SERVICING BRIEF
MINTO COMMUNITIES INC. - HARMONY STAGE 2
4025 STANDHERD DRIVE

CITY OF OTTAWA

July 2017

Prepared for:

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JLR No.: 24051-002

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

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1.0 INTRODUCTION

1.1 General

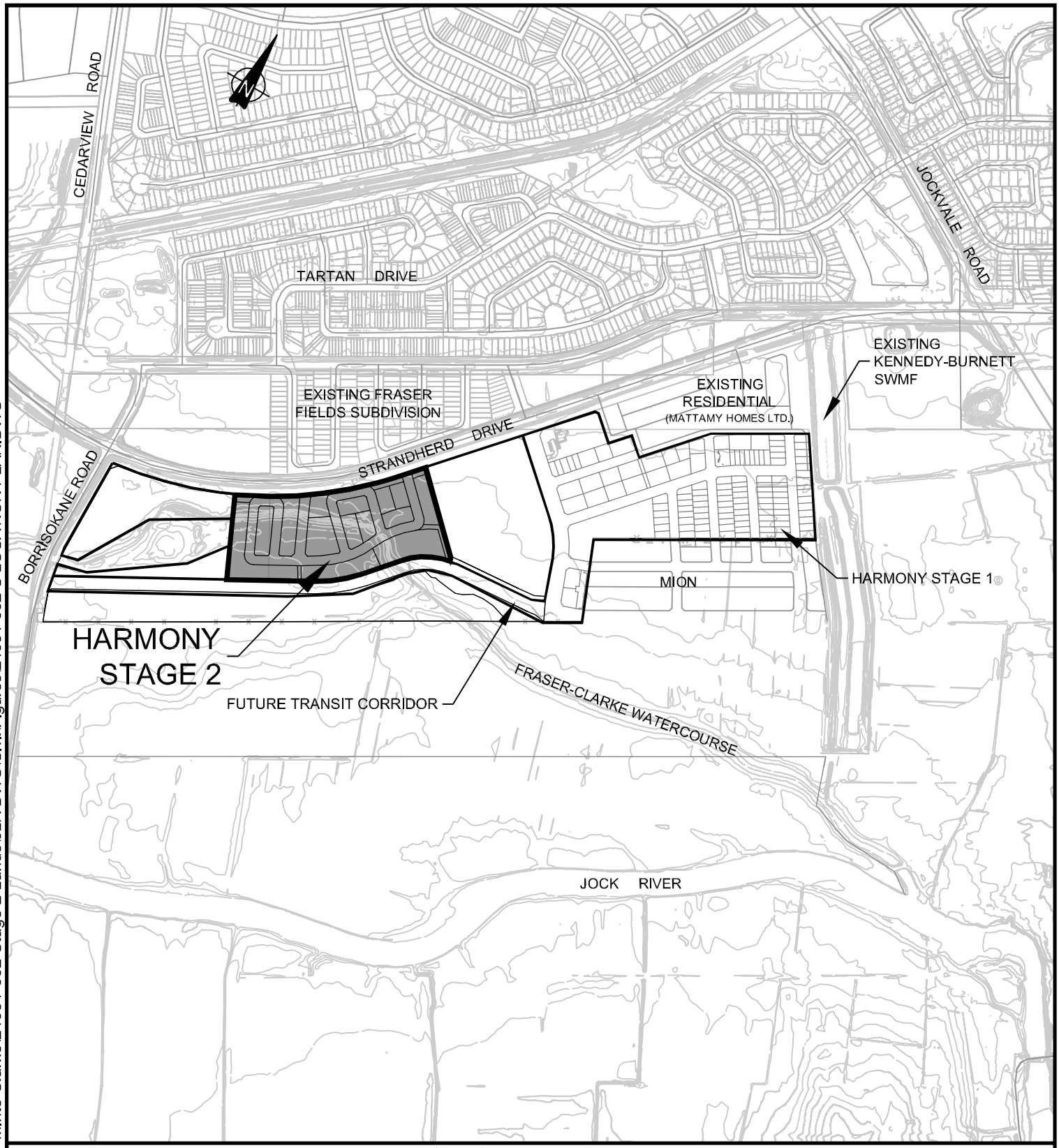
Minto Communities Inc. (Minto) has retained the services of J.L. Richards & Associates Limited (JLR) to prepare a Servicing Brief for the development of their site located at 4005 Strandherd Drive, herein referred to as Harmony Stage 2, in the Barrhaven Community within the City of Ottawa. This Servicing Brief outlines the proposed servicing strategy for the Harmony Stage 2 lands in accordance with previous servicing studies developed for the subject area (presented in Section 1.4 of this Brief) and the November 2009 Servicing Study Guidelines for Development Applications in the City of Ottawa. This Servicing Brief is in support of a Draft Plan Revision Application for Block 124 and Block 125 of Draft Plan D-07-16-16-0004, as approved on May 5, 2017.

1.2 Property Description

Minto's Harmony Stage 2 is a ±6.6 ha parcel of land bounded to the north by Strandherd Drive, to the south by a future transit corridor, to the west by future development blocks and to the east by a future school block as depicted on the Location Plan in Figure 1. Currently, the land is undeveloped and generally drains southerly toward the Fraser Clarke Watercourse (formerly the Fraser Clarke Municipal Drain), which outlets to the Jock River to the south, near the outlet channel of the Kennedy-Burnett Stormwater Management Facility (SWMF). There is an existing temporary SWMF located immediately south of Strandherd Drive within the Harmony Stage 2 lands that currently provides stormwater quality control for the existing Fraser Fields residential subdivision located directly north of Strandherd Drive. The legal description of the subject property is Part of Lots 14 and 15, Concession 3 (Rideau Front), Geographic Township of Nepean, City of Ottawa.

1.3 Proposed Development

Minto's Harmony Stage 2 concept plan consists of 25 single family dwellings, 68 townhouse units and 64 back-to-back townhouse units (refer to Minto's Harmony Stage 2 Concept Plan provided in Appendix 'A'). The proposed concept plan is in conformance with the proposed zoning (R3YY[2145]) of the property, including a combination of single family dwellings, townhouse units and back-to-back townhouse units. Alternate unit layouts comprised of the permitted residential uses may be used at the detailed design stage. Nonetheless, the current concept plan denotes the general layout of single family dwellings, townhouse units and back-to-back townhouse units as well as demonstrates the capacity of the Stage 2 lands to accommodate all units. The proposed Harmony Stage 2 development also includes a 9 metre wide servicing corridor (Block 126) to the south of the future school block, a 0.38 ha park block and a 0.63 ha SWM block. Surrounding the Harmony Stage 2 lands is a 2.28 ha future bus rapid transit (BRT) corridor (Block 121) to the south, a future 4.86 ha school block to the east and two future development blocks (Block 122 – 0.82 ha and Block123 – 2.51 ha) to the west which are anticipated for employment use (refer to the Draft Plan of Subdivision provided in Appendix 'A').



PROJECT:

MINTO COMMUNITIES INC.
HARMONY STAGE 2
PART OF 4025 STRANDHERD DRIVE, OTTAWA

DRAWING:

LOCATION PLAN

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

DESIGN: JW	JLR NO: 24051–002
DRAWN: TB	DRAWING NO.: FIGURE 1
CHECKED: KF	

File Location: R:\24000\24051 LD Minto Clarke\24051-002 Stage 2 Lands\JLR DWG\Civil\Figures\24051-002 C LOCATION PLAN.DWG

PLOT DATE: July 6, 2017 3:04:37 PM

1.4 Background Documentation

Multiple servicing studies have been completed with respect to the municipal infrastructure servicing the Harmony Stage 2 development:

- Infrastructure Master Plan (City of Ottawa, November 2013);
- Kennedy-Burnett Potable Water Master Servicing Study (Stantec Consulting Ltd., April 2014);
- South Nepean Collector Sewer Alignment Finalisation Report (Novatech Engineering Consultants Ltd., revised December 2014); and
- Servicing Options for Lands Surrounding the Kennedy-Burnett SWMF (Novatech Engineering Consultants Ltd., revised January 2017).

In addition to the above-noted studies, an Environmental Assessment was carried out for the expansion of the existing Kennedy-Burnett SWMF and was approved by the City's Planning Committee on June 27th, 2017. An Environmental Assessment for the Chapman Mills Drive extension has also been completed and an Environmental Assessment for the future BRT corridor is ongoing.

2.0 WATER SERVICING

Potable water for Harmony Stage 2 will ultimately be supplied by a future 406 mm diameter watermain along Strandherd Drive. This watermain is planned to extend from Fallowfield Road to Greenbank Road as per the City of Ottawa's Infrastructure Master Plan (IMP) dated November 2013 (refer to extract from the 2013 IMP provided in Appendix 'B'). It is our understanding that construction of the 406 mm diameter watermain will coincide with the proposed urbanization of Strandherd Drive.

Should the Harmony Stage 2 development be constructed with occupancy in advance of the commissioning of the Strandherd Drive 406 mm diameter watermain, it is anticipated that interim water servicing for the Harmony Stage 2 lands can be provided by connections to existing local watermains. These watermain connections include the following, as shown on the Harmony Stage 2 Conceptual Site Servicing Plan (Drawing CS1):

- One (1) connection to the proposed 300 mm diameter watermain stub on Chapman Mills Drive (from Harmony Stage 1), which will extend along the 9 metre wide servicing corridor to the south of the future school block;
- One (1) connection to the existing 300 mm diameter watermain on Tartan Drive, located north of Strandherd Drive.

Preliminary Hydraulic Network Analysis (HNA) results have been provided in Appendix 'B' and show that the residential units within the Stage 2 lands can achieve adequate fire flows through connections to the aforementioned existing local watermains for the interim condition (before the 406 mm Strandherd watermain is commissioned) as well as for the ultimate condition (after the 406 mm Strandherd watermain is commissioned). The minimum required fire flows of 167 L/s for single family units and 183 L/s for row townhouses and back-to-back units are met within the residential lands in accordance with City Technical Bulletin ISDTB-2014-02. The proposed water servicing approach for the interim condition is generally consistent with scenario 2A as

outlined in the Kennedy-Burnett Potable Water Master Servicing Study prepared by Stantec Consulting Ltd. (April 2014).

The future development blocks (Block 122 and 123) will require further site plan approval and will require the commissioning of the 406 mm diameter Strandherd watermain so that connections can be made to this feedermain to provide potable water to this portion of the development. Specific watermain connection options for these blocks will be addressed at the time of site plan approval.

Water servicing specifics such as hydrant spacing, watermain looping and sizing of the local watermains will be addressed in greater detail with a hydraulic network analysis (HNA) during the engineering detailed design stage. The HNA will demonstrate that the proposed watermain sizing within Harmony Stage 2 can deliver the water demands during the peak hourly and maximum day plus fire flow conditions while meeting the pressure requirements prescribed in the City of Ottawa Water Distribution Design Guidelines (July 2010) and the Technical Bulletin issued on May 27, 2014 (ISDTB-2014-02). The analysis will include an assessment of system pressures during low demand conditions (i.e., high pressure check) to determine the need for pressure reducing valves if maximum pressure requirements are exceeded, per the Ontario Building Code (OBC) and Ministry of the Environment and Climate Change (MOECC).

3.0 WASTEWATER SERVICING

As part of the 2013 IMP, the City identified the need to extend the existing South Nepean Collector (SNC) in order to support growth in the Barrhaven Community and provide servicing for future development, including Minto's Harmony Stage 2 development. As per the 2013 IMP, construction of Phase 2 of the SNC started at the upstream end of the existing SNC, located at Jockvale Road just north of the Jock River, and extended northwesterly to Standherd Drive via the future Chapman Mills Drive extension (refer to the extract from the 2013 IMP provided in Appendix 'C').

Construction of the 900 mm dia. Phase 2 SNC extension is complete and is anticipated to be operational up to Strandherd Drive by the end of the 2017 construction season. Given this estimated timeframe, it is anticipated that the SNC extension will be available to service the Harmony Stage 2 development via the servicing corridor (Block 126) that links the Stage 2 lands with Phase 2 of the SNC along Chapman Mills Drive (refer to Drawing CS1 – Conceptual Site Servicing Plan). Sanitary servicing for Harmony Stage 2 will be provided by local gravity sanitary sewers that will ultimately outlet to the SNC at the south end of Chapman Mills Drive, just north of the future BRT corridor at SAN MH 7.

Sanitary servicing for the future development blocks (Blocks 122 and 123) to the west of Harmony Stage 2 could be accommodated by the Stage 2 sanitary sewer system via a servicing corridor anticipated to be located at the north-west corner of the Stage 2 lands (refer to City Proposed Concept Plan provided in Appendix 'A'). Although Phase 3 of the SNC extension along Standherd Drive could also serve as a sanitary outlet for the Harmony Stage 2 lands and future development blocks, it is anticipated that development of these lands will proceed in advance of construction of Phase 3 of the SNC extension, which is anticipated to be constructed between 2019 and 2024 (refer to the extract from the 2013 IMP provided in Appendix 'C').

Consequently, a sanitary sewer system servicing Harmony Stage 2 will outlet via the servicing corridor (Block 126) to Phase 2 of the SNC on Chapman Mills Drive (refer to Drawing CS1 - Conceptual Site Servicing Plan).

As previously mentioned, Minto's Harmony Stage 2 concept plan consists of 25 single family dwellings, 68 townhouse units and 64 back-to-back townhouse units. The proposed development also includes a 9 metre wide servicing corridor, a 0.38 ha park block and a 0.63 ha SWM block. The sanitary sewer system for Harmony Stage 2 may also provide servicing for the future development blocks (Block 122 and 123) anticipated for employment use located west of Harmony Stage 2 (refer to the Draft Plan of Subdivision provided in Appendix 'A'). Table 3.1 below summarizes the calculated peak flows for each land use within the proposed Harmony Stage 2 development.

Table 3.1: Conceptual Peak Flow Calculations for Harmony Stage 2

Land Allocation	Population[(1)]	Area	Average Flow	Peaking Factor[(2)]	Peak Flow	Infiltration Flow[(3)]	Total Flow
Residential / Park / SWM (Block 124 and 125)	450 cap	6.44 ha	350 L/cap/day	2.90	5.29 L/s	1.80 L/s	7.09 L/s
Servicing Corridor (Block 126)	N/A	0.11 ha	N/A	N/A	N/A	0.03 L/s	0.03 L/s
Future Development (Block 122 and 123)	N/A	3.33 ha	50,000 L/ha/day	1.5	2.89 L/s	0.93 L/s	3.82 L/s
						Total Harmony Stage 2 Peak Flow:	7.12 L/s
						Total Future Development Peak Flow:	3.82 L/s
						TOTAL CONCEPTUAL PEAK FLOW:	**10.94 L/s**

(1) Based on 3.4 person/unit for single homes and 2.7 person/unit for townhomes and back-to-backs as per the City of Ottawa Sewer Design Guidelines.
(2) Peaking Factors: Residential peaking factor based on Harmon equation while commercial/employment/institutional peaking factor set as per the City of Ottawa Sewer Design Guidelines (refer to Appendix 'C' for calculations).
(3) Based on 0.28 L/s/ha infiltration allowance as per the City of Ottawa Sewer Design Guidelines.

As indicated in Table 3.1 above, the conceptual peak flow calculated for the proposed Harmony Stage 2 development, inclusive of the future development blocks, is ±10.9 L/s (including infiltration flows). This calculated peak flow is ± 0.5 L/s less than the peak flow of ±11.4 L/s allocated for the Harmony Stage 2 and future development land as part of the Phase 2 SNC detailed design completed by Novatech Engineering Consultants Ltd. (refer to the South Nepean Collector – Phase 2 & 3 Sanitary Sewer Design Sheet and Drainage Area Plan prepared by Novatech in Appendix 'C'). Given the residual capacity of the 900 mm dia. SNC outlet of ±597 L/s and the total conceptual flow of ±371.7 L/s (360.3 L/s + 11.4 L/s) it is noted

that the SNC has adequate capacity to accommodate the conceptual peak flow of ±10.9 L/s (refer to calculations on the South Nepean Collector – Phase 2 & 3 Sanitary Sewer Design Sheet in Appendix 'C').

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

4.1 Overview of the Servicing Strategy

A storm servicing and stormwater management strategy for the Harmony Stage 2 lands was first identified as part of Novatech's Storm Servicing Options Evaluation Report for Future Development Lands Adjacent to Kennedy-Burnett Stormwater Management Facility (dated December 2015). Among the objectives of the 2015 Storm Servicing Evaluation Report, Novatech was to determine whether future development to the west and east of the Kennedy-Burnett SWMF could be serviced by an expanded SWMF. The report was revised and reissued in January 2017.

Novatech's 2017 storm servicing approach for the Harmony Stage 2 lands consisted of a wet pond for the Stage 2 lands to address water quality treatment and water quantity controls prior to discharge to the Fraser Clarke Watercourse. The preferred option from Novatech's January 2017 report is shown in Figure 6 Option 4: Hybrid Expanded K-B SWMF /HDS Units, dated January 2017 (a copy of which is provided in Appendix 'D'). This Figure indicates that submergence of storm sewers is anticipated in the order of ±200 m.

Currently, stormwater quality control for the existing Fraser Fields residential subdivision located immediately north of Strandherd Drive is provided by a temporary wet pond facility, located immediately south of Strandherd Drive within the Harmony Stage 2 lands (Block 125), which currently outlets via a ditch system to the Fraser Clarke Watercourse. Novatech's storm servicing strategy also recommended that flows from the Fraser Field Subdivision be treated via the proposed wet pond developed as part of the Harmony Stage 2 subdivision prior to outletting to the Fraser Clarke Watercourse. At such time, the existing temporary wet pond servicing the Fraser Fields residential subdivision may be decommissioned and the development of Harmony Stage 2 may proceed. The storm flows generated by the Fraser Fields subdivision will be re-routed via the Harmony Stage 2 storm sewer system and outlet at the new wet pond proposed within the south-east corner of the Harmony Stage 2 lands.

4.2 Fraser Clarke Watercourse

In April 2016, Parish Aquatic Services completed an Erosion Threshold Assessment of the Clarke Drain (Fraser Clarke Watercourse). The field work and desktop assessment identified that the Fraser Clarke Watercourse had an erosion threshold of 1,700 L/s and that any increase in duration of flows in excess of 1,700 L/s would result in an increase in erosion of the watercourse and deterioration in the quality of the watercourse. The results identified in the Erosion Threshold Assessment of the Fraser Clarke watercourse were accepted by the Rideau Valley Conservation Authority (RVCA) in a Technical Review Memorandum dated November 7, 2016 (provided in Appendix 'D').

To assess the duration of flows in excess of 1,700 L/s, a PCSWMM model was developed under a long-term simulation of 30 years of precipitation and evaporation data. This modelling tool was used to identify whether the erosion threshold target was met.
Analysis of the continuous simulation of the Fraser Clarke Watercourse and surrounding catchment was undertaken by JLR in December 2016 and a Memorandum was issued to the City (see Appendix 'D'). The Memo identified that a proportional release rate of 77 L/s/ha from the catchment lands to the Fraser Clarke Watercourse, achieved via stormwater management facilities, kept the duration of flows below the erosion threshold in the continuous simulation.

4.3 Servicing Approach

The following is a summary of the storm design criteria for the proposed Harmony Stage 2 lands, which were derived from the 2012 City of Ottawa Design Guidelines and the recent Technical Bulletin PIEDTB-2016-01, dated September 6, 2016, herein referred to as the Design Guidelines:

- Storm sewers are to be designed to capture a minimum 1:2 year storm event on local streets using the Rational Method and the 1:2 year Intensity-Duration-Frequency (IDF) equations as per the Design Guidelines.
- An inlet time of 10 minutes is to be used for the sizing of street storm sewers per the Design Guidelines.
- The runoff coefficients (C-factors) for the residential development to be based on the maximum lot coverage permitted by the proposed zoning, as per the Design Guidelines. C-factors for non-residential land uses to be calculated based on the ratio of pervious and impervious surfaces depicted on proposed site plans.
- Maximum street ponding depth of 350 mm (static and dynamic) as per the Design Guidelines.
- Quality control to meet a MOECC Enhanced Level of Protection (80% TSS removal) via water quality units or a new wet pond.
- Quantity control for lands tributary to the Fraser Clarke Watercourse to be provided so that the free flowing capacity of the watercourse is not exceeded and the duration of flows greater than the erosion threshold of 1700 L/s is not exceeded.
- Major system flow up to the 1:100 year storm event to be contained onsite for the future development blocks (Block 122 and 123).

4.4 Conceptual Servicing Design

The conceptual storm servicing design presented on Drawing CS1 consists of the following:

- Storm sewers were conceptually sized to capture the 1:5 year storm event. Given that the simulated capture is greater than the minimum 1:2 year, it will be re-evaluated at detailed design.
- A release rate from the site of 77 L/s/ha was used to maintain the duration of flows under the erosion threshold along the Fraser Clarke Watercourse. This is to ensure that the free flowing capacity of the watercourse is not exceeded, based on the analysis completed by JLR in December 2016 (refer to Memorandum provided in Appendix 'D').

5.0 SUMMARY OF SERVICING

Servicing of Minto's Harmony Stage 2 development, as depicted on the Conceptual Site Servicing and Grading Plans, has been accounted for in previous studies completed for the subject area. In general, the lands will be serviced as follows:

- Potable water is to be supplied to Harmony Stage 2 via the future 406 mm diameter watermain on Strandherd Drive, which is anticipated to be operational by 2019. In the interim, water supply for the residential blocks within the Stage 2 lands can be provided by connections to existing local watermains. The future development blocks (Block 122 and 123) will be subject to further site plan approval and will require the commissioning of the 406 mm diameter Strandherd watermain.
- Wastewater servicing for Harmony Stage 2 is to be provided by the existing 900 mm diameter SNC along the Chapman Mills Drive extension which is anticipated to be operational in 2017. Wastewater servicing for the future development blocks (Blocks 122 and 123) could be provided by the Stage 2 sanitary sewer system or Phase 3 of the SNC extension along Standherd Drive.
- The existing Fraser Fields subdivision temporary wet pond is to be decommissioned and a new wet pond servicing both the Fraser Fields subdivision and the future residential/park blocks within Stage 2 is to be implemented. The new wet pond will provide both quality and quantity control prior to outletting the Fraser Clarke Watercourse. Quality control for the future development blocks (Block 122 and 123) is to be provided by either a private water quality treatment unit or wet pond.

This report has been prepared for the exclusive use of Minto Communities Inc., for the stated purpose, for the named facility. Its discussions and conclusions are summary in nature and cannot be properly used, interpreted or extended to other purposes without a detailed understanding and discussions with the client as to its mandated purpose, scope and limitations. This report was prepared for the sole benefit and use of Minto Communities Inc. and may not be used or relied on by any other party without the express written consent of J.L. Richards & Associates Limited.

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

Julie White

Julie White, E.I.T.

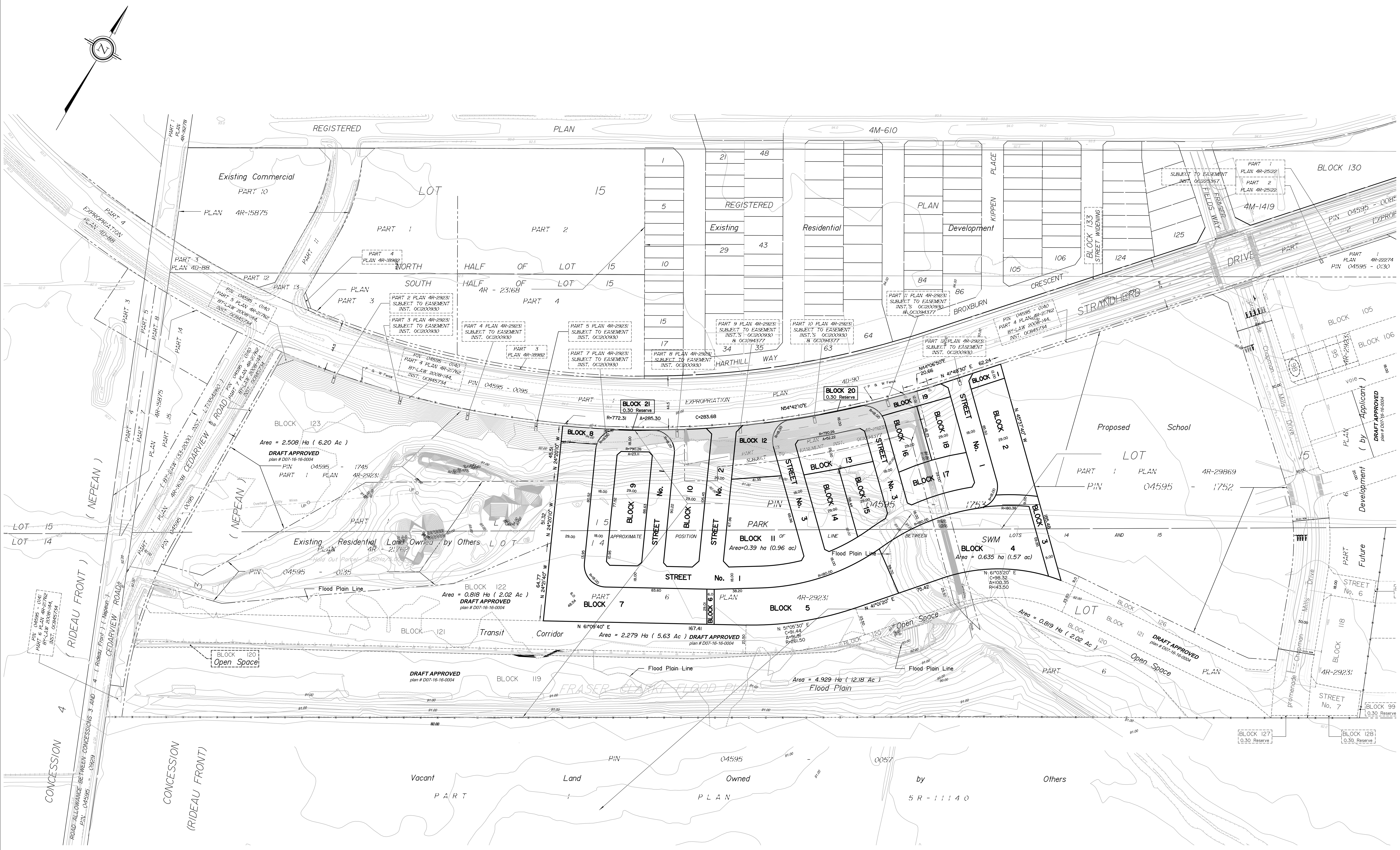
Reviewed by:

LICENSED PROFESSIONAL ENGINEER
J. S. G. FORGET
PROVINCE OF ONTARIO

Guy Forget, P.Eng.

Appendix A

Draft Plan of Subdivision



SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED

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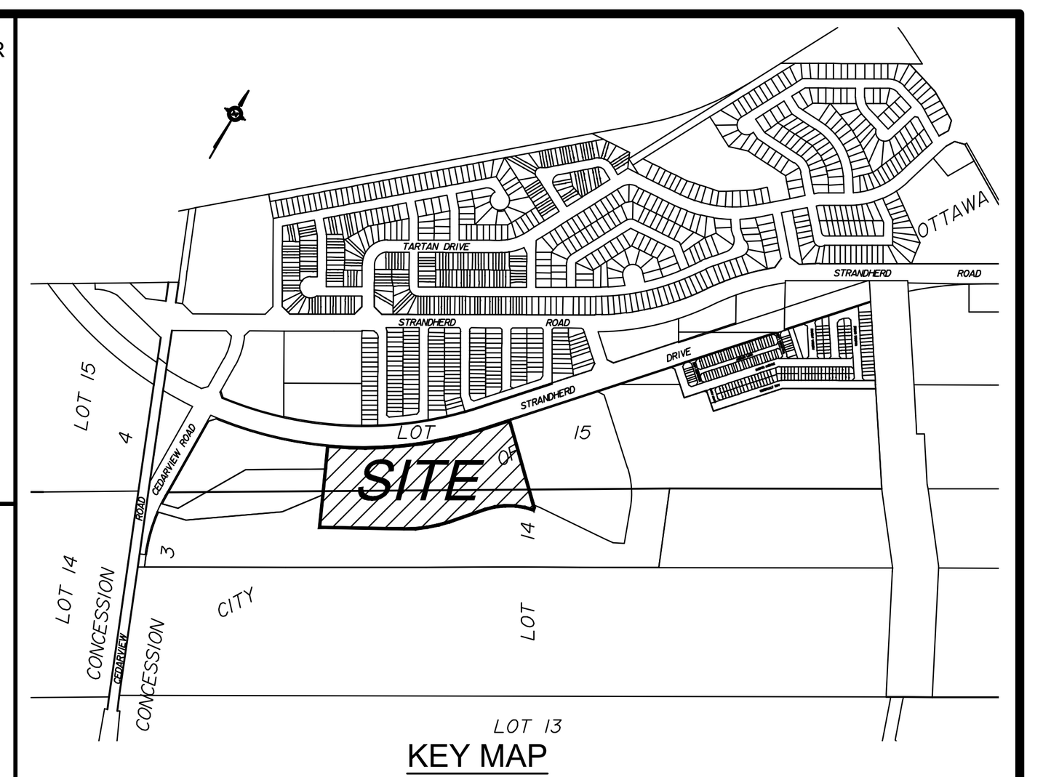
THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT.
THIS □□□□DAY OF □□□□□□□□□□□□, 2017 .

□□□□□□□□□□□□□□□□□□□□□□□□□□□□
DON HERWEYER, MCIP, RPP, MANAGER
DEVELOPMENT REVIEW SOUTH ,
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA



KEY MAP
NOT TO SCALE

DRAFT PLAN OF SUBDIVISION OF

PART OF LOTS 14 And 15 CONCESSION 3 (RIDEAU FRONT)

Ge□gra□hi□ T□wnshi□ □□Ne□ean

CITY OF OTTAWA

Pre□ared b□ Annis , O□Su□i□an , V□□ebe□□ Ltd.

S□a□e 1 : 1250

50 37.5 25 12.5 0 25 50 Metres

Metri□

DISTANCES SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048

SURVEYOR□S CERTIFICATE

I CERTIFY THAT :
The b□undaries □□the □ands t□ be subdi□ided and their re□ati□nshi□ t□ ad□□ining □ands ha□e been a□□urate□□ and □□rre□t□□ sh□wn.

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Date	V. Andrew She□□ ONTARIO LAND SURVEYOR

OWNER□S CERTIFICATE

This is t□ □erti□□ that I am the □wner / agent □□the □ands t□ be subdi□ided and that this □□an was □re□ared in a□□□rdan□e with m□ instru□ti□ns.

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Date	Susan Mur□h□ Vi□e President, Land De□e□□□ment Mint□ C□mmunities In□. I ha□e the auth□rit□ t□ bind the □□r□□rati□n
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Date	Brent Stra□han Seni□r Vi□e President Mint□ C□mmunities In□. I ha□e the auth□rit□ t□ bind the □□r□□rati□n

ADDITIONAL INFORMATION RE□UIRED UNDER SECTION 51-17 OF THE PLANNING ACT

(a) see □□an
(b) see □□an
(□) see □□an
(d) residentia□ h□using, st□rm water management, □□en s□a□e and □ar□ □and
(e) see □□an
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(□) see □□an

REVISION SCHEDULE

N□.	Re□isi□n	Date	BY
2	re□isi□ns	June 28, 2017	N
1	□□an □□r dis□ussi□n	June 26, 2017	N

Ontario Land Surveyors
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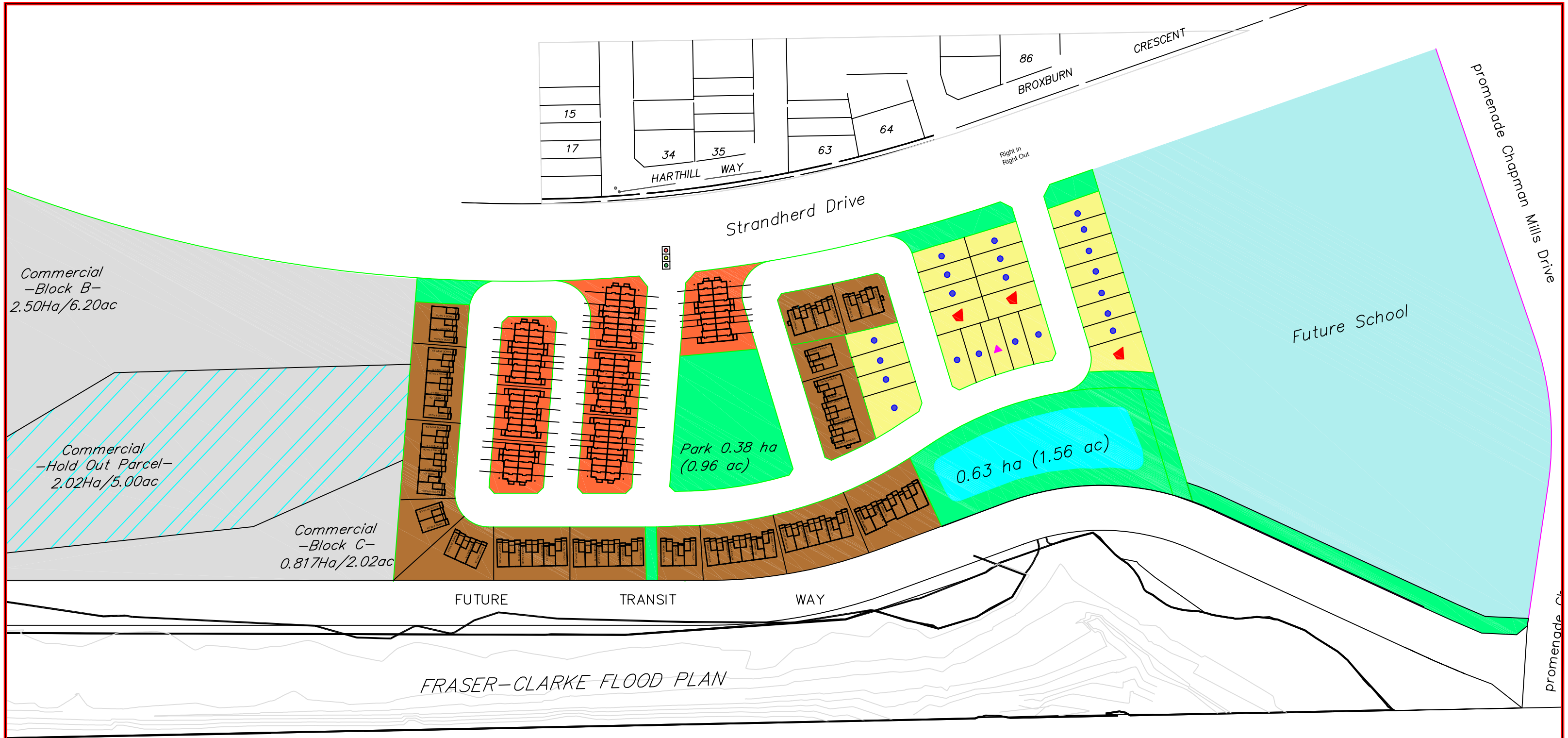
Email: Nepean@aovltd.com

Job No. 15537-16 Minto Pt Lts 14 15 C3 RFNP Stage 2 DPS D2 | N



Harmony Stage II - Plan 1

Date Created: June 5, 2017
Last Revised: June 16, 2017
Author: Adam Renaud
Scale: 1:2

30' Unit Possible

36' Unit Possible

43' Unit Possible

Unit Count		
Singles	25	1x30', 21x36' and 3x43'
Townhomes	68	
B2B	64	
Total Units	157	

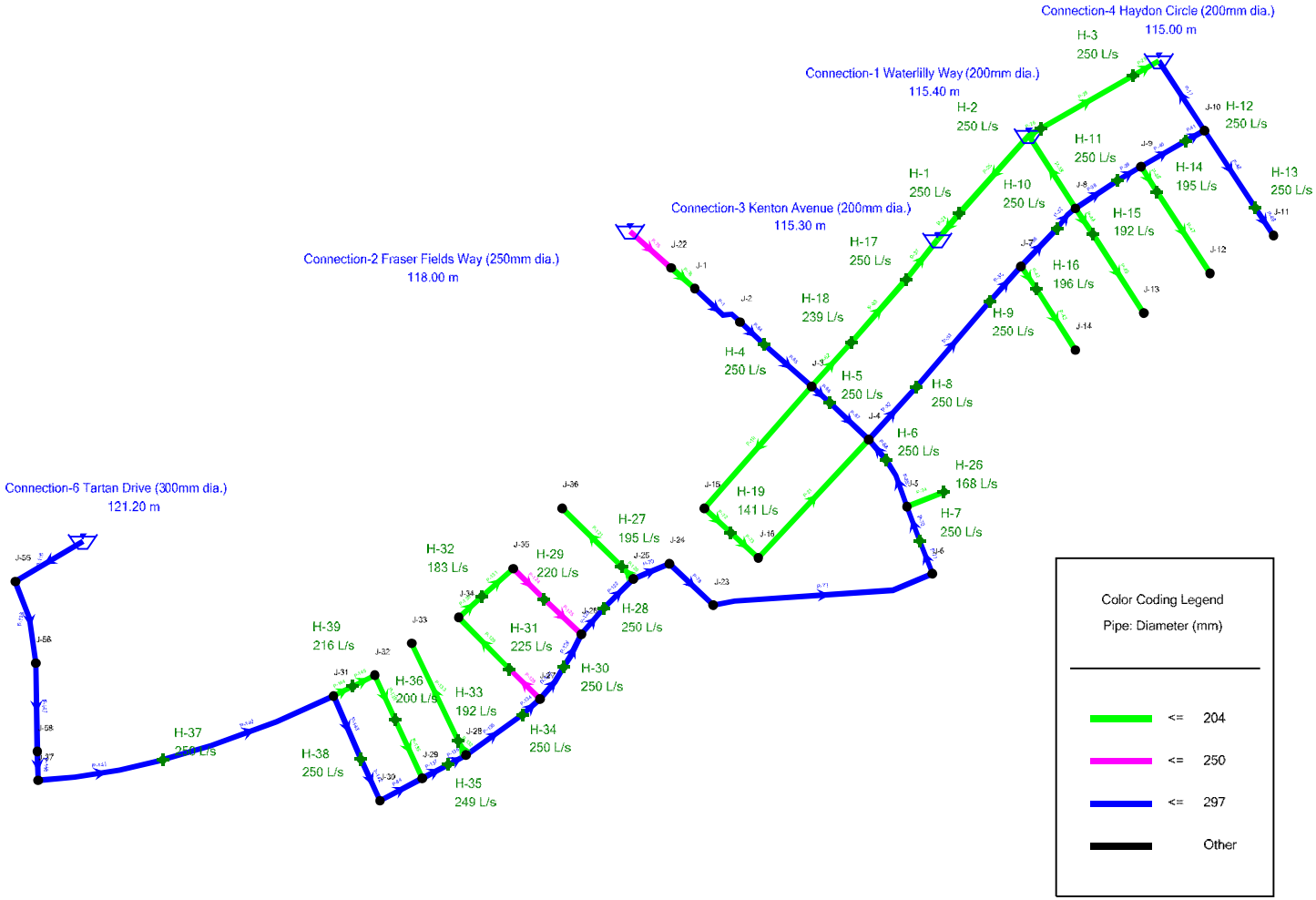
Appendix B

Water Servicing

HARMONY STAGE 2

Watermain Connections at Tartan Drive, Waterlilly Way, Fraser Fields Way, Kenton Avenue and Haydon Circle

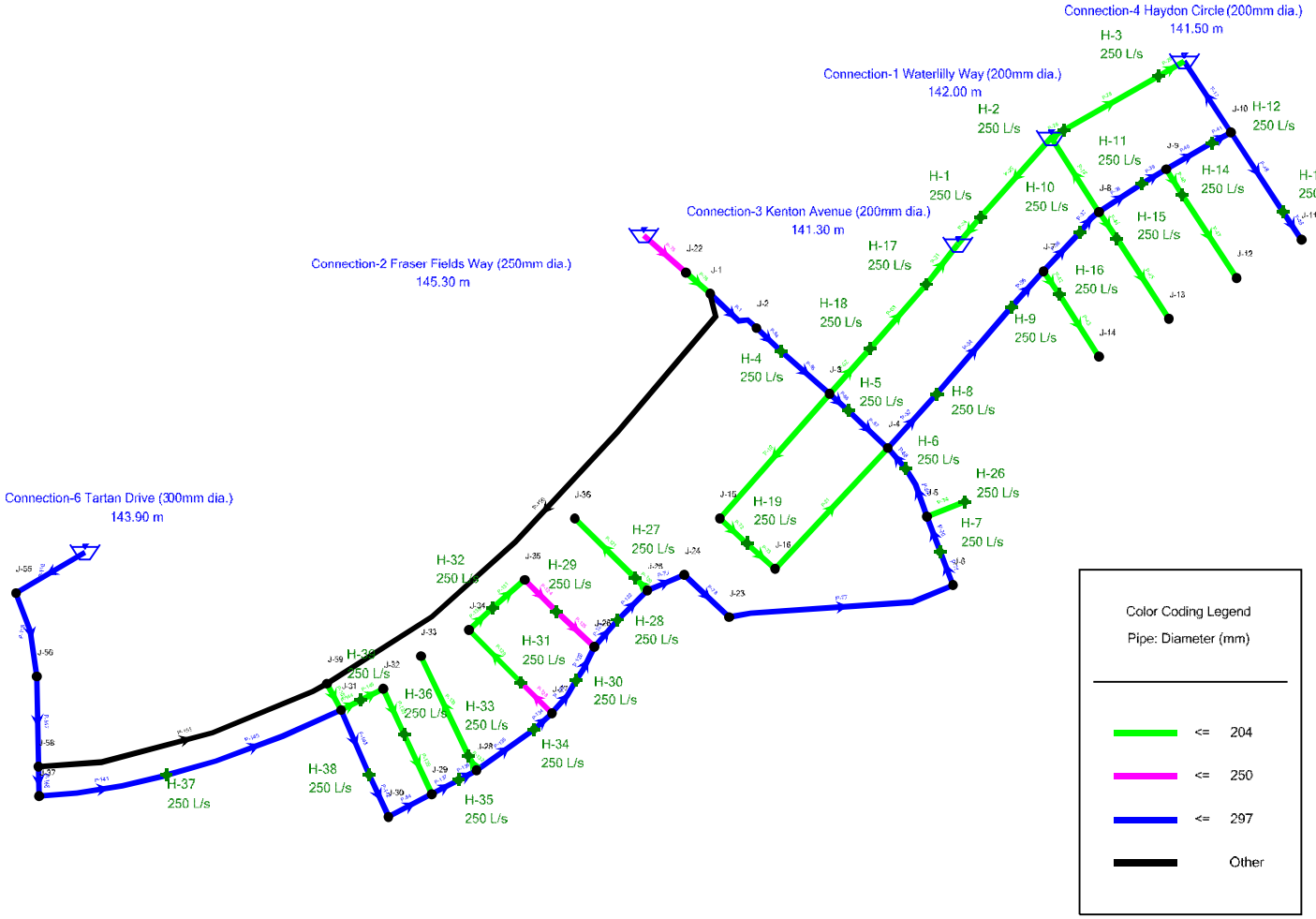
INTERIM CONDITION - MAX DAY + FIRE FLOW



HARMONY STAGE 2

Watermain Connections at Tartan Drive, Waterlilly Way, Fraser Fields Way, Kenton Avenue and Haydon Circle

ULTIMATE CONDITION - MAX DAY + FIRE FLOW



Appendix C

Wastewater Servicing

FALLOWFIELD RD

GREENBANK RD

MOODIE DR

HWY 416

MCKENNA CASEY DR

STRANDHERD DR

JOCK RIVER

LONGFIELDS DR

JOCKVALE RD

A1 12.80ha

A2-A 85.18ha

A2-B 32.46ha

A2-C 15.25ha

A3-A 16.18ha

A3-B 10.30ha

A3-C 5.19ha

A3-D 0.58ha

A3-E 35.68ha

A3-F 8.26ha

A3-G 0.90ha

A3-H 6.09ha

A4 34.44ha

A5 17.72ha

A6-A 15.18ha

A6-B 6.05ha

A6-C 4.87ha

A6-D 17.56ha

A6-E 6.94ha

A7-A 13.62ha

A7-B 11.01ha

A7-C 6.97ha

A7-D 11.74ha

A7-E1 7.70ha

A7-E2 1.54ha

A8-A 28.45ha

A8-B 39.34ha

A8-C 10.52ha

A8-D 10.87ha

130 120 110 100 90 80 70 60 50 40 30 20 10

LEGEND

- EXISTING / PROPOSED HIGH DENSITY RESIDENTIAL
- EXISTING / PROPOSED MEDIUM DENSITY RESIDENTIAL
- EXISTING / PROPOSED LOW DENSITY RESIDENTIAL
- EXISTING / PROPOSED COMMERCIAL
- EXISTING / PROPOSED INSTITUTIONAL
- OTHER LANDS (OPEN SPACE, PARKS, AND SWMFS)
- SOUTH NEPEAN COLLECTOR PHASE 1
- SOUTH NEPEAN COLLECTOR PHASE 2
- SOUTH NEPEAN COLLECTOR PHASE 3
- 80 SOUTH NEPEAN COLLECTOR NODE ID

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SOUTH NEPEAN COLLECTOR SEWER

SANITARY DRAINAGE AREAS AND LAND USE

SCALE 1:20 000

DATE AUG 2015 | JOB 115075 | FIGURE FIG. 1

PROJECT #: 115075
DESIGNED BY: CMS
CHECKED BY: MJP
DATE: August 20, 2015

SANITARY SEWER DESIGN SHEET

South Nepean Collector - Phase 2 & 3

Theoretical Future Full Service Peak Wastewater Flow

NOVATECH
Engineers, Planners & Landscape Architects

Location			Areas				Population				Individual Design Flows			Cumulative Design Flows				
Area I.D.	Existing / Proposed Land Use	Upstream Node	Gross Commercial Area (ha)	Gross Institutional Area (ha)	Gross Residential Area (ha)	Total Gross Area (ha)	Residential Population Density (people / ha)	Individual Residential Population	Cumulative Residential Population	Residential Peaking Factor (Harmon Eqn[1])	Commercial Peak Flow Rate[2] (50,000 L/ha/d) (L/s)	Institutional Peak Flow Rate[2] (50,000 L/ha/d) (L/s)	Infiltration / Inflow Rate (0.28 L/s/ha) (L/s)	Commercial (L/s)	Institutional (L/s)	Infiltration / Inflow (L/s)	Residential Peak Flow Rate (350 L/cap/d) (L/s)	Cumulative Peak Design Flow (L/s)
A1	Commercial	130	12.80			12.80					11.1	0.0	3.6	11.1	0.0	3.6	0.0	14.7
A2-A	Commercial	130	85.18			85.18					73.9	0.0	23.9	85.1	0.0	27.4	0.0	112.5
A2-B	Commercial	130	32.46			32.46					28.2	0.0	9.1	113.2	0.0	36.5	0.0	149.8
A3-A	Low Density Residential	130			16.18	16.18	95.2	1540	1540	3.67	0.0	0.0	4.5	113.2	0.0	41.1	22.9	177.2
A3-B	Institutional	130		10.30		10.30			1540	3.67	0.0	8.9	2.9	113.2	8.9	43.9	22.9	189.0
A3-C	Medium Density Residential	130			5.19	5.19	162.0	841	2381	3.53	0.0	0.0	1.5	113.2	8.9	45.4	34.0	201.6
A3-D	Commercial	130	0.58			0.58			2381	3.53	0.5	0.0	0.2	113.7	8.9	45.6	34.0	202.2
A3-E	Low Density Residential	130			35.68	35.68	95.2	3397	5778	3.19	0.0	0.0	10.0	113.7	8.9	55.5	74.6	252.8
A3-F	Medium Density Residential	130			8.26	8.26	162	1338	7116	3.10	0.0	0.0	2.3	113.7	8.9	57.9	89.4	269.9
A3-G	Institutional	130		0.90		0.90			7116	3.10	0.0	0.8	0.3	113.7	9.7	58.1	89.4	270.9
A4	Low Density Residential	130			34.44	34.44	95.2	3279	10395	2.94	0.0	0.0	9.6	113.7	9.7	67.8	123.7	314.9
A2-C	Commercial (ex. snow dump)	120	15.25			15.25			10395	2.94	13.2	0.0	4.3	127.0	9.7	72.0	123.7	332.4
A3-H	Low Density Residential	120			6.09	6.09	95.2	580	10974	2.91	0.0	0.0	1.7	127.0	9.7	73.7	129.6	340.0
A5	Commercial	110	17.72			17.72			10974	2.91	15.4	0.0	5.0	142.4	9.7	78.7	129.6	360.3
A6-A	Commercial	100	15.18			15.18 *		0 *	10974	2.91	13.2	0.0	4.3	155.5	9.7	82.9	129.6	377.8
A6-B	Institutional	100		6.05		6.05			10974	2.91	0.0	5.3	1.7	155.5	15.0	84.6	129.6	384.7
A6-C	Medium Density Residential	90			4.87	4.87	162.0	789	11763	2.88	0.0	0.0	1.4	155.5	15.0	86.0	137.4	393.9
A6-D	Low Density Residential	90			17.56	17.56	95.2	1672	13435	2.83	0.0	0.0	4.9	155.5	15.0	90.9	153.8	415.2
A6-E	Low Density Residential	90			6.94	6.94	95.2	661	14096	2.81	0.0	0.0	1.9	155.5	15.0	92.9	160.2	423.6
A7-A	Commercial	90	13.62			13.62			14096	2.81	11.8	0.0	3.8	167.4	15.0	96.7	160.2	439.2
A7-B	High Density Residential	90			11.01	11.01	135.0	1486	15582	2.76	0.0	0.0	3.1	167.4	15.0	99.8	174.3	456.4
A7-C	Medium Density Residential	90			6.97	6.97	162.0	1129	16711	2.73	0.0	0.0	2.0	167.4	15.0	101.7	184.9	468.9
A7-D	Medium Density Residential	90			11.74	11.74	162.0	1902	18613	2.68	0.0	0.0	3.3	167.4	15.0	105.0	202.4	489.7
A7-E1/E2	Medium Density Residential	90			9.24	9.24	162.0	1497	20110	2.65	0.0	0.0	2.6	167.4	15.0	107.6	215.9	505.8
A8-A	Commercial	80	28.45			28.45			20110	2.65	24.7	0.0	8.0	192.0	15.0	115.5	215.9	538.5
A8-B	High Density Residential	80			39.34	39.34	135.0	5311	25421	2.55	0.0	0.0	11.0	192.0	15.0	126.6	262.4	596.0
A8-C	Institutional	80		10.52		10.52			25421	2.55	0.0	9.1	2.9	192.0	24.1	129.5	262.4	608.1
A8-D	Low Density Residential	80			16.87	16.87	120.9	2040	27461	2.52	0.0	0.0	4.7	192.0	24.1	134.2	279.8	630.2
ROW Along SNC Sewer Alignment	-	80				14.34			27461	2.52	0.0	0.0	4.0	192.0	24.1	138.2	279.8	634.2
TOTAL		***80***	***221.24***	***27.77***	***230.38***	***493.73***	***-***	***27461***	***27461***	***2.52***	***192.0***	***24.1***	***138.2***	***192.0***	***24.1***	***138.2***	***279.8***	***634.2***

Residential Land Use	Population Density (Units / ha)	Persons per Unit	Persons per ha
Low Density (singles and semis)	26 – 28 (28 used)	2.7 – 3.4 (3.4 used)	95.2
Medium Density (row/townhouse)	50 – 60 (60 used)	2.7	162.0
High Density (apartments)	60 – 75 (75 used)	1.8	135.0

Notes:

1. Harmon Equation = 1 + [14 / (4+(P/1000)$^{1/2}$)] x K

Where: P = population; K = correction factor = 1.0

2. Institutional / Commercial Peaking Factor = 1.5

Reported Design Flows / Assumptions:

1. Area A4: Existing single family units currently serviced by Jockvale pump station to be redirected to SNC
2. Area A8-D: proposed 600 medium density residential units

Minto's Harmony Stage 2 - Peak Flow Allocation

* Minto lands represent 9.88 ha of Area A6-A

Commercial Peak Flow = 9.88 ha x 50,000 L/ha/day x 1.5 / 86400 s
= 8.58 L/s

Infiltration Flow = 9.88 ha x 0.28 L/s/ha
= 2.77 L/s

Total Peak Flow = 8.58 L/s + 2.77 L/s
= 11.35 L/s

Cumulative Peak Flow = 360.3 L/s + 11.35 L/s
= 371.65 L/s

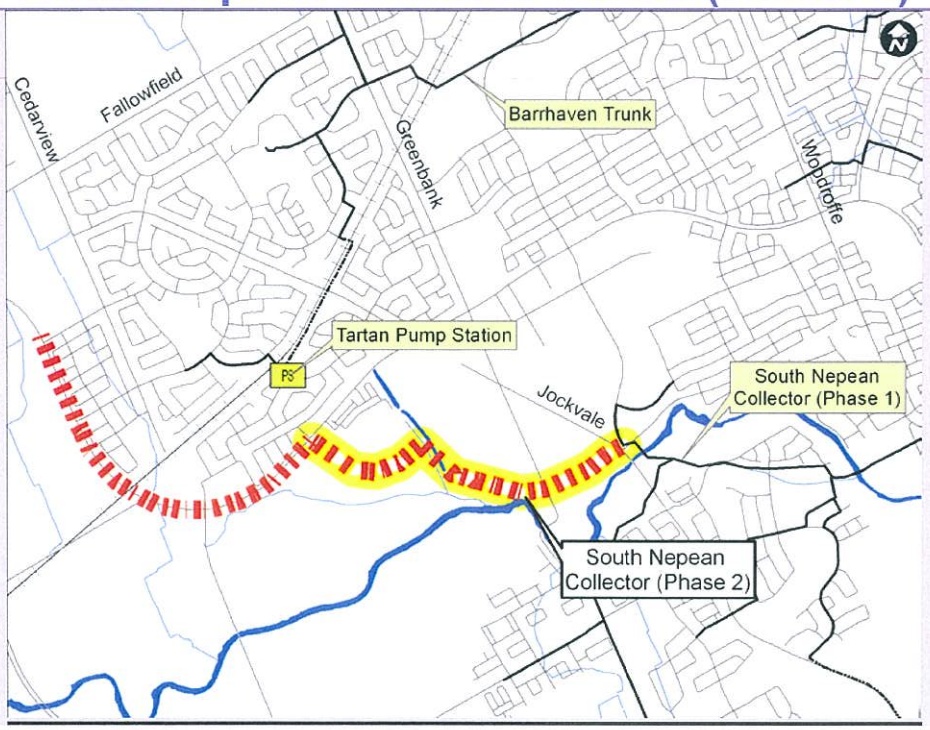
Minto's Harmony Stage 2 - Peaking Factor

* Minto's proposed residential blocks have an estimated population of 450 persons

Cumulative Residential Population = 10974 persons + 450 persons
= 11424 persons

Residential Peaking Factor = 1 + [14 / (4+(P/1000)^1/2)] x K
= 1 + [14 / (4+(11424/1000)^1/2)] x 1.0
= 2.90

South Nepean Collector Sewer (Phase 2)



Scope and Justification

Phase 1 of the South Nepean Collector (SNC) was constructed in 2010 and ends at the Jockvale Road just north of the Jock River. The Phase 2 of SNC which is required to service growth in the South Nepean community starts from the top end of the Phase 1 and extends north and west to Strandherd Drive. The Phase 2 is 1050 mm dia. pipe and is approximately 1450 m long.

Timing

2013 – 2018: Detailed design and construct the sewer

Action Item Funding

Construction Cost Estimate = $3.0 M

Capital Cost Estimate* = $4.8 M (100% Development Charges, 0% Rate)

**Including construction cost, engineering, city internal costs and contingency allowance.*

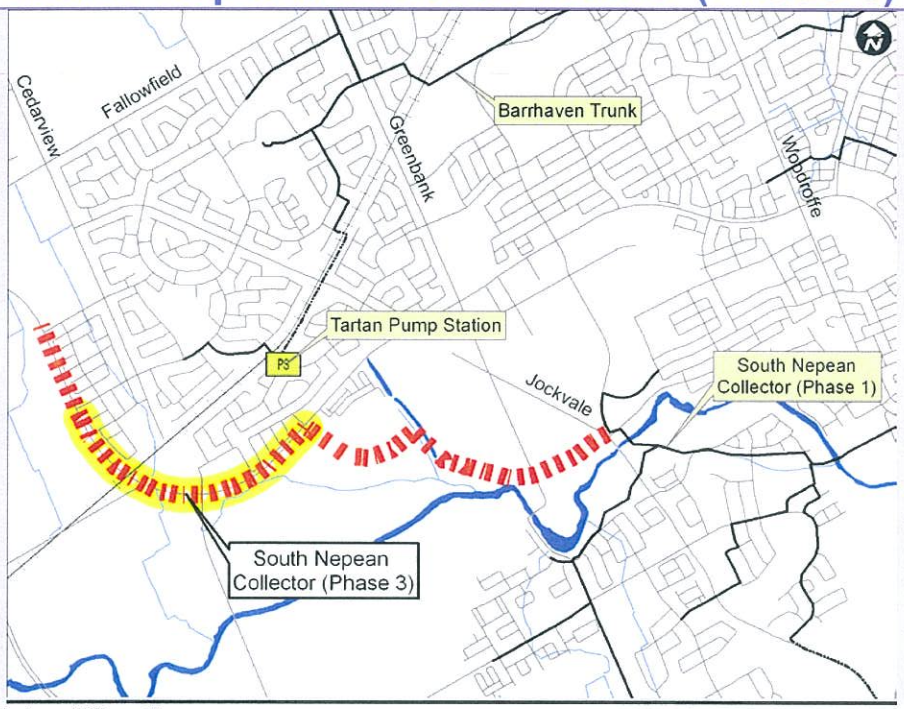
EA Requirements and Consultation

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

Follow Up Actions

Coordinate alignment with plans for the local subdivisions and community design plans.

South Nepean Collector Sewer (Phase 3)



Scope and Justification

Phase 1 of the South Nepean Collector (SNC) was constructed in 2010 and ends at the Jockvale Road just north of the Jock River. The Phase 2 of SNC is scheduled for construction in 2016. The Phase 3 of SNC which is required to service growth in the west part of South Nepean community will start at the end of Phase 2 and continue west and north along Strandherd Drive. The Phase 3 will be constructed with 900, 825 and 750 mm dia. pipe sections and will be approximately 2650 m long.

Timing

2019 – 2024: Detailed design and construct the sewer as a part of the Strandherd Drive expansion.

Action Item Funding

Construction Cost Estimate = $4.8 M

Capital Cost Estimate* = $7.7 M (100% Development Charges, 0% Rate)

**Including construction cost, engineering, city internal costs and contingency allowance.*

EA Requirements and Consultation

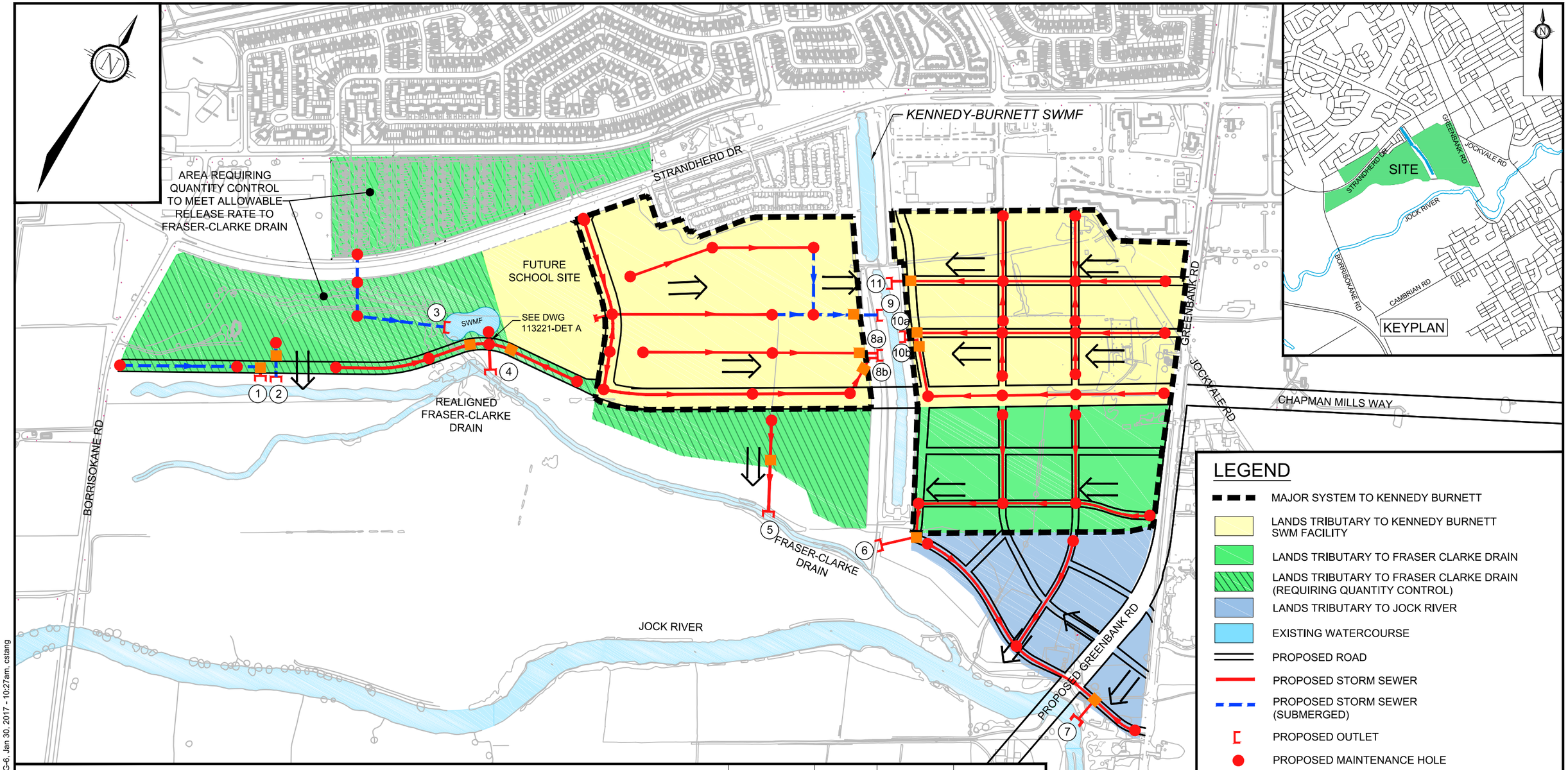
Schedule B Class EA has been completed and the project is approved.

Follow Up Actions

Coordinate detailed design and construction with the Strandherd Drive expansion project.

Appendix D

Storm Servicing and Stormwater Management



LEGEND

- MAJOR SYSTEM TO KENNEDY BURNETT
- LANDS TRIBUTARY TO KENNEDY BURNETT SWM FACILITY
- LANDS TRIBUTARY TO FRASER CLARKE DRAIN
- LANDS TRIBUTARY TO FRASER CLARKE DRAIN (REQUIRING QUANTITY CONTROL)
- LANDS TRIBUTARY TO JOCK RIVER
- EXISTING WATERCOURSE
- PROPOSED ROAD
- PROPOSED STORM SEWER
- PROPOSED STORM SEWER (SUBMERGED)
- PROPOSED OUTLET
- PROPOSED MAINTENANCE HOLE
- PROPOSED HYDRO DYNAMIC SEPARATOR (HDS)
- MAJOR OVERLAND FLOW DIRECTION

	OUTLET						SUBMERGED SEWERS	DEPTH TO OBVERT	MAX GRADE RAISE	STM HGL (D/S - U/S)
ID	WATER COURSE	DRAINAGE AREA	NWL	PIPE INVERT	PIPE SIZE	PEAK FLOW *CONTROLLED				
1	FRASER-CLARKE DRAIN	0.97 ha	90.25	90.15	600mm	28 L/s*	75m	1.5m	1.1m	91.75m - 92.30m
2	FRASER-CLARKE DRAIN	5.34 ha	90.25	89.85	965 x 1525mm ELLIPTICAL	187 L/s*	400m	1.5m	0.9m	91.75m - 92.20m
3	MINTO SWM POND	14.64 ha	90.00	89.81	1220mm x 1930mm ELLIPTICAL	1,785 L/S	195m	1.5m	0.8m	91.65m - 92.23m
4	FRASER-CLARKE DRAIN	1.29 ha + 14.64 ha	89.90	89.90	1050mm	692 L/S*	0m	1.5m	1.0m	91.65m - 92.25m
5	FRASER-CLARKE DRAIN	6.49 ha	89.87	89.87	965 x 1525mm ELLIPTICAL	363 L/S*	0m	1.8m	0.9m	91.65m - 92.00m
6	FRASER-CLARKE DRAIN	11.83 ha	89.90	89.90	1220mm x 1930mm ELLIPTICAL	1,649 L/S	0m	1.8m	0.8m	91.75m - 92.65m
7	JOCK RIVER	9.24 ha	89.20	89.20	965 x 1525mm ELLIPTICAL	1,252 L/S	0m	1.8m	0.1m	91.60m - 92.45m
8A	KENNEDY-BURNETT SWMF	6.58 ha	90.20	90.20	1050mm	915 L/S	0m	1.5m	0.9m	91.80m - 92.80m
8B	KENNEDY-BURNETT SWMF	2.44 ha	90.20	90.20	825mm	444 L/S	0m	1.8m	0.9m	91.80m - 92.76m
9	KENNEDY-BURNETT SWMF	15.49 ha	90.20	90.00	1220mm x 1930mm ELLIPTICAL	2,034 L/S	200m	1.5m	1.2m	91.90m - 93.18m
10A	KENNEDY-BURNETT SWMF	6.68 ha	90.20	90.20	1050mm	928 L/S	0m	2.0m	0m	91.80m - 92.80m
10B	KENNEDY-BURNETT SWMF	2.07 ha	90.20	90.20	825 mm	365 L/S	0m	2.0m	0m	91.80m - 92.78m
11	KENNEDY-BURNETT SWMF	10.90 ha	90.20	90.20	1220mm x 1930mm ELLIPTICAL	1,892 L/S	0m	1.8m	0.3m	91.90m - 92.78m

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Website www.novatech-eng.com

KENNEDY-BURNETT SWMF SERVICING OPTIONS

OPTION 4: HYBRID EXPANDED K-B SWIMF / HDS UNITS

SCALE 1 : 7500 (0, 100, 200, 300)
DATE JAN 2017 | JOB 113221 | FIGURE FIG-6

J.L. Richards
& Associates Limited
864 Lady Ellen Place
Ottawa, ON Canada
K1Z 5M2
Tel: 613 728 3571
Fax: 613 728 6012

MEMORANDUM

TO: John Bougadis, City of Ottawa

DATE: December 19, 2016

JOB NO.: 24051

FROM: Bobby Pettigrew, P.Eng.

CC: Hugo Lalonde (Minto), Glen McDonald (RVCA), James Hall (City of Ottawa), Lucie Dalrymple and Guy Forget (JLR).

RE: Conceptual Servicing Design for lands draining to the Fraser Clarke watercourse

BACKGROUND

This Technical Memorandum (TM) provides a summary of J.L. Richard's (JLR) conceptual stormwater management (SWM) design for the land tributary to the Fraser Clarke watercourse and is issued for Minto's review and subsequent distribution.

Conceptual design of the stormwater servicing for the Minto owned and surrounding lands tributary to the Fraser Clarke watercourse has been completed. Figure 1 shows the extent of the pre-development drainage area for the Fraser Clarke watercourse, including the Fraser Fields subdivision north of Strandherd Drive, along with the current landowner boundaries. The site subject to discussion in this TM are limited to the catchment areas east of Borrisokane Road, west of the Kennedy-Burnett SWMF facility, south of Strandherd Drive and the southern extent of the lands draining to the Fraser Clarke watercourse.

The site was identified in the Jock River Reach One Subwatershed Study (Stantec, 2007) as naturally draining to the Fraser Clarke watercourse. The 2007 Subwatershed Study is the latest study to set any stormwater constraints for the site. Drawing POST-1 from the study is attached for reference.

The conceptual design for the site is in accordance with the report "Servicing Options for Lands Surrounding the Kennedy-Burnett SWMF (Novatech, 2015), in which the recommended servicing strategy is for lands west of the Kennedy-Burnett SWMF up to the Chapman Mills Drive Extension (north – south collector) to be serviced by the Kennedy-Burnett SWMF and lands east of the Chapman Mills Drive Extension drain via water quality controls before discharging to the Fraser Clarke watercourse. The recommended servicing strategy is presented in the attached plan extracted from the Novatech report.

DESIGN CRITERIA

The conceptual design must account for the following design criteria:

Quantity Control

Areas currently draining to the Fraser Clarke watercourse should be designed to limit the post-development flows to pre-development levels..

Quality Control

Since the Fraser Clarke watercourse is a direct fish and aquatic habitat, enhanced water quality control (80% TSS removal) is required.

Erosion Control
In 2015, Parish Aquatic Services (PAS) (now Matrix Solutions Ltd) undertook a site visit assessment of the Fraser Clarke watercourse to identify an erosion threshold value at which point the flow in the channel, flow depth and velocity will produce sufficient shear stress to initiate the mobilization of sediment. If flows in the watercourse exceed the erosion threshold value for durations longer than the channel is normally exposed to such a flow then erosion of the channel will occur at a greater rate than naturally experienced. The report from PAS, dated April 11, 2016 and subsequently approved by the Rideau Valley Conservation Authority (RVCA) on November 7, 2016, has determined that the erosion threshold value for the downstream reach of the Fraser Clarke watercourse is 1700 L/s. The hours of exceedance of this flow at post development should be no greater than under pre-development conditions.

In order to determine the hours of exceedance of the erosion threshold value, the hydrological response along the watercourse was simulated for a thirty (30) year period using historical data for rainfall and temperature. The hours during which the erosion threshold value is exceeded over the thirty year simulation are calculated under both the pre-development and post development scenarios and then compared.

MODEL PARAMETERS AND CATCHMENT AREAS

Pre-development Condition
Under the pre-development condition all the site is considered undeveloped, including the recent Fraser Fields subdivision north of Strandherd Drive. The drainage boundary extends west of Borrisokane Road as there are lands that were found to be tributary the culvert crossings. The drainage areas are shown on the attached Figure 1. The parameters reflect the rural nature of the site under the pre-development condition.

Drainage ID	Area (ha)	Flow Length (m)	Slope (%)	Imperviousness (%)
S1	8.23	750	2	10
U1	23.33	1100	0.2	10
U2	21.18	1110	0.2	10
U3	48.67	1300	0.5	10

In addition to the above parameters, the City of Ottawa standard values were used for Depression Storage (1.57 for impervious, 4.67 for pervious areas) and Horton infiltration coefficients (76.2 mm/hr maximum infiltration rate, 13.2 mm/hr minimum infiltration rate and 4.14 /h decay constant).

Post Development Condition
Under the post development condition the drainage area west of Borrisokane Road was simulated as being redirected to the Jock River via the open ditch system as intended under the 2007 Jock River Subwatershed Study plan. As per the 2015 Novatech report, the residential subdivision on the Minto and Mion owned lands will be directed to the Kennedy-Burnett SWMF. In addition, it is currently envisaged that the proposed school block on the south west corner of the Chapman Mills Drive Extension and Strandherd Drive intersection will also be able to drain to the Kennedy-Burnett SWMF.

Under post development, the remaining drainage areas draining to the Fraser Clarke watercourse include the proposed employment lands development, the BRT corridor north of the realigned section of the Fraser Clarke watercourse, the Braovac/Pavic lands north of the Fraser Clarke watercourse and the open space lands south of the Fraser Clarke watercourse, which are within the floodplain. The catchment areas simulated under the post development condition are shown in the attached Figure 2.

The developable lands (i.e. lands outside the floodplain), which drain to the Fraser Clarke watercourse, have storage nodes in the model to represent stormwater management facilities to enable the developments to meet the design criteria set out above.

The model parameters which differ across the drainage areas are shown in the table below. In addition, the standard City of Ottawa parameters, including depression storage and Horton coefficients, from the pre-development condition were applied.

Drainage ID	Area (ha)	Flow Length (m)	Slope (%)	Imperviousness (%)
BRA	7.1	770	2	64.3
BRT_West	1.0	420	2	71
BRT_East	1.3	270	2	71
Comm	5.35	360	2	93
S1	8.23	1100	2	60
S2 (Residential)	6.45	450	2	64
UD1	21.31	900	2	10
UD2	13.36	890	2	10

STORAGE REQUIREMENTS

At this conceptual stage the storage requirements have been set for the developable lands within the site draining to the Fraser Clarke watercourse based on the future impervious area and the timing of the flows being released into the Fraser Clarke watercourse in order to meet the design criteria set out above.

The critical criterion to meet using storage control is the hours of exceedance of the erosion threshold value. A strategy adopted is for slight over control of the flows from upstream and slight under control of the downstream contributing lands. This allows the peak of the flow to discharge through the system in a short period of time and for the later flows from upstream to be delayed and released at a lower flow rate resulting in a reduced impact downstream.

The storage requirements for each catchment area are shown in the table below.

Drainage ID	Area * Impervious (ha)	Pond Volume (m^3)	Volume per hectare (m^3/ha)	Release Rate (L/s)	Release Rate per hectare (L/s/ha)
BRA	4.8	1600	330	380	78
BRT_West	0.7	230	400	63	78
BRT_East	0.9	420		63	
Comm	5.0	1350	416	650	78
S1, S2	9.1	4500		450	

Further refinement to the storage requirements are anticipated once the Site Plans and/or Draft Plan of Subdivisions for each area become available. In addition changes to the erosion threshold value as a result of the RVCA review may alter the storage requirements.

It should also be noted that the volumes above are for active storage only and do not include any permanent pool volume which may be required to meet the water quality target for the Jock River if treatment units, or alternative water quality treatment, are not in place.

MODELING RESULTS

The results of the pre-development and post development simulations are contained in the tables below. The flows were taken in the most downstream section of the Fraser Clarke watercourse.

Event	Pre-development Flows (m^3/s)	Post Development Flows (m^3/s)
25 mm	0.60	0.70
1:2 year	0.90	1.10
1:5 year	1.40	1.50
1:10 year	1.70	1.70
1:25 year	2.00	1.90
1:50 year	2.30	2.10
1:100 year	2.60	2.30

The results above show that the post development condition controlled flows for all synthetic events are comparable to or less than the pre-development condition, and therefore, meet the water quantity control design criteria. The results also show that in the continuous simulation, the hours of exceedance of the threshold target in the post development condition are zero (0) in both the pre-development and post development conditions. Therefore the erosion control design criterion is considered to be met.

SUMMARY

In summary, the above described servicing option for the site, will maintain the current condition of the watercourse in terms of flows and erosion potential.

Prepared by:

J.L. RICHARDS & ASSOCIATES LIMITED

Bobby Pettigrew, P.Eng.

N

S1
8.23 ha

U3
48.67 ha

U1
23.33 ha

U2
21.18 ha

Minto
Mion
Transit Corridor
Clarke
Braovac / Pavic
Braovac/ Pavic

Legend

Pre-development

- Outfalls
- Conduits
- Junctions
- Storages
- LandOwners
- Subcatchments

50 0 50 100 150 200 m

PROJECT:

FRASER CLARKE LANDS
OTTAWA, ONTARIO

DRAWING:

PCSWMM PRE-DEVELOPMENT DRAINAGE AREAS

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN:	BP	JLR NO:	24051
DRAWN:	BP	DRAWING NO:	**Figure 1**
CHECKED:	BP		

N

S1
8.2 ha

S2
6.4 ha

Comm
5.4 ha

BRT_East
1.3 ha

BRT_West
1 ha

UD1
21.3 ha

UD2
13.3 ha

BRA
7.5 ha

Minto

Mion

Transit Corridor

Clarke

Braovac / Pavic

50 0 50 100 150 200 m

Legend

Post Development

- Outfalls
- Conduits
- Orifices
- Storages
- LandOwners
- Junctions
- Subcatchments

PROJECT:

FRASER CLARKE LANDS
OTTAWA, ONTARIO

DRAWING:

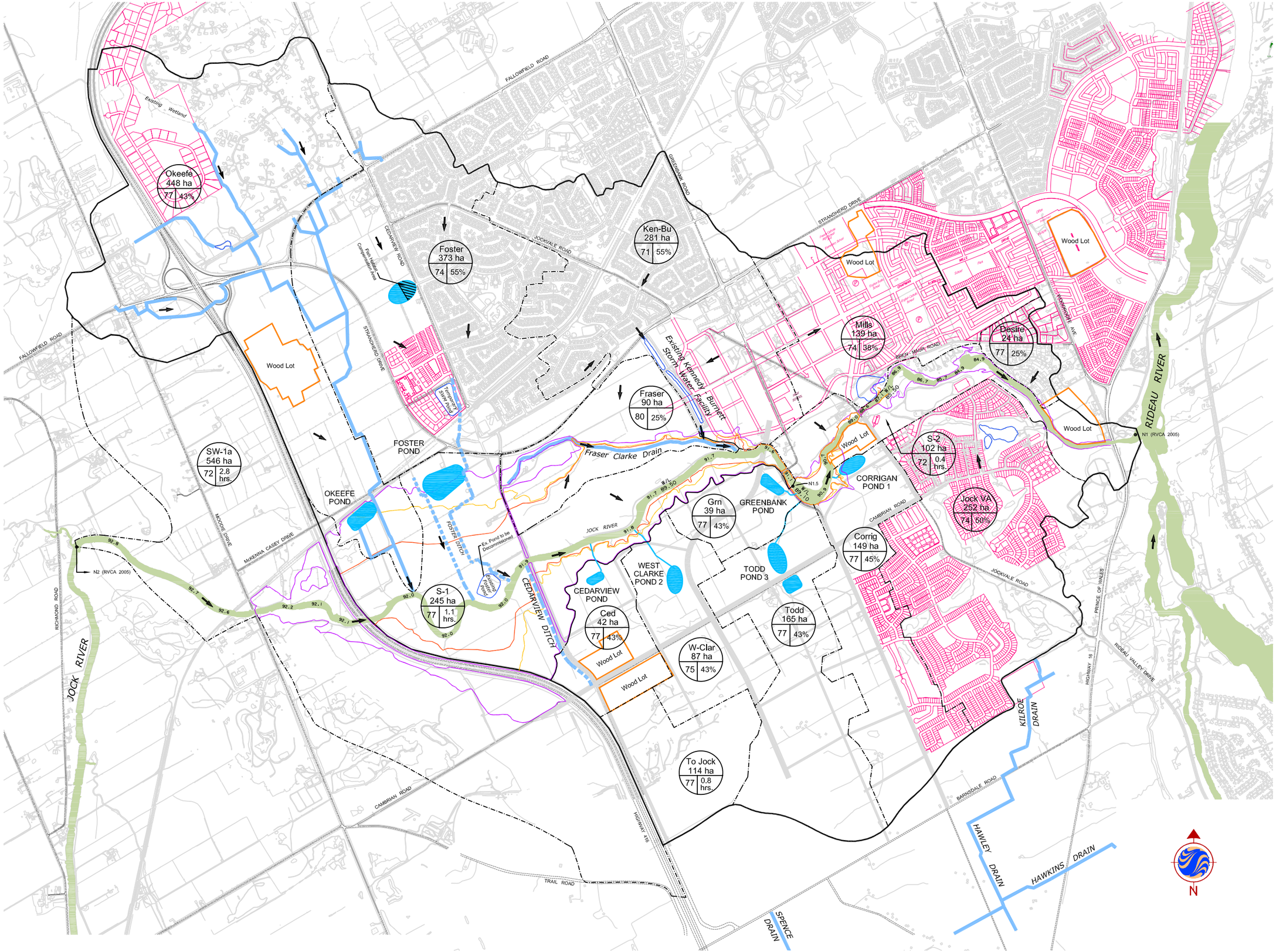
PCSWMM POST DEVELOPMENT DRAINAGE AREAS

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

DESIGN: BP
DRAWN: BP
CHECKED: BP

JLR NO: 24051

DRAWING NO: **Figure 2**



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Legend

- Existing SWM Facility
- Proposed Stormwater Facility
- Proposed Pond Outlet
- Jock River Tributary (Municipal Drain)
- Jock River Tributary (Non-Municipal Drain)
- Watershed Boundary
- 91.7 — Regulatory Flood Level
- W/L 89.50 — Normal Water Level
- Woodlot Limits
- Sub-drainage Area Limit
- Desire 24 ha / 77 / 50% / hrs. — Sub-drainage Area Name; Sub-drainage Area Size; % Impervious or Time to Peak (hours); SCS Curve Number
- Application Plans Under Review
- 10 Year Flood Line
- 25 Year Flood Line
- 100 Year Flood Line

Revision	By	Appd.	YY.MM.DD
3 FINAL REPORT	BCB	N.G.	JUNE 2007
2 JANUARY SUBMISSION	BCB	N.G.	JAN. 2007
1 DRAFT FINAL REPORT	BCB	N.G.	JULY 2006

File Name: 60400414-POST-1	Dwn.	Chkd.	Dsgn.	
	BCB	S.J.P.	N.G.	JULY 2006 YY.MM.DD

Seal

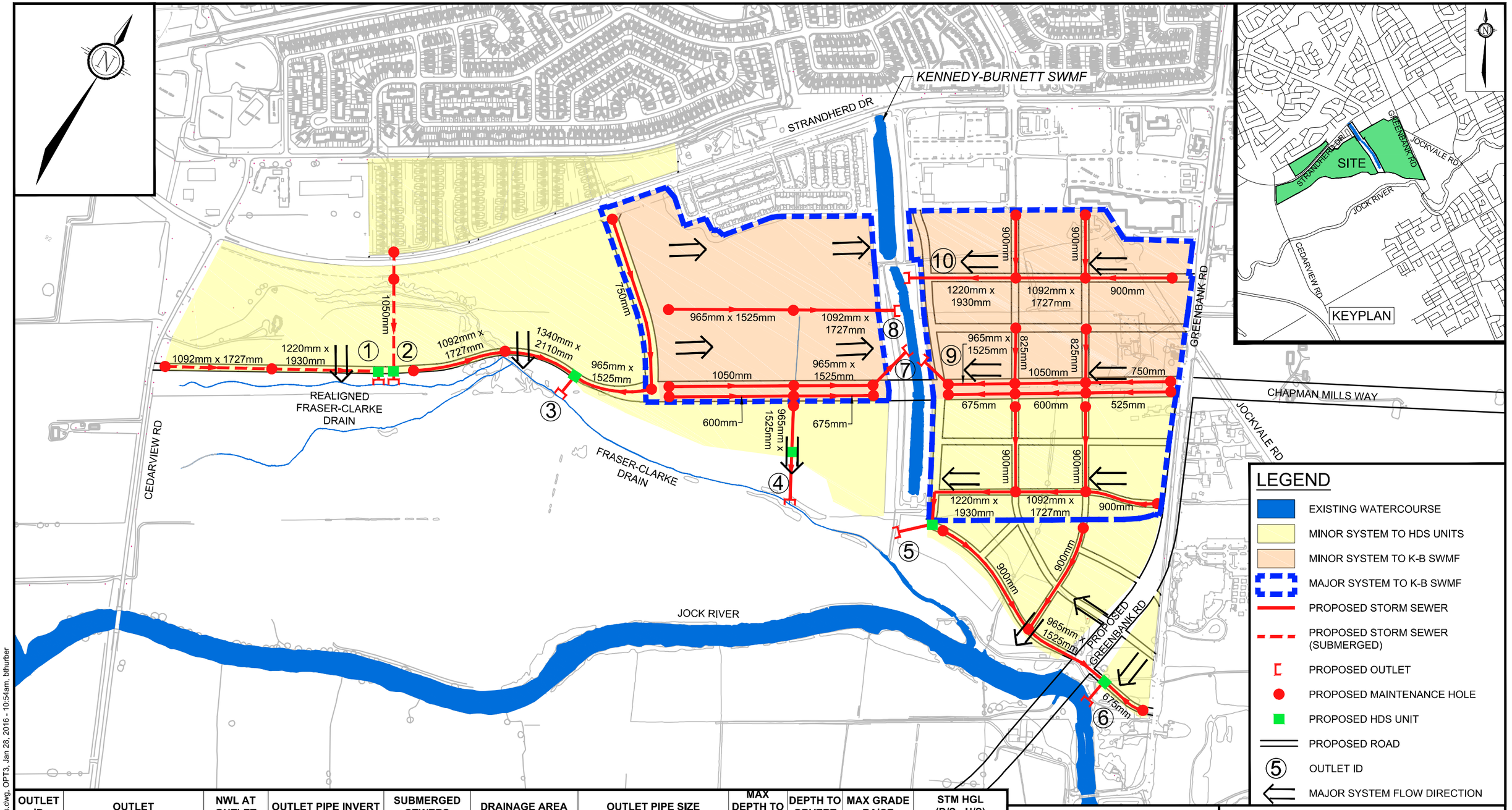
Client/Project

JOCK RIVER REACH ONE SUB-WATERSHED STUDY
Ottawa ON Canada

Title

PROPOSED CONDITIONS DRAINAGE BOUNDARIES

Project No. 60400414
Scale 0 100 300 500
Drawing No. POST-1
Sheet 3 of 4
Revision 3



OUTLET ID	OUTLET	NWL AT OUTLET	OUTLET PIPE INVERT	SUBMERGED SEWERS	DRAINAGE AREA	OUTLET PIPE SIZE	MAX DEPTH TO INVERT	DEPTH TO OBVERT	MAX GRADE RAISE	STM HGL (D/S - U/S)
1	FRASER-CLARKE DRAIN	90.25	89.65 (AT HDS UNIT)	± 600m	9.23 ha	1220mm x 1930mm ELLIPTICAL	2.7m	1.5m	1.2m	91.75m - 92.70m
2	FRASER-CLARKE DRAIN	90.25	89.85 (AT HDS UNIT)	± 400m	8.20 ha	1050mm	2.6m	1.5m	0.6m	91.75m - 92.30m
3	FRASER-CLARKE DRAIN	89.90	89.90	0m	14.81 ha	1340mm x 2110mm ELLIPTICAL	2.8m	1.5m	1.3m	91.65m - 92.85m
4	FRASER-CLARKE DRAIN	89.87	89.87	0m	6.61 ha	965mm x 1525mm ELLIPTICAL	2.6m	1.5m	1.0m	91.65m - 91.95m
5	FRASER-CLARKE DRAIN	89.90	89.90	0m	11.83 ha	1220mm x 1930mm ELLIPTICAL	3.2m	2.0m	1.2m	91.75m - 92.40m
6	JOCK RIVER	89.20	89.20	0m	9.24 ha	965mm x 1525mm ELLIPTICAL	3.0m	2.0m	0.8m	91.60m - 92.50m
7	KENNEDY-BURNETT SWMF	90.20	90.20	0m	7.99 ha	1092mm x 1727mm ELLIPTICAL	2.8m	1.7m	0.6m	91.80m - 92.60m
8	KENNEDY-BURNETT SWMF	90.20	90.20	0m	10.68 ha	1092mm x 1727mm ELLIPTICAL	2.8m	1.7m	0.6m	91.90m - 92.70m
9	KENNEDY-BURNETT SWMF	90.20	90.20	0m	8.75 ha	1092mm x 1727mm ELLIPTICAL	3.1m	2.0m	1.0m	91.80m - 92.30m
10	KENNEDY-BURNETT SWMF	90.20	90.20	0m	10.90 ha	1220mm x 1930mm ELLIPTICAL	2.8m	2.0m	0.7m	91.90m - 92.45m

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KENNEDY-BURNETT SWMF SERVICING OPTIONS

OPTION 3: HYBRID EXPANDED K-B SWMF / HDS UNITS

SCALE 1 : 7500 (0, 100, 200, 300)
DATE JAN 2016 | JOB 113221 | FIGURE FIG. 5

SHT11X17.DWG - 279mmX432mm

M:\2013\113221\CAD\Design\113221-SWM-OPTs.dwg, OPT3, Jan 28, 2016 - 10:54am, bthurber

OFFICE DE PROTECTION DE LA NATURE DE LA VALLÉE RIDEAU
RIDEAU VALLEY CONSERVATION AUTHORITY

Watershed Science and Engineering Services - Technical Review Memorandum

November 7, 2016

To: Jocelyn Chandler, Planner, Planning Advisory Services, RVCA

From: Ferdous Ahmed, Senior Water Resources Engineer, WSES, RVCA

RE: 2015 Clarke Drain, City of Ottawa

Erosion Threshold Analysis – *3rd Review*

I have reviewed the following reports:

- Letter report entitled "Clarke Drain Erosion Threshold Assessment," by John Parish, P.Geo., of Parish Aquatic Services (Matrix Solutions), dated 9 August 2016
- And associated response by PAS to previous comments by RVCA and the City

My comments are as follows:

1. Based on field data and in-house modeling analysis, the consultants have estimated the critical discharges of reaches CD-R1 and CD-R2 at 1.78 and 1.70 cms respectively. This information is to be used in relation to future development in this area.
2. RVCA accepts the conclusions of this report.

I trust this is satisfactory for your present purpose. Please call if you have any questions.
Respectfully,

RVCA Watershed Sciences and Engineering Services

Ferdous Ahmed, Ph.D., P.Eng.
Senior Water Resources Engineer

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