		6	16.2	20.34	1504.6	3.68	22.4							0.3	20.3	5.7	28.1	79.8	305	300	0.25	0.69	50.4	56%
Celtic Ridge Cres	MH 230	MH 229	0.43		12	32.4	0.43	32.4	4.00	0.5							0.4	0.4	0.1	0.6	81.9	203	200	0.32	0.60	19.3	3%
	MH 229	MH 228	0.38		11	29.7	0.81	62.1	4.00	1.0							0.4	0.8	0.2	1.2	70.3	203	200	0.33	0.61	19.6	6%
	MH 228	MH 227	0.10		0	0.0	0.91	62.1	4.00	1.0							0.1	0.9	0.3	1.3	12.3	203	200	0.33	0.61	19.6	6%
	MH 227	MH 226	0.46		13	35.1	1.37	97.2	4.00	1.6							0.5	1.4	0.4	2.0	97.0	203	200	0.32	0.60	19.3	10%
	MH 226	MH 225	0.21		5	13.5	1.58	110.7	4.00	1.8							0.2	1.6	0.4	2.2	43.7	203	200	0.94	1.02	33.1	7%
Celtic Ridge Cres	MH 225	MH 224	0.58		12	32.4	22.50	1647.7	3.65	24.4							0.6	22.5	6.3	30.7	97.5	381	375	0.20	0.72	81.7	38%
	MH 224	MH 209	0.22		4	10.8	22.72	1658.5	3.65	24.5							0.2	22.7	6.4	30.9	66.5	381	375	0.20	0.72	81.7	38%
Streamside Cres	MH 217	MH 218	0.26	2		6.8	0.26	6.8	4.00	0.1							0.3	0.3	0.1	0.2	12.4	203	200	1.00	1.05	34.2	1%
	MH 218	MH 219	0.96	20		68.0	1.22	74.8	4.00	1.2							1.0	1.2	0.3	1.6	120.0	203	200	0.80	0.94	30.6	5%
	MH 219	MH 220	0.62	11		37.4	1.84	112.2	4.00	1.8							0.6	1.8	0.5	2.3	77.8	203	200	0.32	0.60	19.3	12%
Glenbrae Ave	MH 220	MH 221	0.96		28	75.6	2.80	187.8	4.00	3.0							1.0	2.8	0.8	3.8	118.9	203	200	0.32	0.60	19.3	20%
	MH 221	MH 222	1.04		33	89.1	3.84	276.9	4.00	4.5							1.0	3.8	1.1	5.6	119.0	203	200	0.32	0.60	19.3	29%
	MH 222	MH 223	0.20		3	8.1	4.04	285.0	4.00	4.6							0.2	4.0	1.1	5.7	12.9	203	200	0.39	0.66	21.3	27%
	MH 223	MH 210	0.22		4	10.8	4.26	295.8	4.00	4.8							0.2	4.3	1.2	6.0	72.9	203	200	0.33	0.61	19.6	30%
Streamside Cres	MH 217	MH 216	0.37	5		17.0	0.37	17.0	4.00	0.3							0.4	0.4	0.1	0.4	40.1	203	200	0.65	0.85	27.6	1%
	MH 216	MH 215	0.17	2		6.8	0.54	23.8	4.00	0.4							0.2	0.5	0.2	0.5	13.6	203	200	0.65	0.85	27.6	2%
	MH 215	MH 214	0.17	2		6.8	0.71	30.6	4.00	0.5							0.2	0.7	0.2	0.7	31.6	203	200	0.50	0.75	24.2	3%
	MH 214	MH 213	1.02	18		61.2	1.73	91.8	4.00	1.5							1.0	1.7	0.5	2.0	119.0	203	200	0.90	1.00	32.4	6%
	MH 213	MH 212	0.50	7		23.8	2.23	115.6	4.00	1.9							0.5	2.2	0.6	2.5	56.5	203	200	0.32	0.60	19.3	13%
Celtic Ridge Cres	MH 212	MH 211	1.04	16		54.4	3.27	170.0	4.00	2.8							1.0	3.3	0.9	3.7	124.9	203	200	0.32	0.60	19.3	19%
	MH 211	MH 210	0.94	16		54.4	4.21	224.4	4.00	3.6							0.9	4.2	1.2	4.8	122.0	203	200	0.33	0.61	19.6	25%
Celtic Ridge Cres	MH 210	MH 209	0.58	11		37.4	9.05	557.6	3.95	8.9							0.6	9.1	2.5	11.5	80.9	203	200	0.75	0.91	29.6	39%
Easement	MH 209	MH 208	0.06			0.0	31.83	2216.1	3.55	31.9							0.1	31.8	8.9	40.8	50.3	381	375	0.20	0.72	81.7	50%
	MH 208	MH 207	0.24			0.0	32.07	2216.1	3.55	31.9							0.2	32.1	9.0	40.9	111.6	381	375	0.20	0.72	81.7	50%
Area 4a - Phase 2 Lands																											
	MH 273	MH 272	0.57		9	24.3	0.57	24.3	4.00	0.4							0.6	0.6	0.2	0.6	66.0	203	200	0.65	0.85	27.6	2%
	MH 272	MH 271	0.92		16	43.2	1.49	67.5	4.00	1.1							0.9	1.5	0.4	1.5	90.2	203	200	0.40	0.67	21.6	7%
	MH 271	MH 270	1.06		19	51.3	2.55	118.8	4.00	1.9							1.1	2.6	0.7	2.6	113.0	203	200	0.40	0.67	21.6	12%
	MH 270	MH 207	0.00		0	0.0	2.55	118.8	4.00	1.9							0.0	2.6	0.7	2.6	16.0	254	250	0.32	0.69	35.1	8%
Easement	MH 207	MH 206	0.22			0.0	34.84	2240.4	3.55	32.2							0.2	34.8	9.8	41.9	100.0	457	450	0.20	0.81	132.9	32%
Area 2																											
	Area 2	MH 266	3.10			202	3.10	202.0	4.00	3.3							3.1	3.1	0.9	4.1	-	203	200	0.32	0.60	19.3	21%
Klondike Road & Area 4b																											
	MH 266	MH 265	0.24				3.34	202.0	4.00	3.3							0.2	3.3	0.9	4.2	93.7	203	200	0.32	0.60	19.3	22%
	Park	MH 265	1.89				1.89	0.0	4.00	0.0							1.9	1.9	0.5	0.5	13.0	203	200	0.32	0.60	19.3	3%
	MH 265	MH 264	0.31				5.54	202.0	4.00	3.3							0.3	5.5	1.6	4.8	120.0	203	200	0.32	0.60	19.3	25%

BROOKSIDE SUBDIVISION
SANITARY SEWER DESIGN SHEET

LOCATION			RESIDENTIAL AREA AND POPULATION								IND			INST		ICI	INFILTRATION			FLOW	PIPE						
Street	From	To	Area	Dwellings		Pop.	Cumulative		Peak	Peak	Area	Accu.	Peak	Area	Accu.	Peak	Total	Accu.	Infiltration	Total	Length	Dia	Dia	Slope	Velocity	Capacity	Ratio
	Node	Node		SFH	TH		Area	Pop.	Factor	Flow		Area	Factor		Area	Flow	Area	Area	Flow	Flow		Act	Nom		(Full)	(Full)	Q/Qfull
			(ha)				(ha)			(l/s)	(ha)	(ha)		(ha)	(ha)	(l/s)	(ha)	(ha)	(l/s)	(l/s)	(m)	(mm)	(mm)	(%)	(m/s)	(l/s)	(%)
Marconi Ave	MH 269	MH 268	0.14		3	8.1	0.14	8.1	4.00	0.1							0.1	0.1	0.0	0.2	21.3	203	200	1.00	1.05	34.2	0%
	MH 268	MH 267	0.11		2	5.4	0.25	13.5	4.00	0.2							0.1	0.3	0.1	0.3	26.6	203	200	0.56	0.79	25.6	1%
	MH 267	MH 264	0.95		26	70.2	1.20	83.7	4.00	1.4							1.0	1.2	0.3	1.7	120.0	203	200	0.67	0.86	28.0	6%
	MH 264	MH 263	0.78		20	54.0	7.52	339.7	4.00	5.5							0.8	7.5	2.1	7.6	100.0	254	250	0.24	0.60	30.4	25%
	MH 263	MH 262	0.91		27	72.9	8.43	412.6	4.00	6.7							0.9	8.4	2.4	9.0	88.3	254	250	0.24	0.60	30.4	30%
	MH 262	MH 206	0.95		29	78.3	9.38	490.9	3.98	7.9							1.0	9.4	2.6	10.5	118.0	254	250	0.24	0.60	30.4	35%
	MH 206	MH 205	0.10			0.0	44.32	2731.3	3.48	38.5							0.1	44.3	12.4	50.9	52.5	457	450	0.20	0.81	132.9	38%
Area 5a & 5b (KRP) - Klondike Road																											
	Area 5	MH 205									5.4	5.4	4.7			10.3	5.4	5.4	1.5	11.8	-	254	250	0.25	0.61	31.0	38%
Briar Ridge Pump Station Access Road + Area 6 (KRP)																											
	MH 205	MH 204					44.32	2731.3	3.48	38.5		5.4	4.7			10.3	0.0	49.7	13.9	62.7	79.7	457	450	0.20	0.81	132.9	47%
	MH 204	MH 203					44.32	2731.3	3.48	38.5		5.4	4.7			10.3	0.0	49.7	13.9	62.7	79.7	457	450	0.20	0.81	132.9	47%
	Area 6	MH 203									7.9	7.9	4.4			14.1	7.9	7.9	2.2	16.3	-	254	250	0.25	0.61	31.0	53%
	MH 203	MH 202					44.32	2731.3	3.48	38.5		13.3	3.9			21.0	0.0	57.6	16.1	75.6	90.0	457	450	0.26	0.92	151.6	50%
	MH 202	MH 201B					44.32	2731.3	3.48	38.5		13.3	3.9			21.0	0.0	57.6	16.1	75.6	95.0	457	450	0.26	0.92	151.6	50%
	MH 201B	MH 201A					44.32	2731.3	3.48	38.5		13.3	3.9			21.0	0.0	57.6	16.1	75.6	85.0	457	450	0.25	0.91	148.6	51%
	MH 201A	MH 201					44.32	2731.3	3.48	38.5		13.3	3.9			21.0	0.0	57.6	16.1	75.6	90.0	457	450	0.25	0.91	148.6	51%
	MH 201	PS					44.32	2731.3	3.48	38.5		13.3	3.9			21.0	0.0	57.6	16.1	75.6	21.6	457	450	0.15	0.70	115.1	66%
Area 7 (KRP - Ex. Golf Course)																											
	Ex. MH	PS									15.2	15.2	3.9			24.0	15.2	15.2	4.3	28.3							
Area 8 (Claridge Lands)																											
	Ex. MH	PS	45.57			3100	45.57	3100.0	3.43	43.1							45.6	45.6	12.8	55.8							
Pump Station (Areas 1-8)							89.89	5831.3	3.18	75.2		28.5	3.4			39.3	0.0	118.4	33.1	147.6							

DESIGN PARAMETERS

Average Daily Flow=	350	L/cap/day	Industrial Peak Factor=	per MOE graph		
Comm/Inst Flow=	50000	L/ha/day	Extraneous Flow=	0.28 L/s/ha	0.3	L/s/ha
Industrial Flow=	35000	L/ha/day	Minimum Velocity=	0.60 m/s	0.60	m/s
Max Res Peak Factor=	4.00		Manning's n=	0.013	0	
Comm/Inst Peak Factor=	1.50					

Designed: MAB

Checked: JGR

Dwg. Reference: 103106-SAN1
103106-SAN2

PROJECT:
Brookside Subdivision

CLIENT:
Klondike Developments Inc

Date: August 29, 2007

LEGEND

3 — AREA I.D.

10.5 / RES / 500 — AREA IN HECTARES; LANDUSE TYPE: RES = RESIDENTIAL, IND = LIGHT INDUSTRIAL; POPULATION ESTIMATE

SANITARY DRAINAGE AREA BOUNDARY

NOTES:

1. SANITARY DRAINAGE AREAS AND POPULATION VALUES DEPICTED ON THIS DRAWING WERE TAKEN FROM THE "BRIAR RIDGE SANITARY PUMP STATION PRE-DESIGN REPORT" BY CCL (REPORT No. xxxxxxx). THE BOUNDARY LINES ON THIS PLAN HAVE BEEN APPROXIMATED FROM THAT REPORT. PRECISE BOUNDARY LOCATIONS SHOULD BE TAKEN FROM THE APPROVED PUMPING STATION REPORT.
2. AREA No.1 AS BOUNDED HAS A LAND AREA OF 9.0ha. A SIZEABLE PORTION IS ATTRIBUTED TO FUTURE STORMWATER MANAGEMENT FACILITY 'A' WHICH HAS YET TO BE DESIGNED. THE BALANCE OF THE LAND AREA IS ATTRIBUTED TO RESIDENTIAL AND ROADWAY USES. THE DEVELOPMENT AREA=6.10ha WITH POPULATION 610 IS TAKEN DIRECTLY FROM THE "BRIAR RIDGE SANITARY PUMP STATION PRE-DESIGN REPORT".
3. AREA No.2 CURRENTLY EXCLUDES A SMALL PARCEL OF LAND (±1.1ha) ON THE NORTH SIDE OF KLONDIKE ROAD BETWEEN SANDHILL ROAD AND SHIRLEY'S BROOK. THE CITY OF OTTAWA MAY CHOOSE TO EXPLORE SERVICING THIS PARCEL WITH A CONNECTION TO A FUTURE SANITARY SEWER WITHIN KLONDIKE ROAD. RESIDUAL FREE FLOW CAPACITY APPEARS TO EXIST IN THE SANITARY SEWER LINES TO THE PUMP STATION.
4. FOR AREAS No. 3, No. 5 AND No.6 THE POPULATION AND AREA VALUES HAVE BEEN UPDATED FROM THE NOVEMBER 2000 CCL REPORT "BRIAR RIDGE SANITARY PUMP STATION PRE-DESIGN REPORT" TO REFLECT THE LATEST LANDUSE PLANS.
5. ALL PIPE DISTANCES AND SLOPE VALUES IDENTIFIED ON THIS PLAN ARE NOMINAL.

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	No.	REVISION	DATE	BY
				7.	ISSUED TO CLIENT	OCT 10/06	MAB
				6.	ISSUED FOR CONSTRUCTION	AUG 17/06	MAB
				5.	ISSUED WITH MOE APPLICATION	AUG 08/06	MAB
				4.	ISSUED FOR TENDER	MAY 26/06	MAB
				3.	ISSUED FOR MOE APPROVAL	MAY 01/06	MAB
9.	AS-BUILT	JAN 16/14	MAB	2.	REVISED PER CITY COMMENTS	APR 24/06	MAB
8.	ISSUED FOR MOE APPROVAL	NOV 09/06	MAB	1.	ISSUED TO CITY FOR REVIEW	MAR 20/06	MAB

LICENSED PROFESSIONAL ENGINEER M.A. BISSETT PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER J.G. RIDDELL PROVINCE OF ONTARIO

NOVATECH ENGINEERING CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M 1P6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

DESIGN	MAB	SCALE	1:2000
CHECKED	SAY		
DRAWN	SM		
CHECKED	MAB		
APPROVED	JGR		

CITY OF OTTAWA

BROOKSIDE SUBDIVISION

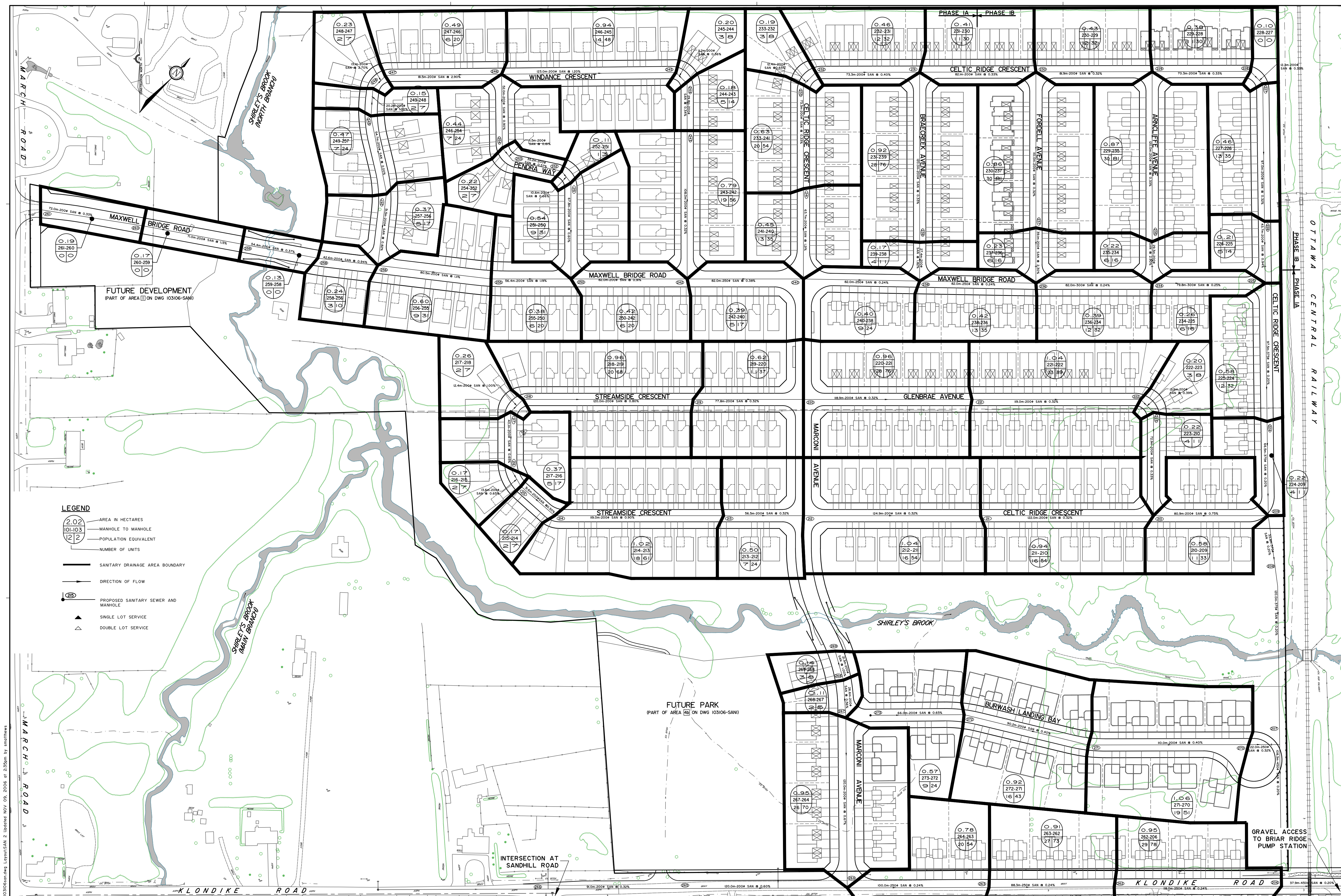
BRIAR RIDGE PUMP STATION SANITARY DRAINAGE PLAN

PROJECT No. 103106-0

DATE AUGUST 2005

DRAWING No. 103106-SANI

PLANBI.DWG - 1000mmX707mm



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	No.	REVISION	DATE	BY
				7.	ISSUED FOR TENDER	MAY 26/06	MAB
13.	AS-BUILT	JAN 16/14	MAB	6.	ISSUED FOR MOE APPROVAL	MAY 01/06	MAB
12.	PHASE 2 DRAINAGE AREAS ADDED	AUG 29/07	MAB	5.	REVISED PER CITY COMMENTS	APR 24/06	MAB
11.	ISSUED FOR MOE APPROVAL	NOV 09/06	MAB	4.	ISSUED TO CITY FOR REVIEW	MAR 20/06	MAB
10.	ISSUED TO CLIENT	OCT 10/06	MAB	3.	ISSUED TO CITY FOR REVIEW	FEB 22/06	MAB
9.	ISSUED FOR CONSTRUCTION	AUG 17/06	MAB	2.	ISSUED TO CITY FOR REVIEW	JAN 20/06	MAB
8.	ISSUED WITH MOE APPLICATION	AUG 08/06	MAB	1.	ISSUED TO CITY FOR REVIEW	NOV 11/05	MAB

LICENSED PROFESSIONAL ENGINEER
M.A. BISSETT
PROVINCE OF ONTARIO

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DESIGN	MAB
CHECKED	SAY
DRAWN	SM
CHECKED	MAB
APPROVED	JGR
SCALE	1:1000

CITY OF OTTAWA

BROOKSIDE SUBDIVISION

BROOKSIDE SUBDIVISION
SANITARY DRAINAGE PLAN

PROJECT No. 103106-0
DATE AUGUST 2005
DRAWING No. 103106-SAN2

PLAN81.DWG - 1000mmX707mm

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MORGAN'S CREEK

760 MARCH ROAD

CITY OF OTTAWA

MINTO COMMUNITIES INC.

JLR PROJECT NO.: 24566

Commercial/Institutional Flow =	50,000	L/day/ha
q =	350	L/cap/d
i =	0.28	L/s/ha
TOWNS HOUSING	2.7	pers/unit
STACKS HOUSING	2.7	pers/unit
SINGLES HOUSING	3.4	pers/unit
Manning's Coefficient (n) =	0.013	

SANITARY SEWER DESIGN SHEET

Designed: K.F.

Checked By: L.D.

Date: July 2012

STREET	SAN MH #		RESIDENTIAL									COM/INST			RES+ COM + INFILTR.		SEWER DATA						UPSTREAM						DOWNSTREAM				
			NUMBER OF UNITS					CUMULATIVE		PEAKING	POP.																					
	FROM	TO	SINGLES units	STACKS units	TOWNS units	POP. pers	AREA ha	POP. pers	AREA ha	FACTOR	FLOW L/s	AREA ha	CUM. AREA L/s	COM/INST FLOW L/s	PEAK EXTR. FLOW L/s	PEAK DES. FLOW L/s	DIA. mm	SLOPE %	CAPAC. L/s	VEL. (full) m/s	LENGTH m	Center Line	Obvert Drop	Obvert	Invert	Cover	Center Line		Obvert	Invert	Cover
FLOW TO 250mmΦ SANITARY - SANDHILL ROAD																																
Morgan's Creek - Private Road	5	4		20		54	0.25	54	0.25	4.00	0.88				0.07	0.95	200	0.33	19.66	0.61	28.40	76.50	0.02	74.81	74.61	1.69	76.75		74.71	74.51	2.04
Morgan's Creek - Private Road	4	3		24		65	0.29	119	0.54	4.00	1.93				0.15	2.08	200	0.33	19.66	0.61	50.70	76.75	0.02	74.69	74.49	2.06	76.55		74.53	74.33	2.02
Morgan's Creek - Private Road	3	2		16		43	0.27	162	0.81	4.00	2.63				0.23	2.85	200	0.33	19.66	0.61	57.70	76.55	0.02	74.51	74.31	2.04	76.50		74.32	74.12	2.18
Morgan's Creek - Private Road	2	1		28		76	0.43	238	1.24	4.00	3.85				0.35	4.20	200	0.33	19.66	0.61	74.20	76.50	0.02	74.30	74.10	2.20	76.85		74.05	73.85	2.80
Morgan's Creek Private Road/ Sandhill Road	1	EX. 300A		12		32	0.24	270	1.48	4.00	4.38				0.41	4.79	200	0.41	21.91	0.68	99.10	76.85		74.03	73.83	2.82	76.90		73.63	73.43	3.28
Sandill Road	EX. 300A	Ex. 301A			4	11	0.11	281	1.59	4.00	4.55				0.45	5.00	250	0.29	33.64	0.66	72.80	76.90		73.68	73.43	3.23	77.90		73.46	73.21	4.44
				100	4	270	1.48																									

SANDHILL ROAD- AS BUILT INFORMATION

Ex. Inv @ SANMH 300A (SE) 73.425

Ex. Obv @ SANMH 300A(SE) 73.625

Information taken from IBI Group As-Built Plans - Briar Ridge Phase 2

DWG No. 109-1 , Rev 5 (As-built) - Sandhill Road (Sta. 1+000 to Klondike)

FLOW TO SANITARY - MARCH ROAD/ MERSEY DRIVE																																
Morgan's Creek - Private Road	8	7		56		151	0.71	151	0.71	4.00	2.45				0.20	2.65	200	0.35	20.24	0.62	75.10	78.60	0.06	76.40	76.20	2.20	78.35		76.13	75.93	2.22
Morgan's Creek - Private Road	7	6					0.05	151	0.76	4.00	2.45				0.21	2.66	200	0.35	20.24	0.62	31.90	78.35	0.06	76.07	75.87	2.28	78.30		75.96	75.76	2.34
Commercial Site - 788 March RD	Future Site	6										0.83	0.83	0.72	0.23	0.95	Detailed Design of Commercial Site located at 788 March Road to be completed in future															
Morgan's Creek Private Rd /March Rd/ Mersey Dr	6	9						151	0.76	4.00	2.45		0.83	0.72	0.45	3.62	200	0.67	28.04	0.86	59.01	78.30		75.90	75.70	2.40	78.70		75.51	75.31	3.19
Mersey Drive	9	10						151	0.76	4.00	2.45		0.83	0.72	0.45	3.62	200	0.32	19.36	0.60	60.00	78.70		75.51	75.31	3.19	78.98		75.31	75.11	3.67
Mersey Drive	124	10				4	0.14	4	0.14	4.00	0.06				0.04	0.10	200	0.55	25.38	0.78	55.00	79.27		75.60	75.40	3.66	78.98		75.30	75.10	3.68
Mersey Drive	10	123				24	0.30	179	1.20	4.00	2.90		0.83	0.72	0.57	4.19	200	0.55	25.38	0.78	41.30	78.98		75.30	75.10	3.68	79.46		75.07	74.87	4.39
Mersey Drive	123	108				32	0.42	211	1.62	4.00	3.42				0.45	3.88	200	0.59	26.28	0.81	109.20	79.46		75.07	74.87	4.40	80.00		74.42	74.22	5.58
Mersey Drive	122	121				24	0.38	24	0.38	4.00	0.39				0.11	0.50	200	3.78	66.52	2.05	63.50	84.45		80.40	80.20	4.05	81.82		78.00	77.80	3.82
Mersey Drive	121	120				24	0.28	48	0.66	4.00	0.78				0.18	0.96	200	2.53	54.43	1.68	68.00	81.82		77.90	77.70	3.92	80.27		76.18	75.98	4.09
Argent Private	3	2		12		32	0.26	32	0.26	4.00	0.53				0.07	0.60	200	0.90	32.46	1.00	52.70	84.25	0.06	81.66	81.46	2.59	84.20		81.19	80.99	3.01
Argent Private	2	1A			16	43	0.33	76	0.59	4.00	1.23				0.17	1.39	200	0.90	32.46	1.00	89.20	84.20	0.60	81.13	80.93	3.07	82.45		80.33	80.13	2.12
Argent Private	3	4		28		76	0.41	76	0.41	4.00	1.23				0.11	1.34	200	0.90	32.46	1.00	69.30	84.25	0.06	80.71	80.51	3.54	82.80		80.09	79.89	2.71
Argent Private	4	1A		20		54	0.28	130	0.69	4.00	2.10				0.19	2.29	200	0.40	21.64	0.67	74.90	82.80		80.03	79.83	2.77	82.45		79.73	79.53	2.72
Argent Private	1A	1					0.02	205	1.30	4.00	3.33				0.36	3.69	200	0.90	32.46	1.00	18.50	82.45	0.50	79.73	79.53	2.72	82.45		79.56	79.36	2.89
Commercial Plaza	1	120A						205	1.30	4.00	3.33				0.36	3.69	250	0.98	61.42	1.21	44.80	82.45	3.05	79.11	78.86	3.34	80.39		78.67	78.42	1.72
Klondike Rd/ MG Phase 13/ Commercial Plza	Upstream	120A						2432	38.86	3.52	34.66	1.69	4.62	4.01	12.18	50.85	300	0.30	55.26								80.39		75.61	75.31	4.78
Klondike Commercial Plaza	120A	120						2637	40.16	3.49	37.28		4.62	4.01	12.54	53.83	300	0.97	99.36	1.36	15.80	80.39		75.62	75.31	4.77	80.25		75.47	75.17	4.78
Westmoreland Avenue	120	117				20	0.33	2705	41.15	3.48	38.14		4.62	4.01	12.82	54.96	300	0.42	65.32	0.90	70.60	80.27	0.01	75.47	75.17	4.80	80.40		75.17	74.87	5.23
Whithorn Avenue	116	119				8	0.14	8	0.14	4.00	0.13				0.04	0.17	200	2.00	48.39	1.49	8.10	83.34	0.10	79.26	79.06	4.08	83.30		79.10	78.90	4.20
Whithorn Avenue	119	118				24	0.22	32	0.36	4.00	0.52				0.10	0.62	200	2.69	56.11	1.73	37.20	83.30	0.30	79.00	78.80	4.30	82.32		78.00	77.80	4.32
Whithorn Avenue	118	117				44	0.50	76	0.86	4.00	1.23				0.24	1.47	200	2.21	50.87	1.57	81.10	82.32	0.75	77.70	77.50	4.62	80.40		75.91	75.71	4.49
Westmoreland Avenue	117	110				24	0.31	2805	42.32	3.47	39.40		4.62	4.01	13.14	56.55	300	0.42	65.50	0.90	68.80	80.40	0.03	75.16	74.86	5.24	80.80		74.87	74.57	5.93
Spalding Avenue	111	110				12	0.33	12	0.33	4.00	0.19				0.09	0.29	200	1.91	47.29	1.46	46.00	81.25	0.78	76.50	76.30	4.75	80.80		75.62	75.42	5.18
Westmoreland Avenue	110	109				16	0.30	2833	42.95	3.46	39.75		4.62	4.01	13.32	57.08	300	0.36	60.32	0.83	66.30	80.80	0.02	74.84	74.54	5.96	80.80		74.60	74.30	6.20
Mersey Drive	Upstream	109				120	2.01	120	2.01	4.00	1.94				0.56	2.51	200	1.00	34.22								81.85		77.20	77.00	4.65
Mersey Drive	109	108				24	0.33	2977	45.29	3.45	41.55		4.62	4.01	13.98	59.54	300	0.46	68.74	0.94	68.70	80.80	0.02	74.58	74.28	6.22	79.90		74.26	73.96	5.64
March Road Easement (West Side)	108	101						3188	46.91	3.42	44.17		4.62	4.01	14.43	62.61	375	0.32	103.89	0.91	12.40	80.00	0.06	74.25	73.87	5.76	80.00		74.21	73.83	5.80
March Road Easement (West Side)	Upstream	101				156	2.01	156	2.01	4.00	2.53				0.56	3.09	200	0.58	26.08								80.00		74.38	74.18	5.62

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

MORGAN'S CREEK

760 MARCH ROAD

CITY OF OTTAWA

MINTO COMMUNITIES INC.

JLR PROJECT NO.: 24566

Commercial/Institutional Flow =	50,000	L/day/ha
q =	350	L/cap/d
i =	0.28	L/s/ha
TOWNS HOUSING	2.7	pers/unit
STACKS HOUSING	2.7	pers/unit
SINGLES HOUSING	3.4	pers/unit
Manning's Coefficient (n) =	0.013	

SANITARY SEWER DESIGN SHEET

Designed: K.F.

Checked By: L.D.

Date: July 2012

STREET	SAN MH #		RESIDENTIAL									COM/INST			RES+ COM + INFILTR.		SEWER DATA					UPSTREAM					DOWNSTREAM				
			NUMBER OF UNITS					CUMULATIVE		PEAKING	POP.		CUM.	COM/INST	PEAK EXTR.	PEAK DES.															
	FROM	TO	SINGLES units	STACKS units	TOWNS units	POP. pers	AREA ha	POP. pers	AREA ha	FACTOR	FLOW L/s	AREA ha	AREA L/s	FLOW L/s	FLOW L/s	FLOW L/s	DIA. mm	SLOPE %	CAPAC. L/s	VEL. (full) m/s	LENGTH m	Center Line	Obvert Drop	Obvert	Invert	Cover	Center Line		Obvert	Invert	Cover
March Road Crossing	*101*	*15A*						*3188*	*46.91*	*3.42*	*44.17*		*4.62*	*4.01*	*14.43*	*62.61*	*375*	*0.30*	*100.18*	*0.88*	*47.00*	*80.00*	*0.02*	*74.15*	*73.77*	*5.85*	*79.41*		*74.00*	*73.63*	*5.41*
Briar Brook Subdvision	*15A*	*8C*						*3188*	*46.91*	*3.42*	*44.17*		*4.62*	*4.01*	*14.43*	*62.61*	*375*	*0.31*	*101.84*	*0.89*	*63.20*	*79.41*		*73.98*	*73.61*	*5.43*	*78.20*		*73.79*	*73.41*	*4.41*

LEGEND

DENOTES EXISTING SEWERS

DENOTES PROPOSED SEWERS

DENOTES SEWERS FOR THE KLONDIKE CROSSING (SUBMITTED JULY 2011) OR FUTURE SEWERS

KLONDIKE COMMERCIAL SITE- AS BUILT INFORMATION

Ex. Inv @ SAN MH 120 (Westmoreland Ave) 75.167

Ex. Obv @ SAN MH 120 (Westmoreland Ave) 75.472

Information taken from JLR As-Built Plans -Klondike Commercial Site (Morgan's Grant)

DWG No. 20668-S1, Rev. 18 (As-Built) - Klondike Commercial Site

MARCH ROAD- AS BUILT INFORMATION

Ex. Inv @ INLET (East Blvd) = 75.69

Ex. Inv @ OUTLET (West Blvd) = 75.40

As-built Length 43.18, Slope = 0.67 %

Information taken from Stantec As-Built Plans - March Road Reconstruction

ISB07-5166 - Dwg. No. 19 , Rev 5 (As-built) - March Rd (Sta 8+200 to 8+500)

MERSEY DRIVE- AS BUILT INFORMATION

Ex. Inv @ MH 124(SW) = 75.40

Ex. Inv @ MH 123 (NW) = 74.87

Information taken from JLR As-Built Plans - Mersey Drive (Morgan's Grant Phase 4)

DWG No. 16087-11 , Rev 8 (As-built) - Mersey Drive (Sta 0+285 to Sta 0+480.9)

EAST MARCH TRUNK SANITARY ANALYSIS

EXISTING CONDITIONS

AREA			RESIDENTIAL														COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			
			Singles		Semis		Townhomes		Apartments		Fut. Res.		TOTAL															
ID	From	To	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	Area	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Area (ha)	Accum. Area (ha)	Area (ha)	Accum. Area (ha)	Peaking Factor	Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	Total Flow (l/s)
1	1	7	431	1465	50	135	471	1272	2	213	12.13	728	3813	8758	3.0	46.5	7.35	13.02	0.00	32.15	3.31	10.70	18.88	15.7	85.79	85.79	24.0	86.2
2	1	7	513	1744	56	151	889	2400	0	0	10.83	650	4945	8758	3.0	60.3	5.67	13.02	32.15	32.15	3.31	8.19	18.88	55.1	137.43	137.43	38.5	153.9
															***TOTAL FLOW FROM AREA 2 = 170 L/s** (Max Design Flow Rate from Constant Speed Pumps @ Briarridge Pump Station)											
3	7	10	0	0	0	0	0	0	0	0	0	0	0	8758	3.0	106.9	1.48	14.51	32.58	64.73	2.88	0.00	18.88	104.4	40.12	263.34	73.7	285.0
4	10	15	0	0	0	0	0	0	0	0	0	0	0	8758	3.0	106.9	0.00	14.51	11.50	76.23	2.79	0.00	18.88	115.0	12.21	275.55	77.2	299.0
5	15	29	0	0	0	0	0	0	0	0	0	0	0	8758	3.0	106.9	0.00	14.51	28.06	104.29	2.62	0.00	18.88	139.5	31.76	307.31	86.0	332.4
6	29	32	0	0	6	16	34	92	0	0	0	0	108	8866	3.0	108.0	0.00	14.51	14.45	118.74	2.55	0.00	18.88	151.6	19.34	326.65	91.5	351.1

EXPANSION SCENARIO

AREA			RESIDENTIAL														COMMERCIAL		INDUSTRIAL			INSTITUTIONAL		C+I+I	INFILTRATION			
			Singles		Semis		Townhomes		Apartments		Fut. Res.		TOTAL															
ID	From	To	No.	Pop.	No.	Pop.	No.	Pop.	No.	Pop.	Area	Pop.	Pop.	Accum. Pop.	Peak Factor	Peak Flow (l/s)	Area (ha)	Accum. Area (ha)	Area (ha)	Accum. Area (ha)	Peaking Factor	Area (ha)	Accum. Area (ha)	Peak Flow (l/s)	Total Area (ha)	Accum. Area (ha)	Infilt. Flow (l/s)	Total Flow (l/s)
EXPANSION AREA			0	0	0	0	0	0	0	0	171.00	14529	14529	23287	2.6	152.2	0.00	13.02	0.00	32.15	3.31	0.00	18.88	0.0	171.00	394.22	47.9	207.0
1	1	7	431	1465	50	135	471	1272	2	213	12.13	728	3813	23287	2.6	39.9	7.35	13.02	0.00	32.15	3.31	10.70	18.88	15.7	85.79	394.22	24.0	79.6
2	1	7	513	1744	56	151	889	2400	0	0	10.83	650	4945	23287	2.6	51.8	5.67	13.02	32.15	32.15	3.31	8.19	18.88	55.1	137.43	394.22	38.5	145.4
															***TOTAL FLOW FROM AREA 2 = 170 L/s** (Max Design Flow Rate from Constant Speed Pumps @ Briarridge Pump Station)											
3	7	10	0	0	0	0	0	0	0	0	0	0	0	23287	2.6	244.0	1.48	14.51	32.58	64.73	2.88	0.00	18.88	104.4	40.12	434.34	121.6	470.0
4	10	15	0	0	0	0	0	0	0	0	0	0	0	23287	2.6	244.0	0.00	14.51	11.50	76.23	2.79	0.00	18.88	115.0	12.21	446.55	125.0	484.0
5	15	29	0	0	0	0	0	0	0	0	0	0	0	23287	2.6	244.0	0.00	14.51	28.06	104.29	2.62	0.00	18.88	139.5	31.76	478.31	133.9	517.4
6	29	32	0	0	6	16	34	92	0	0	0	0	108	23395	2.6	244.9	0.00	14.51	14.45	118.74	2.55	0.00	18.88	151.6	19.34	497.65	139.3	535.9

Design Parameters:

Avg Flow/Person = 350 l/day
Comm./Inst. Flow = 50,000 l/ha/day
Industrial Flow = 35,000 l/ha/day
Infiltration = 0.28 l/s/ha

Pipe Friction n = 0.013
Residential Peaking Factor = Harmon Equation (max 4, min 2)
Peaking Factor Comm./Inst. = 1.5
Industrial Peaking Factor per MOE Guidelines 6.604[A (ha)]^(-0.1992)

Future Residential = 60 People/Gross Hectare

Project: East March Trunk Analysis
Designed: KJM
Checked: MAB
Date: March 3, 2009

NOVATECH
ENGINEERING
CONSULTANTS LTD.
ENGINEERS & PLANNERS
Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario, Canada
K2M IP6
Telephone (613) 254-9643
Facsimile (613) 254-5867
Email: novainfo@novatech-eng.com

EAST MARCH TRUNK SANITARY DRAINAGE AREA PLAN

NORTH KANATA EXPANSION (AREAS 1a,b,c,d,h)

MARCH 2009 108001

LEGEND

- EXISTING RESIDENTIAL
- FUTURE RESIDENTIAL
- COMMERCIAL
- INSTITUTIONAL
- INDUSTRIAL
- OPEN SPACE
- P.S. PUMP STATION
- (12) SANITARY NODE ID #
- SANITARY MANHOLE
- SANITARY SEWER

1H
1C
1B
1D
1A
A 10
187.28 ha
A 7
32.74 ha
A 2
150.41 ha
A 1
89.95 ha
A 3
40.12 ha
A 4
12.21 ha
A 8
17.31 ha
A 5
31.76 ha
A 9
17.12 ha
A 6
19.34 ha
EAST MARCH
TRUNK (750mmØ)

MARCH ROAD
KLONDIKE ROAD
OTTAWA CENTRAL RAILWAY
MARCH VALLEY DRIVE
SANDHILL ROAD
SHIRLEY'S BROOK DRIVE
OLD CARP ROAD
HYDRO CORRIDOR
TERRY FOX DRIVE
LEGGET DRIVE
SOLANDT ROAD

SCALE
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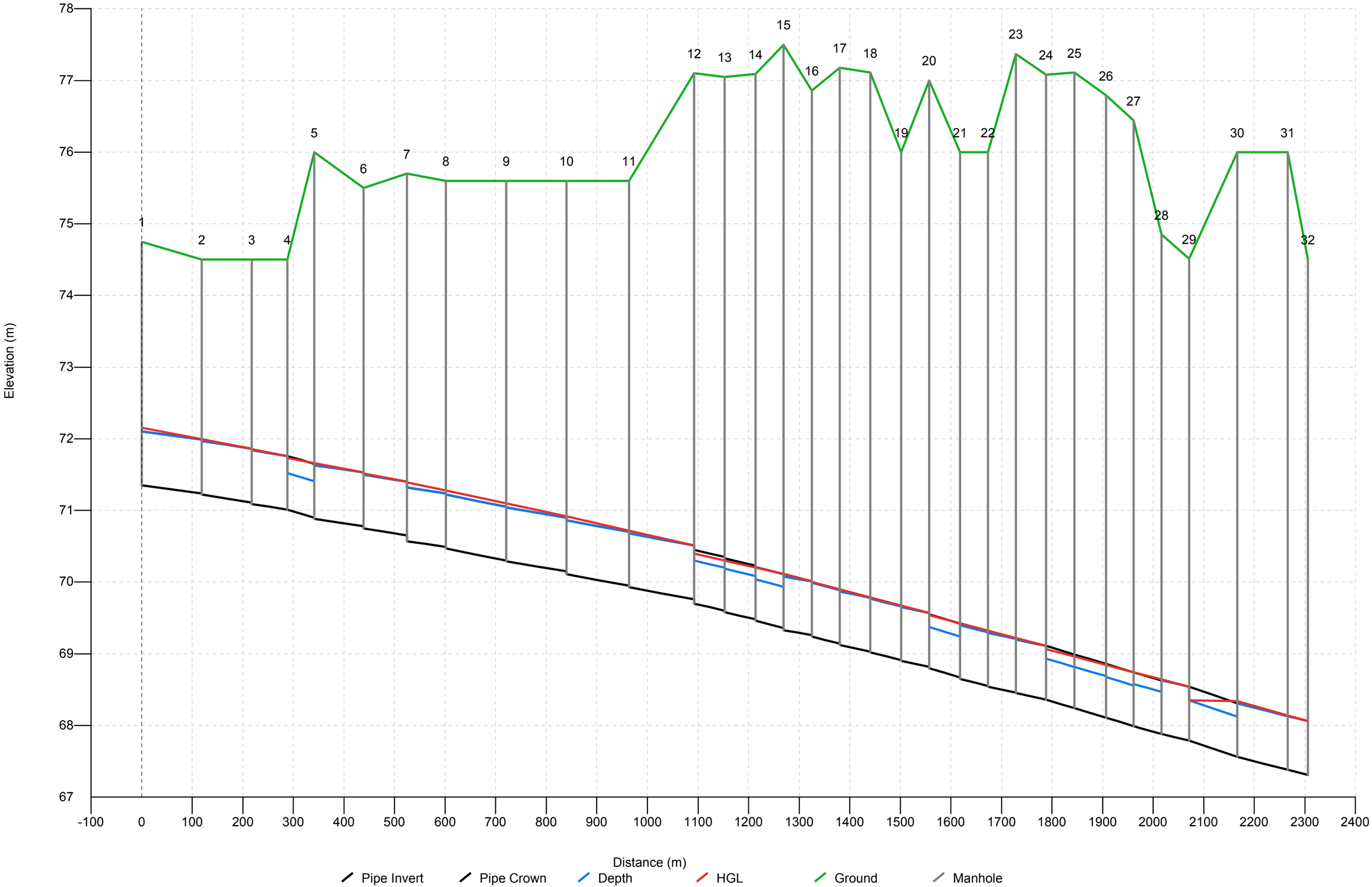
M:\2008\108001\CAD\design\East March Sanitary.dwg, North Kanata Expansion, Mar 18, 2009 - 4:20pm, kmurphy

SHT11X17.DWG - 279mmX432mm

EAST MARCH TRUNK - North Kanata Expansion (Areas 1a,b,c,d,h - 159 L/s)



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EAST MARCH TRUNK SANITARY DRAINAGE AREA PLAN

EXISTING CATCHMENT BOUNDARIES

MARCH 2009 108001

LEGEND

- EXISTING RESIDENTIAL
- FUTURE RESIDENTIAL
- COMMERCIAL
- INSTITUTIONAL
- INDUSTRIAL
- OPEN SPACE
- P.S. PUMP STATION
- (12) SANITARY NODE ID #
- SANITARY MANHOLE
- SANITARY SEWER

MARCH ROAD
KLONDIKE ROAD
OTTAWA CENTRAL RAILWAY
MARCH VALLEY DRIVE
BRIAR RIDGE P.S.
SANDHILL ROAD
SHIRLEY'S BROOK DRIVE
OLD CARP ROAD
KLONDIKE ROAD
MARCH ROAD
TERRY FOX DRIVE
HYDRO CORRIDOR
LEGGET DRIVE
SOLANDT ROAD
EAST MARCH TRUNK (750mmØ)
MARCH P.S.

A 1 89.95 ha
A 2 150.41 ha
A 3 40.12 ha
A 4 12.21 ha
A 5 31.76 ha
A 6 19.34 ha
A 7 32.74 ha
A 8 17.31 ha
A 9 17.12 ha

SCALE
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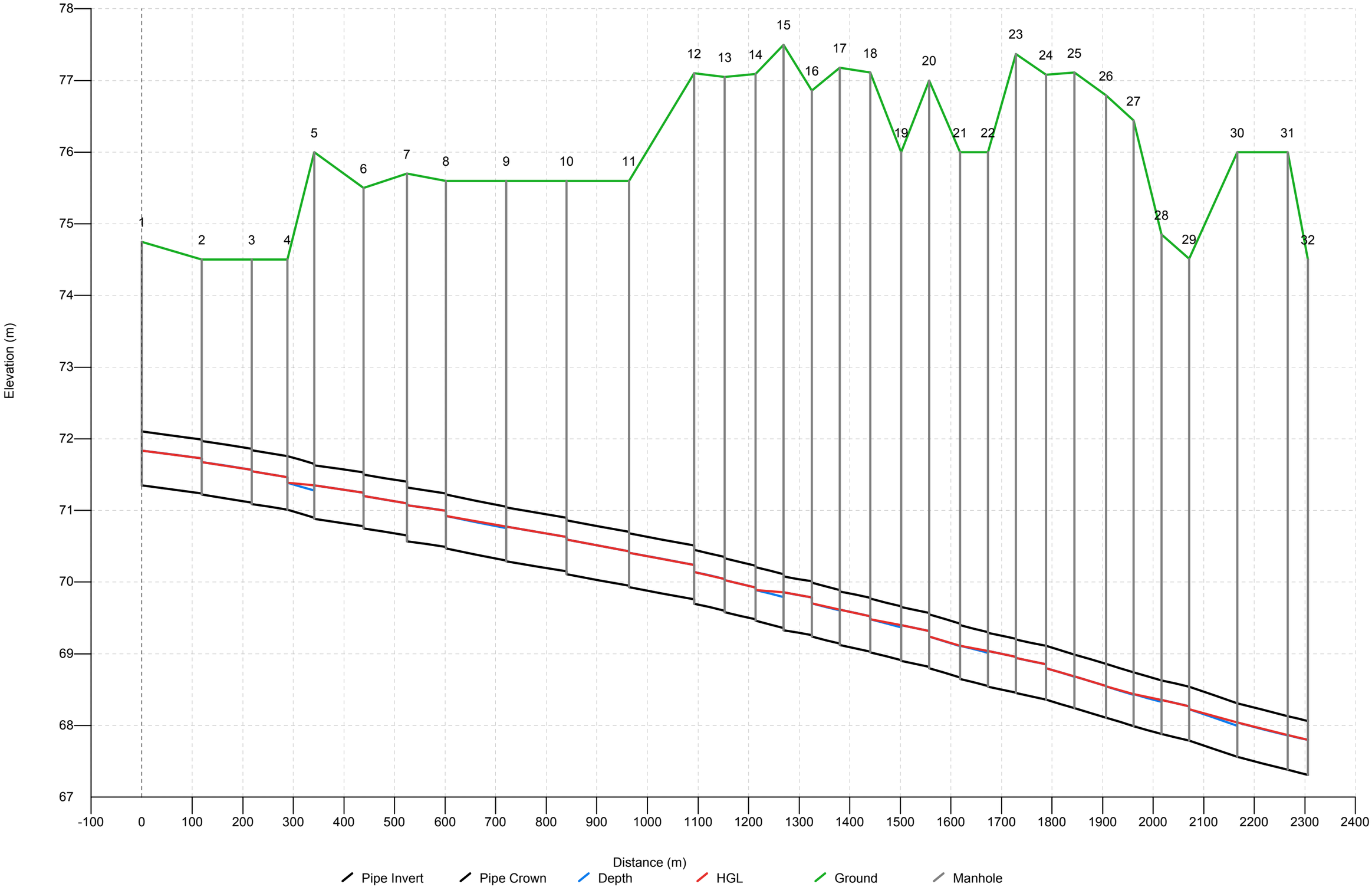
0 100 200 300 400

M:\2008\108001\CAD\design\East March Sanitary.dwg, 11x17 landscape, Mar 10, 2009 - 1:29pm, kmurphy

SHT11X17.DWG - 279mmX432mm

EAST MARCH TRUNK - Existing Urban Boundary (Pipe Profile @ Steady-State)



APPENDIX C-4

KANATA NORTH URBAN EXPANSION AREA

COMMUNITY DESIGN PLAN

Table C-4: Briar Ridge Pump Station (BRPS) - Capacity Analysis

PROJECT : 112117
DESIGNED BY: ARM
CHECKED BY: CJR
DATE: Mar-16

NOVATECH
Engineers, Planners & Landscape Architects

Design Data

	Design Area (ha)	Theoretical Peak Flow (L/s)	Forcemains (mm)	No. of Pumps (Qty)	Pump Impellers Model	Pump Impellers Dia (mm)	Rated Capacity (L/s)
Installed Design *	128	53	200 & 300	2	454	281	55
Ultimate Design at Build-Out **	128	173.8	200 & 300	3	452	330	183

*Installed Design approved per MOE Certificate of Approval 3079-4ZVRAG, dated August 24, 2001
**Refer to Cumming Cockburn Limited "Briarridge Sanitary Pumping Station Pre-Design Report, City of Kanata" June, 2001

Existing (Current) Flows

Based on existing conditions (as determined by monitored data provided by the City & aerial imagery) and full build out of existing design drainage area.

	BRPS Observed Flows (Per City of Ottawa SCADA)								Theoretical Design Flows (Build out of design drainage area)										
Note	Date	Max observed Inflow	Peak I/I	Avg DWF	Peak DWF	Peak I/I + Peak DWF	Units	Total Area	I/I	Population					ICI				Total
								****	0.28 L/s/ha	Area	Pop	Avg	PF	Peak	Area	Avg	PF	Peak	
		(L/s)	(L/s)		(L/s)	(L/s)	(Qty)	(ha)	(L/s)		(pers)	(L/s)		(L/s)	(ha)	(L/s)		(L/s)	(L/s)
BRPS Pump Station Observed Flows																			
Typical	Winter-16	23.3	4.43	11.1	18.9 ***	23.3													
Typical	Jan-15 to Dec-15	29.9	12.56	10.2	17.3 ***	29.9													
Event	Jun-14	37.3	20.64	9.8	16.7 ***	37.3													
Typical	Winter -14	27.1	9.25	10.5	17.9 ***	27.1													
Event	Apr-13	23.1	12.6		18.7	31.3													
Typical	Jan-13			10.9	17.5		1131	81.1	22.72		3442	13.94	3.39	47.28	8.68	3.52	1.5	5.27	75.28
Event	Apr-11	31.9	23		18.7	41.7													
Event	Jul-09	43.7	34.7		12.9	47.6													
Event	Sep-04	43.4	41.1		4.8	45.9	261	18.7	5.24		759	3.07	3.87	11.91		0.00	1.5	0.00	17.15
*** Note: Peaking factor of approximately 1.7 based on monitored SCADA data																			
****Note: Total Area based on aerial imagery corresponding with date of SCADA information used to calculate design I/I																			
Full Buildout of Design Drainage Area																			
Future Flows - Full Buildout of Design Drainage Area								49.4	13.84	10.45	680	2.75	3.32	9.15	32.32	13.09	3.3	43.21	66.20
Existing Flows - Observed as of March 2016								81.1	22.72					18.87					41.59
Based on 65pers/ha of undeveloped residential area																		**Total Flows Tributary to BRPS on Full Buildout =**	**107.79**

Distribution of Total Flows on Full Buildout

Note	Condition	Existing Flows	Peak DWF	Developed Area		Total Area	I/I	Population					ICI				Total
			Pro-Rated			*	0.28 L/s/ha	Area	Pop	Avg	PF	Peak	Area	Avg	PF	Peak	
			(L/s)	(ha)		(ha)	(L/s)		(pers)	(L/s)		(L/s)	(ha)	(L/s)		(L/s)	(L/s)
Klondike Road West	Existing		9.29	39.95		49.02	13.73	9.07	590	2.39	3.32	7.94					30.95
Klondike Road East	Future					19.18	5.37						14.18	5.74	3.3	18.956	24.33
March Valley Road Industrial	Future					19.80	5.54						18.14	7.35	3.3	24.25	29.79
Shirleys Brook Residential	Existing		9.58	41.19		42.57	11.92	1.38	90	0.36	3.32	1.21					22.71
Total			18.87	81.14		**130.57**	**36.56**	10.45	680	2.75		**9.15**	32.32	13.09		**43.21**	**107.78**

*Excluding Park and Open Space

Available Capacity

Assuming BRPS is upgraded from MOE approved capacity to CCL ultimate design.

	Flow (L/s)	
Ultimate Constructed Capacity (per CCL 2001 Report)	183	
Total Flows on Full Buildout of drainage area	107.79	-
2031 Design Flows (per 2013 IMP, including some KNUEA flow)	-	80
Available Capacity within Original BRPS Design Parameters	**75.21**	**103.00**

DESIGN PARAMETERS

Average Daily Flow (Future)=	350 L/cap/day	Industrial Peak Factor =	per MOE graph
Indust/Comm/Inst Flow =	35000 L/ha/day	Max Res Peak Factor=	4
Extraneous Flow =	0.28 L/s/ha	Comm/Inst Peak Factor=	1.5

PREPARED BY: NOVATECH
2016-04-01

Ontario

Ministry of the Environment / Ministère de l'Environnement

CERTIFICATE OF APPROVAL
MUNICIPAL AND PRIVATE SEWAGE WORKS
NUMBER 3079-4ZVRAG

Tenth Line Development Inc.
210 Gladstone Avenue, Suite 2001
Ottawa, Ontario
K2P 0Y6

Site Location: Briarridge Sewage Pumping Station
Lots 9 and 10, Concession IV
Ottawa City, (Ward 4 - Kanata), Ontario

You have applied in accordance with Section 53 of the Ontario Water Resources Act for approval of:

a sanitary sewage pumping station having an initial design peak flow capacity of 53 litres per second, to be constructed to serve the Briarridge Subdivision and surrounding drainage area of approximately 128 hectares, located approximately 130 metres north-east of Catterick Crescent, in the City of Ottawa, consisting of:

SEWAGE PUMPING STATION

a 3.66 metres diameter by approximately 11 metres depth, fiber reinforced plastic (FRP) wet well, equipped with two (2) submersible pumps (one duty, one standby), each rated at 55 litres per second at a total dynamic head of 23 metres, complete with piping, fittings, valves, by-pass connection, level controls, power supply, and a remote control building of 72 square metres floor area, complete with control room, chemical room, valve room and generator room, housing a 125 kilowatts rated standby power diesel generator set, telemetry system for remote station status indication, and all other items necessary to have a complete and operable pumping station;

SANITARY FORCEMAIN AND OVERFLOW PIPE

external piping consisting of a 300 millimetre diameter emergency overflow pipe from the pumping station to the nearby ditch to the west of the pumping station, and dual forcemains (200 millimetre and 300 millimetre diameter) from the pumping station, through the golf course access easement and railway corridor, along Block 24, Catterick Crescent, Shirley's Brook Drive (south), through the park area (Block 17) and Shirley's Brook Drive (north) for connection to the existing capped forcemain east of Helmsdale Road (for 300 millimetre diameter) and the existing trunk sanitary sewer at Sandhill Road (for 200 millimetre diameter); and

SANITARY SEWERS

to be constructed in the railway corridor, the pumping station access road, the golf course access easement and the pumping station site;

all in accordance with the application from Tenth Line Developments, dated March 20, 2001, including final plans, specifications, hydraulic design data sheets and "Briarridge Sanitary Pumping Station Pre-Design Report, City of Kanata", prepared by Cumming Cockburn Ltd., Consulting Engineers.

For the purpose of this Certificate of Approval and the terms and conditions specified below, the following definitions apply:

1. "Certificate" means this entire Certificate of Approval document, issued in accordance with Section 53 of the *Ontario Water Resources Act*;

2. "Director" means any Ministry employee appointed by the Minister pursuant to Section 5 of the *Ontario Water Resources Act*;

3. "Environmental Appeal Board" means the Environmental Review Tribunal established pursuant to the Environmental Review Tribunal Act;

4. "Ministry" means the Ontario Ministry of the Environment;

5. "Owner" means Tenth Line Development Inc.; and

6. "works" means the sewage works described in the Owner's application, this Certificate and in the supporting documentation referred to herein, to the extent approved by this Certificate.

You are hereby notified that this approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

GENERAL CONDITIONS

1. Except as otherwise provided by these Conditions, the Owner shall design, build, install, operate and maintain the works in accordance with the description given in this Certificate, the application for approval of the works and the submitted supporting documents and plans and specifications as listed in this Certificate.

2. Where there is a conflict between a provision of any submitted document referred to in this Certificate and the Conditions of this Certificate, the Conditions in this Certificate shall take precedence, and where there is a conflict between the listed submitted documents, the document bearing the most recent date shall prevail.

The reasons for the imposition of these terms and conditions are as follows:

Conditions No. 1 and No. 2 are imposed to ensure that the works are built and operated in the manner in which

they were described for review and upon which approval was granted. These conditions are also included to emphasize the precedence of Conditions in the Certificate and the practice that the Approval is based on the most current document, if several conflicting documents are submitted for review.

In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 101 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

The Notice should also include:

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the works are located;

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Appeal Board
2300 Yonge St., 12th Floor
P.O. Box 2382
Toronto, Ontario
M4P 1E4

AND

The Director
Section 53, *Ontario Water Resources Act*
Ministry of the Environment
2 St. Clair Avenue West, Floor 12A
Toronto, Ontario
M4V 1L5

*** Further information on the Environmental Appeal Board's requirements for an appeal can be obtained directly from the Board at: Tel: (416) 314-4600, Fax: (416) 314-4506 or www.ert.gov.on.ca**

The above noted sewage works are approved under Section 53 of the Ontario Water Resources Act.

DATED AT TORONTO this 24th day of August, 2001

Yvonne Hall, P.Eng.
Director

KC/

c: District Manager, MOE Ottawa District Office
Jim Moffatt, P. Eng., Cumming Cockburn Limited
P. Pagé, City Clerk & Director, Secretariat Services, The Corporation of the City of Ottawa
R. Phillips, Interim Coordinator - Ottawa West, The Corporation of the City of Ottawa
C. Goulet, P.Eng., MOE Ottawa District Office

THIS CERTIFICATE WAS MAILED
ON Aug 28 01
(Signed)

Ministry of the Environment
Environmental Assessment and Approvals Branch
Floor 12A
2 St Clair Ave W
Toronto ON M4V 1L5
Fax: 416-314-8452
Telephone: (416) 314-8001

Ministère de l'Environnement
Direction des évaluations et des autorisations environnementales
Étage 12A
2 av St Clair O
Toronto ON M4V 1L5
Télécopieur: 416-314-8452
Téléphone : (416) 314-8001

Ontario

May 11, 2001

Jim Burghout, Development Manager
Tenth Line Development Inc.
210 Gladstone Avenue, Suite 2001
Ottawa, Ontario
K2P 0Y6

Dear Sir:

Re: Application for Approval of Air
Diesel Generator
Ottawa City, Regional Municipality Of Ottawa-Carleton, Ontario
MOE Reference Number 5533-4VXNTT

Please find enclosed the Certificate of Approval for the above noted reference number.

The certificate is issued for your emergency diesel generator set with a general requirement for compliance with noise limits set out in the Ministry Publication NPC-205. Please note that in order to achieve compliance, it is necessary to have appropriate silencing equipment and materials installed. The following minimum recommendations for noise abatement measures should be adequate for a majority of installations:

- Acoustical treatment of the cooling air intake and exhaust openings (facing the receptor within ± 90 0 angle from the axis of each opening) in the mechanical room housing the diesel generator set, capable of providing the following values of Insertion-Loss in 1/1 octave frequency bands:

Centre Frequency (Hertz)	125	250	500	1000	2000	4000
Insertion-Loss (decibels)	10	12	14	15	15	15

- Engine combustion exhaust muffler for the diesel generator set, capable of providing the following values of Insertion Loss in 1/1 octave frequency bands:

Centre Frequency (Hertz)	125	250	500	1000	2000	4000
Insertion-Loss (decibels)	23	29	30	28	22	21

and;

- External doors in the mechanical room housing the diesel generator-set made of at least 50 millimetres thick solid slab wood or steel skin with glass fibre insulated core, set in a door jamb