JLR No.: 24051-003.1
Revision: 2

October 31, 2018

Site Servicing Report

Harmony Stage 1 – Block 104

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Table of Contents

List of Tables

List of Figures

List of Appendices

1.0 INTRODUCTION

1.1 General

Minto Communities Inc. (Minto) has retained the services of J.L. Richards & Associates Limited (JLR) to proceed with the detailed design of municipal infrastructure for a proposed stacked townhome development referred to as Block 104, located at the south-east corner of the Chapman Mills Drive and Chakra Street intersection in the Barrhaven South Community (BSC).

This Site Servicing Report outlines the design objectives and criteria, servicing constraints and strategies for developing the subject site with water, wastewater and stormwater management services in accordance with the City of Ottawa Sewer Design Guidelines (2012) and associated technical bulletins and the Harmony Stage 1 subdivision detailed design (November 2017). This Report also includes strategies and solutions for implementing erosion and sedimentation control measures throughout construction.

1.2 Site Description and Proposed Development

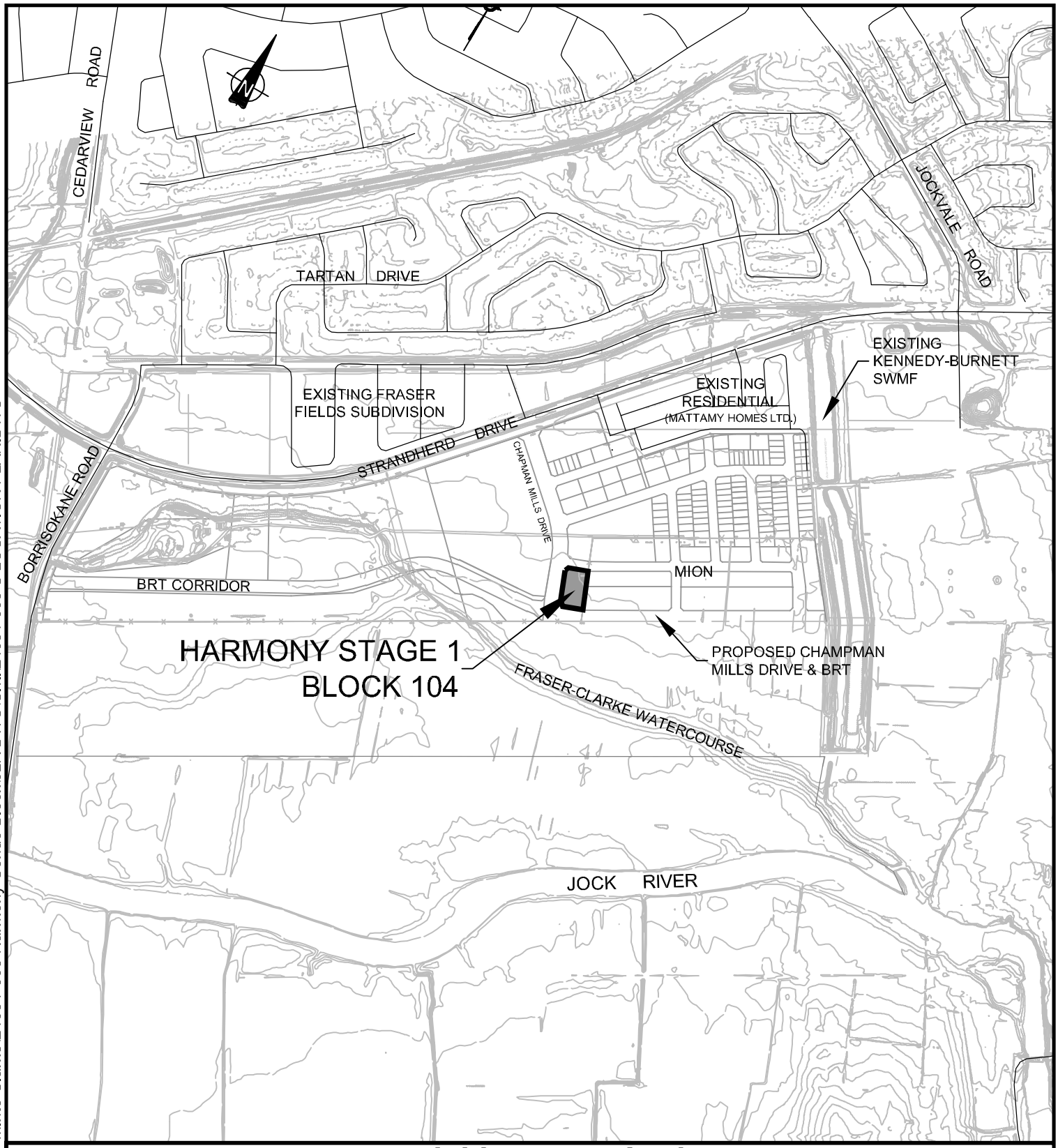
The subject site is bounded by Chapman Mills Drive to the west, Chakra Street to the north, the future Bus Rapid Transit Corridor (BRT) to the south and future residential development to the east, as depicted on the Location Plan in Figure 1. The proposed development consists of two stacked townhome blocks consisting of 12 units each for a total of 24 units on site. The site also includes 34 parking spaces and an amenity space.

The subject site is part of Minto's residential subdivision known as Harmony Stage 1, as shown on the Draft Plan of Subdivision in Appendix 'A1'. Water, wastewater and stormwater servicing of the subject site was accounted for as part of the Harmony Stage 1 detailed design. Sewer and watermain stubs were designed off of Chakra Street to service solely Block 104, as shown on the Chakra Street plan and profile drawing provided in Appendix 'A2'. Additionally, a temporary catchbasin was installed within Block 104 to provide interim drainage to the site which remained lower than the surrounding areas following development of Harmony Stage 1 and the surrounding roadways.

1.3 Permits and Approvals

MOECC Environmental Compliance Approval (ECA) was granted in November 2017 for the Harmony Stage 1 subdivision sanitary and storm sewers, which included the stubs designed to service the proposed stacked townhomes within Block 104. Refer to Appendix 'A3' for a copy of the ECA approval (MOECC ECA No. 3245-ATBRR3, dated November 23, 2017). City of Ottawa commence work notification was subsequently issued and construction of the Harmony Stage 1 sewers and watermains is presently underway. Given that the proposed Block 104 will be privately owned and operated, it is anticipated that no additional ECA is required for the private onsite sewer works.

The City of Ottawa Development Servicing Study Checklist has been included in Appendix 'A4' which provides the details associated with the proposed development and the approval and permit requirements. A pre-consultation meeting between Minto and the City was completed on December 11, 2017.



PROJECT:

MINTO COMMUNITIES INC.
HARMONY STAGE 1 - BLOCK 104
PART OF 4025 STRANDHERD DRIVE, OTTAWA

DRAWING:

LOCATION PLAN

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

DESIGN: JW	JLR NO: 24051–003
DRAWN: TB	DRAWING NO.: FIGURE 1
CHECKED: JW	

File Location: R:\24000\24051 LD Minto Clarke\24051-003 Harmony Condo Block\JLR DWG\Civil\24051-003 C LOCATION PLAN.DWG

PLOT DATE: March 1, 2018 8:43:47 AM

1.4 Engineering Drawings

Engineering Drawings have been prepared in support of the development of Block 104. The following four (4) drawings have been included at the back of this report:

- Site Servicing Plan (Drawing S1);
- Grading Plan (Drawing G1);
- Storm Drainage and Ponding Plan (SWM);
- Removals & Erosion & Sediment Control Plan (RESC).

2.0 WATER SERVICING

2.1 Design Criteria

A Hydraulic Network Analysis (HNA) was completed as part of the detailed design for the Harmony Stage 1 subdivision to confirm that the proposed watermains could provide adequate supply while complying with both the City of Ottawa Design Guidelines for Water Distribution (July 2010) and Technical Bulletin ISDTB-2014-02, herein referred to as the Design Guidelines and TB-2014-02, respectively. The Design Guidelines require that a water supply system be designed to satisfy the following demand criteria:

- maximum day demand plus fire flow; and
- maximum hourly demand (peak hour demand).

The HNA completed as part of the Harmony Stage 1 design included a conceptual 50 mm diameter service to supply potable water to the future Block 104. The HNA has since been updated to reflect the proposed watermain layout for Block 104, but is based on the same demands and the boundary conditions used in the original Harmony Stage 1 HNA (refer to Appendix ‘B1’ for a copy of City correspondence for boundary conditions).

2.2 System Pressures

Section 4.2.2 of the Design Guidelines requires that new development additions to the public water distribution system be designed such that the minimum and maximum water pressures, as well as flow rates, conform to the following:

i. Under maximum hourly demand conditions (peak hour), the pressures shall not fall below 276 kPa (40 psi).

ii. During periods of simultaneous maximum day and fire flow demand, the residual pressure at any point in the distribution system shall not be less than 140 kPa (20 psi).

iii. In accordance with the Ontario Code & Guide for Plumbing, the static pressure at any fixture shall not exceed 552 kPa (80 psi) in areas that may be occupied.

iv. The maximum pressure at any point in the distribution system shall not exceed 689 kPa (100 psi) in unoccupied areas.

The HNA for Harmony Stage 1 and the subsequent Block 104 were carried out to fulfill the above watermain pressure and demand objectives.

2.3 Water Demands

To assess the performance of the water distribution system, the above-noted water demand scenarios were developed and evaluated against the pressure criteria listed in Section 2.2 using Bentley's WaterCAD® V8i software platform. The average day demand calculated for Block 104 was based on a daily residential consumption rate of 350 L/capita, in accordance with Table 4.2 of the Design Guidelines and a unit density of 2.7 persons/unit, in accordance with Table 4.1 of the Design Guidelines. Maximum daily and peak hourly demands were calculated using the prescribed ratios included in the Design Guidelines (i.e., maximum day to average day ratio of 2.5, and a peak hourly to maximum day ratio of 2.2). Table 2. 2.1 summarizes the water demands computed for the subject site which are consistent with the Harmony Stage 1 demand calculations (refer to Appendix 'B2' for overall subdivision water demand calculations).

Table 2.3: Calculated Water Demands

Average Day Demand	Maximum Day Demand	Peak Hourly Demand
0.26 L/s	0.66 L/s	1.44 L/s

2.4 Simulation of Fire Flows

Various guidelines are used throughout North America to establish fire flow requirements for different types of buildings. The Guidelines entitled "Water Supply for Public Fire Protection (1999)" developed by the Fire Underwriters Survey (FUS) govern fire flow protection requirements in the City of Ottawa. In addition, fire flow requirements used in this HNA have been calculated in accordance with TB-2014-02. Based on these documents, a fire flow requirement of 167 L/s was calculated for the subject site; refer to Appendix 'B3' for the FUS calculations.

2.5 Proposed Watermain Servicing

The proposed watermain layout for Block 104 is shown on the Site Servicing Plan (Drawing S1 included at the back of this Report). Water will be supplied to the site by a 50 mm diameter watermain network that will connect to the existing 50 mm diameter watermain stub at Chakra Street. Each unit will be provided with its own water service; therefore, a total of 24 water services are proposed onsite. Fire protection will be provided by the existing hydrants adjacent to the site on Chakra Street and on Chapman Mills Drive.

2.6 Simulation Results

2.6.1 Peak Hour Demand

The proposed water distribution system as depicted on Drawing S1 was simulated under the peak hour demand based on the aforementioned water demand and boundary conditions. The simulation results show a minimum

residual pressure of 422 kPa (61 psi) at Junction J-67 under the peak hour demand, thus exceeding the minimum operating pressure of 276 kPa (40 psi) as recommended in the Design Guidelines (refer to Appendix 'B4' for WaterCAD® simulation schematic with results).

2.6.2 Maximum Day Plus Fire Flow

Section 4.2.2.3 of the Design Guidelines requires that the water distribution system satisfy the maximum day demand combined with the FUS fire flow requirement, as presented in Appendix 'B3'. The fire flow simulation was carried out by allowing WaterCAD® to calculate the available fire flow that can be drawn from a hydrant without allowing any part of the system to experience pressures less than 140 kPa (20 psi).

The simulation results indicate that a minimum fire flow of 192 L/s is available at Hydrant H-7 on Chapman Mills Drive and 168 L/s is available at Hydrant H-26 on Chakra Street while fulfilling the maximum day demand. Consequently, the distribution system can deliver the required fire flow of 167 L/s (refer to Appendix 'B4' for WaterCAD® simulation schematic with results).

2.6.3 High Pressure Check

The Design Guidelines require that a high pressure check (maximum hydraulic grade elevation) be performed on the proposed system to ensure that the maximum pressure constraint of 552 kPa (80 psi) as per the Ontario Code & Guide for Plumbing is not exceeded. To generate the highest pressure, the demand at all Junctions was set to zero (0). Simulation results for this scenario indicate that residual pressures are expected to range between 592 kPa (86 psi) and 610 kPa (88 psi) exceeding the maximum pressure constraint of 552 kPa (80 psi) (refer to Appendix 'B4' for WaterCAD® simulation schematic with results). Consequently, pressure reducing valves (PRVs) should be installed on all water service laterals as part of the building plumbing.

2.7 Summary and Conclusions

Based on the above HNA simulation results, it is recommended that the water distribution system shown on the Site Servicing Plan (Drawing S1) be implemented to provide domestic water supply to the stacked townhomes. Existing hydrants on Chakra Street and Chapman Mills Drive will provide adequate fire protection for the subject site.

3.0 WASTEWATER SERVICING

3.1 Background

Wastewater generated by the proposed Block 104 was accounted for in the Harmony Stage 1 subdivision detail design completed by JLR in 2017. In the Harmony Stage 1 design, the 0.32 ha site was identified as 'Future High Density Residential - Block 118'. The block was designed to be serviced by a 200 mm diameter stub on the south side of Chakra Street, at the eastern limit of the Block. A peak design flow of 1.14 L/s was accounted for based on

24 stacked townhome units and assuming 2.7 persons per unit (refer to Appendix 'C1' for the Sanitary Sewer Design Sheet and Drainage Plan). Wastewater generated from the proposed stacked townhome units will ultimately discharge to the existing 900 mm diameter South Nepean Collector located along Chapman Mills Drive.

3.2 Design Criteria

The proposed sanitary sewers servicing Block 104 were designed based on the City of Ottawa Sewer Design Guidelines (October 2012) and associated Technical Bulletins. Key design parameters have been summarized in Table 3.2 below:

Table 3.2: Wastewater Servicing Design Criteria

Design Criteria	Design Value	Reference
Domestic Flows	280 L/capita/ day	ISTB-2018-01
Population Density	Towns: 2.7 persons/unit	City Table 4.2 Section 4.3
Residential peaking factor	Harmon Formula	City Section 4.5.1
Infiltration flow	0.33 L/s/effective gross ha	ISTB-2018-01
Minimum velocity	0.6 m/s	City Section 6.1.2.2
Maximum velocity	3.0 m/s	City Section 6.1.2.2
Manning Roughness Coefficient (for smooth wall pipes)	0.013	City Section 6.1.8.2
Minimum allowable slopes	Varies	City Table 6.2, Section 6.1.2.2

3.3 Proposed Sanitary Servicing and Calculations

It is proposed to collect and convey wastewater flows generated within Block 104 via a 200 mm diameter sanitary sewer collection system that will outlet to the existing 200 mm diameter stub on Chakra Street. One sanitary service lateral will be provided per two stacked townhome units, totaling 12 sanitary service laterals. The Sanitary Sewer Design Sheet and Sanitary Drainage Plan for Block 104 has been included in Appendix 'C2'. A peak design flow of 0.95 L/s was calculated for the stacked townhome units based on the parameters described in Table 3.2. The calculated peak flow is 0.2 L/s less than the peak flow allocated for the site as part of the Harmony Stage 1 detailed design due to the change in design criteria prescribed in the recent Technical Bulletin ISTB-2018-01.

3.4 Summary and Conclusions

Based on the above servicing details and the Sanitary Sewer Design Sheet and Drainage Plan provided in Appendix 'C2', it is recommended that the sanitary sewer system presented on Drawing S1 (included at the back of this Report) be implemented to provide sanitary servicing for the proposed stacked townhome units.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

4.1 Background

Stormwater management for the proposed Block 104 was accounted for in the overall Harmony Stage 1 storm sewer design completed by JLR in 2017. In the Harmony Stage 1 design, the 0.32 ha site was identified as 'Future High Density Residential - Block 118'. The block was designed to be serviced by a 375 mm diameter storm sewer outlettling to maintenance hole 125 on Chakra Street, at the eastern limit of the Block, as shown on the Storm Sewer Drainage Plan and Design Sheet provided in Appendix 'D1'. The Harmony Stage 1 storm sewer network was designed to ultimately discharge to an interim off-line linear pond to the east of the subdivision, but will ultimately outlet to the retrofitted Kennedy-Burnett stormwater management facility in the future.

A hydraulic model was created during the Harmony Stage 1 design which included the proposed Block 104 development. A storm event with a 1:5 year return period was modelled using the PCSWMM hydraulic solver and the results yielded a peak discharge rate of 89.0 L/s for the developed Block 104 based on an assumed C-factor of 0.80 (simulation results can be found in Appendix 'D5'). A minor system release rate of 89.0 L/s was, therefore, allocated for Block 104 as part of the Harmony Stage 1 detailed design. Furthermore, storm events in excess of the allowable minor system release rate and up to the 1:100 year reoccurrence were assumed to be detained onsite.

4.2 Design Criteria

Storm servicing for the proposed Block 104 was designed in accordance with the following design criteria established as part of the Harmony Stage 1 subdivision storm sewer design:

- Storm runoff outletting to the existing Chakra Street sewer is to be limited to the allocated peak flow of 89.0 L/s;
- Runoff in excess of allocated minor system release rate and up to the 1:100 year recurrence is to be retained onsite;
- Major overland flow in excess of the 1:100 year recurrence is to be conveyed southerly to the future BRT corridor, which will ultimately outlet to the existing Kennedy-Burnett stormwater management facility.

Furthermore, the detailed stormwater management design was carried out in accordance with the design criteria prescribed in the City of Ottawa Sewer Design Guidelines (2012) and associated Technical Bulletins, as summarized in Table 4.2 below.

Table 4.2: Storm Servicing Design Criteria

General Design Criteria
Storm sewers sized to accommodate the 1:5 year peak flows calculated with the Rational Method and the City of Ottawa Intensity-Duration-Frequency (IDF) curves.
Storm sewers designed based on a minimum inlet time of ten (10) minutes, as per the Technical Bulletin ISDTB-2012-4.
Minimum roadway profile grades at 0.5%.
Maximum 0.35 m street/parking lot ponding depth per PIEDTB-2016-01.
Minimum 0.30 m freeboard between a ponding area spillover elevation and the lowest building opening, and water level shall not touch the building envelope during the stress test event (100 year event + 20%).
Minimum 0.30 m freeboard between 1:100 year HGL and underside of footing elevation.
Provide measures to ensure that site preparation and construction is in accordance with the current Best Management Practices for Erosion and Sediment Control.

4.3 Proposed Storm Servicing and Stormwater Management Strategy

4.3.1 Proposed Storm Servicing

Storm runoff generated by the 0.32 ha site will be collected by proposed onsite catch basins and conveyed by a 375 mm diameter storm sewer that will discharge to the existing 375 mm diameter stub on Chakra Street (refer to Appendix ‘D2’ for Storm Sewer Design Sheet). The 1:100 year hydraulic grade line (HGL) for Block 104 was modelled using the PCSWMM hydraulic solver under interim and ultimate conditions. The interim HGL represents the current condition during which stormwater discharges to an interim off-line linear pond to the east of the subdivision whereas the ultimate HGL represents the future condition during which stormwater will outlet to the retrofitted Kennedy-Burnett stormwater management facility. The results yielded a maximum HGL of 92.44 m under interim conditions (refer to Appendix ‘D5’ for model results). The proposed underside of footing elevations for the two stacked townhome blocks are 93.09 m and 92.80 m. As such, the minimum required freeboard of 0.30 m between the 1:100 year HGL and the underside of footing has been achieved.

4.3.2 Off-Site Runoff and Allowable Minor System Release Rate

The total of the controlled and uncontrolled flows will be restricted to the allowable release rate of 89.0 L/s and peak flows in excess of this rate and up to the 1:100 year storm event will be retained onsite. In order to achieve this criterion, onsite restrictions (i.e., inlet control devices (ICDs)) are proposed. Consequently, the stormwater management approach includes the provision of

onsite storage which will be achieved via parking lot depressions. The 1:5 year and 1:100 year peak flows were calculated using the Rational Method for each of the catchment areas. The minimum storage volume requirement was then calculated based on specified ICD restricted release rates using the Modified Rational Method (refer to the stormwater management calculations provided in Appendix 'D3'). Note that the specified ICD release rates are greater than the 1:2 year storm event but less than the 1:5 year storm event. The storage volume provided by each ponding area was designed to accommodate the storage volume requirements as calculated by the Modified Rational Method. The stormwater management concept for major system flows was designed such that storm runoff in excess of the 1:100 year storm event will be conveyed southerly to the future BRT corridor, as shown on the Grading Plan (Drawing G1 provided at the back of this Report).

Table 4.3 below summarizes the inlet control devices (ICDs), the storage volume requirement, as calculated by the Modified Rational Method (Appendix 'D3'), and the ponding depths at each ponding area. Details associated with the selection of each ICD type are provided in Appendix 'D4'.

Table 4.3: Stormwater Management Summary

Drainage Area	Catch Basin / ICD No.	Total Release Rate (1:100 yr)	ICD Type	Storage Requirement (1:100 year)	Storage Available	1:100 yr Ponding Depth	Max. Ponding Depth
1	Overland 1	1.86 L/s	N/A	N/A	N/A	N/A	N/A
2	Overland 2	35.37 L/s	N/A	N/A	N/A	N/A	N/A
3	CB 2 – ICD2	14.50 L/s	100 VHV-1	1.65 m^3	4.6 m^3	0.12 m	0.17 m
4	CB 1 – ICD1	9.00 L/s (restricted)	100 VHV-1	7.56 m^3	10.14 m^3	0.14 m	0.15 m
5	CB 3 – ICD3	15.00 L/s (restricted)	125 VHV -2	7.83 m^3	11.25 m^3	0.20 m	0.23 m
6	CBMH1 – ICD4	10.00 L/s	100 VHV-1	6.66 m^3	8.64 m^3	0.20 m	0.21 m
	Total	**85.73 L/s**		**23.70 m^3**	**34.63 m^3**		

4.3.3 Summary of Restricted Flows and Storage Capacity

Based on the summation of uncontrolled and controlled areas indicated in Table 4.3, the 1:100 year peak flow has been restricted to a total release rate of 85.73 L/s, which is below the allowable release rate of 89.0 L/s. Furthermore, the total

storage volume requirement of 23.7 m^3 can be provided by the proposed parking lot depressions which have ponding depths less than 0.35 m during the 1:100 year event (refer to Drawing SWM for ponding area information). It should be noted that there is residual sag storage available for storm events in excess of the 1:100 year event and, therefore, the ponding depths during the stress test event (1:00 year + 20%) are well below the finished grade elevations at the stacked townhome blocks, refer to stress test calculations in Appendix 'D3'. Note that flow depths at the spillover points were approximated using the weir equation. Consequently, the water quantity criterion established as part of the Harmony Stage 1 detailed design and in accordance with City Standards has been fulfilled by the design.

4.3.4 Water Quality

Stormwater runoff from the proposed Block 104 will be ultimately conveyed to the hydrodynamic separator (HDS) located directly upstream of the interim off-line linear pond to the east of the Harmony Stage 1 subdivision adjacent to the existing Kennedy-Burnett SWM facility. This end-of-pipe HDS unit was designed to achieve 80% TSS removal for the Harmony Stage 1 development, which includes Block 104. Consequently, there is no additional water quality measures proposed as part of the proposed stormwater servicing.

4.4 Summary and Conclusions

The storm and stormwater management solution presented in this Site Servicing Report was found to fulfill the water quantity criteria presented in Section 4.2. The total of the controlled and uncontrolled peak flows outletting offsite were designed to be less than the allocated release rate of 89.0 L/s up to the 100 year storm event. Furthermore, the site has been designed with adequate surface storage to retain stormwater onsite up to the 1:100 year event. Therefore, it is recommended that the stormwater servicing shown on the Site Servicing Plan (Drawing S1) be implemented to provide stormwater management for the stacked townhome development.

5.0 EROSION AND SEDIMENTATION CONTROL

Prior to initiating construction of the proposed development, erosion and sedimentation control measures, as outlined in the Ontario Ministry of Natural Resources (MNR) Guidelines on Erosion and Sediment Control for Urban Construction Sites, are to be implemented to trap sediment on site.

The following erosion and sedimentation control measures are proposed, as shown on Drawing ESC:

- supply and installation of a silt fence barrier, as per OPSD 219.110;
- supply and installation of filter fabric between the frame and cover of existing catch basins adjacent to the proposed development, including regular inspection and maintenance as required;
- stockpiles of material during construction are to be located along flat areas away from drainage paths and are to be enclosed with additional silt fence;

- proposed catch basins are to be equipped with sumps, inspected frequently, and cleaned as required;
- sandbags are to be placed blocking part of the sewer pipe in the connecting storm maintenance holes to eliminate construction debris from entering the existing storm sewer system. The sandbags are to be removed after the proposed storm sewers have been fully cleaned.

The proposed erosion control measures shall conform to the following documents:

- "Guidelines on Erosion and Sediment Control for Urban Construction Sites" published by Ontario Ministries of Natural Resources, Environment, Municipal Affairs, and Transportation & Communication, Association of Construction Authorities of Ontario and Urban Development Institute, Ontario, May 1987.
- "MTO Drainage Manual", Chapter F: "Erosion of Materials and Sediment Control", Ministry of Transportation & Communications, 1985.
- "Erosion and Sediment Control" Training Manual by Ministry of Environment, Spring 1998.
- Applicable Regulations and Guidelines of the Ministry of Natural Resources.

6.0 CONCLUSIONS

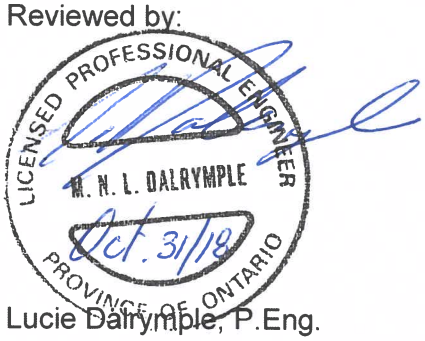
This Servicing Report and the associated Drawings describe the servicing solutions to provide municipal services for the proposed stacked townhome development at Block 104, in accordance with the City of Ottawa Design Guidelines. Construction details are to be in accordance with Local and Provincial design standards. It is recommended that this Servicing Report be reviewed with the intent of providing approval to permit Minto to proceed with the presented servicing.

This Report has been prepared for the exclusive use of Minto, 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 and may not be used or relied on by any other party without the express written consent of JLR.

Prepared by:

Nick Gianetto, E.I.T.

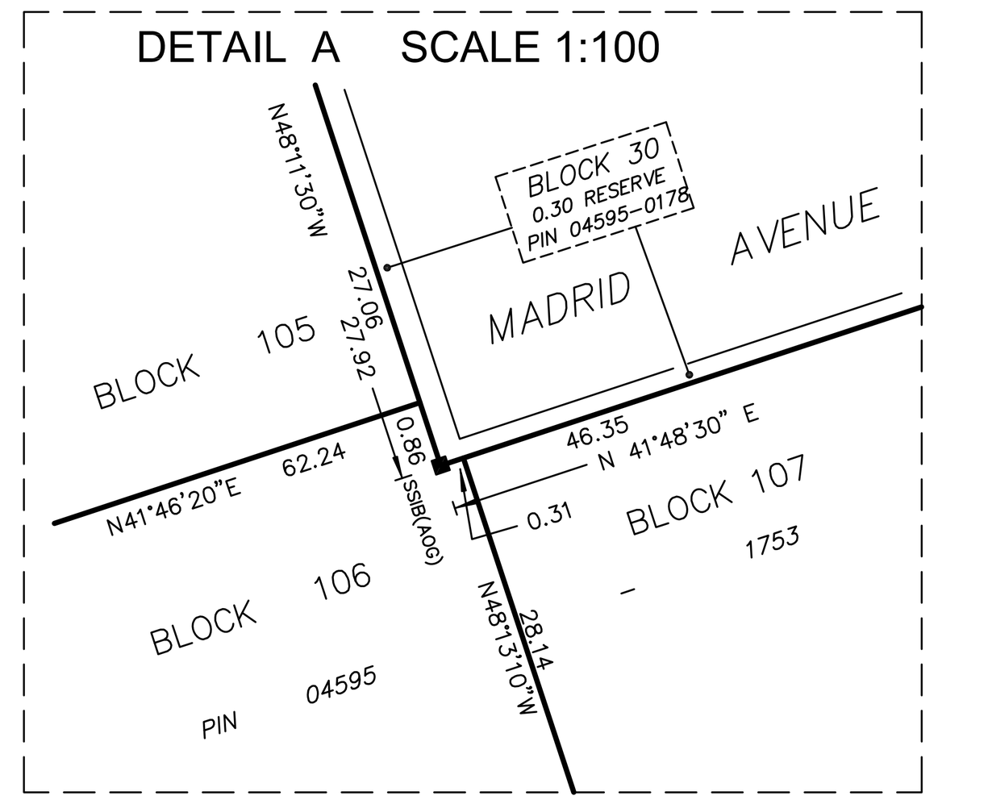
Reviewed by:

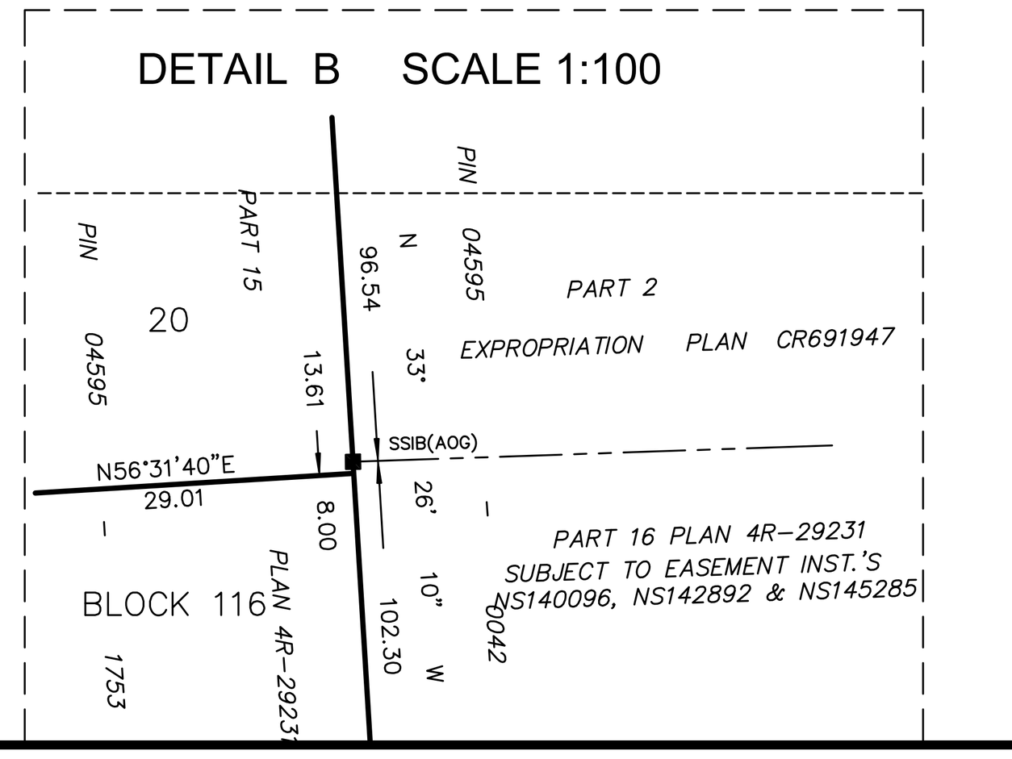


Lucie Dalrymple, P.Eng.

Appendix A1

Harmony Stage 1
Draft 4M Plan





NOTES AND LEGEND

—□—	denotes	Survey Monument Planted.
—■—	"	Survey Monument Found
SIB	"	Standard Iron Bar.
SSIB	"	Short Standard Iron Bar.
CC	"	Cut Cross.
IB	"	Iron Bar.
CLF	"	Chain Link Fence
BF	"	Board Fence
(AOG)	"	Annis, O'Sullivan, Vollebekk Ltd.
(P1)	"	Registered Plan 4M-1361
(P2)	"	Plan 4R-29869
(P3)	"	Plan 4R-29231
(P4)	"	Plan 4R-12321
(P5)	"	Plan 4R-25122
(P6)	"	Plan 4R-22274

All planted survey monuments are IB's unless otherwise noted.

APPROVED UNDER SECTION 51 OF THE PLANNING ACT BY THE CITY OF OTTAWA.

THIS ________ DAY OF ____________________ , _______

STEPHEN WILLIS, MCIP, RPP,
GENERAL MANAGER
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT
CITY OF OTTAWA

PLAN 4M-

I CERTIFY THAT THIS PLAN IS REGISTERED IN THE LAND REGISTRY OFFICE FOR THE LAND TITLES DIVISION OF OTTAWA-CARLETON NO. 4 AT _____ O'CLOCK ON THE ____ DAY OF _________, ____ AND ENTERED IN THE PARCEL REGISTER FOR PROPERTY IDENTIFIERS ______________________________

AND THE REQUIRED CONSENTS ARE REGISTERED AS PLAN DOCUMENT NO.___________

____
LAND REGISTRAR

This plan comprises all of the land identified by PIN'S 04487-2429 and 04487-0703 and part of the land identified by PIN 04487-2428 .

All of of PIN 04595-0130
- Part of Block 105
- Block 118

Part of of PIN 04595-1753
- Lots 1 to 96 (inclusive)
- Blocks 97 to 104 (inclusive)
- Part of Block 105
- Blocks 106 to 117 (inclusive)
- rue Hamsa Street
- rue Octave Street
- rue Lilith Street
- rue Namaste Street
- rue Chakra Street
- avenue Clarity Avenue
- voie Watterlilly Way
- promenade Chapman Mills Drive
- avenue Kenton Avenue

PLAN OF SUBDIVISION OF

PART OF LOTS 14 and 15
CONCESSION 3 (RIDEAU FRONT)
Geographic Township of Nepean
CITY OF OTTAWA

Surveyed by Annis , O'Sullivan , Vollebekk Ltd.

Scale 1 : 750

30 22.5 15 7.5 0 15 30 Metres

Metric

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

SURVEYOR'S CERTIFICATE

I CERTIFY THAT :

1. This survey and plan are correct and in accordance with the Surveys Act, the Surveyors Act and the Land Titles Act and the regulations made under them.
2. The Survey was completed on the ____ day of _____ ,2017.

__________ Date

____
V. Andrew Shelp
Ontario Land Surveyor

OWNER'S CERTIFICATE

THIS IS TO CERTIFY THAT :

1. Lots 1 to 96 both inclusive, Blocks 104 to 117, rue Hamsa Street, rue Octave Street, rue Lilith Street, rue Namaste Street, avenue Clarity Avenue, rue Chakra Street, voie Watterlilly Way, promenade Chapman Mills Drive, avenue Kenton Avenue, Road Widening, namely Block 118 and the Reserve, namely, Blocks 97 to 103 both inclusive have been laid out in accordance with our instructions.
2. The Streets are dedicated as public highways.

Dated the ____ day of ____________,2017

____
Brent Strachan, Senior Vice President
Minto Communities Inc.
I have the authority to bind the corporation.

Dated the ____ day of ____________,2017

____
Susan Murphy, Vice President
Minto Communities Inc.
I have the authority to bind the corporation.

Distances shown on this plan are ground distances and can be converted to grid distances by multiplying by the combined scale factor of 0.999927.

Bearings are grid, derived from Can-Net 3.0 Real Time Network GPS observations on reference points A and B, shown hereon, having a bearing of N 41°48'30" E and are referenced to Specified Control Points 01919791338 and 01919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinates are derived from Can-Net 3.0 Real Time Network GPS observations referenced to Specified Control Points 01919791338 and 01919871649, MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

Coordinate values are to urban accuracy in accordance with O. Reg. 216/10.

. 01919791338	Northing	5006055.96	Easting	346140.91
. 01919871649	Northing	5007189.87	Easting	372435.05
. Point A	Northing	5013770.03	Easting	362789.72
. Point B	Northing	5013988.65	Easting	362985.24

Caution: Coordinates cannot, in themselves, be used to re-establish corners or boundaries shown on this plan.

ANNIS, O'SULLIVAN, VOLLEBEKK LTD.
14 Concourse Gate, Suite 500
Nepean, Ont. K2E 7S6
Phone: (613) 727-0850 / Fax: (613) 727-1079
Email: Nepean@aovltd.com
Ontario Land Surveyors

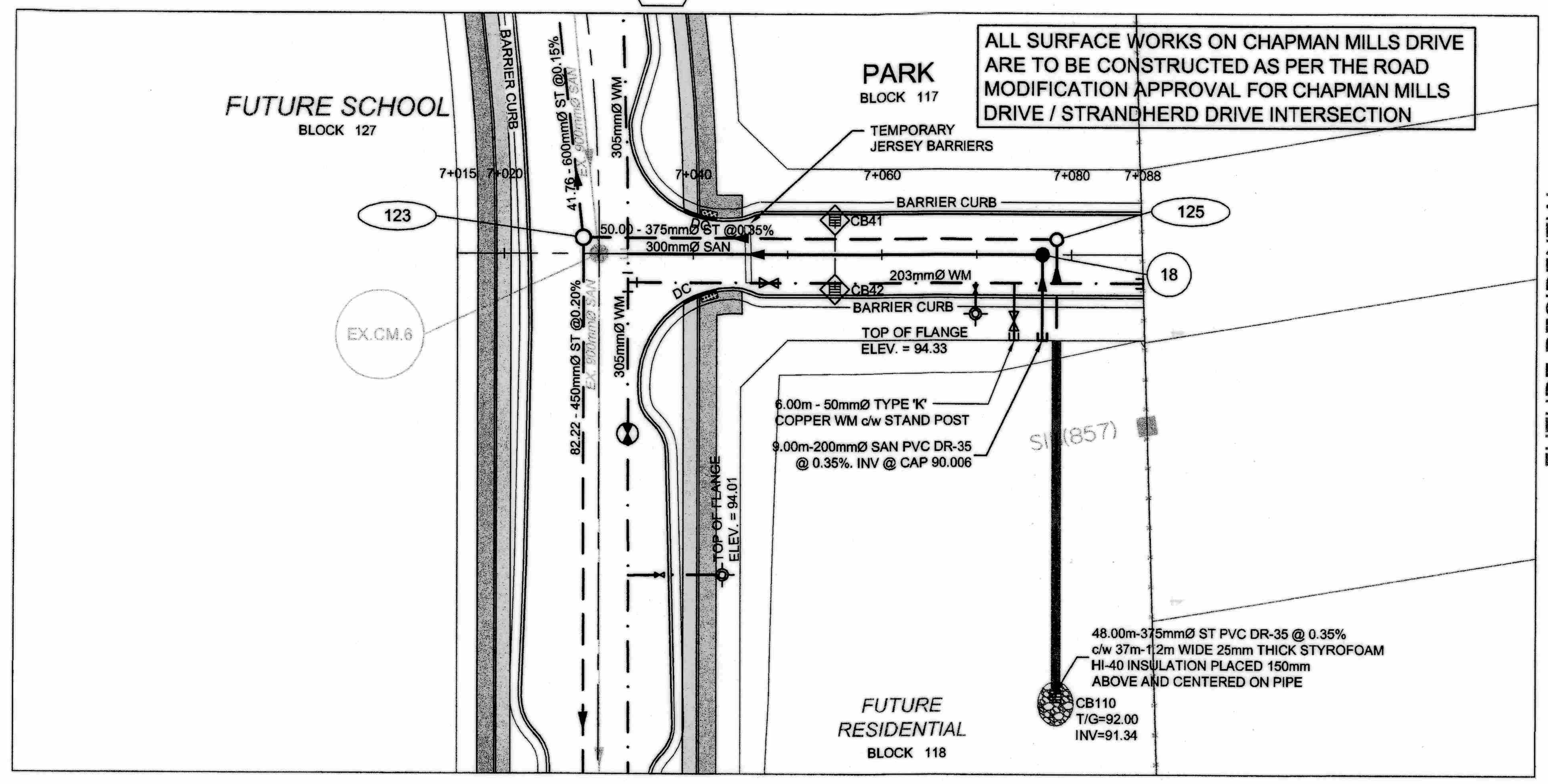
Job No.17300—17 Minto PtLt 15 C 3 RF NP SUB D2 | ig

Appendix A2

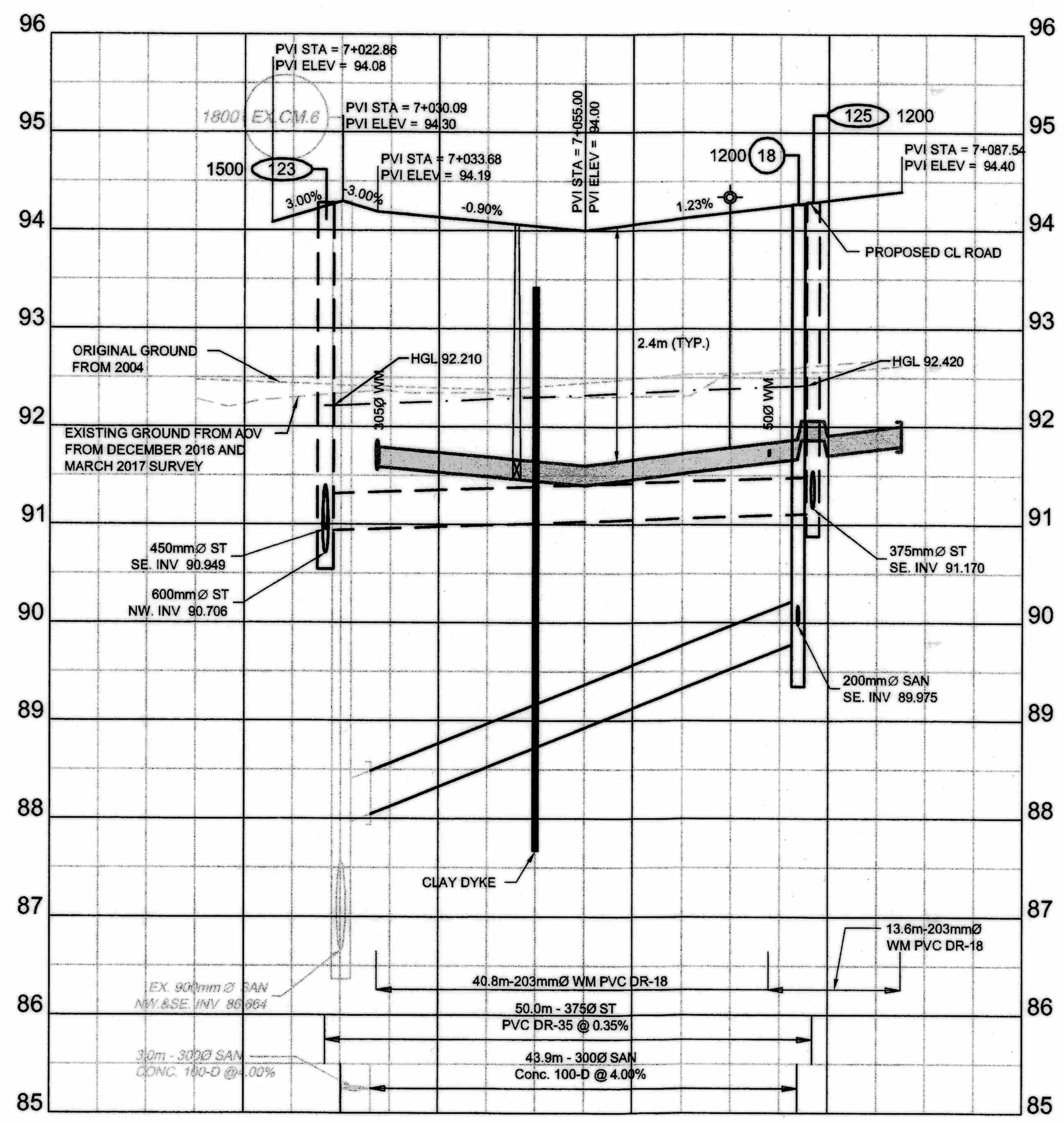
Harmony Stage 1 – Chakra
Street Plan and Profile Drawing

CHAKRA STREET

CHAPMAN MILLS DRIVE (10)

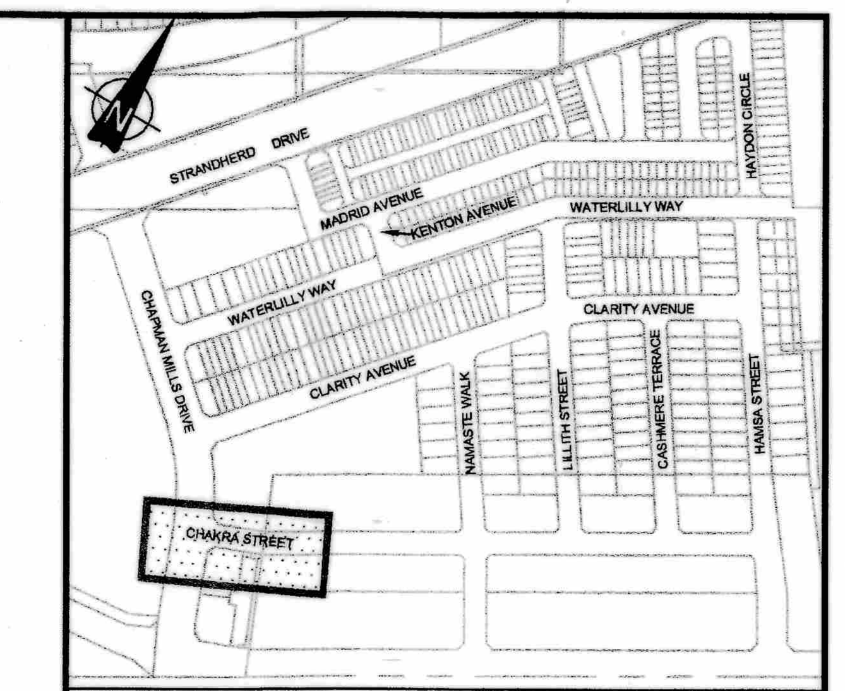


CHAPMAN MILLS DRIVE (10)



DESIGN PROFILE ELEVATIONS	92.23; 92.34; 94.135; 92.31; 94.062; 92.63; 94.308
W.M. TOP ELEVATIONS	91.861 305x203 TEE; 91.735; 91.663 VALVE & VB; 91.662; 91.783 HYDRANT VALVE & VB; 91.833 203x50 TEE; 91.869 22.5° VERTICAL BEND; 92.060 22.5° VERTICAL BEND; 91.908; 92.060 22.5° VERTICAL BEND; 91.907 22.5° VERTICAL BEND; 92.001 CAP
STORM SEWER INV. ELEVATION	90.935; 91.110
SANITARY SEWER INV. ELEVATION	88.000; 88.120; 88.120; 89.874
C.L. ROADWAY STATION	7+000.00; 7+020.00; 7+028.39; 7+030.05; 7+033.68; 7+040.00; 7+048.03; 7+060.00; 7+069.84; 7+073.90; 7+076.78; 7+077.21; 7+076.90; 7+078.40; 7+080.00; 7+079.58; 7+079.92; 7+087.54; 7+100.00

File Location: r:\24000\24051 ld minto clarke\24051-001 stage 1 lands\jlr drawings\Civil\24051-001 C CHAKRA.dwg



KEYPLAN, N.T.S.

LEGEND:
- EXISTING CATCH BASIN
- CATCH BASIN c/w ICD
- PROPOSED CATCH BASIN & LEAD
- PROPOSED ELBOW CATCHBASIN
- PROPOSED TEE CATCHBASIN
- 250mmØ PERFORATED PIPE AS PER CITY OF OTTAWA STANDARD DRAWING S29
- PROPOSED WATERMAIN, VALVE & HYDRANT
- PROPOSED VALVE CHAMBER
- PROPOSED REDUCER
- EXISTING WATERMAIN, VALVE & HYDRANT
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING STORM SEWER & MANHOLE
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED STORM SEWER & MANHOLE
- MANHOLE NUMBER AND SIZE (mm) C/W SAFETY PLATFORM PER OPSD 404.020
- SINGLE SERVICE CONNECTION (STORM, SANITARY AND WATER)
- DOUBLE SERVICE CONNECTION (STORM, SANITARY AND WATER)
- CONC. SIDEWALK
- ASPHALT SIDEWALK
- BOREHOLE, TEST PIT
- CHAINLINK FENCE
- TACTILE WALKING SURFACE INDICATOR (TWSI)

No.	ISSUE / REVISION	DD/MM/YY
06	ISSUED FOR CONSTRUCTION / ISSUED FOR MYLARS	16/11/17
05	ISSUED TO CITY FOR MOE SUBMISSION	31/10/17
04	ISSUED TO CITY FOR REVIEW - 4TH SUBMISSION / ISSUED FOR TENDER	16/10/17
03	ISSUED TO CITY FOR REVIEW - 3RD SUBMISSION	19/09/17
02	ISSUED TO CITY FOR REVIEW - 2ND SUBMISSION	11/07/17
01	ISSUED TO CITY FOR REVIEW - 1ST SUBMISSION	12/05/17

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

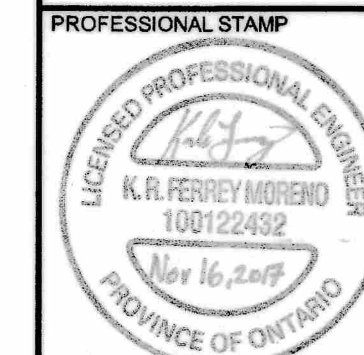
SCALE: 1:500H, 1:50V

CLIENT:
MINTO COMMUNITIES INC.
200-180 KENT STREET
OTTAWA, ON
K1P 0B6

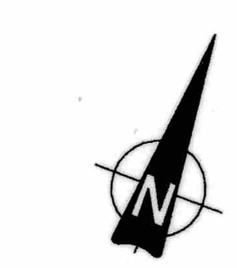
CONSULTANT:
J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
www.jlrichards.ca

CONSULTANT:

PROFESSIONAL STAMP



PROJECT NORTH



PROJECT:
MINTO COMMUNITIES INC.
HARMONY STAGE 1
4005 STRANDHERD DRIVE

DRAWING:
PLAN & PROFILE
CHAKRA STREET
7+020 TO 7+087

REVIEWED BY DEVELOPMENT REVIEW BRANCH
Signed ________
Date Nov 20 2017
Plan Number 17495

DESIGN:	JW	DRAWING #:	11
DRAWN:	CJM		
CHECKED:	KF		
JLR #:	24051-001		

D07-16-16-0004

#17495

Appendix A3

MOECC Environmental Compliance Approval

Ontario

Ministry of the Environment and Climate Change
Ministère de l'Environnement et de l'Action en matière de changement climatique

ENVIRONMENTAL COMPLIANCE APPROVAL

NUMBER 3245-ATBRR3
Issue Date: November 23, 2017

Minto Communities Inc.
180 Kent Street, Suite No. 200
Ottawa, Ontario
K1P 0B6

Site Location: Harmony Subdivision - Stage 1
4005 Strandherd Drive, 3783 Strandherd Drive and 4025 Strandherd Drive
Part of Lots 14 and 15, Concession 3 (Rideau Front)
City of Ottawa

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act, R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

- **sanitary sewers:** on Waterlilly Way (from Station 6+038.00 to Station 6+224.84), Clarity Avenue (from Station 5+036.41 to Station 5+490.87), Chakra Street (from Station 7+033.68 to Station 7+076.90), Namaste Walk (from Station 4+033.40 to Station 4+128.90), Lilith Street (from Station 3+052.40 to Station 3+241.12), Cashmere Terrace (from Station 2+035.18 to Station 2+160.85), Hamsa Street (from Station 1+053.66 to Station 1+242.43), discharging to the existing 900 mm diameter South Nepean Collector located along Chapman Mills Drive;

- **storm sewers:** on Chapman Mills Drive (from Station 10+116.33 to Station 10+392.72) Waterlilly Way (from Station 6+051.56 to Station 6+216.51 and from Station 6+230.52 to Station 6+311.35), Clarity Avenue (from Station 5+020.00 to Station 5+493.73), Chakra Street (from Station 7+028.39 to Station 7+078.40), Block 110 (from Station 9+037.88 to Station 9+115.81), Namaste Walk (from Station 4+032.02 to Station 4+128.90), Lilith Street (from Station 3+034.25 to Station 3+239.51), Cashmere Terrace (from Station 2+032.27 to Station 2+159.24), Hamsa Street (from Station 1+037.73 to Station 1+242.43), Block 116 (from Station 8+044.00 to Station 8+107.13), discharging to the interim off-line dry pond facility located to the west and parallel to the existing Kennedy-Burnett stormwater management facility;

- **34.0m of 500mm diameter galvanized CSP culvert:** to be constructed in the City of Ottawa on Strandherd Drive located under entranceway of Chapman Mills Drive;

- **one (1) oil-grit separator:** Continuous Deflection Separation (CDS) System, Model CDS PMSU 56_53_10 configured as an Offline installation for submerged application or equivalent, located immediately east of Block 116 within the City of Ottawa's stormwater management block (at Station 8+080.00) serving a total drainage area of approximately 16 hectares, designed for Enhanced Level of protection, having a sediment storage capacity of 20,040 L, an oil storage capacity of 3652 L, a total storage volume of approximately 20,040 L, and a maximum treatment rate of 1,650 L/s, receiving inflow from the storm sewer located along Block 116, discharging via a 1950 mm diameter outlet pipe to interim off-line dry pond facility located to the west and parallel to the existing Kennedy-Burnett stormwater management facility;

- **one (1) interim dry pond:** located to the west and parallel to the existing Kennedy-Burnett stormwater management facility, serving a total drainage area of approximately 17 hectares, having a maximum available storage volume of 820 m^3 and a maximum depth of 1.67 m, complete with one (1) inlet structure, consisting of a 1950 mm diameter storm sewer, one (1) emergency overflow weir and riprap-lined spillway, and one (1) outlet structure, consisting of three (3) 375 mm PVC culverts with invert elevations of 90.55 m, and one (1) 6.5 m long compound weir structure with invert elevation of 90.93 m. The outlet structure allows a maximum discharge of 2,620 L/s under the 100-year storm event to the Jock River located to the south;

- **one (1) overflow channel:** to convey major overland flow from the existing Mattamy Barrhaven Mews development to the Kennedy-Burnett stormwater management facility;

including erosion/sedimentation control measures during construction and all other controls and appurtenances essential for the proper operation of the aforementioned Works;

all in accordance with the submitted application and supporting documents listed in Schedule 'A' forming part of this Approval.

For the purpose of this environmental compliance approval, the following definitions apply:

1. "*Approval* " means this entire document and any schedules attached to it, and the application;

2. "*Director* " means a person appointed by the Minister pursuant to section 5 of the *EPA* for the purposes of Part II.1 of the *EPA* ;

3. "*District Manager* " means the District Manager of the appropriate local District Office of the *Ministry* , where the *Works* are geographically located;}

4. "*EPA* " means the *Environmental Protection Act*, R.S.O. 1990, c.E.19, as amended;

5. "*Equivalent* " means a substituted oil and grit separator that meets the required quality and performance standards of the approved oil and grit separator;}

6. "*Interim Works* " means the interim stormwater management works, described in this *Approval* and that are to be used for short-term purposes only in accordance with this *Approval,* until otherwise approval for an extension of this period has been granted;}

7. "*Ministry* " means the ministry of the government of Ontario responsible for the *EPA* and *OWRA* and includes all officials, employees or other persons acting on its behalf;

8. "*Owner* " means Minto Communities Inc., and includes its successors and assignees;

9. "*OWRA* " means the *Ontario Water Resources Act, R.S.O. 1990, c. O.40* , as amended;

10. "*Significant Threat Policy(ies)* " has the same meaning as in the Clean Water Act, 2006;

11. "*Source Protection Plan* " means a drinking water source protection plan prepared under the Clean Water Act, 2006;

12. "*Wet Event* " means a rainfall event with a minimum of 15 millimetres of rain in a 24 hour period;

13. "*Water Supervisor* " means the Water Supervisor of the appropriate local office of the Safe Drinking Water Branch of the *Ministry* , where the *Works* are geographically located

14. "*Works* " means the sewage works described in the *Owner* 's application, and this *Approval*

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

TERMS AND CONDITIONS

1. GENERAL CONDITIONS

1. The *Owner* shall ensure that any person authorized to carry out work on or operate any aspect of the *Works* is notified of this *Approval* and the conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

2. 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 *Approval* , and the application for approval of the *Works* .

3. Where there is a conflict between a provision of any document in the schedule referred to in this *Approval* and the conditions of this *Approval* , the conditions in this *Approval* shall take precedence, and where there is a conflict between the documents in the schedule, the document bearing the most recent date shall prevail.

4. Where there is a conflict between the documents listed in Schedule "A" and the application, the application shall take precedence unless it is clear that the purpose of the document was to amend the application.

5. The conditions of this *Approval* are severable. If any condition of this *Approval*, or the application of any requirement of this *Approval* to any circumstance, is held invalid or unenforceable, the application of such condition to other circumstances and the remainder of this *Approval* shall not be affected thereby.

2. EXPIRY OF APPROVAL

1. This *Approval* will cease to apply to those parts of the Work which have not been constructed within five (5) years of the date of this *Approval*.

2. In the event that completion and commissioning of any portion of the *Works* is anticipated to be delayed beyond the specified expiry period, the *Owner* shall submit an application of extension to the expiry period, at least twelve (12) months prior to the end of the period. The application for extension shall include the reason(s) for the delay, whether there is any design change(s) and a review of whether the standards applicable at the time of Approval of the *Works* are still applicable at the time of request for extension, to ensure the ongoing protection of the environment.

3. This *Approval* to the *Interim Works* shall expire and become null and void on December 31, 2022.

3. CHANGE OF OWNER

1. The *Owner* shall notify the *District Manager* and the *Director*, in writing, of any of the following changes within thirty (30) days of the change occurring:

    a. change of Owner;

    b. change of address of the *Owner*;

    c. change of partners where the *Owner* is or at any time becomes a partnership, and a copy of the most recent declaration filed under the *Business Names Act*, R.S.O. 1990, c.B17 shall be included in the notification to the *District Manager*; or

    d. change of name of the corporation where the *Owner* is or at any time becomes a corporation, and a copy of the most current information filed under the *Corporations Information Act*, R.S.O. 1990, c. C39 shall be included in the notification to the *District Manager*.

2. In the event of any change in ownership of the *Works*, other than a change to a successor municipality, the *Owner* shall notify in writing the succeeding owner of the existence of this *Approval*, and a copy of such notice shall be forwarded to the *District Manager* and the *Director*.

3. The *Owner* shall ensure that all communications made pursuant to this condition refer to the number at the top of this *Approval*.

4. Notwithstanding any other requirements in this *Approval*, upon transfer of the ownership or assumption of the *Works* to a municipality if applicable, any reference to the *District Manager* shall be replaced with the *Water Supervisor*.

4. OPERATION AND MAINTENANCE

1. If applicable, any proposed storm sewers or other stormwater conveyance in this *Approval* can be constructed but not operated until the proposed stormwater management facilities in this *Approval* or any other *Approval* that are designed to service the storm sewers or other stormwater conveyance are in operation.

2. The *Owner* shall make all necessary investigations, take all necessary steps and obtain all necessary approvals so as to ensure that the physical structure, siting and operations of the *Works* do not constitute a safety or health hazard to the general public.

3. The *Owner* shall undertake an inspection of the condition of the *Works*, at least once a year, and undertake any necessary cleaning and maintenance to ensure that sediment, debris and excessive decaying vegetation are removed from the *Works* to prevent the excessive build-up of sediment, oil/grit, debris and/or decaying vegetation, to avoid reduction of the capacity and/or permeability of the *Works*, as applicable. The *Owner* shall also regularly inspect and clean out the inlet to and outlet from the *Works* to ensure that these are not obstructed.

4. The *Owner* shall design, construct and operate the *Works* with the objective that the effluent from the *Works* is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film, sheen, foam or discoloration on the receiving waters.

5. The *Owner* shall maintain a logbook to record the results of these inspections and any cleaning and maintenance operations undertaken, and shall keep the logbook at the *Owner's* administration office for inspection by the *Ministry*. The logbook shall include the following:

    a. the name of the *Works*; and

    b. the date and results of each inspection, maintenance and cleaning, including an estimate of the quantity of any materials removed and method of clean-out of the *Works*.

6. The *Owner* shall prepare an operations manual prior to the commencement of operation of the *Works* that includes, but is not necessarily limited to, the following information:

    a. operating and maintenance procedures for routine operation of the *Works* ;

    b. inspection programs, including frequency of inspection, for the *Works* and the methods or tests employed to detect when maintenance is necessary;

    c. repair and maintenance programs, including the frequency of repair and maintenance for the *Works* ;

    d. contingency plans and procedures for dealing with potential spills and any other abnormal situations and for notifying the *District Manager* ; and

    e. procedures for receiving, responding and recording public complaints, including recording any follow-up actions taken.

7. The *Owner* shall maintain the operations manual current and retain a copy at the location of the *Works* for the operational life of the *Works* . Upon request, the *Owner* shall make the manual available to *Ministry* staff.

5. TEMPORARY EROSION AND SEDIMENT CONTROL

1. The *Owner* shall install and maintain temporary sediment and erosion control measures during construction and conduct inspections once every two (2) weeks and after each significant storm event (a significant storm event is defined as a minimum of 25 mm of rain in any 24 hours period). The inspections and maintenance of the temporary sediment and erosion control measures shall continue until they are no longer required and at which time they shall be removed and all disturbed areas reinstated properly.

2. The *Owner* shall maintain records of inspections and maintenance which shall be made available for inspection by the *Ministry* , upon request. The record shall include the name of the inspector, date of inspection, and the remedial measures. if any, undertaken to maintain the temporary sediment and erosion control measures.

6. MONITORING AND RECORDING

The *Owner* shall, upon commencement of operation of the *Works* , carry out the following monitoring program:

1. All samples and measurements taken for the purposes of this *Approval* are to be taken at a time and in a location characteristic of the quality and quantity of the effluent stream over the time period being monitored.

2. Samples shall be collected at the following sampling points, at the frequency specified, by means of the specified sample type and analyzed for each parameter listed and all results recorded, as outlined in **Schedule "B".**

3. The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following:

    a. the *Ministry's* Procedure F-10-1, "Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only)", as amended from time to time by more recently published editions;

    b. the *Ministry's* publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater" (January 1999), ISBN 0-7778-1880-9, as amended from time to time by more recently published editions; and

    c. the publication "Standard Methods for the Examination of Water and Wastewater" (21st edition), as amended from time to time by more recently published editions.

7. REPORTING

1. One (1) week prior to the start-up of the operation of the *Works*, the *Owner* shall notify the *District Manager* (in writing) of the pending start-up date.

2. The *Owner* shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to *Ministry* staff.

3. The *Owner* shall prepare and submit a performance report to the *District Manager* on an annual basis, within ninety (90) days following the end of the period being reported upon. The first such report shall cover the first annual period following the commencement of operation of the *Works* and subsequent reports shall be submitted to cover successive annual periods following thereafter. The reports shall contain, but shall not be limited to, the following information:

    a. a summary and interpretation of all monitoring data and an overview of the success and adequacy of the *Works*, including demonstration using the monitoring data that the appropriate level of quality control has been achieved;

    b. a description of any operating problems encountered and corrective actions taken;

    c. a summary of all maintenance carried out on any major structure, equipment, apparatus, mechanism or thing forming part of the *Works*, including an estimate of the quantity of any materials removed from the *Works*;

    d. a summary of the calibration and maintenance carried out on all monitoring equipment;

e. a summary of any complaints received during the reporting period and any steps taken to address the complaints;

f. a summary of all spill or abnormal discharge events; and

g. any other information the *District Manager* requires from time to time.

8. SOURCE WATER PROTECTION

1. The *Owner* shall ensure, if applicable, that the design, construction and operation of the *Works* conforms to any Significant Threat Policies in any Source Protection Plan that applies to the location of the *Works* .

Schedule 'A' forms part of this *Approval* and contains a list of supporting documentation / information received, reviewed and relied upon in the issuance of this *Approval* .

SCHEDULE "A"

1. Application for Environmental Compliance Approval for Municipal and Private Sewage Works, dated October 27, 2017 and received on November 8, 2017, submitted by Minto Communities Inc.;

2. Transfer of Review Letter of Recommendation, dated November 3, 2017 and signed by Charles Warnock, P. Eng., City of Ottawa;

3. Harmony Stage 1, 4005 Strandherd Drive, City of Ottawa, Site Servicing Report, dated November 2017, prepared by J.L. Richards & Associates Limited;

4. Engineering Drawings: Minto Communities Inc., Harmony Stage 1, Revision # 5 dated October 31, 2017, prepared by J.L. Richards & Associates Limited;

5. RVCA email dated October 17, 2017;

6. Pre-submission consultation email with the local MOECC office dated September 1, 2017; and

7. Pipe Data Form.

SCHEDULE "B"

Table 1: Effluent Monitoring

(Samples to be collected from the influent and effluent streams of the **oil and grit separator**)

Sample Type	Grab
Frequency	Three (3) rainfall *Wet Events* per year, with two (2) of the events occurring between May and September
Parameters	Total Suspended Solids, Phosphorus and Temperature

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

1. Condition 1 is imposed to ensure that the *Works* are constructed and operated in the manner in which they were described and upon which approval was granted. This condition is also included to emphasize the precedence of conditions in the *Approval* and the practice that the *Approval* is based on the most current document, if several conflicting documents are submitted for review.

2. Condition 2 is included to ensure that, when the *Works* are constructed, the *Works* will meet the standards that apply at the time of construction to ensure the ongoing protection of the environment.

3. Condition 3 is included to ensure that the *Ministry* records are kept accurate and current with respect to approved Works and to ensure that subsequent owners of the *Works* are made aware of the *Approval* and continue to operate the *Works* in compliance with it.

4. Condition 4 is included as regular inspection and necessary removal of sediment and excessive decaying vegetation from the *Works* are required to mitigate the impact of sediment, debris and/or decaying vegetation on the treatment capacity of the *Works* . The Condition also ensures that adequate storage is maintained in the *Works* at all times as required by the design. Furthermore, this Condition is included to ensure that the *Works* are operated and maintained to function as designed. Condition 4.1 is included to prevent the operation of stormwater pipes and other conveyance until such time that their required associated stormwater management Works are also constructed.

5. Condition 5 is included as installation, regular inspection and maintenance of the temporary sediment and erosion control measures is required to mitigate the impact on the downstream receiving watercourse during construction until they are no longer required.

6. Condition 6 is included to enable the *Owner* to evaluate and demonstrate the performance of the *Works* , on a continual basis, so that the *Works* are properly operated and maintained at a level which is consistent with the design objectives specified in the *Approval* and that the *Works* do not cause any impairment to the receiving watercourse or the environment.

7. Condition 7 is included to provide a performance record for future references, to ensure that the *Ministry* is made aware of problems as they arise, and to provide a compliance record for all the terms and conditions outlined in this *Approval* , so that the *Ministry* can work with the *Owner* in resolving any problems in a timely manner.

8. Condition 8 is included to ensure that the *Works* conform to the policies of the local Source Water Protection Plan.

In accordance with Section 139 of the Environmental Protection Act, you may by written Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

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

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

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

This Notice must be served upon:

The Secretary*****
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of
Part II.1 of the Environmental Protection Act
Ministry of the Environment and
Climate Change
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or www.ert.gov.on.ca**

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 23rd day of November, 2017

Christina Labarge, P.Eng.
Director
appointed for the purposes of Part II.1 of the
Environmental Protection Act

GS/

c: District Manager, MOECC Ottawa
Water Supervisor, MOE Ottawa office
John Sevigny, C.E.T., Project Manager, Infrastructure Approvals, City of Ottawa (File No.: D07-16-16-0004)
Cody Oram, P. Eng., Senior Engineer- Infrastructure Applications, City of Ottawa (File No.: D07-16-16-0004)
Charles Warnock, P. Eng., City of Ottawa (File No.: D07-16-16-0004)
Linda Carkner, Program Manager ROW Information and Approvals at City of Ottawa (File No.: D07-16-16-0004)
Karla Ferrey, P. Eng./ John Robert Pettigrew, J.L. Richards & Associates Limited

Appendix A4

City of Ottawa Development
Servicing Study Checklist

Harmony Stage 1 – Block 104 DEVELOPMENT SERVICING STUDY CHECKLIST	
REFERENCED STUDIES AND REPORTS	**REFERENCE**
Site Servicing Report for Minto Communities Inc., Harmony Stage 1 – Block 104 (J.L. Richards & Associates Limited, July 5 2018)	SSR

4.1	**GENERAL CONTENT**	**REFERENCE**
☐	Executive Summary (for larger reports only).	N/A
☒	Date and revision number of the report.	SSR (Title Page)
☒	Location map and plan showing municipal address, boundary, and layout of proposed development.	Site Servicing Plan (S1)
☒	Plan showing the site and location of all existing services.	Site Servicing Plan (S1)
☐	Development statistics, land use, density, adherence to zoning and official plan, and reference to applicable subwatershed and watershed plans that provide context to which individual developments must adhere.	N/A
☐	Summary of Pre-consultation Meetings with City and other approval agencies.	SSR (Section 2.1, 3.2, 4.2)
☒	Reference and confirm conformance to higher level studies and reports (Master Servicing Studies, Environmental Assessments, Community Design Plans), or in the case where it is not in conformance, the proponent must provide justification and develop a defendable design criteria.	SSR (Section 1.1)
☒	Statement of objectives and servicing criteria.	SSR (Section 2.1, 3.2, 4.2)
☒	Identification of existing and proposed infrastructure available in the immediate area.	SSR (Sect. 1.2, 2.1, 3.1,4.1)
☐	Identification of Environmentally Significant Areas, watercourses and Municipal Drains potentially impacted by the proposed development (Reference can be made to the Natural Heritage Studies, if available).	N/A
☒	Concept level master grading plan to confirm existing and proposed grades in the development. This is required to confirm the feasibility of proposed stormwater management and drainage, soil removal and fill constraints, and potential impacts to neighbouring properties. This is also required to confirm that the proposed grading will not impede existing major system flow paths.	Grading Plan (G1)
☐	Identification of potential impacts of proposed piped services on private services (such as wells and septic fields on adjacent lands) and mitigation required to address potential impacts.	N/A

☐	Proposed phasing of the development, if applicable.	N/A
☒	Reference to geotechnical studies and recommendations concerning servicing.	Site Servicing Plan (S1)
☒	All preliminary and formal site plan submissions should have the following information: ▪ Metric scale ▪ North arrow (including construction North) ▪ Key plan ▪ Name and contact information of applicant and property owner ▪ Property limits, including bearings and dimensions ▪ Existing and proposed structures and parking areas ▪ Easements, road widening and rights-of-way ▪ Adjacent street names	All Drawings

4.2	DEVELOPMENT SERVICING REPORT: WATER	REFERENCE
☐	Confirm consistency with Master Servicing Study, if available.	N/A
☒	Availability of public infrastructure to service proposed development.	Site Servicing Plan (S1)
☒	Identification of system constraints.	SSR (Sect. 2.2)
☒	Identify boundary conditions.	SSR (Appendix B1)
☒	Confirmation of adequate domestic supply and pressure.	SSR (Sect. 2.6, Appendix B4)
☒	Confirmation of adequate fire flow protection and confirmation that fire flow is calculated as per the Fire Underwriter's Survey. Output should show available fire flow at locations throughout the development.	SSR (Sect. 2.4, 2.6, Appendix B3)
☒	Provide a check of high pressures. If pressure is found to be high, an assessment is required to confirm the application of pressure reducing valves.	SSR (Sect. 2.6)
☒	Definition of phasing constraints. Hydraulic modelling is required to confirm servicing for all defined phases of the project, including the ultimate design.	SSR (Sect. 2.7)
☒	Address reliability requirements, such as appropriate location of shutoff valves.	Site Servicing Plan (S1)
☒	Check on the necessity of a pressure zone boundary modification.	SSR (Sect. 2.7)
☒	Reference to water supply analysis to show that major infrastructure is capable of delivering sufficient water for the proposed land use. This includes data that shows that the expected demands under average day, peak hour and fire flow conditions provide water within the required pressure range.	SSR (Sect 2.6, 2.7, Appendices B2, B3, B4)

☒	Description of the proposed water distribution network, including locations of proposed connections to the existing system, provisions for necessary looping, and appurtenances (valves, pressure reducing valves, valve chambers, and fire hydrants), including special metering provisions.	SSR (Sect. 2.5) Site Servicing Plan (S1)
☐	Description of off-site required feedermains, booster pumping stations, and other water infrastructure that will be ultimately required to service proposed development, including financing, interim facilities, and timing of implementation.	N/A
☒	Confirmation that water demands are calculated based on the City of Ottawa Design Guidelines.	SSR (Sect. 2.1, Appendix B1)
☒	Provision of a model schematic showing the boundary conditions locations, streets, parcels, and building locations for reference.	SSR (Appendix B4) Site Servicing Plan (S1)

4.3	**DEVELOPMENT SERVICING REPORT: WASTEWATER**	**REFERENCE**
☒	Summary of proposed design criteria (Note: Wet weather flow criteria should not deviate from the City of Ottawa Sewer Design Guidelines. Monitored flow data from relatively new infrastructure cannot be used to justify capacity requirements for proposed infrastructure).	SSR (Sect. 3.2)
☐	Confirm consistency with Master Servicing Study and/or justifications for deviations.	N/A
☐	Consideration of local conditions that may contribute to extraneous flows that are higher than the recommended flows in the Guidelines. This includes groundwater and soil conditions, and age and condition of sewers.	N/A
☒	Description of existing sanitary sewer available for discharge of wastewater from proposed development.	SSR (Sect. 3.1)
☒	Verify available capacity in downstream sanitary sewer and/or identification of upgrades necessary to service the proposed development. (Reference can be made to previously completed Master Servicing Study if applicable.)	SSR (Sect. 3.3)
☐	Calculations related to dry weather and wet weather flow rates from the development in standard MOE sanitary sewer design table (Appendix 'C') format.	N/A
☒	Description of proposed sewer network, including sewers, pumping stations and forcemains.	SSR (Sect. 3.3) Site Servicing Plan (S1)
☐	Discussion of previously identified environmental constraints and impact on servicing (environmental constraints are related to limitations imposed on the development in order to preserve the physical condition of watercourses, vegetation, soil cover, as well as protecting against water quantity and quality).	N/A

☐	Pumping stations: impacts of proposed development on existing pumping stations or requirements for new pumping station to service development.	N/A
☐	Forcemain capacity in terms of operational redundancy, surge pressure and maximum flow velocity.	N/A
☐	Identification and implementation of the emergency overflow from sanitary pumping stations in relation to the hydraulic grade line to protect against basement flooding.	N/A
☐	Special considerations, such as contamination, corrosive environment, etc.	N/A

4.4	DEVELOPMENT SERVICING REPORT: STORMWATER	REFERENCE
☒	Description of Drainage outlets and downstream constraints, including legality of outlets (i.e., municipal drain, right-of-way, watercourse, or private property).	SSR (Sect. 4.1)
☒	Analysis of available capacity in existing public infrastructure.	SSR (Sect. 4.1)
☒	A Drawing showing the subject lands, its surroundings, the receiving watercourse, existing drainage patterns, and proposed drainage pattern.	Site Servicing Plan (S1)
☒	Water quantity control objective (e.g. controlling post-development peak flows to pre-development level for storm events ranging from the 2 or 5 year event (dependent on the receiving sewer design) to 100 year return period); if other objectives are being applied, a rationale must be included with reference to hydrologic analyses of the potentially affected subwatersheds, taking into account long-term cumulative effects.	SSR (4.2, Appendix D3)
☒	Water Quality control objective (basic, normal or enhanced level of protection based on the sensitivities of the receiving watercourse) and storage requirements.	SSR (Sect. 4.3)
☐	Description of the stormwater management concept with facility locations and descriptions with references and supporting information.	SSR (Sect. 4.3)
☐	Setback from private sewage disposal systems.	N/A
☐	Watercourse and hazard lands setbacks.	N/A
☒	Record of pre-consultation with the Ontario Ministry of Environment and the Conservation Authority that has jurisdiction on the affected watershed.	SSR (Sect. 1.3)
☐	Confirm consistency with subwatershed and Master Servicing Study, if applicable study exists.	N/A

☒	Storage requirements (complete with calculations) and conveyance capacity for minor events (1:5 year return period) and major events (1:100 year return period).	SSR (Sect. 4.3, Appendix D3)
☐	Identification of watercourses within the proposed development and how watercourses will be protected, or, if necessary, altered by the proposed development with applicable approvals.	N/A
☒	Calculate pre- and post-development peak flow rates, including a description of existing site conditions and proposed impervious areas and drainage catchments in comparison to existing conditions.	SSR (Sect. 4.1, 4.2, Appendix D3) Storm Drainage and Ponding Plan (SWM)
☐	Any proposed diversion of drainage catchment areas from one outlet to another.	N/A
☒	Proposed minor and major systems, including locations and sizes of stormwater trunk sewers, and stormwater management facilities.	SSR (Sect. 4.3) Site Servicing Plan (S1)
☐	If quantity control is not proposed, demonstration that downstream system has adequate capacity for the post-development flows up to and including the 100-year return period storm event.	N/A
☐	Identification of potential impacts to receiving watercourses.	N/A
☐	Identification of municipal drains and related approval requirements.	N/A
☒	Description of how the conveyance and storage capacity will be achieved for the development.	SSR (Sect 4.3, 4.4)
☒	100 year flood levels and major flow routing to protect proposed development from flooding for establishing minimum building elevations (MBE) and overall grading.	SSR (Sect 4.3) Site Servicing Plan (S1)
☐	Inclusion of hydraulic analysis, including hydraulic grade line elevations.	SSR (Appendix D5)
☒	Description of approach to erosion and sediment control during construction for the protection of receiving watercourse or drainage corridors.	SSR (Sect. 5.0) Erosion & Sediment Control Plan (ESC)
☐	Identification of floodplains – proponent to obtain relevant floodplain information from the appropriate Conservation Authority. The proponent may be required to delineate floodplain elevations to the satisfaction of the Conservation Authority if such information is not available or if information does not match current conditions.	N/A
☐	Identification of fill constraints related to floodplain and geotechnical investigation.	N/A

4.5	APPROVAL AND PERMIT REQUIREMENTS	REFERENCE
The Servicing Study shall provide a list of applicable permits and regulatory approvals necessary for the proposed development, as well as the relevant issues affecting such approval. The approval and permitting shall include but not be limited to the following:		
☐	Conservation Authority as the designated approval agency for modification of floodplain, potential impact on fish habitat, proposed works in or adjacent to a watercourse, cut/fill permits and Approval under Lakes and Rivers Improvement Act. The Conservation Authority is not the approval authority for the Lakes and Rivers Improvement Act. Where there are Conservation Authority regulations in place, approval under the Lakes and Rivers Improvement Act is not required, except in cases of dams, as defined in the Act.	N/A
☒	Application for Environmental Compliance Approval (ECA) under the Ontario Water Resources Act.	Approval through Harmony Stage 1 (MOECC ECA No. 3245-ATBRR3)
☐	Changes to Municipal drains.	N/A
☐	Other permits (National Capital Commission, Parks Canada, Public Works and Government Services Canada, Ministry of Transportation, etc.).	N/A

4.6	CONCLUSION CHECKLIST	REFERENCE
☒	Clearly stated conclusions and recommendations.	SSR (Sect. 2.7, 3.4, 4.4)
☐	Comments received from review agencies, including the City of Ottawa and information on how the comments were addressed. Final sign-off from the responsible reviewing agency.	
☒	All draft and final reports shall be signed and stamped by a Professional Engineer registered in Ontario.	SSR (Section 5.0)

Appendix B1

Hydraulic Boundary Conditions

Boundary Conditions for Clarke Lands – Existing Conditions

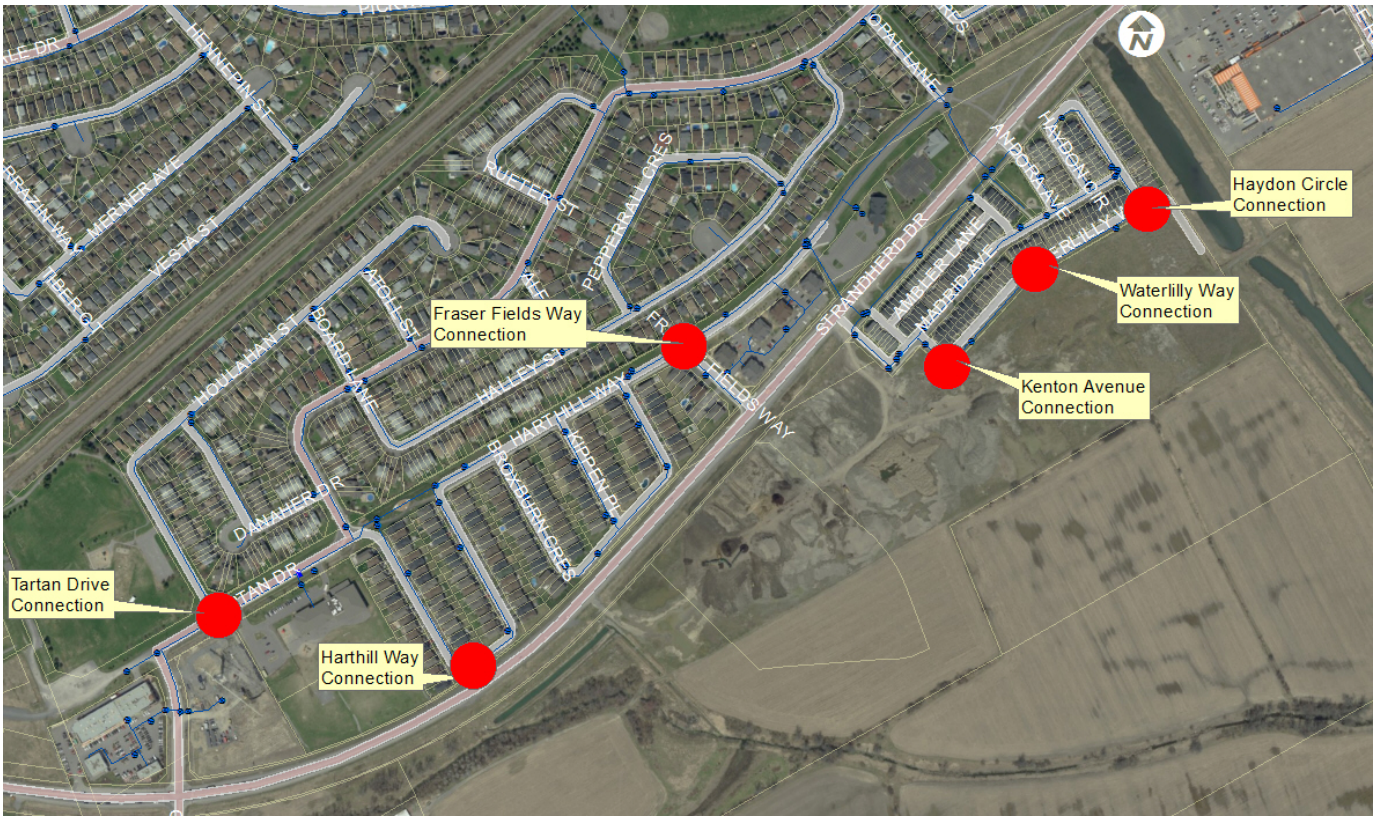
Information Provided:

Date provided: June 2017

Scenario	Demand	
	L/min	L/s
Average Daily Demand	984.6	16.4
Maximum Daily Demand	1524.6	25.4
Peak Hour	2644.8	44.1
Fire Flow Demand # 1	10980	183.0
Fire Flow Demand # 2*	12000	200.0

* A fire flow of 14,000 l/min will result in pressures below 20 psi

Location:



Results:

Connection 1 - WaterLilly Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	156.3	87.4
Peak Hour	140.4	64.9
Max Day plus Fire (11,000l/min)	115.4	29.2
Max Day plus Fire (12,000l/min)	109.7	21.2

[1] Ground Elevation = 94.8m

Connection 2 - Fraser Fields Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	156.3	88.5
Peak Hour	140.5	66.0
Max Day plus Fire (11,000l/min)	118.0	34.1
Max Day plus Fire (12,000l/min)	112.8	26.7

[1] Ground Elevation = 94.0m

Connection 3 - Kenton Avenue

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	156.3	87.7
Peak Hour	140.4	65.2
Max Day plus Fire (11,000l/min)	115.3	29.4
Max Day plus Fire (12,000l/min)	109.6	21.4

[1] Ground Elevation = 94.6m

Connection 4 - Haydon Circle

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	156.3	88.5
Peak Hour	140.4	66.0
Max Day plus Fire (11,000l/min)	115.0	29.9
Max Day plus Fire (12,000l/min)	109.3	21.8

[1] Ground Elevation = 94.0m

Connection 5 - Harthill Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	156.3	140.8
Peak Hour	140.8	67.2
Max Day plus Fire (11,000l/min)	115.1	30.7
Max Day plus Fire (12,000l/min)	109.1	22.2

[1] Ground Elevation = 93.5m

Connection 6 - Tartan Drive Way

Demand Scenario	Head (m)	Pressure[1] (psi)
Maximum HGL	156.3	88.6
Peak Hour	141.0	141.0
Max Day plus Fire (11,000l/min)	121.2	38.9
Max Day plus Fire (12,000l/min)	116.3	31.8

[1] Ground Elevation = 93.9m

Notes:

1) The existing water distribution system cannot accommodate fire flows exceeding 12,000 l/min at a pressure of 20 psi.
2) As per the Ontario Building Code in areas that may be occupied, the static pressure at any fixture shall not exceed 552 kPa (80 psi.) Pressure control measures to be considered are as follows, in order of preference:
   a) If possible, systems to be designed to residual pressures of 345 to 552 kPa (50 to 80 psi) in all occupied areas outside of the public right-of-way without special pressure control equipment.
   b) Pressure reducing valves to be installed immediately downstream of the isolation valve in the home/ building, located downstream of the meter so it is owner maintained.
3) Existing watermains downstream of the boundary condition locations must be part of the hydraulic assessment.

Disclaimer

The boundary condition information is based on current operation of the city water distribution system. The computer model simulation is based on the best information available at the time. The operation of the water distribution system can change on a regular basis, resulting in a variation in boundary conditions. The physical properties of watermains deteriorate over time, as such must be assumed in the absence of actual field test data. The variation in physical watermain properties can therefore alter the results of the computer model simulation. Fire Flow analysis is a reflection of available flow in the watermain; there may be additional restrictions that occur between the watermain and the hydrant that the model cannot take into account.

Annie Williams

From: Hall, James <James.Hall@ottawa.ca>
Sent: June 5, 2017 6:15 PM
To: Annie Williams
Cc: Hugo Lalonde; Guy Forget; Karla Ferrey; Julie White
Subject: RE: Minto Communities' Harmony Stage 2
Attachments: ClarkeLands_Ultimate Conditions_June52017.docx; ClarkeLands_Existing Conditions_June52017.docx

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Annie,

Please find the attached Boundary Conditions. Please also see the below notes from our modeling group.

If you have any questions, please don't hesitate to contact me.

Sincerely,
Jim

-----Original Message-----
Sent: Monday, June 05, 2017 4:33 PM
Subject: RE: Minto Communities' Harmony Stage 2

Hi James,

BCs for Harmony stage 2. A few comments:

1) Due to the complexity of this file (i.e. 26 modelling runs in total to produce the information in the attached word documents), JLR will be asked to develop a system model comprised of existing and future watermains in the vicinity of the development for future/additional BC requests.
2) Under interim conditions (i.e. without the strandherd watermain in place), the watermain network cannot produce fire flows in excess of 12,000 l/min while maintaining a residual pressure of 20 psi.
3) Constructing watermains across Strandherd in advance of the future Strandherd Road Widening Project should be avoided.

-----Original Message-----
From: Annie Williams [mailto:awilliams@jlrichards.ca]
Sent: Wednesday, May 31, 2017 1:40 PM
To: Hall, James <James.Hall@ottawa.ca>
Cc: Hugo Lalonde <HLalonde@minto.com>; Guy Forget <gforget@jlrichards.ca>; Karla Ferrey <kferrey@jlrichards.ca>; Julie White <jwhite@jlrichards.ca>
Subject: RE: Minto Communities' Harmony Stage 2

Hi Jim,

Can you please provide a status update for this boundary condition request?

Just to clarify the fire flow scenarios, we have requested 2 different fire flows because there is current uncertainty with the commercial block as we do not yet know what type of buildings will be built, the floor area to expect, exposure to adjacent buildings, sprinkler systems, etc.

Please let me know if you have any questions.

Thank you,

Annie Williams, EIT
Civil Engineering Intern

J.L. Richards & Associates Limited
864 Lady Ellen Place, Ottawa, ON K1Z 5M2
Tel: 613-728-3571 Fax: 613-728-6012
<https://urldefense.proofpoint.com/v2/url?u=http-3A__www.jlrichards.ca_&d=DQIF-g&c=euGZstcaTDllvimEN8b7jXrwqOf-v5A_CdpgnVfiiMM&r=-lKO5D5A1yZCmkr7Fc8ELqLYVMeHJM86GEaQPY3ZZ5s&m=hQfVDW6dd_M8MhXo_O2TXVtItmJn7Cx8OfNUzSpXtKg&s=CNI6ErcNyHnNdt7kmgGTHSehg1kj021SniurOJm9lFo&e= >

From: Annie Williams
Sent: May 24, 2017 3:57 PM
To: 'james.hall@ottawa.ca'
Cc: Hugo Lalonde; Guy Forget; Karla Ferrey; Julie White
Subject: Minto Communities' Harmony Stage 2

Hi Jim,

We are preparing the preliminary design of municipal services in support of Minto Communities' Harmony Stage 2 located at 4025 Strandherd Drive (See attached Location Plan). Boundary conditions were previously provided for Harmony Stage 1 on March 17, 2017 (attached) under existing conditions and ultimate conditions, which assumed the presence of a 400mmØ watermain along Strandherd Drive. We have calculated the additional water demands for the next stage and we request boundary conditions under both existing conditions and ultimate conditions to complete a hydraulic network analysis for Harmony Stage 2. The required development details are as follows:

1. Type of Development: Residential – 33 SF units, 74 TH units, 56 BB units, as well as Commercial Blocks and the Harmony Stage 1 subdivision;

2. Location of Development: 4025 Strandherd Drive – south of Strandherd Drive and west of Harmony Stage 1 (See attached Location Plan);

3. Location of Requested Boundary Conditions: Connections 1, 2, 3 and 4 as shown on the previous Boundary Conditions provided (March 17, 2017) as well as connections to the existing watermain on Tartan Drive and Harthill Way (Refer to attached Location Plan);

Estimated Water Demands (includes both Stage 1 and Stage 2):

4. Average Day Demand: 16.41 L/s

5. Max. Day Demand: 25.41 L/s

6. Peak Hour Demand: 44.08 L/s

7. Estimated Fire Flow: 183 L/s (11,000 L/min) and 233 L/s (14,000 L/min)

Please provide boundary conditions at the locations specified in Item No. 3 for Peak Hour, Max. Day plus Fire Flow (11,000 L/min and 14,000 L/min) and Maximum Pressure Check scenarios.

If we could receive the requested boundary conditions at your earliest convenience it would be much appreciated.

Should you have any questions or require anything further, please do not hesitate to call.

Regards,

Appendix B2

Water Demands

WATERMAIN DEMAND CALCULATION SHEET

NODE	RESIDENTIAL UNITS SF	SD & TH	BB	ST	POP'N	NON-RESIDENTIAL INDTRL (ha.)	COMM. (ha.)	INST. (# stu)	AVERAGE DAILY DEMAND (l/s) Res.	Non-res.	Total	MAXIMUM DAILY DEMAND (l/s) Res.	Non-res.	Total	PEAK HOUR DEMAND (l/s) Res.	Non-res.	Total
HARMONY STAGE 1																	
J-1	0	0	0	0	0				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
J-2	0	0	0	0	0		0.56		0.00	0.16	0.16	0.00	0.24	0.24	0.00	0.44	0.44
J-3	5	45	12	0	171				0.69	0.00	0.69	1.73	0.00	1.73	3.81	0.00	3.81
J-4*	0	17	0	0	46				0.19	0.00	4.19	0.46	0.00	4.46	1.02	0.00	5.02
J-5	0	0	0	0	0				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Block 104	0	0	0	24	65				0.26	0.00	0.26	0.66	0.00	0.66	1.44	0.00	1.44
J-7	8	18	0	0	76				0.31	0.00	0.31	0.77	0.00	0.77	1.69	0.00	1.69
J-8	10	14	0	0	72				0.29	0.00	0.29	0.73	0.00	0.73	1.60	0.00	1.60
J-9	20	0	0	0	68				0.28	0.00	0.28	0.69	0.00	0.69	1.52	0.00	1.52
J-10	21	11	0	0	101				0.41	0.00	0.41	1.02	0.00	1.02	2.25	0.00	2.25
J-11	9	0	0	0	31				0.12	0.00	0.12	0.31	0.00	0.31	0.68	0.00	0.68
J-12	10	0	0	0	34				0.14	0.00	0.14	0.34	0.00	0.34	0.76	0.00	0.76
J-13	9	0	0	0	31				0.12	0.00	0.12	0.31	0.00	0.31	0.68	0.00	0.68
J-14	6	0	0	0	20				0.08	0.00	0.08	0.21	0.00	0.21	0.45	0.00	0.45
J-15	0	0	0	0	0			400	0.00	0.97	0.97	0.00	1.46	1.46	0.00	2.63	2.63
J-16	0	0	0	0	0			400	0.00	0.97	0.97	0.00	1.46	1.46	0.00	2.63	2.63
SUB-TOTAL (STAGE 1)	**98**	**105**	**12**	**24**	**714**	**0**	**0.56**	**800**	**2.89**	**2.10**	**8.99**	**7.23**	**3.16**	**14.39**	**15.90**	**5.70**	**25.60**
HARMONY STAGE 2																	
J-31	0	5	5	0	27				0.11	0.00	0.11	0.27	0.00	0.27	0.60	0.00	0.60
J-30	0	13	7	0	54				0.22	0.00	0.22	0.55	0.00	0.55	1.20	0.00	1.20
J-32	0	0	13	0	35				0.14	0.00	0.14	0.36	0.00	0.36	0.78	0.00	0.78
J-29	0	12	14	0	70				0.28	0.00	0.28	0.71	0.00	0.71	1.56	0.00	1.56
J-33	0	0	13	0	35				0.14	0.00	0.14	0.36	0.00	0.36	0.78	0.00	0.78
J-28*	0	9	7	0	43				0.18	0.00	4.18	0.44	0.00	4.44	0.96	0.00	4.96
J-34	0	4	5	0	24				0.10	0.00	0.10	0.25	0.00	0.25	0.54	0.00	0.54
J-27	0	20	0	0	54				0.22	0.00	0.22	0.55	0.00	0.55	1.20	0.00	1.20
J-35	7	3	0	0	32				0.13	0.00	0.13	0.32	0.00	0.32	0.71	0.00	0.71
J-26	5	0	0	0	17				0.07	0.00	0.07	0.17	0.00	0.17	0.38	0.00	0.38
J-36	8	0	0	0	27				0.11	0.00	0.11	0.28	0.00	0.28	0.61	0.00	0.61
J-25	10	0	0	0	34				0.14	0.00	0.14	0.34	0.00	0.34	0.76	0.00	0.76
J-37	0	0	0	0	0		5.34		0.00	1.55	1.55	0.00	2.32	2.32	0.00	4.17	4.17
SUB-TOTAL (STAGE 2)	**30**	**66**	**64**	**0**	**453**	**0**	**5.34**	**0**	**1.84**	**1.55**	**7.39**	**4.60**	**2.32**	**10.92**	**10.08**	**4.17**	**18.25**
EXISTING																	
J-22	0	10	0	0	27				0.11	0.00	0.11	0.27	0.00	0.27	0.60	0.00	0.60
J-22	0	0	0	60	162				0.66	0.00	0.66	1.64	0.00	1.64	3.61	0.00	3.61
J-56											0.42			0.63			1.13
J-56											2.27			3.40			6.12
SUB-TOTAL (EXISTING)	**0**	**10**	**0**	**60**	**189**	**0**	**0**	**0**	**0.77**	**0.00**	**3.46**	**1.91**	**0.00**	**5.94**	**4.21**	**0.00**	**11.46**
TOTALS	**128**	**181**	**76**	**84**	**1356**	**0**	**6**	**800**	**5.50**	**3.65**	**19.84**	**13.74**	**5.48**	**31.25**	**30.19**	**9.87**	**55.31**

ASSUMPTIONS

RESIDENTIAL DENSITIES

- Single Family (SF) 3.4 p / p / u
- Semi-Detached (SD) & Townhouse (TH) 2.7 p / p / u
- Back-to-Back Units (BB) 2.7 p / p / u
- Terrace Stacked Units (ST) 2.7 p / p / u

AVG. DAILY DEMAND

- Residential 350 l / cap / day
- Industrial (Business Park) 35,000 l / ha / day
- Commercial (Employment Area) 25,000 l / ha / day
- Institutional (School) 70 l / student / day

MAX. DAILY DEMAND

- Residential 875 l / cap / day
- Industrial (Business Park) 52,500 l / ha / day
- Commercial (Employment Area) 37,500 l / ha / day
- Institutional (School) 105 l / student / day

MAX. HOURLY DEMAND

- Residential 1,925 l / cap / day
- Industrial (Business Park) 94,500 l / ha / day
- Commercial (Employment Area) 67,500 l / ha / day
- Institutional (School) 189 l / student / day

PARK WITH SPLASH PAD* 4.00 l / s

*Constant flow rate added to Junction J-4 and J-32

Appendix B3

Fire Flow Requirements

Calculation of Fire Flow Requirements for Residential Dwelling Units
Harmony Block 104

$F = 220xCx\sqrt{A}$

for F = required fire flow, in L/min
C = coefficient for type of construction
A = total floor area in building (all storeys, excluding basements at least 50% below grade), in m^2

					Reductions/Charges									Total F	Rounded F [10]		Capped F [11]
Unit Type [1]	A (m^2)		C [6]	F (L/min)	For Occupancy Hazard		F'	For Sprinkler Protection		F'	Placement	For Exposure/Separation [9]		F'	F	(L/min)	(L/s)	**(L/s)**
Single	(2)	3158	1.5	18,545	(7)	-25%	13,909	(8)	0%	13,909	Lots 50-60	Front (25.4m), Back (12.0m), Sides (27.7m and >45m)	35%	18,777	18,777	19,000	317	**167**
Row Townhouse	(3)	787	1.5	9,258	(7)	-25%	6,943	(8)	0%	6,943	TH 12	Front (27.8m), Back (16.2m), Sides (3.7m and 4.8m)	65%	11,456	11,456	11,000	183	**183**
Back-to-Back	(4)	755	1.5	9,067	(7)	-25%	6,801	(8)	0%	6,801	TH 22	Front (27.8m), Back (23.3m), Sides (0m and 4.6m)	65%	11,221	11,221	11,000	183	**183**
Stacked Townhouse	(5)	1236	1.5	11,602	(7)	-25%	8,701	(8)	0%	8,701	Block 104	Front (>45m), Back (26.0m), Sides (both >45m)	10%	9,571	9,571	10,000	167	**167**

NOTES:
(1) Fire flow determination for typical residential unit.
(2) Two-storey single family dwelling; basement more than 50% below grade (basement excluded from area).
Maximum number of units less than 3.0 m = 11 units west of Cashmere Terrace.
Area for 11 units = 11 x (143.55 m^2 x 2) = 11 x [287.10 m^2] = 3158 m^2.
(3) Two-storey row townhouse dwelling; basement more than 50% below grade (basement excluded from area): Includes floor area of adjacent wood frame structure seperated by less than 3.0 m.
Maximum number of units = 6 units along Waterlilly Way (TH12). Top storey area and ground floor area taken separately, garage area excluded from ground floor area.
Area for 6 units = 438.58 m^2 (total top storey area) + 348.25 m^2 (total ground floor area excluding garages) = 787 m^2.
(4) Three-storey back-to-back dwelling attached on 2 or 3 walls; no basement; 2-hr fire wall between attached units c and d, and also between attached units i and j.
Maximum number of units less than 3.0 m = 6 units south of Madrid Avenue and north of Waterlilly Way.
Back-to-back units are compartmentalized due to 2-hr fire wall. 24 m2 garage excluded from area.
Area for 6 units = 6 x [(49.93 m^2 x 3) - 24 m^2] = 6 x [125.79 m^2] = 755 m^2.
(5) Four-storey stacked townhouse dwelling attached on 2 or 3 walls, all storeys assumed above grade.
Maximum number of units = 12 units along Chapman Mills Drive (Block 104)
Area for 12 units = (308.88 m^2 x 4) = 1236 m^2.
(6) C = 1.5 for wood frame construction.
(7) Dwellings classified as low hazard occupancy in accordance with FUS Appendix.
(8) No automatic sprinkler system.
(9)

Separation	Charge *
0 to 3 m	25%
3.1 to 10 m	20%
10.1 to 20 m	15%
20.1 to 30 m	10%
30.1 to 45 m	5%

* The total percentage shall be the sum of the percentages for all sides, but shall not exceed 75%.

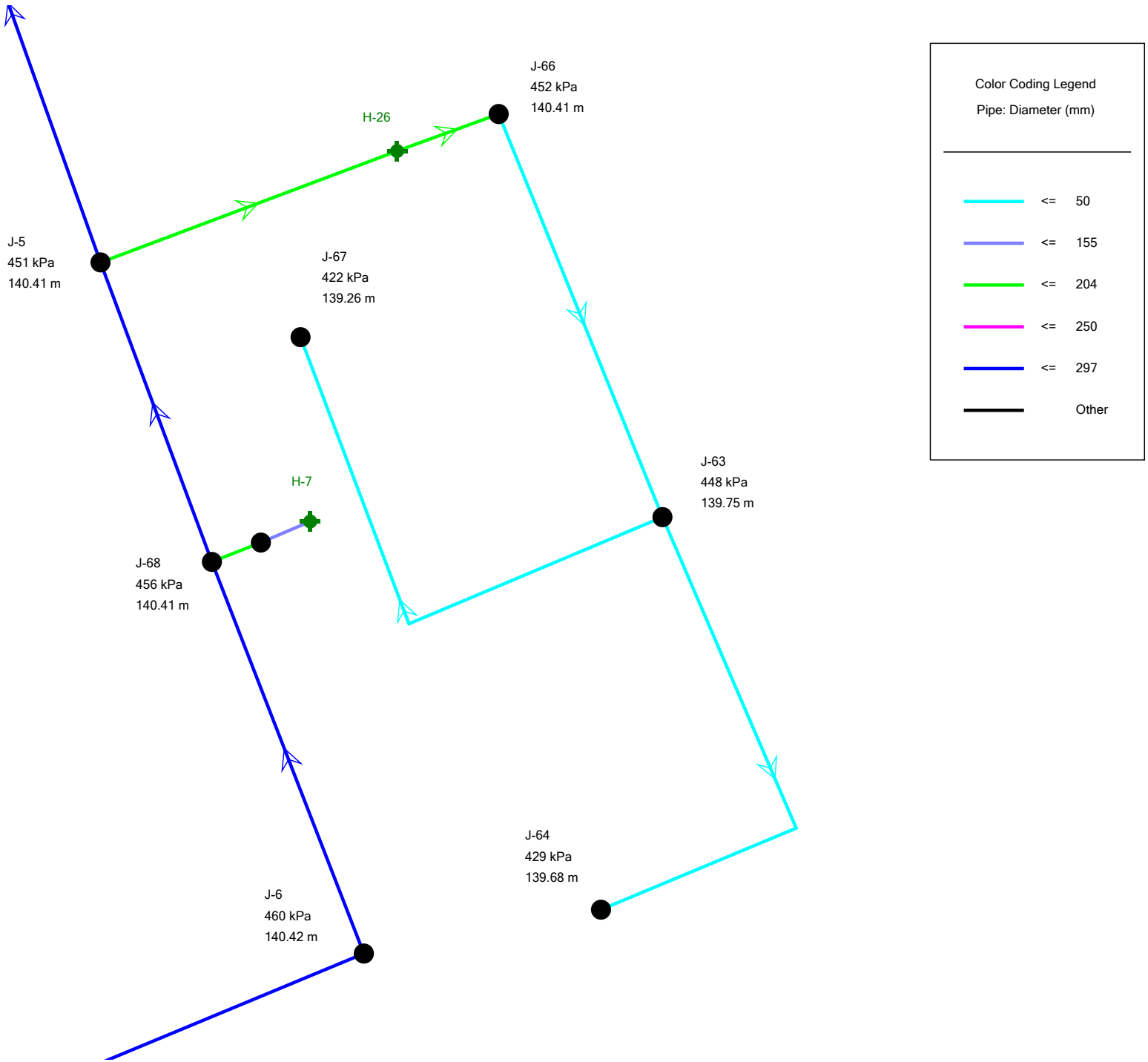
(10) Fire flow rounded to nearest 1,000 L/min in accordance with FUS.
(11) Fire flow may be capped in accordance with ISDTB-2014-02.

Based on Fire Underwriters Survey (FUS), Water Supply for Public Fire Protection, dated 1999, and City of Ottawa Technical Bulletin ISDTB-2014-02, dated May 27, 2014.

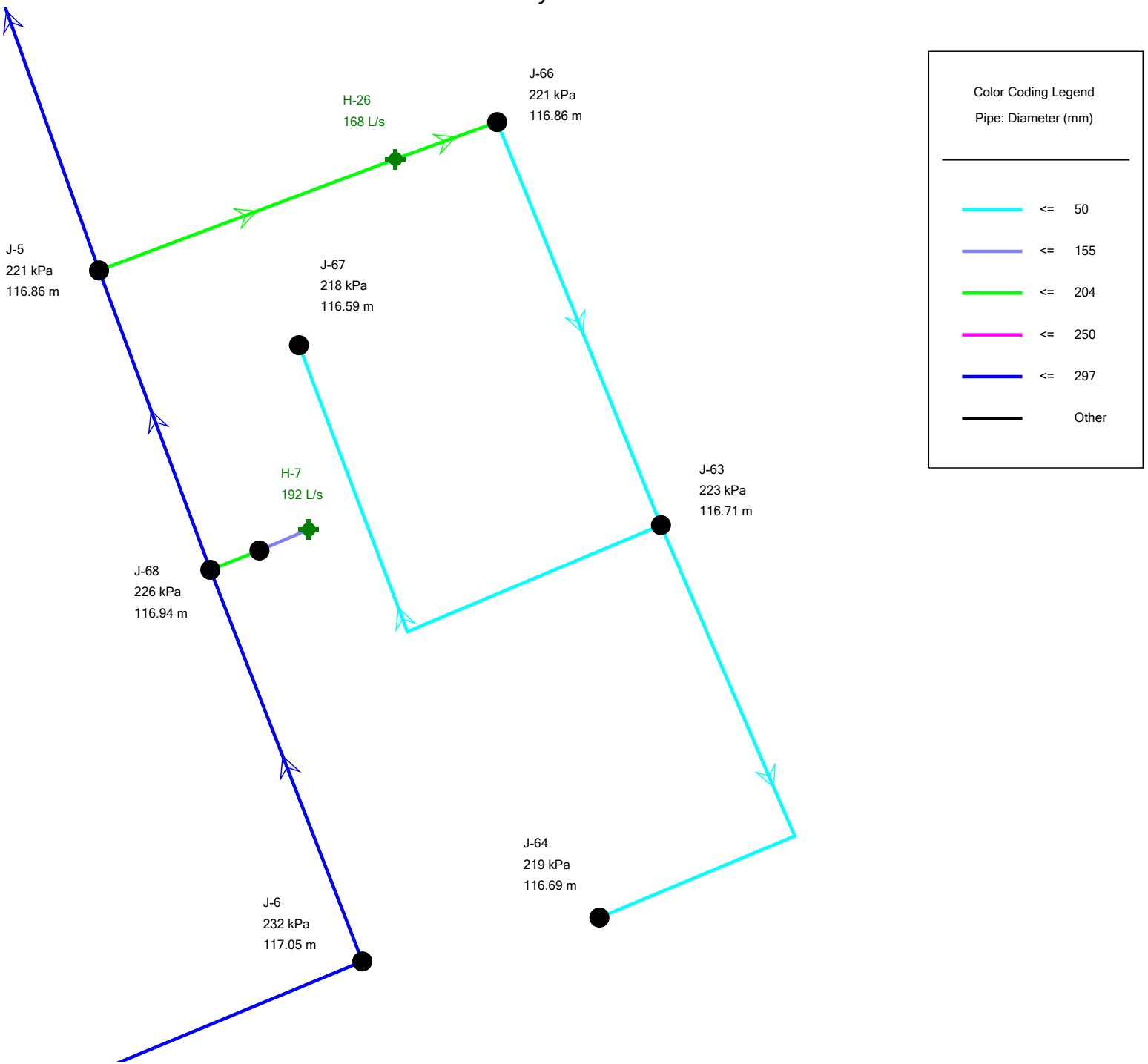
Appendix B4

Simulation Results

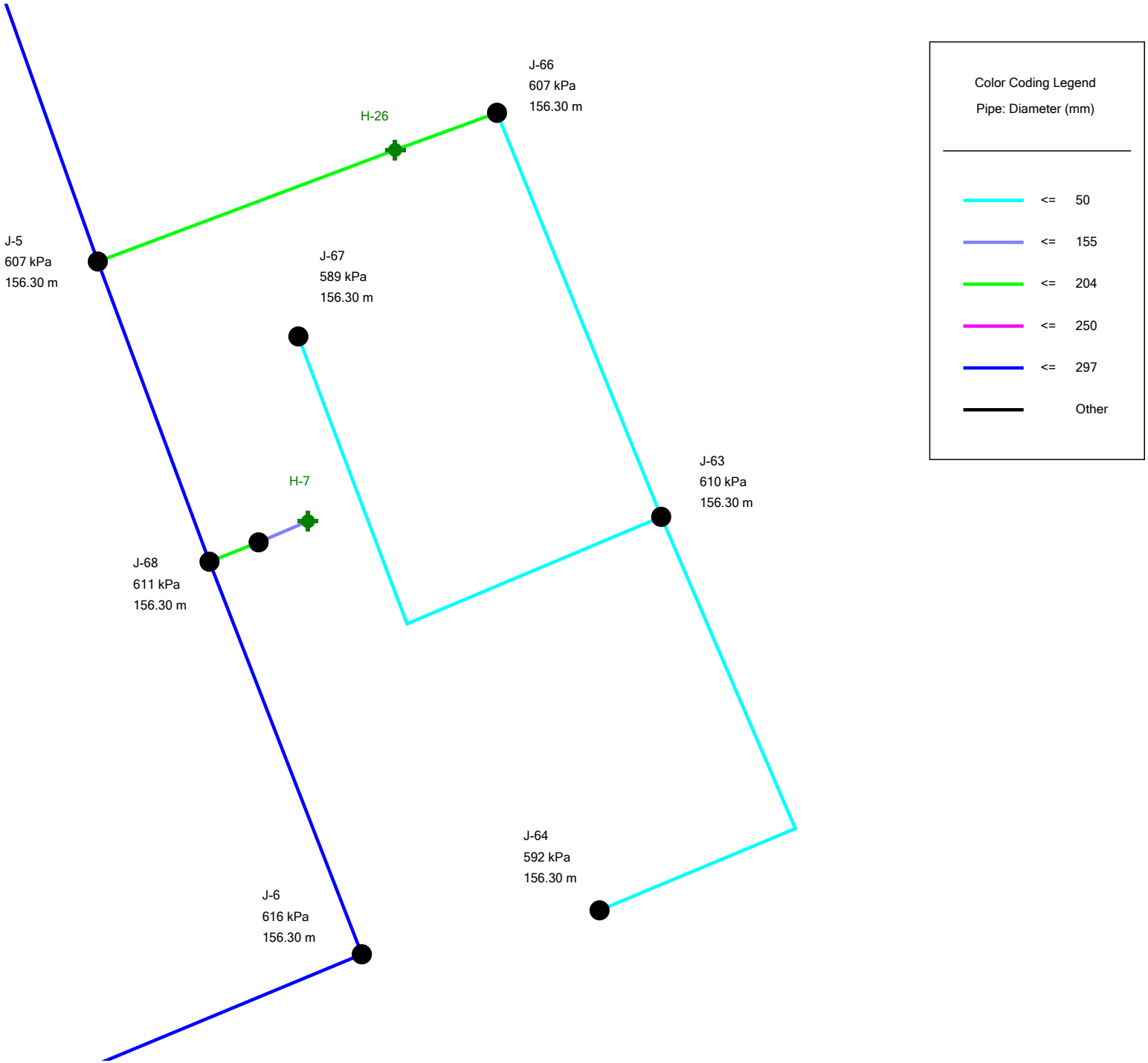
Harmony Block 104
Peak Hour Demand



Harmony Block 104
Maximum Day Demand + Fire Flow



Harmony Block 104
Maximum Pressure



Appendix C1

Harmony Stage 1 - Sanitary Sewer Design Sheet and Sanitary Drainage Plan

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

HARMONY STAGE 1
4005 STRANDHERD DRIVE
CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 24051-001

SANITARY SEWER DESIGN SHEET

Designed by: J.W.
Checked by: K.F.

Date : November 2017

Single Family	3.4	pers/unit	q =	350	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.280	L/s/ha
			Inst. =	50000	L/ha/day
Manning's Coeff. N =	0.013				

Denotes Existing Sanitary Sewer (South Nepean Collector) - In accordance with City of Ottawa Drawings Contract No. ISD14-2033
Denotes Existing Sanitary Sewer (Mattamy Barrhaven Mews) - Per IBI As-Constructed Drawings dated February 2010
Denotes Future External Lands (Refer to South Nepean Collector - Phase 2 & 3 Sanitary Sewer Design Sheet prepared by Novatech, dated August 2015)

STREET	M.H. #		RESIDENTIAL							INSTITUTIONAL/COMMERCIAL					SEWER DATA					RESIDUAL	UPSTREAM					DOWNSTREAM				
			NUMBER OF UNITS			CUMULATIVE		PEAKING	POPUL.				PEAK EXTR.	PEAK DES.															
	FROM	TO	SING.	MULT.	AREA ha	POPUL. peop.	AREA ha	FACTOR	FLOW l/s	AREA ha	CUMM. AREA ha	INST. FLOW l/s	FLOW l/s	FLOW l/s	DIA. mm	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	CAP. l/s	Center Line	Obvert	Invert	Cover	Center Line	Obvert Drop	Obvert	Invert	Cover
Hamsa Street	MH1	MH2	10	0	0.48	34	0.48	4.00	0.55	0.00	0.00	0.00	0.13	0.69	200	0.35	20.2	0.62	64.5	19.56	94.06	92.191	91.988	1.87	93.86	1.00	91.965	91.762	1.89
Hamsa Street	MH5	MH3	14	0	0.69	48	0.69	4.00	0.77	0.00	0.00	0.00	0.19	0.96	200	0.35	20.2	0.62	88.9	19.28	93.88	91.462	91.259	2.42	93.47		91.151	90.947	2.32
Hamsa Street	MH3	MH2	5	0	0.26	65	0.95	4.00	1.05	0.00	0.00	0.00	0.27	1.31	200	0.35	20.2	0.62	37.0	18.93	93.47	91.151	90.947	2.32	93.86	0.06	91.021	90.818	2.84
Clarity Avenue	**MH2**	**MH6**	**4**	**0**	**0.25**	**112**	**1.68**	**4.00**	**1.82**	**0.00**	**0.00**	**0.00**	**0.47**	**2.29**	**200**	**0.35**	**20.2**	**0.62**	**76.1**	**17.95**	**93.86**	**90.961**	**90.758**	**2.90**	**93.94**		**90.695**	**90.491**	**3.25**
Cashmere Terrace	MH8	MH7	11	0	0.51	37	0.51	4.00	0.61	0.00	0.00	0.00	0.14	0.75	200	0.35	20.2	0.62	62.6	19.49	94.07	91.194	90.991	2.88	93.77		90.975	90.772	2.79
Cashmere Terrace	MH7	MH6	10	0	0.41	71	0.92	4.00	1.16	0.00	0.00	0.00	0.26	1.41	200	0.35	20.2	0.62	63.1	18.83	93.77	90.975	90.772	2.79	93.94	0.06	90.755	90.551	3.19
Clarity Avenue	**MH6**	**MH10A**	**4**	**0**	**0.24**	**197**	**2.84**	**4.00**	**3.20**	**0.00**	**0.00**	**0.00**	**0.80**	**3.99**	**200**	**0.35**	**20.2**	**0.62**	**51.0**	**16.25**	**93.94**	**90.695**	**90.491**	**3.25**	**93.76**		**90.516**	**90.313**	**3.24**
Clarity Avenue	**MH10A**	**MH10**	**0**	**0**	**0.00**	**197**	**2.84**	**4.00**	**3.20**	**0.00**	**0.00**	**0.00**	**0.80**	**3.99**	**200**	**0.35**	**20.2**	**0.62**	**25.4**	**16.25**	**93.76**	**90.516**	**90.313**	**3.24**	**94.02**		**90.427**	**90.224**	**3.59**
Lilith Street	MH9	MH10	0	14	0.46	38	0.46	4.00	0.61	0.00	0.00	0.00	0.13	0.74	200	0.35	20.2	0.62	65.5	19.50	95.00	92.343	92.139	2.66	94.02	1.69	92.113	91.910	1.91
Lilith Street	MH12	MH11	10	0	0.46	34	0.46	4.00	0.55	0.00	0.00	0.00	0.13	0.68	200	0.35	20.2	0.62	62.8	19.56	94.15	90.919	90.716	3.23	93.84		90.699	90.496	3.14
Lilith Street	MH11	MH10	9	0	0.41	65	0.87	4.00	1.05	0.00	0.00	0.00	0.24	1.29	200	0.35	20.2	0.62	60.5	18.95	93.84	90.699	90.496	3.14	94.02	0.06	90.487	90.284	3.53
Clarity Avenue	**MH10**	**MH13**	**0**	**6**	**0.27**	**316**	**4.44**	**4.00**	**5.12**	**0.00**	**0.00**	**0.00**	**1.24**	**6.36**	**200**	**0.35**	**20.2**	**0.62**	**78.5**	**13.88**	**94.02**	**90.427**	**90.224**	**3.59**	**94.10**		**90.153**	**89.949**	**3.95**
Namaste Walk	MH14	MH13	14	0	0.69	48	0.69	4.00	0.77	0.00	0.00	0.00	0.19	0.96	200	0.35	20.2	0.62	97.1	19.28	94.20	90.552	90.349	3.65	94.10	0.06	90.213	90.009	3.89
Clarity Avenue	**MH13**	**MH15**	**0**	**17**	**0.59**	**409**	**5.72**	**4.00**	**6.63**	**0.00**	**0.00**	**0.00**	**1.60**	**8.23**	**200**	**0.35**	**20.2**	**0.62**	**117.4**	**12.01**	**94.10**	**90.153**	**89.949**	**3.95**	**94.22**	**-0.05**	**89.742**	**89.538**	**4.48**
Park (Block 117)	MH16	MH15	0	0	1.67	0	1.67	4.00	0.00	0.00	0.00	0.00	0.47	0.47	150	0.50	11.2	0.62	12.9	10.77	94.32	90.357	90.205	3.96	94.22	0.50	90.293	90.140	3.93
Clarity Avenue	**MH15**	**EX. CM 4**	**0**	**12**	**0.46**	**442**	**7.85**	**4.00**	**7.16**	**0.00**	**0.00**	**0.00**	**2.20**	**9.36**	**300**	**2.00**	**142.7**	**1.96**	**106.9**	**133.31**	**94.22**	**89.793**	**89.488**	**4.43**	**94.32**	**0.01**	**87.655**	**87.350**	**6.66**
Future Institutional (Block 127)	STUB	EX. CM 4	0	0	0.00	0	0.00	4.00	0.00	4.86 *	4.86	4.22	1.36	5.58	250	1.00	62.0	1.22	15.7	56.46	94.41	90.431	90.177	3.98	94.32	2.63	90.274	90.020	4.05
Upstream Mixed Use Development	--	EX. CM 1	--	--	105.84	10974	105.84	2.91	129.56	175.19	175.19	152.07	78.69	360.33															
Chapman Mills Drive	EX. CM 1	EX. CM 2	0	0	0.16	10974	106.00	2.91	129.56	0.00	175.19	152.07	78.73	360.37	900	0.10	597.2	0.91	60.9	236.85	95.03	87.833	86.918	7.20	94.43		87.772	86.857	6.66
Future Commercial (Block 105)	STUB	EX. CM 2	0	0	0.00	0	0.00	4.00	0.00	0.76	0.76	0.66	0.21	0.87	250	1.00	62.0	1.22	15.0	61.17	94.53	90.624	90.370	3.91	94.43	2.70	90.474	90.220	3.96
Chapman Mills Drive	EX. CM 2	EX. CM 3	0	0	0.16	10974	106.16	2.91	129.56	0.00	175.95	152.73	78.99	361.29	900	0.10	597.2	0.91	47.4	235.94	94.43	87.772	86.857	6.66	94.41		87.724	86.810	6.69
Waterlilly Way	EX. 22A	17	0	22	0.56	59	0.56	4.00	0.96	0.00	0.00	0.00	0.16	1.12	200	1.00	34.2	1.06	84.2	33.10	94.59	92.702	92.499	1.89	94.54	0.55	91.860	91.657	2.68
Waterlilly Way	17	EX. CM 3	5	17	0.70	122	1.26	4.00	1.98	0.00	0.00	0.00	0.35	2.33	250	1.00	62.0	1.22	105.6	59.70	94.54	91.310	91.056	3.23	94.41	2.53	90.254	90.000	4.16
Chapman Mills Drive	EX. CM 3	EX. CM 4	0	0	0.21	11096	107.63	2.91	130.79	0.00	175.95	152.73	79.40	362.93	900	0.10	597.2	0.91	76.1	234.30	94.41	87.724	86.810	6.69	94.32		87.648	86.734	6.67
Chapman Mills Drive	EX. CM 4	EX. CM 5	0	0	0.09	11538	115.57	2.89	135.20	0.00	180.81	156.95	82.99	375.14	900	0.10	597.2	0.91	32.0	222.08	94.32	87.648	86.734	6.67	94.20		87.616	86.702	6.58
Chapman Mills Drive	EX. CM 5	EX. CM 6	0	0	0.11	11538	115.68	2.89	135.20	0.00	180.81	156.95	83.02	375.17	900	0.10	597.2	0.91	42.3	222.05	94.20	87.616	86.702	6.58	94.30		87.574	86.660	6.73
High Density Residential (Block 118)	STUB	18	0	24	0.32	65	0.32	4.00	1.05	0.00	0.00	0.00	0.09	1.14	200	0.35	20.2	0.62	9.0	19.10	94.39	90.090	89.887	4.30	94.27	0.00	90.059	89.855	4.21
Chakra Street	18	EX. CM 6	0	0	0.10	65	0.42	4.00	1.05	0.00	0.00	0.00	0.12	1.17	300	4.00	201.8	2.77	46.8	200.60	94.27	90.059	89.754	4.21	94.30	0.61	88.185	87.880	6.11
Chapman Mills Drive	EX. CM 6	EX. CM 7	0	0	0.21	11603	116.31	2.89	135.85	0.00	180.81	156.95	83.19	376.00	900	0.10	597.2	0.91	74.0	221.23	94.30	87.574	86.660	6.73	93.40	0.01	87.500	86.586	5.90
Future Residential Development	STUB	EX. CM 7	0	0	8.83 *	1430 **	8.83	3.69	21.41	5.35	5.35	4.64	3.97	30.02	250	0.25	31.0	0.61	12.0	1.00	93.61	87.434	87.180	6.18	93.40	-0.09	87.404	87.150	6.00
Chapman Mills Drive	EX. CM 7	EX. CM 8	0	0	0.00	13033	125.14	2.84	149.92	0.00	186.16	161.59	87.16	398.68	900	0.10	597.2	0.91	25.7	198.54	93.40	87.490	86.576	5.91	93.38		87.464	86.550	5.92
																											INV =	**86.550**	

Notes:
* Institutional, Commercial and Residential Area taken from Draft Plan of Subdivision prepared by Annis, O'Sullivan, Vollebekk Ltd. (Residential Area inclusive of Future Transit Corridor (2.279 Ha) and Servicing Easement (0.112 Ha))
** Cumulative Population based on Medium Density Residential Land Use (162 pers/ha) as per Novatech's South Nepean Collector - Phase 2 & 3 Sanitary Sewer Design Sheet dated August 2015

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

HARMONY STAGE 1
4005 STRANDHERD DRIVE
CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 24051-001

SANITARY SEWER DESIGN SHEET

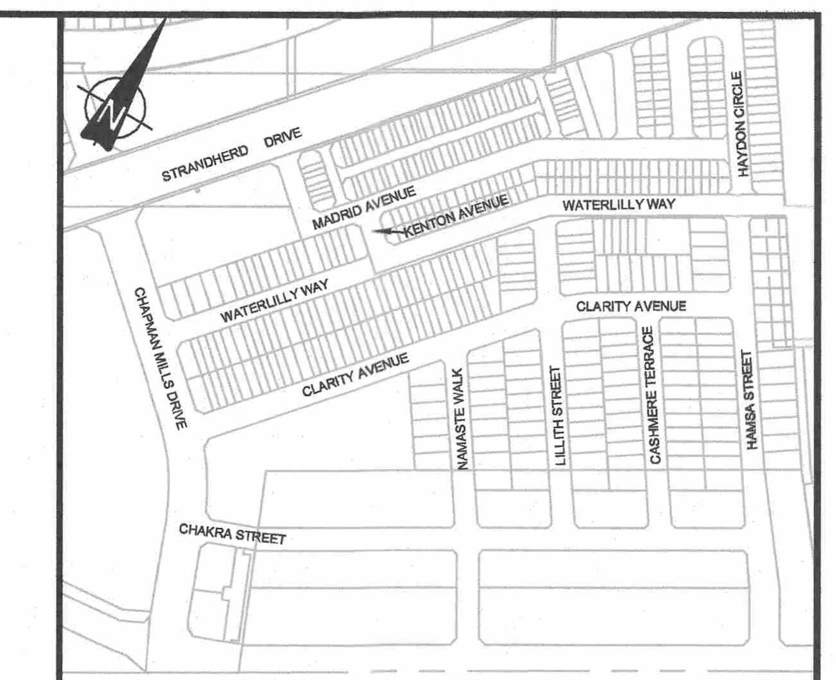
Designed by: J.W.
Checked by: K.F.

Date : November 2017

Single Family	3.4	pers/unit	q =	350	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.280	L/s/ha
			Inst. =	50000	L/ha/day
Manning's Coeff. N =	0.013				

Denotes Existing Sanitary Sewer (South Nepean Collector) - In accordance with City of Ottawa Drawings Contract No. ISD14-2033
Denotes Existing Sanitary Sewer (Mattamy Barrhaven Mews) - Per IBI As-Constructed Drawings dated February 2010
Denotes Future External Lands (Refer to South Nepean Collector - Phase 2 & 3 Sanitary Sewer Design Sheet prepared by Novatech, dated August 2015)

STREET	M.H. #		RESIDENTIAL							INSTITUTIONAL/COMMERCIAL					SEWER DATA					RESIDUAL	UPSTREAM				DOWNSTREAM				
			NUMBER OF UNITS			CUMULATIVE		PEAKING	POPUL.	AREA	CUMM.	INST.	PEAK EXTR.	PEAK DES.															
			SING.	MULT.	AREA	POPUL.	AREA	FACTOR	FLOW		AREA	FLOW	FLOW	FLOW	DIA.	SLOPE	CAPAC.	VEL.	LENGTH	CAP.	Center	Obvert	Invert	Cover	Center	Obvert	Obvert	Invert	Cover
	FROM	TO			ha	peop.	ha		l/s	ha	ha	l/s	l/s	l/s	mm	%	l/s	m/s	m	l/s	Line				Line	Drop			
EXISTING BARRHAVEN MEWS																													
Waterlilly Way	EX. 21A	EX. 22A	0	15	0.33	41	0.33	4.00	0.66	0.00	0.00	0.00	0.09	0.75	200	0.61	26.8	0.83	59.3	26.06	94.90	92.967	92.764	1.93	94.55		92.603	92.400	1.95
Kenton Avenue	EX. 22A	EX. 11B	0	0	0.06	41	0.39	4.00	0.66	0.00	0.00	0.00	0.11	0.77	250	0.32	35.2	0.69	43.6	34.39	94.55	92.614	92.360	1.94	94.00		92.474	92.220	1.53
Madrid Avenue	EX. 12A	EX. 11B	0	8	0.19	22	0.19	4.00	0.35	0.00	0.00	0.00	0.05	0.40	250	0.30	33.9	0.67	46.9	33.49	94.29	92.104	91.850	2.19	94.00		91.964	91.710	2.04
Waterlilly Way	EX. 21A	EX. 20A	0	16	0.36	43	0.36	4.00	0.70	0.00	0.00	0.00	0.10	0.80	200	0.56	25.6	0.79	77.9	24.77	94.90	93.088	92.885	1.81	94.92		92.653	92.450	2.27
Waterlilly Way	EX. 20A	EX. 19A	0	15	0.34	84	0.70	4.00	1.36	0.00	0.00	0.00	0.20	1.55	250	0.32	35.0	0.69	72.4	33.41	94.92	92.664	92.410	2.26	94.64		92.434	92.180	2.21
Waterlilly Way	EX. 19A	EX. 18A	0	16	0.37	127	1.07	4.00	2.06	0.00	0.00	0.00	0.30	2.36	250	0.31	34.4	0.68	81.5	32.00	94.64	92.424	92.170	2.22	93.94		92.174	91.920	1.77



KEYPLAN, N.T.S.

LEGEND:

DRAINAGE BOUNDARY

EXISTING DRAINAGE BOUNDARY FROM IBI

0.37 — AREA IN HECTARES
EX.19A-EX.18A — PIPE REACH UPSTREAM MAINTENANCE HOLE TO DOWNSTREAM MAINTENANCE HOLE
16 — NUMBER OF UNITS
43 — POPULATION

10 — EXISTING IBI NUMBER OF UNITS
0.23 — EXISTING IBI AREA IN HECTARES

POPULATION
SINGLE FAMILY: 3.4 PERS/UNIT
TOWHOUSE (ROW) 2.7 PERS/UNIT

No.	ISSUE / REVISION	DD/MM/YY
05	ISSUED TO CITY FOR MOE SUBMISSION	31/10/17
04	ISSUED TO CITY FOR REVIEW - 4TH SUBMISSION / ISSUED FOR TENDER	16/10/17
03	ISSUED TO CITY FOR REVIEW - 3RD SUBMISSION	19/09/17
02	ISSUED TO CITY FOR REVIEW - 2ND SUBMISSION	11/07/17
01	ISSUED TO CITY FOR REVIEW - 1ST SUBMISSION	12/05/17

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:1000

CLIENT:
MINTO COMMUNITIES INC.
200-180 KENT STREET
OTTAWA, ON
K1P 0B6

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

CONSULTANT:

PROFESSIONAL STAMP
LICENSED PROFESSIONAL ENGINEER
K.R. FERREY MORENO
100122432
Nov 1st, 2017
PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:
MINTO COMMUNITIES INC.
HARMONY STAGE 1
4005 STRANDHERD DRIVE

DRAWING:
SANITARY DRAINAGE PLAN

DESIGN:	JW		
DRAWN:	CJM	DRAWING #:	DSAN
CHECKED:	KF		
JLR #:	24051-001		

D07-16-16-0004

#17495

File Location: r:\24000\24051 ld minto clarke\24051-001 stage 1 lands\jlr drawings\Civil\24051-001 C DSAN.dwg

Appendix C2

Block 104 - Sanitary Sewer Design Sheet and Sanitary Drainage Plan

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

HARMONY STAGE 1 - BLOCK 104
4025 STRANDHERD DRIVE, CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 24051-003.1

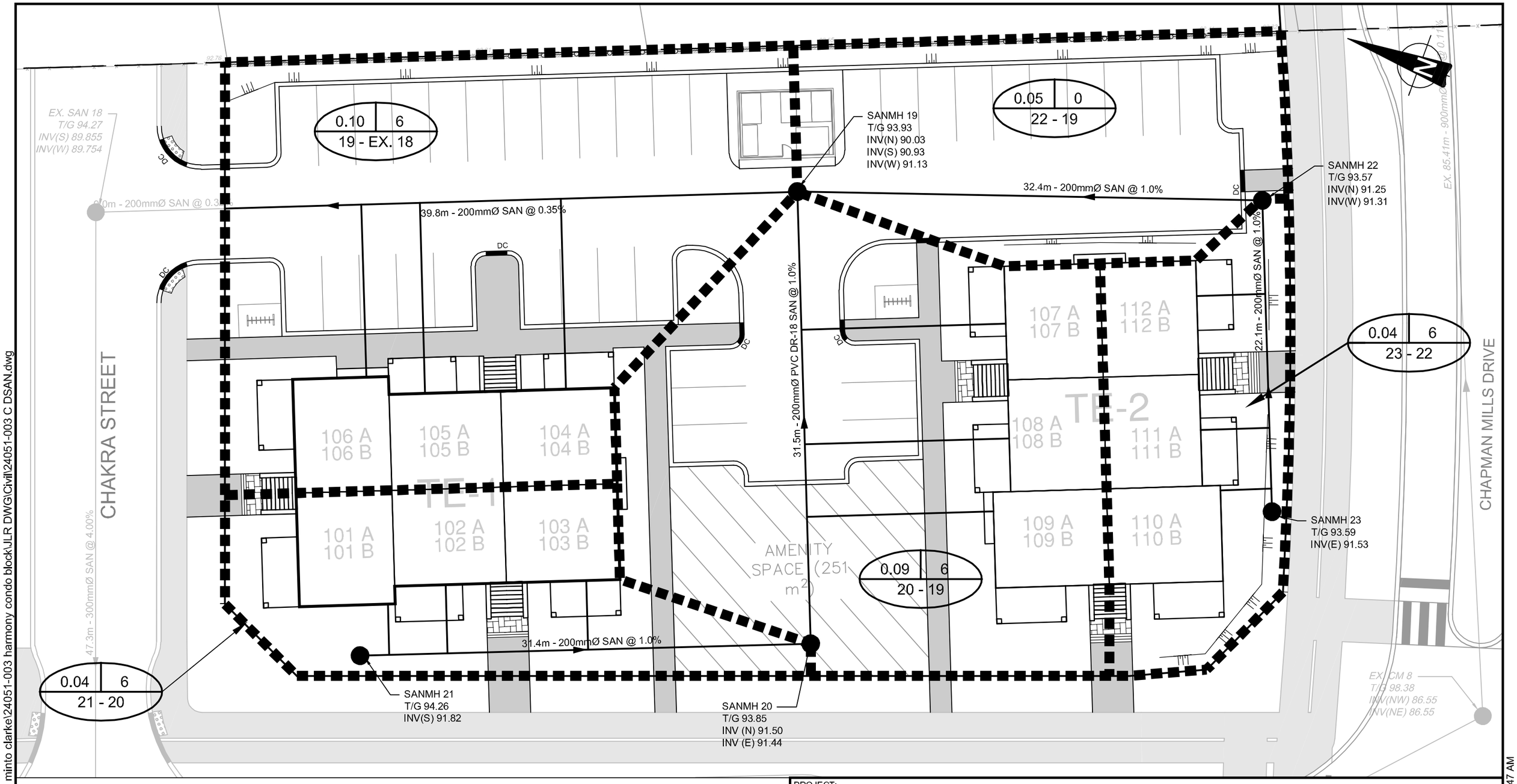
SANITARY SEWER DESIGN SHEET

Single Family	3.4	pers/unit	q =	280	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.330	L/s/ha
Manning's Coeff. N =	0.013		Inst. =	50000	L/ha/day

Denotes Existing Harmony Stage 1 Sanitary Sewer

Designed by: J.R.
Checked by: H.M.
Date : July 2018

			RESIDENTIAL							INSTITUTIONAL/COMMERCIAL					SEWER DATA					RESIDUAL	UPSTREAM				DOWNSTREAM				
STREET	M.H. #		NUMBER OF UNITS			CUMULATIVE		PEAKING	POPUL.				PEAK EXTR.	PEAK DES.															
	FROM	TO	SING.	MULT.	AREA ha	POPUL. peop.	AREA ha	FACTOR	FLOW l/s	AREA ha	CUMM. AREA ha	INST. FLOW l/s	FLOW l/s	FLOW l/s	DIA. mm	SLOPE %	CAPAC. l/s	VEL. m/s	LENGTH m	CAP. l/s	T/G	Obvert	Invert	Cover	T/G	Obvert Drop	Obvert	Invert	Cover
Block 104	MH23	MH22	0	6	0.06	16	0.06	4.00	0.21	0.00	0.00	0.00	0.02	0.23	200	1.00	34.2	1.06	23.2	33.99	93.59	91.746	91.543	1.84	93.57	0.06	91.514	91.311	2.06
Block 104	MH22	MH19	0	0	0.06	16	0.13	4.00	0.21	0.00	0.00	0.00	0.04	0.25	200	1.00	34.2	1.06	32.4	33.96	93.65	91.454	91.251	2.20	93.93	0.90	91.130	90.927	2.80
Block 104	MH21	MH20	0	6	0.06	16	0.06	4.00	0.21	0.00	0.00	0.00	0.02	0.23	200	1.00	34.2	1.06	31.4	33.99	94.26	92.019	91.816	2.24	93.85	0.06	91.705	91.502	2.15
Block 104	MH20	MH19	0	6	0.06	32	0.13	4.00	0.42	0.00	0.00	0.00	0.04	0.46	200	1.00	34.2	1.06	31.5	33.75	93.85	91.645	91.442	2.21	93.93	1.10	91.330	91.127	2.60
Block 104	MH19	EX. MH18	0	6	0.06	65	0.32	4.00	0.84	0.00	0.00	0.00	0.11	0.95	200	0.35	20.2	0.62	48.9	19.30	93.93	90.230	90.027	3.70	94.27	0.00	90.059	89.855	4.21
Chakra Street	EX. MH18	EX. CM 6	0	0	0.10	65	0.42	4.00	0.84	0.00	0.00	0.00	0.14	0.98	300	4.00	201.8	2.77	46.8	200.79	94.27	90.059	89.754	4.21	94.30	0.61	88.185	87.880	6.11



LEGEND

- AREA IN HECTARES
- NUMBER OF UNITS
- PIPE REACH UPSTREAM MAINTENANCE HOLE TO DOWNSTREAM MAINTENANCE HOLE
- DRAINAGE BOUNDARY

PROJECT:

MINTO COMMUNITIES INC. HARMONY STAGE 1 - BLOCK 104

4025 STRANDHERD DRIVE

DRAWING:

SANITARY DRAINAGE PLAN

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

DESIGN: JW
DRAWN: CJM
CHECKED: HM

JLR NO: 24051-003.1

DRAWING NO.: DSAN

File Location: R:\24000\24051 ld minto clarke\24051-003 harmony condo block\JLR DWG\Civil\24051-003 C DSAN.dwg

PLOT DATE: March 8, 2018 11:06:47 AM

Appendix D1

Harmony Stage 1 - Storm Sewer Design Sheet and Storm Drainage Plan

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

HARMONY STAGE 1
4005 STRANDHERD DRIVE
CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 24051-01

STORM SEWER DESIGN SHEET

Designed by: J.W.

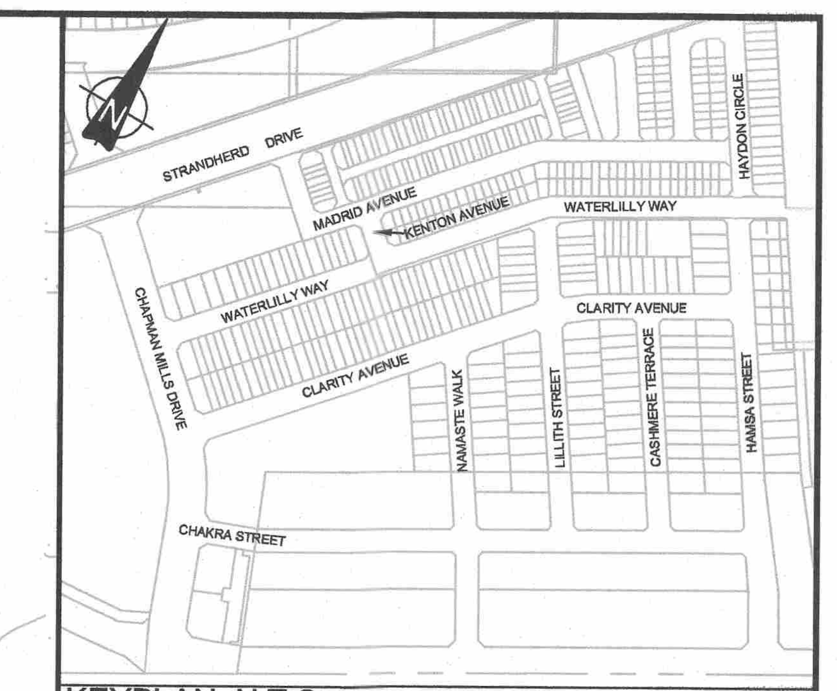
Checked by: K.F.

Date: November 2017

Manning's Coefficient, n =	0.013
IDF CURVE =	2 Year

Denotes Existing Storm Sewer (Mattamy Barrhaven Mews) - Per IBI As-Constructed Drawings dated February 2010

STREET	Maintenance Hole Number		DRAINAGE AREAS									Inlet Time	In Pipe Flow Time	2 YR PEAK FLOW				5 YR PEAK FLOW				TOTAL	PLUG FLOW	SEWER DATA							Residual Capacity	UPSTREAM					DOWNSTREAM				
										Total Area		Cum. Area 2 YR (ha)	Cum. Area 5 YR (ha)									Peak Design Flow (L/s)	Peak ICD Flow (L/s)	PIPE																
	FROM	TO	0.30	0.53	0.72	0.75	0.76	0.80	0.90	2 Yr	5 Yr													Dia (mm)	H (mm)	W (mm)	Slope (%)	Q full (L/s)	V full (m/s)	Length (m)	$Q_{cap} - Q_d$ (L/s)	Centre Line	Obvert	Invert	Cover	Center Line	Drop	Obvert	Invert	Cover
														(min.)	(min.)	2.78AR	Cum. 2.78AR	2 Yr Intensity (mm/hr)	Peak Flow (L/s)	2.78AR	Cum. 2.78AR	5 Yr Intensity (mm/hr)	Peak Flow (L/s)																	
Commercial (Block 105)	Stub	MH120							0.76		0.76	0.00	0.76	10.00	0.42					1.90	1.90	104.19	198.13	198.13	235.0	600			0.15	248.09	0.85	21.6	50.0	94.34	91.835	91.225	2.51	94.24	0.00	91.803	91.193	2.44
														10.42																										
Chapman Mills Drive	MH120	MH121			0.55						0.55	0.00	1.31	10.42	2.16					1.10	3.00	102.01	306.28	306.28	164.0	675			0.15	339.63	0.92	119.2	33.4	94.24	91.803	91.117	2.44	94.41	-0.34	91.624	90.938	2.79
														12.58																										
Future Institutional Block	Stub	MH121				4.86					4.86	0.00	4.86	10.00	0.14					10.13	10.13	104.19	1055.80	1055.80	--	1050			0.25	1424.40	1.59	13.8	368.6	94.41	92.001	90.934	2.41	94.32	0.00	91.967	90.900	2.35
														10.14																										
Chapman Mills Drive	MH123	MH124			0.36						0.36	0.00	0.36	10.00	1.69					0.72	0.72	104.19	75.08	75.08	152.0	450			0.20	133.02	0.81	82.2	57.9	94.30	91.406	90.949	2.89	93.45	0.00	91.242	90.785	2.21
														11.69																										
High Density (Block 118)	Stub	MH125						0.32			0.32	0.00	0.32	10.00	0.19					0.71	0.71	104.19	74.15	74.15	89.0	375			0.35	108.21	0.95	10.6	34.1	94.40	91.588	91.207	2.81	94.28	0.06	91.551	91.170	2.73
Chakra Street	MH125	MH123			0.10					0.10		0.10	0.32	10.19	0.88	0.20	0.20	76.10	15.23		0.71	103.22	73.46	88.69	14.0	375			0.35	108.21	0.95	50.0	19.5	94.28	91.491	91.110	2.79	94.30	0.00	91.316	90.935	2.98
														11.06																										
Chapman Mills Drive	MH123	MH122			0.19						0.19	0.10	0.51	11.06	0.82		0.20	72.95	14.60	0.38	1.09	98.89	107.98	122.59	88.0	600			0.15	248.09	0.85	41.8	125.5	94.30	91.316	90.706	2.98	94.18	0.00	91.253	90.644	2.93
Chapman Mills Drive	MH122	MH121										0.10	0.51	11.88	0.63		0.20	70.26	14.06		1.09	95.20	103.95	118.02	0.0	600			0.15	248.09	0.85	32.3	130.1	94.18	91.253	90.644	2.93	94.32	-0.76	91.205	90.595	3.12
														12.52																										
Clarity Avenue	**MH121**	**MH115**			**0.34**					**0.34**		**0.44**	**6.68**	**12.58**	**1.22**	**0.68**	**0.88**	**68.13**	**60.00**		**14.23**	**92.28**	**1312.88**	**1372.88**	**51.0**	**1350**			**0.15**	**2156.55**	**1.46**	**106.5**	**783.7**	**94.32**	**91.967**	**90.595**	**2.35**	**94.22**	**0.00**	**91.807**	**90.435**	**2.41**
														13.80																										
Park (Block 117)	Stub	MH115	1.54								1.54	0.00	1.54	10.00	0.27					1.28	1.28	104.19	133.82	133.82	89.0	450			0.25	148.72	0.91	14.8	14.9	94.33	91.387	90.929	2.94	94.21	-0.46	91.350	90.893	2.86
														10.27																										
Clarity Avenue	**MH115**	**MH115A**		**0.42**	**0.41**					**0.83**		**1.27**	**8.22**	**13.80**	**0.88**	**1.44**	**2.32**	**64.76**	**150.24**		**15.51**	**87.65**	**1359.61**	**1509.85**	**74.0**	**1350**			**0.15**	**2156.55**	**1.46**	**77.3**	**646.7**	**94.22**	**91.807**	**90.435**	**2.41**	**94.10**	**-0.08**	**91.691**	**90.319**	**2.41**
														14.68																										
Waterlilly Way	MH118	MH117		0.17	0.39					0.56		0.56	0.00	10.00	1.49	1.03	1.03	76.81	79.19					79.19	52.0	600			0.20	286.47	0.98	87.5	207.3	94.50	92.214	91.604	2.29	94.30	0.00	92.039	91.429	2.26
Waterlilly Way	MH117	MH116			0.34					0.34		0.90	0.00	11.49	1.21	0.68	1.71	71.54	122.44					122.44	52.0	675			0.20	392.18	1.06	77.3	269.7	94.40	92.039	91.353	2.36	94.30	0.00	91.884	91.198	2.42
														12.70																										
Easement (Block 110)	MH116	MH115A										0.90	0.00	12.70	1.41		1.71	67.79	116.03					116.03	0.0	675			0.15	339.63	0.92	77.9	223.6	94.16	91.884	91.198	2.28	94.32	0.00	91.767	91.081	2.55
														14.11																										
Clarity Avenue	**MH115A**	**MH113**		**0.46**						**0.46**		**2.63**	**8.22**	**14.68**	**0.43**	**0.68**	**4.71**	**62.53**	**294.48**		**15.51**	**84.60**	**1312.29**	**1606.77**	**0.0**	**1500**			**0.15**	**2856.14**	**1.57**	**40.4**	**1249.4**	**94.22**	**91.767**	**90.243**	**2.45**	**94.10**	**0.00**	**91.707**	**90.183**	**2.39**
														15.11																										
Namaste Walk	MH114	MH113		0.11	0.42					0.53		0.53	0.00	10.00	1.65	1.00	1.00	76.81	77.02					77.02	74.0	600			0.20	286.47	0.98	96.9	209.5	94.17	91.603	90.994	2.57	94.10	-0.30	91.409	90.800	2.69
														11.65																										
Clarity Avenue	**MH113**	**MH110**			**0.24**					**0.24**		**3.40**	**8.22**	**15.11**	**0.84**	**0.48**	**6.19**	**61.51**	**380.89**		**15.51**	**83.20**	**1290.57**	**1671.45**	**52.0**	**1500**			**0.15**	**2856.14**	**1.57**	**78.9**	**1184.7**	**94.10**	**91.707**	**90.183**	**2.39**	**94.02**	**0.00**	**91.588**	**90.064**	**2.43**
														15.95																										
Waterlilly Way	MH109A	EX. 21			0.13					0.13		0.13	0.00	10.00	1.65	0.26	0.26	76.81	19.99					19.99	25.0	300			0.35	59.68	0.82	80.8	39.7	94.60	92.393	92.088	2.21	94.77	0.00	92.110	91.805	2.66
Waterlilly Way	EX. 21	MH109			0.17		0.18			0.35		0.48	0.00	11.65	0.96	0.72	0.98	71.01	69.65					58.00	58.0	300			0.33	57.95	0.80	45.9	0.0	94.77	92.110	91.805	2.66	95.00	0.45	91.959	91.654	3.04
Lilith Street	MH109	MH110			0.22					0.22		0.70	0.00	12.60	1.27	0.44	1.42	68.07	96.74					96.74	52.0	450			0.35	175.96	1.07	81.7	79.2	95.00	91.508	91.051	3.49	94.02	-0.37	91.222	90.765	2.80
														13.87																										
Lilith Street	MH112	MH111										0.00	0.00	10.00	1.30									0.00	0.0	375			0.25	91.46	0.80	62.7		94.14	91.545	91.164	2.59	93.80	0.00	91.388	91.007	2.41
Lilith Street	MH111	MH110		0.27	0.53					0.80		0.80	0.00	11.30	1.16	1.46	1.46	72.14	105.23					105.23	74.0	600			0.16	256.22	0.88	60.9	151.0	93.80	91.388	90.779	2.41	94.02	-0.30	91.291	90.681	2.73
														12.46																										
Clarity Avenue	**MH110**	**MH110A**										**4.90**	**8.22**	**15.95**	**0.34**		**9.07**	**59.61**	**540.82**		**15.51**	**80.61**	**1250.34**	**1791.16**	**0.0**	**1500**			**0.15**	**2856.14**	**1.57**	**31.6**	**1065.0**	**94.02**	**91.588**	**90.064**	**2.43**	**93.68**	**0.00**	**91.541**	**90.017**	**2.14**
Clarity Avenue	**MH110A**	**MH106**			**0.23**					**0.23**		**5.13**	**8.22**	**16.29**	**0.47**	**0.46**	**9.53**	**58.89**	**561.37**		**15.51**	**79.62**	**1235.01**	**1796.38**	**28.0**	**1500**			**0.15**	**2856.14**	**1.57**	**44.0**	**1059.8**	**93.68**	**91.541**	**90.017**	**2.14**	**93.94**	**-0.04**	**91.475**	**89.951**	**2.46**
														16.75																										
Cashmere Terrace	MH108	MH107		0.33						0.33		0.33	0.00	10.00	1.30	0.49	0.49	76.81	37.34					37.34	0.0	375			0.25	91.46	0.80	62.7	54.1	94.02	91.769	91.388	2.25	93.75	0.00	91.612	91.231	2.14
Cashmere Terrace	MH107	MH106			0.56					0.56		0.89	0.00	11.30	1.33	1.12	1.61	72.14	115.94					115.94	74.0	525			0.16	179.46	0.80	64.3	63.5	93.75	91.612	91.079	2.14	93.94	0.00	91.510	90.976	2.43
														12.64																										
Clarity Avenue	**MH106**	**MH102**		**0.40**	**0.24**					**0.64**		**6.66**	**8.22**	**16.75**	**0.73**	**1.07**	**12.21**	**57.91**	**707.11**		**15.51**	**78.29**	**1214.35**	**1921.46**	**52.0**		**1585**	**2495**	**0.15**	**5749.47**	**1.87**	**82.2**	**3828.0**	**93.94**	**91.513**	**89.913**	**2.43**	**93.86**	**0.00**	**91.390**	**89.790**	**2.47**
														17.49																										
Waterlilly Way	MH109	EX. 20										0.00	0.00	10.00	0.16									0.00	0.0	300			0.33	57.95	0.80	7.7		95.00	91.960	91.656	3.04	94.96	-0.03	91.935	91.630	3.03
Waterlilly Way	EX. 20	EX. 19			0.16		0.17			0.33		0.33	0.00	10.16	1.40	0.68	0.68	76.19	51.77					51.77	43.0	375			0.24	89.05	0.80	67.4	37.3	94.96	91.961	91.580	3.00	94.68	0.04	91.801	91.420	2.88
Waterlilly Way	EX.19	MH101										0.33	0.00	11.57	1.59		0.68	71.27	48.43					48.43	0.0	375			0.28	96.96	0.85	81.2	48.5	94.68	91.761	91.380	2.92	93.94	0.36	91.533	91.152	2.41
Hamsa Street	MH101	MH102			0.19					0.19		0.52	0.00	13.16	1.42	0.38	1.06	66.49	70.46					70.46	50.0	450			0.25	148.72	0.91	77.2	78.3	94.00	91.171	90.714	2.83	93.86	-0.41	90.978	90.521	2.88
														14.58																										
Hamsa Street	**MH102**	**MH103**			**0.22**					**0.22**		**7.40**	**8.22**	**17.49**	**0.33**	**0.44**	**13.71**	**56.46**	**774.00**		**15.51**	**76.29**	**1183.43**	**1957.43**	**52.0**		**1585**	**2495**	**0.15**	**5749.47**	**1.87**	**36.6**	**3792.0**	**93.86**	**91.390**	**89.790**	**2.47**	**93.37**	**-0.38**	**91.335**	**89.735**	**2.04**
														17.82																										
Hamsa Street	MH105	MH103		0.32	0.25					0.57		0.57	0.00	10.00	1.89	0.97	0.97	76.81	74.65					74.65	52.0	525			0.16	179.46	0.80	91.0	104.8	93.95	91.107	90.574	2.84	93.40	-0.75	90.961	90.428	2.44
														11.89																										
Easement (Block 116)	**MH103**	**MH104**										**7.97**	**8.22**	**17.82**	**0.33**		**14.68**	**55.83**	**819.72**		**15.51**	**75.44**	**1170.23**	**1989.95**	**0.0**	**1950**			**0.15**	**5749.47**	**1.87**	**36.4**	**3759.5**	**93.37**	**91.716**	**89.735**	**1.65**	**93.50**	**0.00**	**91.661**	**89.680**	**1.84**
Easement (Block 116)	**MH104**	**Pond**										**7.97**	**8.22**	**18.14**	**0.24**		**14.68**	**55.23**	**810.82**		**15.51**	**74.61**	**1157.39**	**1968.22**	**0.0**	**1950**			**0.15**	**5749.47**	**1.87**	**26.7**	**3781.3**	**93.50**	**91.661**	**89.680**	**1.84**	**93.50**	**0.00**	**91.621**	**89.640**	**1.88**
														18.38																									INVERT @ POND =		89.640	



KEYPLAN, N.T.S.

LEGEND:

- DRAINAGE BOUNDARY
- EXISTING IBI DRAINAGE BOUNDARIES
- AREA IN HECTARES
- RUNOFF COEFFICIENT
- PIPE REACH UPSTREAM MAINTENANCE HOLE TO DOWNSTREAM MAINTENANCE HOLE
- EXISTING IBI AREA IN HECTARES
- EXISTING IBI RUNOFF COEFFICIENT

No.	ISSUE / REVISION	DD/MM/YY
05	ISSUED TO CITY FOR MOE SUBMISSION	31/10/17
04	ISSUED TO CITY FOR REVIEW - 4TH SUBMISSION / ISSUED FOR TENDER	16/10/17
03	ISSUED TO CITY FOR REVIEW - 3RD SUBMISSION	19/09/17
02	ISSUED TO CITY FOR REVIEW - 2ND SUBMISSION	11/07/17
01	ISSUED TO CITY FOR REVIEW - 1ST SUBMISSION	12/05/17

VERIFY SHEET SIZE AND SCALES. BAR TO THE RIGHT IS 25mm IF THIS IS A FULL SIZE DRAWING. 0 25mm

SCALE: 1:1000

CLIENT:
MINTO COMMUNITIES INC.
200-180 KENT STREET
OTTAWA, ON
K1P 0B6

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

CONSULTANT:

PROFESSIONAL STAMP: LICENSED PROFESSIONAL ENGINEER K.R. FERREY MORENO 100122432 Nov 1st, 2017 PROVINCE OF ONTARIO

PROJECT NORTH

PROJECT:
MINTO COMMUNITIES INC.
HARMONY STAGE 1
4005 STRANDHERD DRIVE

DRAWING:
STORM DRAINAGE PLAN

DESIGN:	JW	DRAWING #:	DST
DRAWN:	CJM		
CHECKED:	KF		
JLR #:	24051-001		

D07-16-16-0004

File Location: r:\24000\24051 ld minto clarke\24051-001 stage 1 lands\4 drawings\Civil\24051-001 C DST.dwg

#17495

Appendix D2

Block 104 – Storm Sewer Design Sheet

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

HARMONY STAGE 1 - BLOCK 104
4025 STRANDHERD DRIVE, CITY OF OTTAWA
MINTO COMMUNITIES INC.
JLR NO. 24051-01

STORM SEWER DESIGN SHEET

Designed by: J.W.
Checked by: H.M.
Date: March 2018

Manning's Coefficient, n =	0.013
IDF CURVE =	2 Year

Denotes Existing Storm Sewer (Mattamy Barrhaven Mews) - Per IBI As-Constructed Drawings dated February 2010
Denotes Existing Storm Sewer (Harmony Stage 1 development - completion of sewer installation anticipated Spring 2018) - In accordance with J.L. Richards Plan and Profile drawings, dated November 2017.
Denotes Proposed Storm Sewer (Harmony Stage 1 - Block 104)

STREET	Maintenance Hole Number		DRAINAGE AREAS												Inlet Time (min.)	In Pipe Flow Time (min.)	2 YR PEAK FLOW				5 YR PEAK FLOW				TOTAL	SEWER DATA							Residual Capacity Q_{cap} - Q_d (L/s)	UPSTREAM				DOWNSTREAM				
			0.30	0.53	0.66	0.72	0.75	0.76	0.80	0.90	Total Area 2 Yr	Total Area 5 Yr	Cum. Area 2 YR (ha)	Cum. Area 5 YR (ha)			2.78AR	Cum. 2.78AR	2 Yr Intensity (mm/hr)	Peak Flow (L/s)	2.78AR	Cum. 2.78AR	5 Yr Intensity (mm/hr)	Peak Flow (L/s)	Peak Design Flow (L/s)	Dia (mm)	PIPE H (mm)	PIPE W (mm)	Slope (%)	Q full (L/s)	V full (m/s)	Length (m)		Centre Line	Obvert	Invert	Cover	Center Line	Drop	Obvert	Invert	Cover
	FROM	TO																																							
Commercial (Block 105)	Stub	MH120								0.76		0.76	0.00	0.76	10.00	0.42					1.90	1.90	104.19	198.13	198.13	600			0.15	248.09	0.85	21.6	50.0	94.34	91.835	91.225	2.51	94.24	0.00	91.803	91.193	2.44
															10.42																											
Chapman Mills Drive	MH120	MH121				0.55						0.55	0.00	1.31	10.42	2.16					1.10	3.00	102.01	306.28	306.28	675			0.15	339.63	0.92	119.2	33.4	94.24	91.803	91.117	2.44	94.41	-0.34	91.624	90.938	2.79
															12.58																											
Future Institutional Block	Stub	MH121					4.86					4.86	0.00	4.86	10.00	0.14					10.13	10.13	104.19	1055.80	1055.80	1050			0.25	1424.40	1.59	13.8	368.6	94.41	92.001	90.934	2.41	94.32	0.00	91.967	90.900	2.35
															10.14																											
Chapman Mills Drive	MH123	MH124				0.36						0.36	0.00	0.36	10.00	1.69					0.72	0.72	104.19	75.08	75.08	450			0.20	133.02	0.81	82.2	57.9	94.30	91.406	90.949	2.89	93.45	0.00	91.242	90.785	2.21
															11.69																											
Block 104	CBMH1	MH125			0.32							0.32	0.00	0.32	10.00	1.31					0.59	0.59	104.19	61.56	61.56	375			0.35	108.21	0.95	74.7	46.7	93.40	91.812	91.431	1.59	94.28	0.06	91.551	91.170	2.73
Chakra Street	MH125	MH123				0.10					0.10		0.10	0.32	11.31	0.88	0.20	0.20	72.11	14.43		0.59	97.74	57.75	72.18	375			0.35	108.21	0.95	50.0	36.0	94.28	91.491	91.110	2.79	94.30	0.00	91.316	90.935	2.98
															12.19																											
Chapman Mills Drive	MH123	MH122				0.19						0.19	0.10	0.51	12.19	0.82		0.20	69.31	13.87	0.38	0.97	93.89	91.18	105.05	600			0.15	248.09	0.85	41.8	143.0	94.30	91.316	90.706	2.98	94.18	0.00	91.253	90.644	2.93
Chapman Mills Drive	MH122	MH121											0.10	0.51	13.01	0.63		0.20	66.91	13.39		0.97	90.60	87.98	101.37	600			0.15	248.09	0.85	32.3	146.7	94.18	91.253	90.644	2.93	94.32	-0.76	91.205	90.595	3.12
															13.64																											
Clarity Avenue	MH121	MH115				0.34					0.34		0.44	6.68	13.64	1.22	0.68	0.88	65.17	57.40		14.11	88.22	1244.44	1301.84	1350			0.15	2156.55	1.46	106.5	854.7	94.32	91.967	90.595	2.35	94.22	0.00	91.807	90.435	2.41
															14.86																											
Park (Block 117)	Stub	MH115	1.54									1.54	0.00	1.54	10.00	0.27					1.28	1.28	104.19	133.82	133.82	450			0.25	148.72	0.91	14.8	14.9	94.33	91.387	90.929	2.94	94.21	-0.46	91.350	90.893	2.86
															10.27																											
Clarity Avenue	MH115	MH115A		0.42		0.41					0.83		1.27	8.22	14.86	0.88	1.44	2.32	62.10	144.09		15.39	84.02	1293.12	1437.21	1350			0.15	2156.55	1.46	77.3	719.3	94.22	91.807	90.435	2.41	94.10	-0.08	91.691	90.319	2.41
															15.74																											
Waterlilly Way	MH118	MH117		0.17		0.39					0.56		0.56	0.00	10.00	1.49	1.03	1.03	76.81	79.19					79.19	600			0.20	286.47	0.98	87.5	207.3	94.50	92.214	91.604	2.29	94.30	0.00	92.039	91.429	2.26
Waterlilly Way	MH117	MH116				0.34					0.34		0.90	0.00	11.49	1.21	0.68	1.71	71.54	122.44					122.44	675			0.20	392.18	1.06	77.3	269.7	94.40	92.039	91.353	2.36	94.30	0.00	91.884	91.198	2.42
															12.70																											
Easement (Block 110)	MH116	MH115A											0.90	0.00	12.70	1.41		1.71	67.79	116.03					116.03	675			0.15	339.63	0.92	77.9	223.6	94.16	91.884	91.198	2.28	94.32	0.00	91.767	91.081	2.55
															14.11																											
Clarity Avenue	MH115A	MH113		0.46							0.46		2.63	8.22	15.74	0.43	0.68	4.71	60.07	282.91		15.39	81.24	1250.31	1533.23	1500			0.15	2856.14	1.57	40.4	1322.9	94.22	91.767	90.243	2.45	94.10	0.00	91.707	90.183	2.39
															16.17																											
Namaste Walk	MH114	MH113		0.11		0.42					0.53		0.53	0.00	10.00	1.65	1.00	1.00	76.81	77.02					77.02	600			0.20	286.47	0.98	96.9	209.5	94.17	91.603	90.994	2.57	94.10	-0.30	91.409	90.800	2.69
															11.65																											
Clarity Avenue	MH113	MH110				0.24					0.24		3.40	8.22	16.17	0.84	0.48	6.19	59.14	366.21		15.39	79.96	1230.60	1596.81	1500			0.15	2856.14	1.57	78.9	1259.3	94.10	91.707	90.183	2.39	94.02	0.00	91.588	90.064	2.43
															17.01																											
Waterlilly Way	MH109A	EX. 21				0.13					0.13		0.13	0.00	10.00	1.65	0.26	0.26	76.81	19.99					19.99	300			0.35	59.68	0.82	80.8	39.7	94.60	92.393	92.088	2.21	94.77	0.00	92.110	91.805	2.66
Waterlilly Way	EX. 21	MH109				0.17		0.18			0.35		0.48	0.00	11.65	0.96	0.72	0.98	71.01	69.65					58.00	300			0.33	57.95	0.80	45.9	0.0	94.77	92.110	91.805	2.66	95.00	0.45	91.959	91.654	3.04
Lilith Street	MH109	MH110				0.22					0.22		0.70	0.00	12.60	1.27	0.44	1.42	68.07	96.74					96.74	450			0.35	175.96	1.07	81.7	79.2	95.00	91.508	91.051	3.49	94.02	-0.37	91.222	90.765	2.80
															13.87																											
Lilith Street	MH112	MH111											0.00	0.00	10.00	1.30									0.00	375			0.25	91.46	0.80	62.7		94.14	91.545	91.164	2.59	93.80	0.00	91.388	91.007	2.41
Lilith Street	MH111	MH110		0.27		0.53					0.80		0.80	0.00	11.30	1.16	1.46	1.46	72.14	105.23					105.23	600			0.16	256.22	0.88	60.9	151.0	93.80	91.388	90.779	2.41	94.02	-0.30	91.291	90.681	2.73
															12.46																											
Clarity Avenue	MH110	MH110A											4.90	8.22	17.01	0.34		9.07	57.40	520.74		15.39	77.58	1194.02	1714.75	1500			0.15	2856.14	1.57	31.6	1141.4	94.02	91.588	90.064	2.43	93.68	0.00	91.541	90.017	2.14
Clarity Avenue	MH110A	MH106				0.23					0.23		5.13	8.22	17.35	0.47	0.46	9.53	56.73	540.82		15.39	76.67	1180.04	1720.86	1500			0.15	2856.14	1.57	44.0	1135.3	93.68	91.541	90.017	2.14	93.94	-0.04	91.475	89.951	2.46
															17.81																											
Cashmere Terrace	MH108	MH107		0.33							0.33		0.33	0.00	10.00	1.30	0.49	0.49	76.81	37.34					37.34	375			0.25	91.46	0.80	62.7	54.1	94.02	91.769	91.388	2.25	93.75	0.00	91.612	91.231	2.14
Cashmere Terrace	MH107	MH106				0.56					0.56		0.89	0.00	11.30	1.33	1.12	1.61	72.14	115.94					115.94	525			0.16	179.46	0.80	64.3	63.5	93.75	91.612	91.079	2.14	93.94	0.00	91.510	90.976	2.43
															12.64																											
Clarity Avenue	MH106	MH102		0.40		0.24					0.64		6.66	8.22	17.81	0.73	1.07	12.21	55.84	681.74		15.39	75.45	1161.17	1842.91		1585	2495	0.15	5749.47	1.87	82.2	3906.6	93.94	91.513	89.913	2.43	93.86	0.00	91.390	89.790	2.47
															18.55																											
Waterlilly Way	MH109	EX. 20											0.00	0.00	10.00	0.16									0.00	300			0.33	57.95	0.80	7.7		95.00	91.960	91.656	3.04	94.96	-0.03	91.935	91.630	3.03
Waterlilly Way	EX. 20	EX. 19				0.16		0.17			0.33		0.33	0.00	10.16	1.40	0.68	0.68	76.19	51.77					51.77	375			0.24	89.05	0.80	67.4	37.3	94.96	91.961	91.580	3.00	94.68	0.04	91.801	91.420	2.88
Waterlilly Way	EX.19	MH101											0.33	0.00	11.57	1.59		0.68	71.27	48.43					48.43	375			0.28	96.96	0.85	81.2	48.5	94.68	91.761	91.380	2.92	93.94	0.36	91.533	91.152	2.41
Hamsa Street	MH101	MH102				0.19					0.19		0.52	0.00	13.16	1.42	0.38	1.06	66.49	70.46					70.46	450			0.25	148.72	0.91	77.2	78.3	94.00	91.171	90.714	2.83	93.86	-0.41	90.978	90.521	2.88
															14.58																											
Hamsa Street	MH102	MH103				0.22					0.22		7.40	8.22	18.55	0.33	0.44	13.71	54.49	747.05		15.39	73.61	1132.89	1879.94		1585	2495	0.15	5749.47	1.87	36.6	3869.5	93.86	91.390	89.790	2.47	93.37	-0.38	91.335	89.735	2.04
															18.88																											
Hamsa Street	MH105	MH103		0.32		0.25					0.57		0.57	0.00	10.00	1.89	0.97	0.97	76.81	74.65					74.65	525			0.16	179.46	0.80	91.0	104.8	93.95	91.107	90.574	2.84	93.40	-0.75	90.961	90.428	2.44
															11.89																											
Easement (Block 116)	MH103	MH104											7.97	8.22	18.88	0.33		14.68	53.91	791.55		15.39	72.82	1120.79	1912.34	1950			0.15	5749.47	1.87	36.4	3837.1	93.37	91.716	89.735	1.65	93.50	0.00	91.661	89.680	1.84
Easement (Block 116)	MH104	Pond											7.97	8.22	19.20	0.24		14.68	53.35	783.32		15.39	72.06	1109.01	1892.33	1950			0.15	5749.47	1.87	26.7	3857.1	93.50	91.661	89.680	1.84	93.50	0.00	91.621	89.640	1.88
															19.44																											
																																								INVERT @ POND =		89.640	

Appendix D3

Stormwater Management Calculations

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

Harmony Stage 1 - Block 104
4025 Strandherd Drive

JLR No. 24051-003.1

STORMWATER MANAGEMENT CALCULATIONS

TOTAL ALLOWABLE RELEASE RATE (MINOR SYSTEM CAPTURE RATE):

Allocated Stormwater Management Parameters from Harmony Stage 1 Subdivision Design:

Area = 0.32 ha

Allowable minor system release rate (1:100 yr) = 89.0 L/s

Note:

Allowable minor system realease rate of 89.0L/s as per Minto's Harmony Stage 1 design prepared by J.L.Richards and Associates Ltd., dated November 2017.

Storm servicing to be developmed to limit the 1:100 year peak flow to the allowable peak flow of 89.0 L/s (controlled and uncontrolled areas).

SUMMARY OF STORMWATER MANAGEMENT CALCULATIONS FOR CONTROLLED AND UNCONTROLLED AREAS:

Drainage Area No.	Type or ID. No	Area (ha) C=0.20	Area (ha) C=0.90	C-Factor (5 year)	C-Factor (100 year, +25%)	$Q_{(5\text{-}yr)}$ (L/s)	$Q_{(100\text{-}yr)}$ (L/s)	$Q_{(100\text{-}yr)}$ (restricted) (L/s)	$Q_{(100\text{-}yr)}$ (unrestricted) (L/s)	$Q_{(100\text{-}yr)}$ (total) (L/s)	Hydrovex	$Q_{(2\text{-}yr)}$ (L/s) (Min. ICD rate)
1	Uncontrolled - Overland	0.015	0.000	0.20	0.25	0.87	1.86		1.86	1.86	N/A	
2	Uncontrolled - Overland	0.037	0.062	0.64	0.72	18.31	35.37		35.37	35.37	N/A	
3	CB 2 - ICD2	0.003	0.034	0.84	0.94	9.04	17.25	14.50		14.50	100 VHV-1	6.69
4	CB 1 - ICD1	0.006	0.042	0.81	0.91	11.30	21.59	9.00		9.00	100 VHV-1	8.36
5	CB 3 - ICD3	0.018	0.052	0.72	0.81	14.60	28.05	15.00		15.00	125 VHV -2	10.80
6	CBMH1 - ICD 4	0.014	0.039	0.72	0.80	10.98	21.10	10.00		10.00	100 VHV-1	8.12
		Area (ha) = 0.322				**Q(100-yr) = (total unrestricted)**	**125.22**		**Q(100-yr) = (total restricted release)**	**85.73**		

Therefore, $Q_{(100\ yr)}$ total restricted release rate of 88.48 L/s is less than the $Q_{(5\ yr)}$ total allowable release rate of 89.0 L/s

DETAILS OF STORAGE VOLUME CALCULATIONS FOR UNCONTROLLED AND CONTROLLED AREAS

Area 1: Uncontrolled - Overland 1 (Total Area = 0.015)

	5 year	100 year
A asph =	0.000	0.000
C-Factor =	0.900	1.000
A landscape =	0.015	0.015
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.003	0.004
C-Factor (overall) =	0.200	0.250

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	0.87	N/A	N/A	N/A	178.56	1.86	N/A	N/A	N/A
15	83.6	0.70	N/A	N/A	N/A	142.89	1.49	N/A	N/A	N/A
20	70.3	0.59	N/A	N/A	N/A	119.95	1.25	N/A	N/A	N/A
25	60.9	0.51	N/A	N/A	N/A	103.85	1.08	N/A	N/A	N/A

Area 2: **Uncontrolled - Overland 2** (Total Area = 0.099)

	5 year	100 year
A asph =	0.062	0.062
C-Factor =	0.900	1.000
A landscape =	0.037	0.037
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.063	0.071
C-Factor (overall) =	0.638	0.720

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	18.31	N/A	N/A	N/A	178.56	35.37	N/A	N/A	N/A
15	83.6	14.68	N/A	N/A	N/A	142.89	28.30	N/A	N/A	N/A
20	70.3	12.34	N/A	N/A	N/A	119.95	23.76	N/A	N/A	N/A
25	60.9	10.70	N/A	N/A	N/A	103.85	20.57	N/A	N/A	N/A

Area 3: **CB 2 - ICD 2 - Ponding Area 3** (Total Drainage Area = 0.037)

	5 year	100 year
Area (paved) =	0.034	0.034
C-Factor =	0.900	1.000
Area (landscape) =	0.003	0.003
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.031	0.035
C-Factor (overall) =	0.843	0.939

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.19	9.04	18.00	N/A	N/A	178.56	17.25	14.50	2.75	1.65
15	83.56	7.25	18.00	N/A	N/A	142.89	13.80	14.50	N/A	N/A
20	70.25	6.09	18.00	N/A	N/A	119.95	11.59	14.50	N/A	N/A
25	60.90	5.28	18.00	N/A	N/A	103.85	10.03	14.50	N/A	N/A
30	53.93	4.68	18.00	N/A	N/A	91.87	8.87	14.50	N/A	N/A
35	48.52	4.21	18.00	N/A	N/A	82.58	7.98	14.50	N/A	N/A
40	44.18	3.83	18.00	N/A	N/A	75.15	7.26	14.50	N/A	N/A

Qp Stress Test (100 yr +20%)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m3)	Qp Spillover L/s
20.70	14.5	6.20	3.72	0.00
16.57	14.5	2.07	1.86	0.00
13.91	14.5	N/A	N/A	0.00
12.04	14.5	N/A	N/A	0.00
10.65	14.5	N/A	N/A	0.00
9.57	14.5	N/A	N/A	0.00
8.71	14.5	N/A	N/A	0.00

Available Storage: 4.28 m^3

Minimum storage volume requirement = 1.65 m^3

The stress test is containted with the storage area provided.

*** Runoff from the 1:100 year storm event is contained within the sag storage provided.**

Area 4: **CB 1 - ICD 1 - Ponding Area 4** (Total Drainage Area = 0.048)

	5 year	100 year
Area (paved) =	0.042	0.042
C-Factor =	0.900	1.000
Area (landscape) =	0.006	0.006
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.039	0.044
C-Factor (overall) =	0.813	0.906

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.19	11.30	10.00	1.30	0.78	178.56	21.59	9.00	12.59	7.56
15	83.56	9.06	10.00	N/A	N/A	142.89	17.28	9.00	8.28	7.45
20	70.25	7.62	10.00	N/A	N/A	119.95	14.51	9.00	5.51	6.61
25	60.90	6.60	10.00	N/A	N/A	103.85	12.56	9.00	3.56	5.34
30	53.93	5.85	10.00	N/A	N/A	91.87	11.11	9.00	2.11	3.80
35	48.52	5.26	10.00	N/A	N/A	82.58	9.99	9.00	0.99	2.07
40	44.18	4.79	10.00	N/A	N/A	75.15	9.09	9.00	0.09	0.21

Qp Stress Test (100 yr +20%)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Qp Spillover L/s
25.91	9.00	16.91	10.15	0.01
20.74	9.00	11.74	10.56	0.47
17.41	9.00	8.41	10.09	0.00
15.07	9.00	6.07	9.10	0.00
13.33	9.00	4.33	7.80	0.00
11.98	9.00	2.98	6.27	0.00
10.90	9.00	1.90	4.57	0.00

Available Storage: 10.14 m^3

Depth of Flow at Spillover: 0.04 **m**

Water elevation during stress test: 94.19 **m**

Minimum storage volume requirement = 7.56 m^3

*** Runoff from the 1:100 year storm event is contained within the sag storage provided.**

Area 5: **CB 3 - ICD 3 - Ponding Area 5** (Total Drainage Area = 0.070)

	5 year	100 year
Area (paved) =	0.052	0.052
C-Factor =	0.900	1.000
Area (landscape) =	0.018	0.018
C-Factor =	0.200	0.250
(AxC)pav + (AxC)land =	0.050	0.057
C-Factor (overall) =	0.720	0.807

(\+ Qp Spillover from Area 4)

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.19	14.60	20.00	N/A	N/A	178.56	28.05	15.00	13.05	7.83
15	83.56	11.71	20.00	N/A	N/A	142.89	22.44	15.00	7.44	6.70
20	70.25	9.84	20.00	N/A	N/A	119.95	18.84	15.00	3.84	4.61
25	60.90	8.53	20.00	N/A	N/A	103.85	16.31	15.00	1.31	1.97
30	53.93	7.56	20.00	N/A	N/A	91.87	14.43	15.00	N/A	N/A
35	48.52	6.80	20.00	N/A	N/A	82.58	12.97	15.00	N/A	N/A
40	44.18	6.19	20.00	N/A	N/A	75.15	11.80	15.00	N/A	N/A

Qp Stress Test (100 yr +20%)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Qp Spillover (L/s)
33.66	15.00	18.67	11.20	0.00
26.93	15.00	12.40	11.16	0.00
22.61	15.00	7.61	9.13	0.00
19.57	15.00	4.57	6.86	0.00
17.32	15.00	2.32	4.17	0.00
15.56	15.00	0.56	1.19	0.00
14.16	15.00	N/A	N/A	N/A

Available Storage: 11.25 m^3

Minimum storage volume requirement = 7.83 m^3

The stress test is containted with the storage area provided.

*** Runoff from the 1:100 year storm event is contained within the sag storage provided.**

Area 6: **CBMH1 - ICD 4 - Ponding Area 6** (Total Drainage Area = 0.053)

	5 year	100 year
A asph =	0.039	0.039
C-Factor =	0.900	1.000
A landscape =	0.014	0.014
C-Factor =	0.200	0.250
(AxC)asph + (AxC)grass =	0.038	0.043
C-Factor (overall) =	0.715	0.802

Time (min)	Intensity 1:5 Yr (mm/hr)	Qp 1:5 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Intensity 1:100 Yr (mm/hr)	Qp 1:100 Yr (L/s)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)
10	104.2	10.98	10.00	0.98	0.59	178.56	21.10	10.00	11.10	6.66
15	83.6	8.80	10.00	N/A	N/A	142.89	16.88	10.00	6.88	6.19
20	70.3	7.40	10.00	N/A	N/A	119.95	14.17	10.00	4.17	5.01
25	60.9	6.42	10.00	N/A	N/A	103.85	12.27	10.00	2.27	3.40
30	53.9	5.68	10.00	N/A	N/A	91.87	10.85	10.00	0.85	1.54
35	48.5	5.11	10.00	N/A	N/A	82.58	9.76	10.00	N/A	N/A
40	44.2	4.66	10.00	N/A	N/A	75.15	8.88	10.00	N/A	N/A

Qp Stress Test (100 yr +20%)	Qp ICD (L/s)	Qp stored (L/s)	Max Volume Requirement (m^3)	Qp Spillover L/s
25.32	10.00	15.32	9.19	0.92
20.26	10.00	10.26	9.23	0.66
17.01	10.00	7.01	8.41	0.00
14.72	10.00	4.72	7.09	0.00
13.03	10.00	3.03	5.45	0.00
11.71	10.00	1.71	3.59	0.00
10.65	10.00	0.65	1.57	0.00

Minimum storage volume requirement = 6.66 m^3

Available Storage: 8.64 m^3

Depth of Flow at Spillover: 0.05 **m**

Water elevation during stress test: 94.66 **m**

*** Runoff from the 1:100 year storm event is contained within the sag storage provided.**

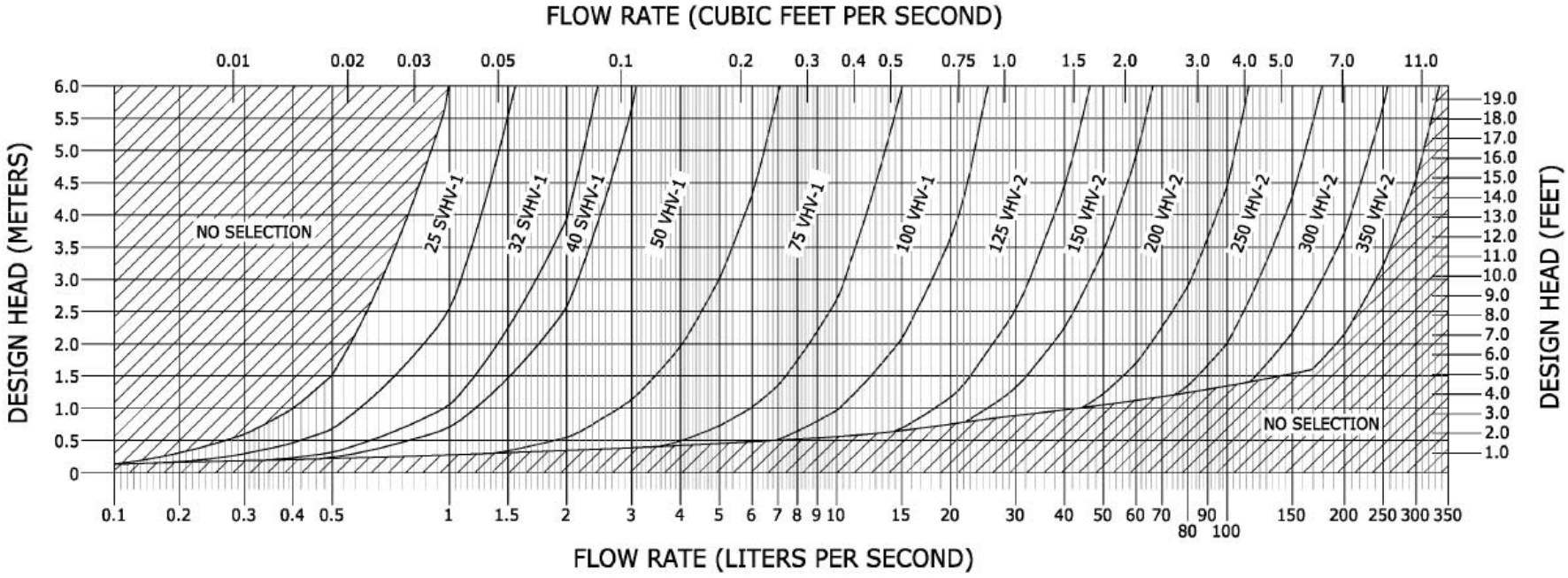
Appendix D4

Inlet Control Device (ICD) Table

Harmony Stage 1 - Block 104
4025 Strandherd Drive

JLR No. 24051-003.1

Figure 3 : HYDROVEX® VHV/SVHV Selection Chart



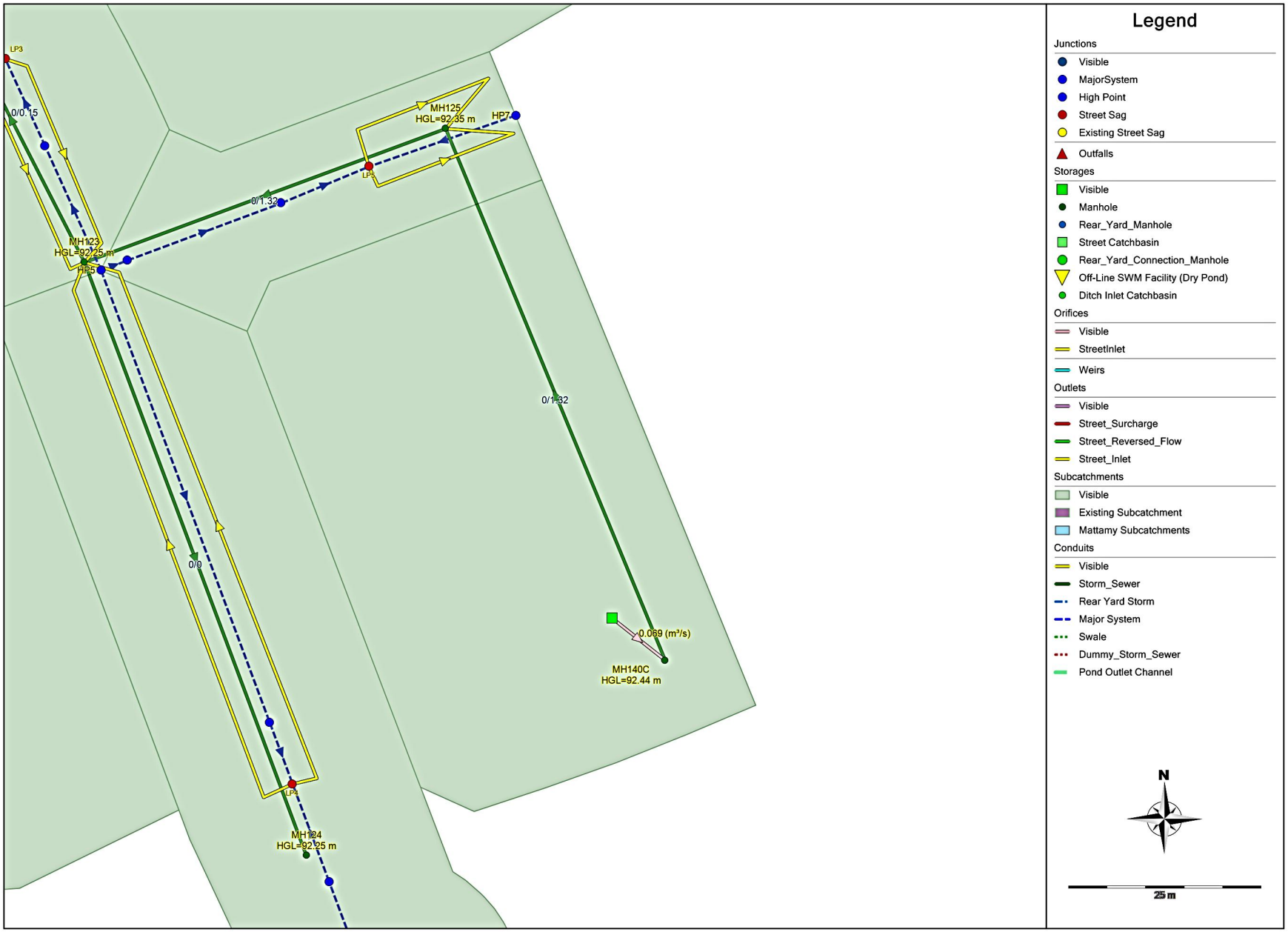
CATCHBASIN ICD TABLE							
ICD #	OUTLET PIPE DIA. (mm)	Qr (L/s)	OUTLET INVERT (m)	TOP OF GRATE (m)	1:100 YR PONDING (m)	DESIGN HEAD (m)	HYDROVEX MODEL #
CB1 - ICD1	200	9.00	92.20	94.00	94.14	1.84	100 VHV-1
CB2 - ICD2	200	14.50	92.00	93.90	94.02	1.92	100 VHV-1
CB3 - ICD3	200	15.00	91.73	93.63	93.83	2.00	125 VHV -2
CBMH1 - ICD4	375	10.00	91.43	93.40	93.59	1.97	100 VHV-1

Appendix D5

PCSWMM Results

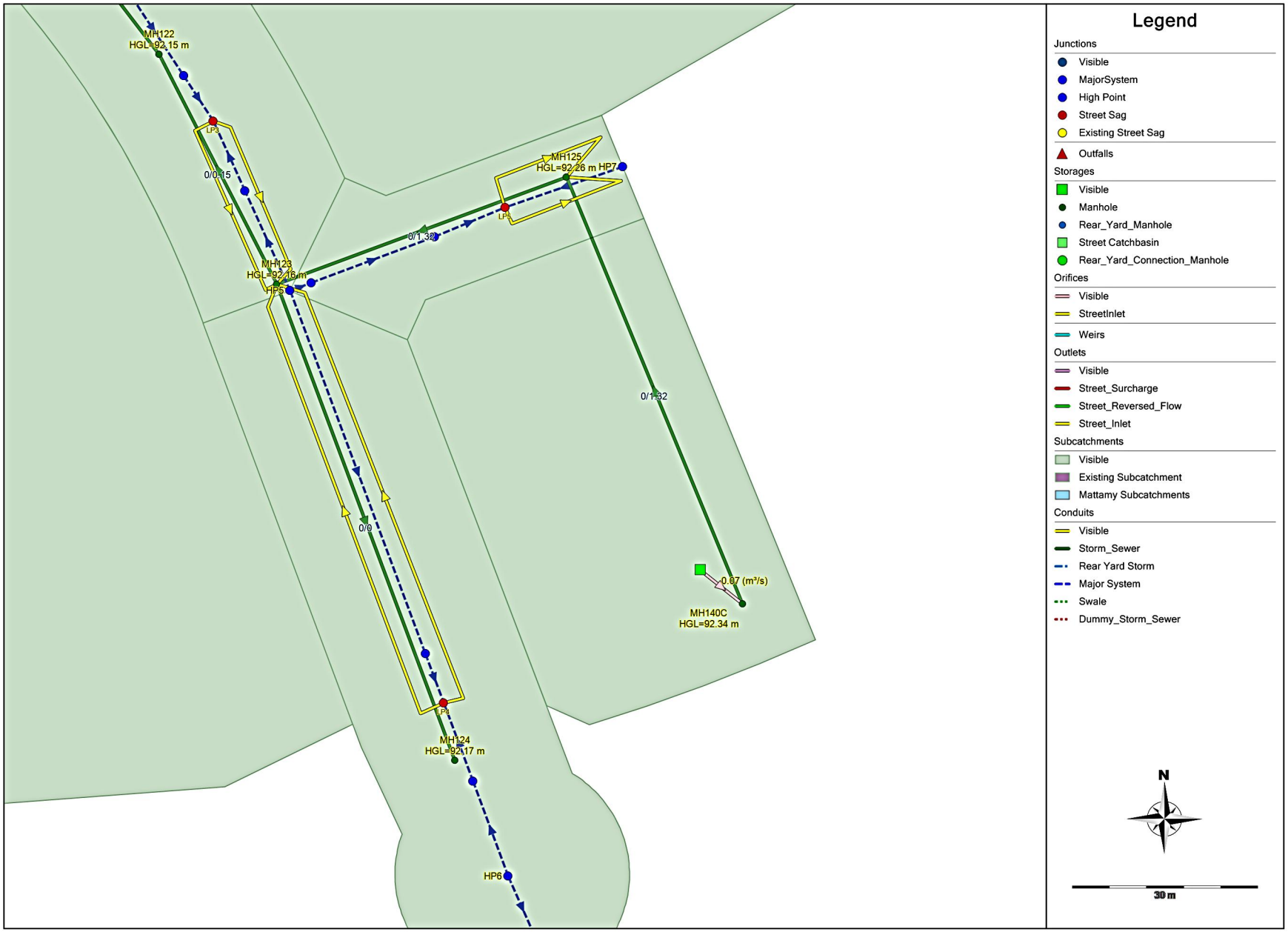
PCSWMM Scenario: Interim Condition - Condo Block Analysis

File Title: Interim_Condo_Block, CHI_3hr_100yr_CDS_(Culvert_Outlet).inp



PCSWMM Scenario: Ultimate Condition - Condo Block Analysis

File Title: Ultimate_Condo_Block, CHI_3hr_100yr_CDS.inp



CANADA'S BEST MANAGED COMPANIES

www.jlrichards.ca

Ottawa

864 Lady Ellen Place
Ottawa ON Canada
K1Z 5M2
Tel: 613 728-3571

ottawa@jlrichards.ca

Kingston

203-863 Princess Street
Kingston ON Canada
K7L 5N4
Tel: 613 544-1424

kingston@jlrichards.ca

Sudbury

314 Countryside Drive
Sudbury ON Canada
P3E 6G2
Tel: 705 522-8174

sudbury@jlrichards.ca

Timmins

201-150 Algonquin Blvd. East
Timmins ON Canada
P4N 1A7
Tel: 705 360-1899
timmins@jlrichards.ca

North Bay

200-175 Progress Road
North Bay ON Canada
P1A 0B8
Tel: 705 495-7597

northbay@jlrichards.ca

Hawkesbury

326 Bertha Street
Hawkesbury ON Canada
K6A 2A8
Tel: 613 632-0287

hawkesbury@jlrichards.ca

Guelph

107-450 Speedvale Ave. West
Guelph ON Canada
N1H 7Y6
Tel: 519 763-0713

guelph@jlrichards.ca

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS