SERVICING BRIEF

MINTO COMMUNITIES INC.
ARCADIA RESIDENTIAL STAGES 3, 4, 5, and COMMERCIAL STAGE 2

CITY OF OTTAWA

December 2016
(Revised March 2017)
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JLR 26299-01

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1.0 INTRODUCTION

1.1 General

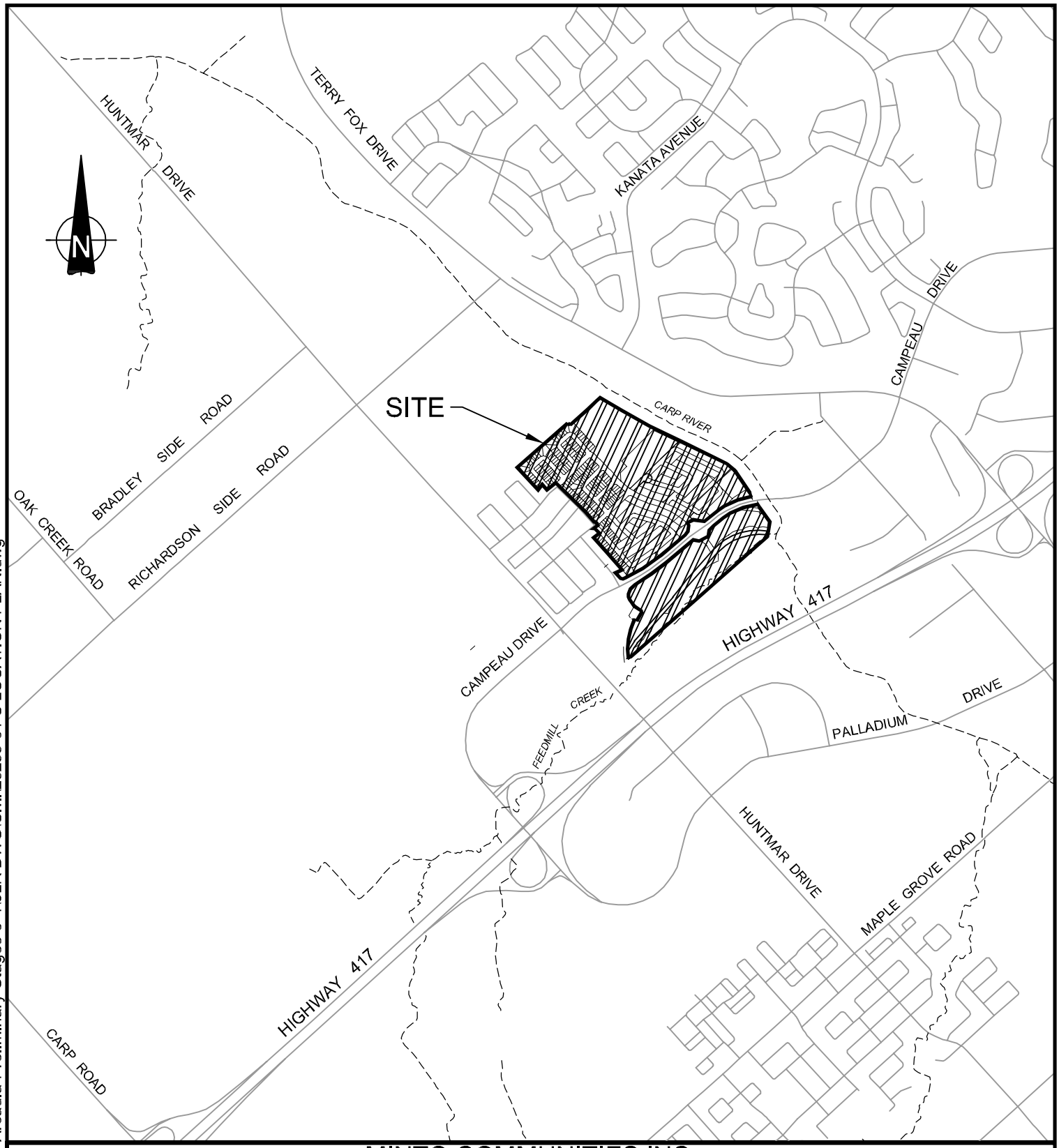
Minto Communities Inc. (Minto) has retained the services of J.L. Richards & Associates Limited (JLR) to prepare a Servicing Brief for municipal infrastructure for their Arcadia development sited at 450 Huntmar Drive, located in Kanata West, within the City of Ottawa. The subject site is located east of the existing residential development known as Arcadia Stages 1 and 2. The subject site, herein referred to as the Arcadia Development, consists of three (3) residential development stages and one (1) commercial stage. This Servicing Brief outlines the proposed servicing strategy for Minto's Arcadia Development Residential Stages 3 and 4, Future Residential Stage 5, and Future Commercial Stage 2, in accordance with previous servicing studies developed for the area (presented in Section 1.4 of this Brief) and the Servicing Study Guidelines for Development Applications in the City of Ottawa (City).

1.2 Property Description

Minto's Arcadia Development is located within the City of Ottawa's Official Plan (OP) boundary, and consists of a ± 48 ha parcel bounded by existing residential and commercial to the west, and by the Carp River to the east, as depicted on the Location Plan in Figure 1. The Development is bisected near the south end by the future Campeau Drive extension. Currently, the land is undeveloped and generally drains easterly towards the Carp River. There is an existing drainage corridor within the Development that serves as the dedicated outlet for the existing stormwater management facility (SWMF) servicing Arcadia Stages 1 and 2 and Commercial Stage 1.

1.3 Proposed Development

The proposed Arcadia Development consists of approximately 27 ha of residential development which includes future Stage 5 (Blocks 240 and 241), as shown on the Draft Plan of Subdivision provided in Appendix 'A'. The three residential stages are anticipated to consist of the residential units listed in the following table, as per Concept Plan 8 – Rev 2 in Appendix 'A'.



PROJECT:

MINTO COMMUNITIES INC.

ARCADIA STAGE 3, 4, 5; AND COMMERCIAL STAGE 2

450 HUNTMAR DRIVE, OTTAWA, ONTARIO

DRAWING:

LOCATION PLAN

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
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Table 1: Proposed Residential Unit Breakdown

	Single	Row Town	Back-to-Back Town	Condos	Total
Stage 3	113	246	0	0	359
Stage 4	89	0	0	0	89
Future Stage 5	81	75	32	36	224
Total	**283**	**321**	**32**	**36**	**672**

Based on Table 1 above, a total of 672 units are envisioned for the proposed Arcadia residential development. Note that the unit counts and road patterns for future Stage 5 are subject to change and that those shown on the Concept Plan have been assumed for the purposes of allocating future flows and are to be verified at detailed design.

The commercial portion of the proposed Arcadia Development, referred to as Commercial Stage 2, totals approximately 5.2 ha and is located to the south of Campeau Drive and west of Street No. 11.

Blocks have also been provided for park use (2.7 ha), a future transit way (1.5 ha), stormwater management (7.3 ha), and open space (4.8 ha), as shown on the Draft Plan of Subdivision provided in Appendix 'A'.

1.4 Background Documents

Development of the Arcadia area is governed by the following background Studies and Reports:

1. Kanata West Master Servicing Study (KWMSS), Stantec/CCL/IBI, June 2006.
2. Carp River Watershed/Sub-Watershed Study, Robinson Consultants, 2004.
3. Model Calibration/Validation Exercise Carp River Restoration Plan Final Report, Greenland International Consulting Ltd., June 2011.
4. Conceptual Site Servicing Study (CSSS), Arcadia Stages 1, 2, 5 & 8, IBI Group, September 2013.
5. Arcadia Phase 1 - Site Servicing Report, IBI Group, July 2012.
6. Arcadia Phase 1 - Stormwater Management (SWM) Report, IBI Group, June 2012.
7. PCSWMM model (Existing and Future Conditions) developed by the City of Ottawa.
8. Arcadia Stage 2 Site Servicing Report, JLR, October 2014.

9. Arcadia – Stage 2 SWM Report and Stage 2 Inlet Design Brief, IBI Group, October 2014.
10. Signature Ridge Pump Station (SRPS) Hydraulic Grade Line Analysis, IBI Group, September 2014 (Rev.2).
11. Arcadia Lands Conceptual Alternate Stormwater Servicing & Stormwater Management Strategy Technical Memorandum, JLR, August 2, 2016.
12. Arcadia Residential Stages 3, 4 & 5 + Commercial Stage 2 Stormwater Management Strategy Report, JLR, May 2017.

2.0 WATER SERVICING

Potable water for the Arcadia Development will ultimately be supplied by the existing 600 mm diameter watermain along Campeau Drive in accordance with the 2006 KWMSS Watermain Final Concept Drawing WM-1 (a copy of which is provided in Appendix 'B'). Specifically, potable water will be supplied from the above-mentioned feedermain by connections to the following existing local watermains as shown on the JLR Conceptual Site Servicing Plan (Drawing CS8, Dated May 2018):

- One (1) - 200 mm diameter watermain stub along Paine Avenue ± 20 m east of Clonrush Way.
- One (1) - 200 mm diameter watermain stub at Street No. 4 and Paine Avenue.
- Two (2) - 200 mm diameter watermain stubs at the intersection of Calvington Avenue and Clonrush Way.
- One (1) - 200 mm diameter and One (1) - 300 mm diameter watermain stub at the intersection of Campeau Drive and Riverchase Road/Street No. 11.

A hydraulic network analysis (HNA) was conducted using the H2OMAP software platform for the Arcadia Development based on boundary conditions obtained from the City of Ottawa in February 2017 (refer to Appendix 'B' for correspondence). It should be noted that the boundary condition under the peak hour demand is conservative as it reflects a slightly higher unit count when compared to the current concept plan, as per the calculations provided in Appendix 'B'. A conceptual 200 mm diameter water distribution system was evaluated for the Arcadia Development, inclusive of Residential Stages 3, 4, and 5 and Commercial Stage 2. The model results are provided in Appendix 'B'. The results of the analysis indicate that the proposed 200 mm diameter watermains will be sufficient to satisfy the minimum pressure constraint under peak hour conditions.

Similarly, the proposed watermain can satisfy the maximum day plus fire flow requirements in accordance with the City of Ottawa Water Distribution Guidelines (July 2010). The required fire flow (RFF) calculation will, however, be refined at detailed design based on exposure, unit separation, etc., in accordance with the latest interpretation of the City Technical Bulletins ISDTB-2014-02 and ISTB-2018-02. Should the RFFs be found to be greater than those calculated at this conceptual stage, then updated hydraulic boundary conditions will be requested.

The model results also showed that pressures in excess of 552 kPa (80 psi) are expected along the water distribution system. Consequently, pressure reducing valves will be required on all service laterals to satisfy the maximum pressure requirements of the Ontario Building Code. The HNA will be further refined and water servicing specifics such as hydrant spacing and watermain looping will be addressed at the engineering detailed design stage. The HNA will demonstrate that the proposed water distribution system within the Arcadia Development can deliver adequate water supply during peak hour and maximum day plus fire flow demand conditions while meeting the pressure requirements prescribed in the City of Ottawa Water Distribution Design Guidelines (July 2010) and the Technical Bulletins ISDTB-2014-02 and ISTB-2018-02.

3.0 WASTEWATER SERVICING

3.1 Background

Wastewater generated in the Arcadia Development will ultimately outlet to the existing 675 mm diameter trunk sanitary sewer on Campeau Drive. This existing trunk sanitary sewer is the dedicated outlet for the Arcadia Development in accordance with the 2006 KWMSS and the IBI detailed trunk sanitary sewer design (refer to the KWMSS Drawing No. S-1 prepared by Stantec and the Drainage Area Plan (Drawing No. 501A) prepared by IBI in Appendix ‘C’). Wastewater flows from the Arcadia Development will be conveyed to the 675 mm diameter trunk sanitary sewer by a connection to the existing 375 mm and 450 mm diameter sanitary sewer stubs at the Campeau Drive and Riverchase Road/Street No. 11 intersection and via the existing 250 mm diameter sanitary sewer on Clonrush Way at Paine Avenue.

As per the IBI Campeau trunk sanitary sewer design, 32.67 ha of the Arcadia Development north of Campeau Drive was allocated to the 450 mm diameter sanitary sewer stub extending northerly along Riverchase Road (refer to the IBI Sanitary Sewer Design Sheet and External Sanitary Drainage Area Plan provided in Appendix ‘C’). Additionally, 124 future Arcadia stacked townhouses (i.e., urban townhouses) fronting

Campeau Drive were conceptually designed by IBI to outlet directly to the Campeau trunk sanitary sewer between MH 303A to MH 307A.

In regard to the tributary area on the south side of Campeau Drive, approximately 9.4 ha of the proposed Arcadia Development (eastern portion) was allocated to the existing 375 mm diameter sanitary sewer stub at the Street No. 11 intersection and approximately 3.6 ha of the proposed Development (western portion) was allocated to the existing 300 mm diameter sanitary sewer at the Country Glen intersection. The table below summarizes the allocated wastewater outlets for the proposed Arcadia Development.

Table 2: Allocated Peak Wastewater Flows to Campeau Trunk Sanitary Sewer

Allocated Outlet	Arcadia Development Tributary Area	Peak Flow
Tributary Area North of Campeau		
Riverchase Road – 450 mm dia. stub	32.67 ha	35.6 L/s
Campeau Drive Stacked Towns (MH 303A to MH 307A)	1.41 ha	5.0 L/s
Subtotal for Development North of Campeau	**34.08 ha**	**40.6 L/s**
Tributary Area South of Campeau		
Street No. 11 – 375 mm dia. stub	9.37 ha	10.1 L/s
Country Glen – 300 mm dia. sewer	3.61 ha	3.9 L/s
Subtotal for Development South of Campeau	**12.98 ha**	**14.0 L/s**
Total Arcadia Allocation	**47.06 ha**	**54.6 L/s**

Although none of the proposed Arcadia Development was allocated to the existing sanitary sewers within the existing Arcadia Stages 1 and 2, it is noted that these existing sewers do have residual capacity. There is a minimum residual capacity of 13.4 L/s between MHs 202A and 201A on Calvington Avenue (refer to the Arcadia Stage 2 Sanitary Sewer Design Sheet prepared by JLR provided in Appendix ‘C’). However, given the elevation of the existing sanitary sewer system and the conceptual centreline of road elevations as indicated on the JLR Conceptual Grading Plan (Drawing CG8, dated May 2018) for the proposed development, it is anticipated that only the western leg of Street No. 4, located directly adjacent to Arcadia Stage 2, could be serviced via the existing Arcadia Stage 2 sanitary sewer on Paine Avenue.

3.2 Peak Wastewater Flows

Table 3 below summarizes the theoretical peak wastewater flows for each stage within the proposed Arcadia Development based on the unit counts indicated in Table 1.

Table 3: Conceptual Peak Flow Calculations for Arcadia Development

Stage	Population(1)	Area	Average Flow	Peaking Factor(2)	Peak Flow	Infiltration Flow(3)	Total Flow
Stage 3 Residential + park land	1049 cap	16.34 ha	280 L/cap/day	3.23	11.0 L/s	5.4 L/s	16.4 L/s
Stage 4 Residential	303 cap	3.80 ha	280 L/cap/day	3.46	3.4 L/s	1.3 L/s	4.7 L/s
Future Stage 5 Res. (4)	661 cap	8.96 ha	280 L/cap/day	3.33	7.1 L/s	3.0 L/s	10.1 L/s
Commercial Stage 2	N/A	5.15 ha	28,000 L/ha/day	1.5	2.5 L/s	1.7 L/s	4.2 L/s
TOTAL CONCEPTUAL PEAK FLOW:							**35.4 L/s**

(1) Based on densities of 3.4 person/unit for single homes and 2.7 person/unit for townhomes/back-to-backs/condos as per the City of Ottawa Sewer Design Guidelines.
(2) Residential peaking factor based on Harmon equation
(3) Based on 0.33 L/s/ha infiltration allowance as per Technical Bulletin ISTB-2018-01.
(4) Stage 5 peak flow subject to change and to be confirmed at detailed design.

The peak flows indicated in Table 3 were calculated in accordance with the parameters prescribed in the City's Technical Bulletin ISTB-2018-01. Based on the theoretical peak flows summarized in Table 3 above, it is anticipated that the proposed development will generate approximately 19.2 L/s less than the peak flow allocated for the Arcadia Development by IBI to the Campeau Drive trunk sanitary sewer.

3.3 Overflows and Hydraulic Grade Line (HGL) Analysis

Protection against basement flooding within the existing Arcadia Stages 1 and 2 is currently provided by an existing overflow that outlets to the existing 'interim' stormwater management facility (SWMF), located east of Clonrush Way. As per the IBI Signature Ridge Pump Station Hydraulic Grade Line Analysis Report (September 2014), protection against basement flooding for the proposed Arcadia Development is to be provided by one emergency sewer overflow to the ultimate Pond 1 SWMF (i.e., ultimate Paine Pond) identified in the 2006 KWMSS.

An updated HGL analysis of the conceptual Arcadia sanitary sewer system shown on the Conceptual Servicing Plan (Drawing CS8) was completed using the PCSWMM

software platform. The HGL analysis was based on the Signature Ridge HGL analysis completed by IBI in September 2014 with the following revisions:

1. Peak wastewater flows were calculated in accordance with the parameters prescribed in Technical Bulletin ISTB-2018-01 and based on residential unit counts and land uses per the current proposed Arcadia Development concept (Appendix 'A').
2. The inclusion of local sanitary sewers in the Arcadia Development based on the current concept plan.

Similar to the IBI model, an emergency sanitary sewer overflow was included at the SWMF referred to as the Paine Pond at an elevation equivalent to the 1:100 year event (i.e., 93.54). HGL results produced in the updated model were then compared to conceptual underside of footing (USF) elevations which were assumed to be at a depth of 1.4 m below centreline of road elevation. It should be noted that these footing depths are significantly lower than those considered in the 2013 IBI HGL analysis. This is due to the recent grade raise constraints identified by Paterson Group and indicated on the Conceptual Grading Plan (Drawing CG8). Based on the conceptual USF elevations, the sanitary HGL would be above the USF elevation for most units within the south eastern portion of the development around Riverchase Road, as indicated on the Sanitary HGL Results One Overflow - Drawing SAN1 (note negative freeboard signifies that the HGL elevation is higher than the USF).

A revised stormwater management strategy (detailed further in Section 4.0) was required from that prescribed in the 2006 KWMSS due to grade raise restrictions within and servicing constraints within the proposed Arcadia Development. The revised recommended strategy includes an additional SWMF located to the southeast of the Campeau Drive and Street No. 11 intersection. This new facility, referred to as the Campeau Pond, also provides the opportunity for a second overflow to reduce the sanitary HGL. This second overflow would reduce HGL elevations by approximately 0.3 m at Riverchase Road compared to the scenario with one overflow. The HGL elevations would be below those identified in the 2014 IBI analysis and the majority would be below the conceptual USF elevations based on a conceptual footing depth of 1.4 m from centreline of road (refer to the freeboard indicated on Sanitary HGL Two Overflows - Drawing SAN2). The only exception being at the northeast corner of Future Stage 5 where conceptual HGL elevations were found to be above the USF elevation.

The sanitary HGL analysis will be refined at detailed design, however, it is anticipated that one or more of the following solutions may be required to address the high sanitary HGL within the Arcadia Development, particularly in Future Stage 5:

- Additional house risers to minimize basement depth.

- Units without full basements (i.e., crawl space basement).
- Sanitary pumps in individual units.
- A condition of sale identifying the extent of freeboard and providing and the owner with the option of either risking sewer surcharge or installing a pump.
- Backflow preventers on basement floor drains.

4.0 STORM SERVICING AND STORMWATER MANAGEMENT

4.1 Background

In 2006, the KWMSS was prepared on behalf of the Kanata West Owner's Group to investigate servicing requirements for a large mixed-use community in Kanata West. In terms of stormwater servicing and stormwater management, the KWMSS recommended that the ±725 ha area be serviced by seven (7) water quality/quantity stormwater management facilities spread over the Kanata West Study Area. The largest facility in Kanata West, Pond 1, was identified to serve as the dedicated stormwater outlet for approximately 77 ha, which included all of the lands owned by Minto (Minto Communities and Minto Properties), the Campeau Drive right-of-way (ROW, from Huntmar Drive to the Carp River), as well as the future transit way (north of Feedmill Creek). Refer to the 2006 KWMSS Storm Sewer Minor System Drawing ST-MN and Storm Drainage Area Plan North – Pond 1 Drawing ST-PN provided in Appendix 'D' for additional details.

Pond 1 was conceptually sized within a 1.50 ha block as part of the 2006 KWMSS based on design standards that were applicable at that time. Since then, the Ottawa Sewer Design Guidelines (OSDG) were updated and re-issued in October 2012. The 2012 OSDG and subsequent Technical Bulletins provide more details in terms of modelling technique for infiltration (Horton Method), calculation of Runoff Coefficients (C-Factors) based on maximum permissible zoning, calculation of time of concentration, and assessing the performance of the infrastructure under a specific climate change event. Furthermore, the City has also developed a PCSWMM model of the Carp River and its tributary areas and has generated hydrographs at key locations that are to be matched under post-development conditions. Due to the changes in the OSDG as well as the completion of the Carp River PCSWMM model, the SWM strategy outlined in the 2006 KWMSS warranted re-evaluation.

More recently, preliminary sizing of the ultimate Pond 1 was carried out by IBI as part of the Report entitled "Conceptual Site Servicing Study – Arcadia Stages 1, 2, 5 & 8", dated September 2013. The simulation results for this undertaking demonstrated that the

Pond 1 block identified in the 2006 KWMSS needed to be increased in size from 1.50 ha to 2.45 ha in order to fulfill the requirements of the 2012 OSDG. The Conceptual Site Servicing Study provided the following configuration details for Pond 1 (refer to Figure 6 Ultimate Pond Conceptual Section in Appendix 'D'):

- Bottom of facility: 92.00 m
- Permanent pool elevation: 92.65 m
- 1:100 year water surface elevation: 93.54 m
- Revised SWM Block Area: 2.45 ha

It should be noted that the 2.45 ha SWM Block was sized prior to the development of the "calibrated" PCSWMM model.

At the time of the ultimate SWMF pond preliminary design (2013), the first phase of residential development in Arcadia, known as Stage 1, was approved by the City. Given that the Carp River restoration works had yet to be implemented, Pond 1 could not be constructed at its location identified in the 2006 KWMSS, as these lands were still zoned as Floodplain Hazard. As a result, an interim SWMF east of Clonrush Way was implemented to service Arcadia Residential Stage 1 and the portion of the Campeau Drive ROW adjacent to Stage 1. This Interim SWMF was designed to provide water quality control for its tributary area and was sized to meet the Carp River targeted hydrographs, which were developed by Greenland International Consulting Ltd. as part of their Final Report entitled "Model Calibration/Validation Exercise Carp River Restoration Plan", dated June 2011. In 2014, JLR was retained by Minto to proceed with the detailed design of Residential Stage 2, located to the north of Stage 1. To support the development of Stage 2, upgrades to the interim SWMF were carried out in order to achieve water quality control requirements as well as the targeted hydrographs. The works consisted of the addition of a sedimentation forebay on the northern side of the facility complete with inlet maintenance hole structure, refer to Interim Development Scenario Drainage Area Plan provided in Appendix 'D'.

The detailed design for Arcadia Commercial Stage 1, located at the southeast quadrant of the Campeau Drive and Huntmar Drive intersection, was carried out by IBI in 2014. Minor system flow from this development was designed to be conveyed northerly along Country Glen Way to the existing interim SWMF. As part of this detailed design, approximately 3.55 ha of the future Arcadia Commercial Stage 2 development and transit way were allocated to the Country Glen trunk storm sewer and ultimately to the interim SWMF. Refer to the Storm Drainage Area Plan (Drawing No. C-500) prepared by IBI provided in Appendix 'D'.

In August 2016, an alternative SWM solution for the Arcadia Development to that presented in the 2006 KWMSS was developed by JLR and presented to the City in the form of a Memorandum entitled “Conceptual Alternate Stormwater Servicing and Stormwater Management Strategy” dated August 2, 2016. The proposed stormwater management approach consisted of two (2) wet ponds supplemented by privately owned water quality units, all of which would serve as the dedicated outlets to the Arcadia Development as well as for the future Campeau Drive ROW and transit way.

JLR subsequently issued a “Stormwater Management Strategy Report” dated April 2017 in which four SWM strategies for the Arcadia Development were analyzed using the PCSWMM modelling platform and one strategy was selected as the recommended approach. This recommended strategy consisted of two wet ponds located immediately west of the Carp River: one at Paine Avenue and one south of Campeau Drive to service the Arcadia Development. The JLR SWM Strategy Report has subsequently been re-issued to address City comments and has been included as part of this submission under separate cover. The recommended SWM strategy was also summarized in a letter prepared by JLR, dated March 26, 2018, which identified the proposed strategy as a minor deviation from the SWM solution presented in the 2006 KWMSS (refer to Appendix ‘D’ for a copy of the letter).

4.2 Servicing Approach

Storm and stormwater management servicing for the Arcadia Development will be designed as follows:

- The drainage system will be designed following the dual drainage principle. The minor storm sewer system will be sized to capture and convey runoff during frequent storm events while the major overland system will be designed to convey excess runoff generated from severe storm events that is not captured by the minor system.

- Storm sewers will be sized to capture and convey storm flows from the 1:2 year storm event (for local roads), the 1:5 year storm event (for collector roads) and the 1:10 year storm event (Campeau and transit way) using the Rational Method and Intensity-Duration-Frequency (IDF) curves from the OSDG, as per Technical Bulletin PIEDTB-2016-01.

- An inlet time of 10 minutes will be used to size all street sewers as per the OSDG.

- Runoff coefficients (C-Factors) for the residential development will be based on maximum lot coverage permitted by zoning, as per the OSDG. The C-factors for non-residential land usages will be calculated based on the ratio of pervious and impervious surfaces depicted on the proposed site plans.

- A minimum roadway sag storage of 50 m^3/ha will be incorporated into the design of the subdivision as per the 2006 KWMSS.

- Storm sewer inlet control rates will be set during detailed design based on the land use type and results of the major overland flow analysis. These control rates will be set to ensure that the street overland flow depths (static plus dynamic) are within the maximum allowable depth of 350 mm, as per Technical Bulletin PIEDTB-2016-01.

- Release rates from the SWMFs will be set to match the target hydrographs of the Carp River so that 100 year peak flows and water levels along the Carp River do not exceed the values presented in the PCSWMM ultimate condition model (dated February 2017).

- The hydraulic analysis completed using PCSWMM will be refined to assess freeboard to ensure that basements are protected from surcharged sewers.

- Quality control will be provided to meet a MOECC Normal Level of Protection (i.e., 70% total suspended solids removal) before outletting to the Carp River in accordance with the Carp River Watershed Study and the 2006 KWMSS.

4.3 Conceptual Servicing Design

The conceptual storm servicing design for the Arcadia Development consists of a new wet SWMF (Campeau Pond) located within Block 224, as shown on the JLR Conceptual Servicing Plan (Drawing CS8) and described in the May 2018 SWM Strategy Report. This new pond would serve as the dedicated outlet for the southern portion of Arcadia Stage 3, the southern portion of future Stage 5 (Block 241), the eastern portion of Commercial Stage 2, the Campeau Drive ROW (from Clonrush Way to the Carp River) and the future transit way, as shown on the Storm Drainage Plan (Drawing DST).

It is noted that major system flows generated in Arcadia Stage 3 are not permitted to cross Campeau Drive overland to outlet to the SWMF in accordance with the OSDG (i.e., major system flows shall not cross arterial roadways). For this reason, a spillover area northwest of the Campeau Drive/Riverchase Road intersection is proposed. Should

the roadway sags of Stage 3 not offer sufficient major system storage, this spillover area would capture cascading major system flows and gradually release the flows, at a restricted rate, to the minor system. Similarly, it is anticipated that a dry pond at the southwest corner of future Stage 5 (Block 241) will be required to capture major system flows. Conversely, major system flows up to the 1:100 year storm event generated within the western portion of Commercial Stage 2 would be stored onsite.

Minor and major system flows generated in the northern portion of Residential Stage 3, Residential Stage 4, future Stage 5 (Block 240) and existing Residential Stage 2 are proposed to outlet to a new wet SWMF referred to as the Paine Pond located within Bock 223, as shown on the Storm Drainage Plan (Drawing DST). The future Stage 5 will have a separate forebay along the southern limit of the pond Block 223 and will consequently require a servicing easement within the park (Block 222). The Paine Pond will also serve as the minor system outlet for existing Stage 1. As indicated on the Conceptual Grading Plan (Drawing CG8), major system flows from existing Stage 1 can be conveyed either to the Paine Pond or to the Campeau Pond and will be assessed at detailed design depending on available sag storage capacity.

4.4 HGL Analysis and Sump Pumps

A preliminary HGL analysis was completed for the proposed storm sewer system as is detailed in the May 2018 SWM Strategy Report by JLR. Based on the results of the HGL analysis and the conceptual USF elevations estimated assuming a depth of 1.4 m below centreline, it is anticipated that units within the eastern portion of the subdivision will have less than 0.30 m freeboard between HGL and USF. Sump pumps are, therefore, anticipated to be required for storm laterals servicing units within the eastern portion of the Arcadia Development. It is understood that the City will approve sump pumps in new developments subject to fulfilling the screening criteria outlined in a forthcoming Technical Bulletin expected to be issued by the City later this year (2018). The proposed Arcadia Development fulfills the screening criteria as follows:

1. The Arcadia lands are underlain by clay soils that are subject to grade raise restrictions determined by Paterson Group and indicated on the Conceptual Grading Plan (Drawing CG8).

2. The finished grades required to allow for gravity drainage and adequate depth of cover would exceed the grade raise restrictions identified by Paterson, thus necessitating potentially excessive amounts of light weight fill.

3. Sewer sizes have been maximized to reduce HGL as much as possible but are limited by downstream crossing constraints at Campeau Drive (with existing watermain) and at Riverchase Road and Paine Avenue (with the sanitary sewer).

5.0 SUMMARY OF SERVICING

Servicing of Minto's Arcadia Development will generally consist of the following as depicted on the Conceptual Servicing and Grading Plans.

5.1 Water Servicing

Potable water will be supplied to the Arcadia Development via connections to existing local watermains at the intersections of Paine Avenue and Clonrush Way, Clonrush Way and Calvington Avenue, and Riverchase Road and Campeau Drive. Pressure reducing valves on water services will be required.

5.2 Wastewater Servicing

Wastewater servicing will be provided by connections to two existing sanitary sewer stubs located at the intersection of Riverchase Road and Campeau Drive as well as one connection to the existing Paine Avenue sanitary sewer.

5.3 Stormwater Servicing

End of pipe treatment for the Arcadia Development will be provided by two wet SWMFs: the Paine Pond located east of Riverchase Road, and the Campeau Pond located south of Campeau Drive. Quantity control will be provided by street sag storage and spillover areas.

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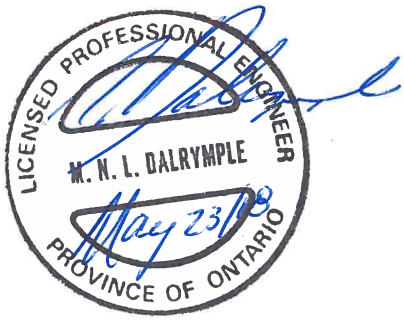
Hilary MacKay, P.Eng.

Reviewed by:



Lucie Dalrymple, P.Eng.

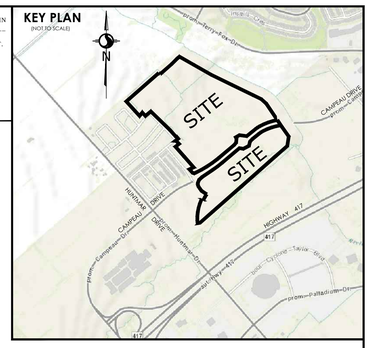
A P P E N D I X ‘A’

DRAFT PLAN OF SUBDIVISION &
CONCEPT PLAN 8 - REV 2

SUBJECT TO THE CONDITIONS, IF ANY, SET FORTH IN OUR LETTER DATED _____ 20__
THIS DRAFT PLAN IS APPROVED BY THE CITY OF OTTAWA UNDER SECTION 51 OF THE PLANNING ACT. THIS ____ DAY OF _____ 2018.

DERRICK MOODIE, MANAGER
DEVELOPMENT REVIEW WEST
PLANNING, INFRASTRUCTURE AND ECONOMIC DEVELOPMENT DEPARTMENT, CITY OF OTTAWA

KEY PLAN
(NOT TO SCALE)



DRAFT PLAN OF SUBDIVISION

PART OF LOTS 3 AND 4 CONCESSION 1

(GEOGRAPHIC TOWNSHIP OF MARCH)

CITY OF OTTAWA

Scale 1:1250

20 0 20 40 60 80 METRES

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

SCHEDULE OF LAND USE			
LOT/BLOCK	USE	UNITS	AREA (Ha/ac)
1 TO 209	SINGLES	209	7.19/17.77
210 TO 219	EXECUTIVE TOWNS	195	4.02/9.92
220 AND 221	REAR LANE TOWNS	51	0.53/1.30
222	PARK		2.65/6.54
223 AND 224	STORM POND		7.26/17.95
225	COMMERCIAL		5.15/12.73
226 TO 234	OPEN SPACE		4.78/11.83
235	TRANSIT WAY		1.46/3.60
236 TO 239	WALKWAY		0.08/0.20
240 AND 241	FUTURE RESIDENTIAL	224	8.94/22.14
	STREETS		5.54/13.69
TOTAL		679	47.62/117.67

INFORMATION: REQUIRED UNDER SECTION 51 (17) OF THE PLANNING ACT R.S.O. 1990

a. SEE PLAN
b. SEE PLAN
c. SEE PLAN
d. SEE PROPOSED LAND USE SCHEDULE (ABOVE)
e. SEE PLAN
f. SEE PLAN
g. SEE PLAN
h. CITY WATER AVAILABLE
i. SEE SOIL REPORT
j. SEE TOPOGRAPHICAL INFORMATION
k. ALL CITY SERVICES AVAILABLE
l. SUBJECT TO EASEMENT PER INST. NO. OC1529517

OWNER'S CERTIFICATE
I HEREBY AUTHORIZE STANTEC GEOMATICS LTD. TO SUBMIT THIS DRAFT PLAN OF SUBDIVISION ON MY BEHALF

DATE

SURVEYOR'S CERTIFICATE
I HEREBY CERTIFY THAT THE BOUNDARIES OF THE SUBJECT LANDS AND THEIR RELATIONSHIP TO ADJOINING LANDS HAVE BEEN ACCURATELY AND CORRECTLY SHOWN.

DATE

BRIAN J. WEBSTER
ONTARIO LAND SURVEYOR

Stantec
Stantec Geomatics Ltd.
CANADA LAND SURVEYORS
ONTARIO LAND SURVEYORS
1331 CLYDE AVENUE, SUITE 400
OTTAWA, ONTARIO, K2C 3G4
TEL. 613.722.4420 FAX. 613.722.2799
stantec.com

DRAWN: CEC | CHECKED: * | PM: FP | FIELD: N/A | PROJECT No.: 161613606-131

M:\Jobs\161613606_ottawa_onsite_ph3_fp\subdivision_draft_plan\drawing\161613606-131-mxsite_PH3_dft_24.dwg

Unit Type	Stage 3		Stage 4		Stage 5		Total	
Singles	113	31%	89	100%	81	36%	**283**	**42%**
Executive Towns	195	54%	0	0%	58	26%	**253**	**38%**
Avenue Towns	0	0%	0	0%	32	14%	**32**	**5%**
Rear Lane Towns	51	14%	0	0%	17	8%	**68**	**10%**
Condos	0	0%	0	0%	36	16%	**36**	**5%**
Total	359		89		224		**672**	

Tittle:

Concept Plan 8 - Rev 2

Project:

Arcadia - Stages 3+

Legend

- Single Family Homes
- Executive Town Homes
- Avenue Town Homes (B2B)
- Parkland
- Storm Water Management
- Open Space
- Rear Lane Town Homes
- Stage Limit
- Subdivision Limit
- 2018 JLR Feedmill Creek Limit
- JLR Stage 5 Servicing Limit

No.	Description	Date	By
2	Added Stage 5 Servicing Limit	2018-04-27	A.R
1	Issued For Review	2018-04-27	A.R

Revisions

minto Communities

Drawn By: A.R
Checked By: C.S

Minto Communities Inc
180 Kent Street,
Ottawa, ON
K1P 0B6

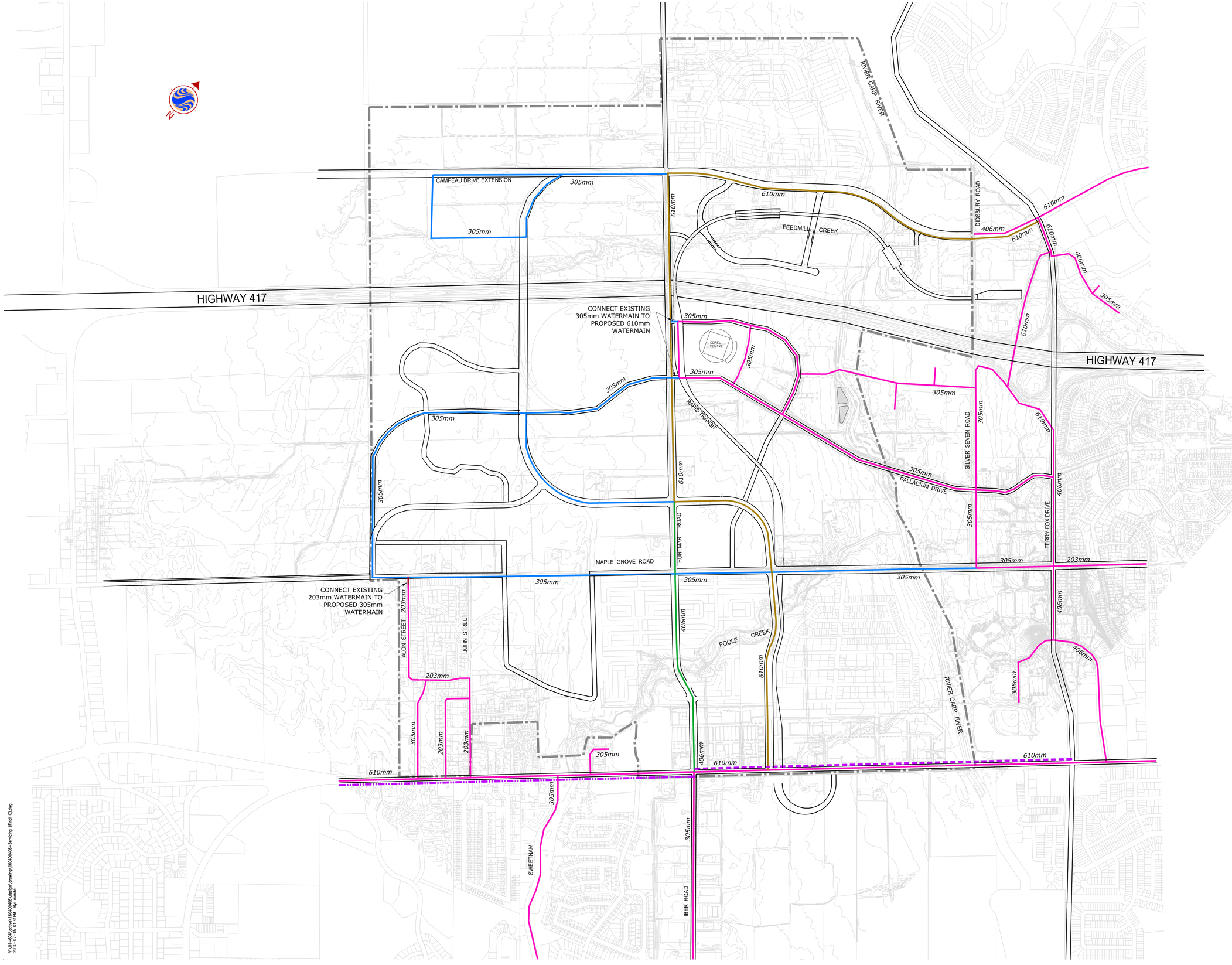
North

Scale: NTS

Z:\Active Projects\Arcadia\Stage 3+\03 Drawings & Plans\Concept Plans\2018\Concept 8\Rev 2\Arcadia - Concept Plan 8 - 2018-04-27 - Rev I.dwg, 5/9/2018 11:06:56 AM

A P P E N D I X ‘B’

BACKGROUND WATER SERVICING DOCUMENTS & PRELIMINARY HNA RESULTS



Stantec Consulting Ltd.
1505 Laperriere Avenue
Ottawa ON Canada
K1Z 7T1
Tel. 613.722.4420
Fax. 613.722.2799
www.stantec.com

Stantec

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Legend

- KANATA–WEST CONCEPT PLAN BOUNDARY
- EXISTING WATERMAIN
- EXISTING 610mm WATERMAIN TO BE UPGRADED TO 914mm
- EXISTING 610mm WATERMAIN TO BE UPGRADED TO 762mm
- PROPOSED 610mm DIA. WATERMAIN
- PROPOSED 406mm DIA. WATERMAIN
- PROPOSED 305mm DIA. WATERMAIN
- PROPOSED 203mm DIA. WATERMAIN

Notes

INTERNAL WATERMAIN SIZE ARE EXPECTED TO VARY FROM 152mm TO 305mm.

CCL/IBI
Commerce Communication Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

	Revision	By	Appd.	Date
5	REVISED FOR DEC.21/05 SUBMISSION	GBU	SJP	DEC.21/05
4	REVISED AS PER CITY COMMENTS (Sept.16/05)	GBU	MAF	OCT.28/05
3	REVISED WATER DISTRIBUTION NETWORK	GBU	S.J.P.	AUG 09/05
2	REVISED POND 1 AREA	NI	MAF	JUNE 09/05
1	REVISED LOTTING FOR TARTAN AND MATTAMY	BCB	SJP	JAN.18/05

File Name:

Dwn. Chkd. Dsgn. Date

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

Watermain
Final Concept

Project No. 60400406

Scale 1:7500 (0, 75, 225, 375m)

Drawing No. WM-1

Sheet 2 of 7

Revision 5

\\01-454\active\160404061\design\drawing\160400406-Servicing (Final C).dwg
2015-Oct-15 10:41PM By: mwells

Ivan Dzeparoski

From: Bougadis, John <John.Bougadis@ottawa.ca>
Sent: February 22, 2017 2:52 PM
To: Ivan Dzeparoski
Cc: Hilary MacKay; Newton, Tim
Subject: RE: Arcadia Stage 3&4 Boundary Condition Clarification
Attachments: AcadiaStage3and4_Boundary Conditions_Feb222017.docx; H2OMAP Map_ 'Arcadia Stage 2_Rev2'.pdf

Hi everyone,

I added a number of future watermains within Phase 3 and Phase 4 and recomputed the boundary conditions (BC) at the requested locations (see attached). The results are comparable with JLR's ultimate conditions models for Arcadia (see attached PDF).

This issue does happen from time to time when a future "critical" watermain is not modelled when the BCs are extracted from the City's model.

Thanks

John

x14990

From: Ivan Dzeparoski [mailto:idzeparoski@jlrichards.ca]
Sent: Wednesday, February 22, 2017 1:29 PM
To: Bougadis, John
Cc: Hilary MacKay; Susan Murphy
Subject: RE: Arcadia Stage 3&4 Boundary Condition Clarification

Hi John,

As discussed please find attached schematic of the overall distribution network for Arcadia and HGLs at the specific nodes under Max Day plus fire conditions.

Thank you,

Ivan Dzeparoski

Ivan Dzeparoski
Water Resources Intern

J.L. Richards & Associates Limited
864 Lady Ellen Place, Ottawa, ON K1Z 5M2

Tel: 613-728-3571 Fax: 613-728-6012
J.L. Richards & Associates Limited
ENGINEERS · ARCHITECTS · PLANNERS
CANADA'S BEST MANAGED COMPANIES

From: Bougadis, John [mailto:John.Bougadis@ottawa.ca]
Sent: February 22, 2017 10:43 AM
To: Ivan Dzeparoski
Cc: Hilary MacKay
Subject: RE: Arcadia Stage 3&4 Boundary Condition Clarification

Hi Ivan,

Could you send me the following:

- Ultimate water distribution network, with sizes, for Arcadia.
- EPANet Model schematic
- HGLs at the nodes under Max day plus fire conditions.

My goal is to review this sometime this week.

Thanks

John
x14990

From: Ivan Dzeparoski [mailto:idzeparoski@jlrichards.ca]
Sent: Tuesday, February 21, 2017 3:35 PM
To: Bougadis, John
Cc: Hilary MacKay
Subject: Arcadia Stage 3&4 Boundary Condition Clarification

Hi John,

As per our conversation please find attached the boundary conditions that we received in June 2014, prior detailed design of Arcadia Stage 2 project. In addition, please find attached Overall Arcadia Demand Table and H2OMAP Schematic from the Conceptual Servicing Study for complete details that we sent as part of the boundary condition request for the aforementioned project.

Should you have any questions or concerns please do not hesitate to contact me.

Ivan Dzeparoski

Ivan Dzeparoski
Water Resources Intern

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

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Boundary Conditions for Acadia Stage 3 and 4

Information Provided:
Date provided: February 2017

Scenario	Interim Condition		Ultimate Condition	
	Demand		Demand	
	L/min	L/s	L/min	L/s
Average Daily Demand	540	9	810	13.5
Maximum Daily Demand	1098	18.3	1644	27.4
Peak Hour	2262	37.7	3384	56.4
Fire Flow Demand	12000	200	12000	200

Location:

- Future internal 203 mm watermains (shown conceptually in orange in the figure above) was added to the City's model.

Results:

Connection 1 - Paine Avenue

Demand Scenario	Interim Conditions		Ultimate Conditions	
	Head (m)	Pressure[1] (psi)	Head (m)	Pressure[1] (psi)
Maximum HGL	161.6	93.7	161.4	93.4
Peak Hour	154.4	83.5	154.4	83.5
Max Day plus Fire (12,000l/min)	135.8	57.0	134.0	54.5

[1] Ground Elevation = 95.7m

Connection 2 - Calvington Avenue

Demand Scenario	Interim Conditions		Ultimate Conditions	
	Head (m)	Pressure[1] (psi)	Head (m)	Pressure[1] (psi)
Maximum HGL	161.6	92.6	161.4	92.3
Peak Hour	154.5	82.5	154.5	82.6
Max Day plus Fire (12,000l/min)	143.8	67.2	142.4	65.3

[1] Ground Elevation = 96.5m

Connection 3 - Campeau Drive

Demand Scenario	Interim Conditions		Ultimate Conditions	
	Head (m)	Pressure[1] (psi)	Head (m)	Pressure[1] (psi)
Maximum HGL	161.6	96.5	161.4	96.3
Peak Hour	154.6	86.5	154.6	86.5
Max Day plus Fire (12,000l/min)	153.3	84.8	153.0	84.3

[1] Ground Elevation = 93.76m

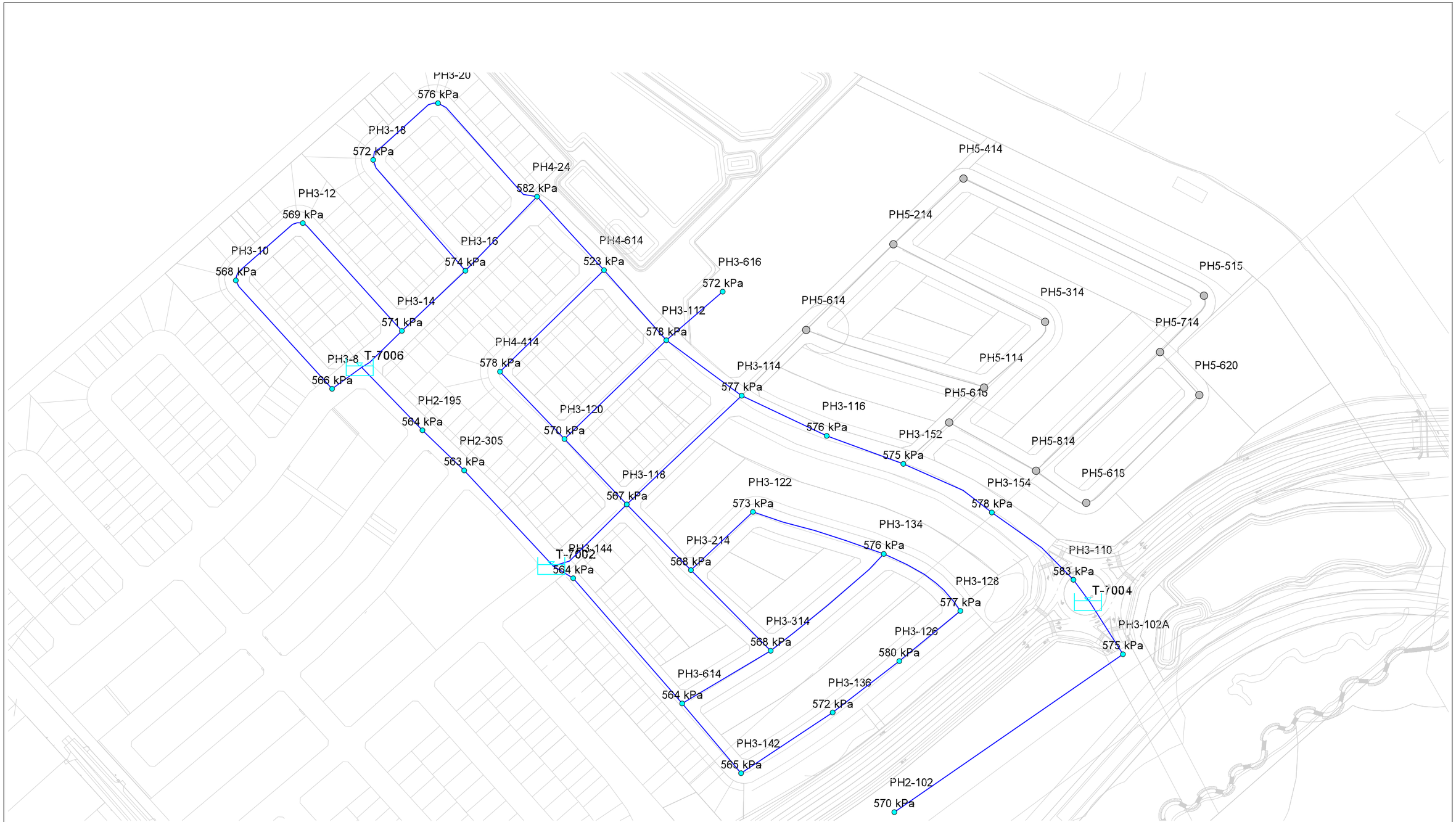
Notes:

1) In the future, please provide:
    - FUS calculation for your “design” fire structure.
    - Demands for residential and ICI land-uses. The City’s water model applies demand patterns based on land-use type.
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) One set of boundary conditions was provided on Paine Avenue and Calvington Avenue. The HGL is the same at the requested locations for Paine and Calvington.
4) One set of boundary conditions was provided on Campeau Drive. The City avoids placing demands, especially large fire flows, on dead-end watermain stubs. The consultant is responsible for modelling the hydraulic losses along the 200 mm and 300 mm watermains, respectively.

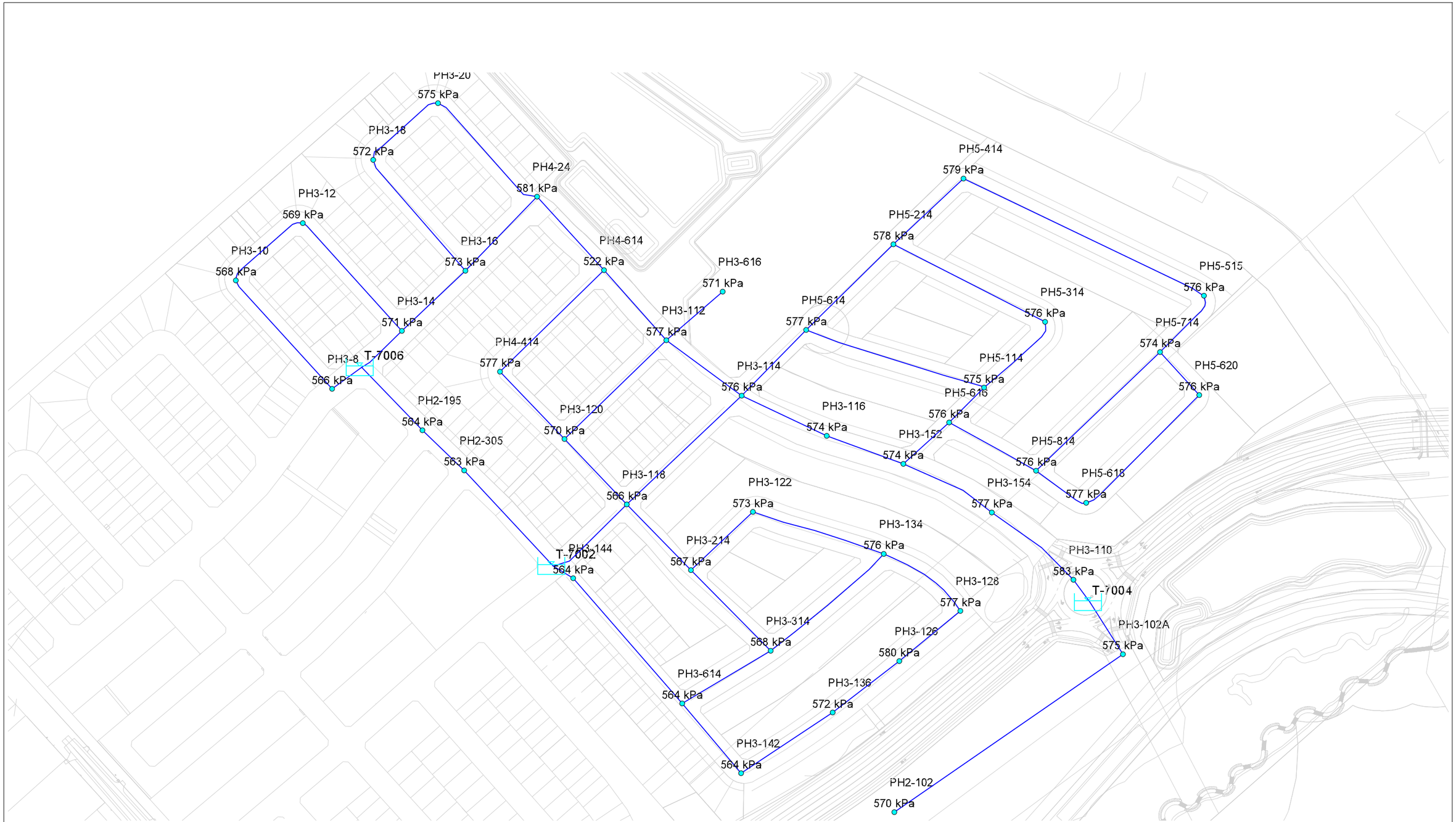
Disclaimer

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.



Prepared By: Ivan Dzeparoski

Date: Thursday, May 17, 2018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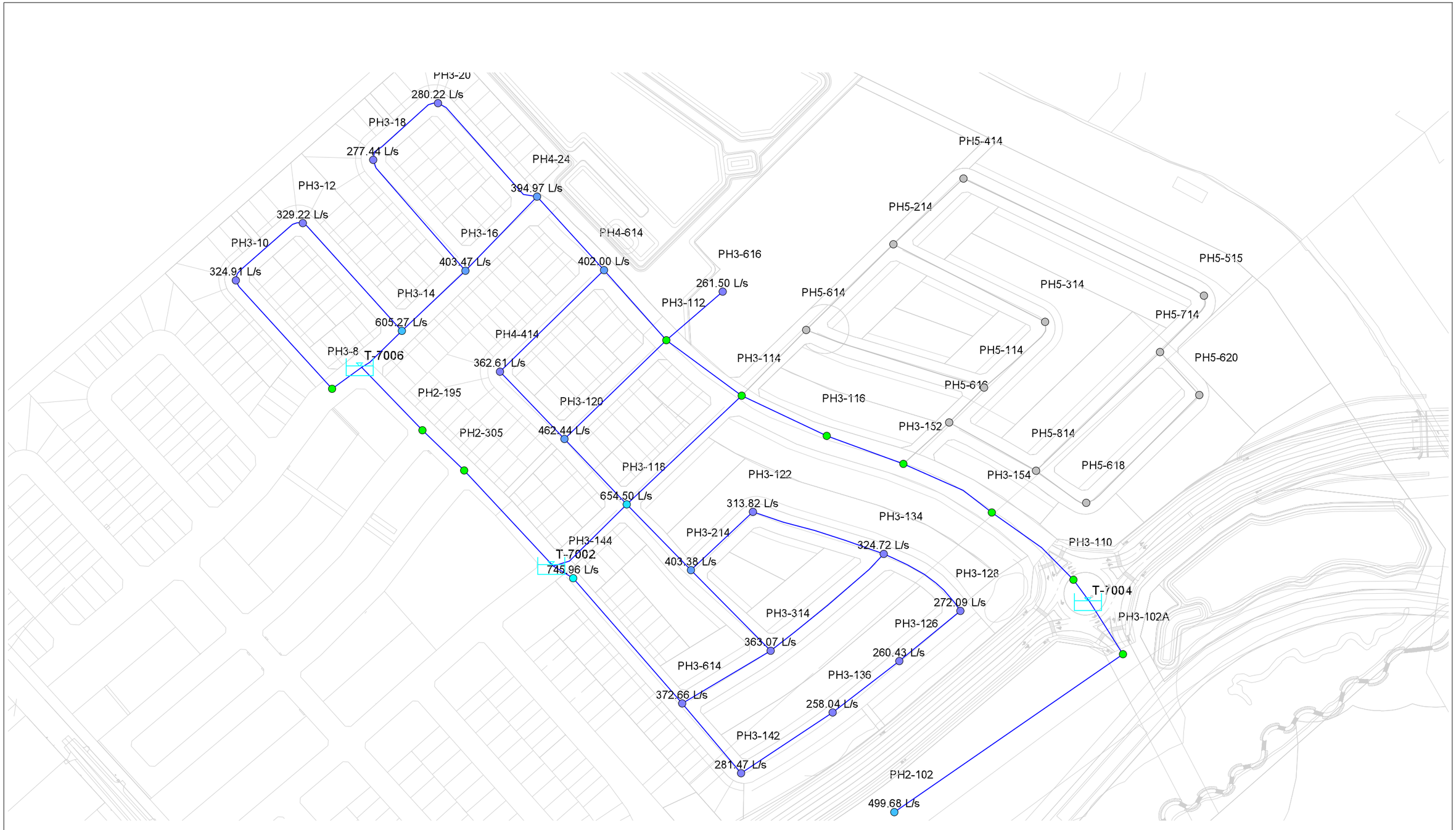
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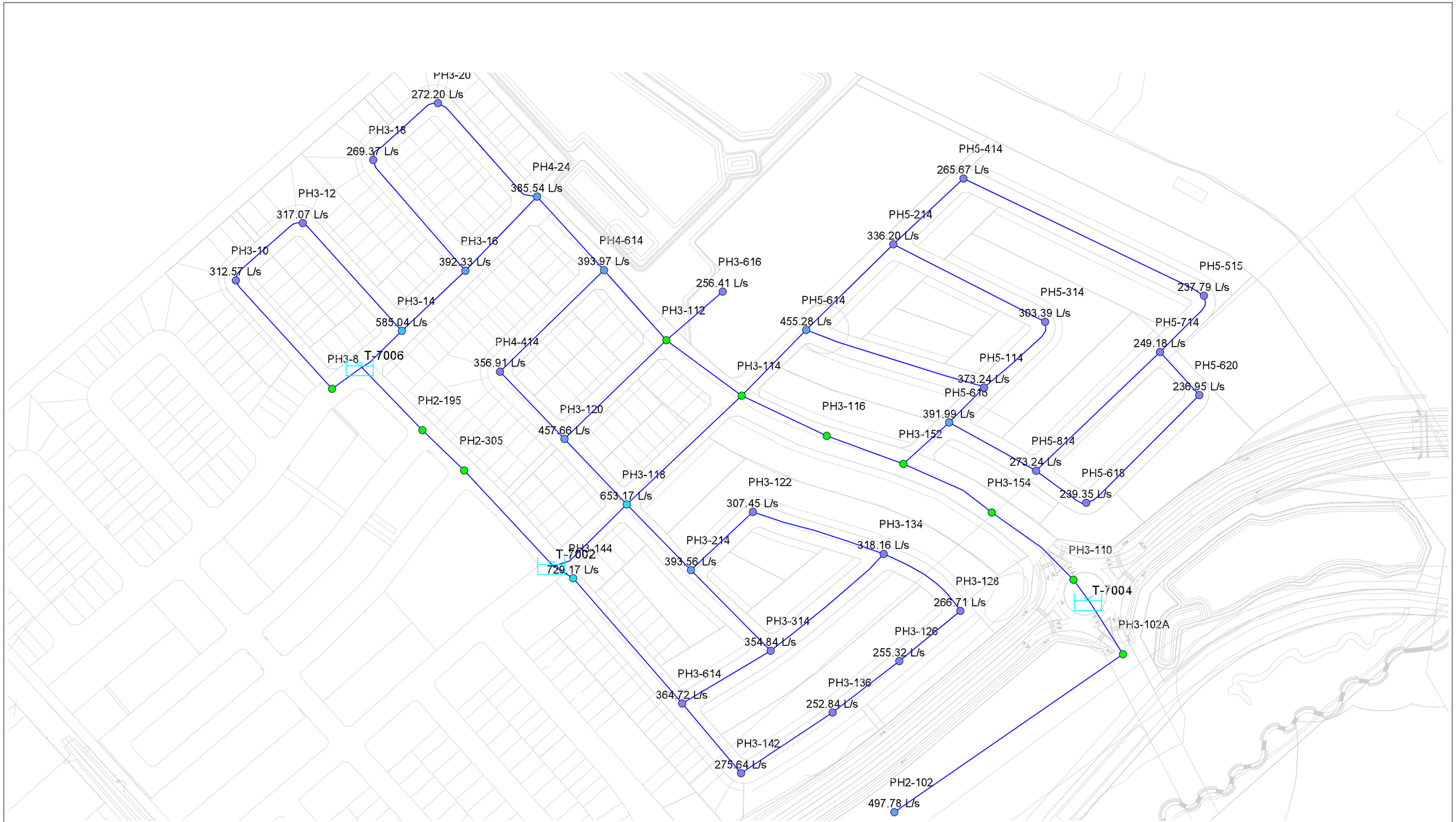
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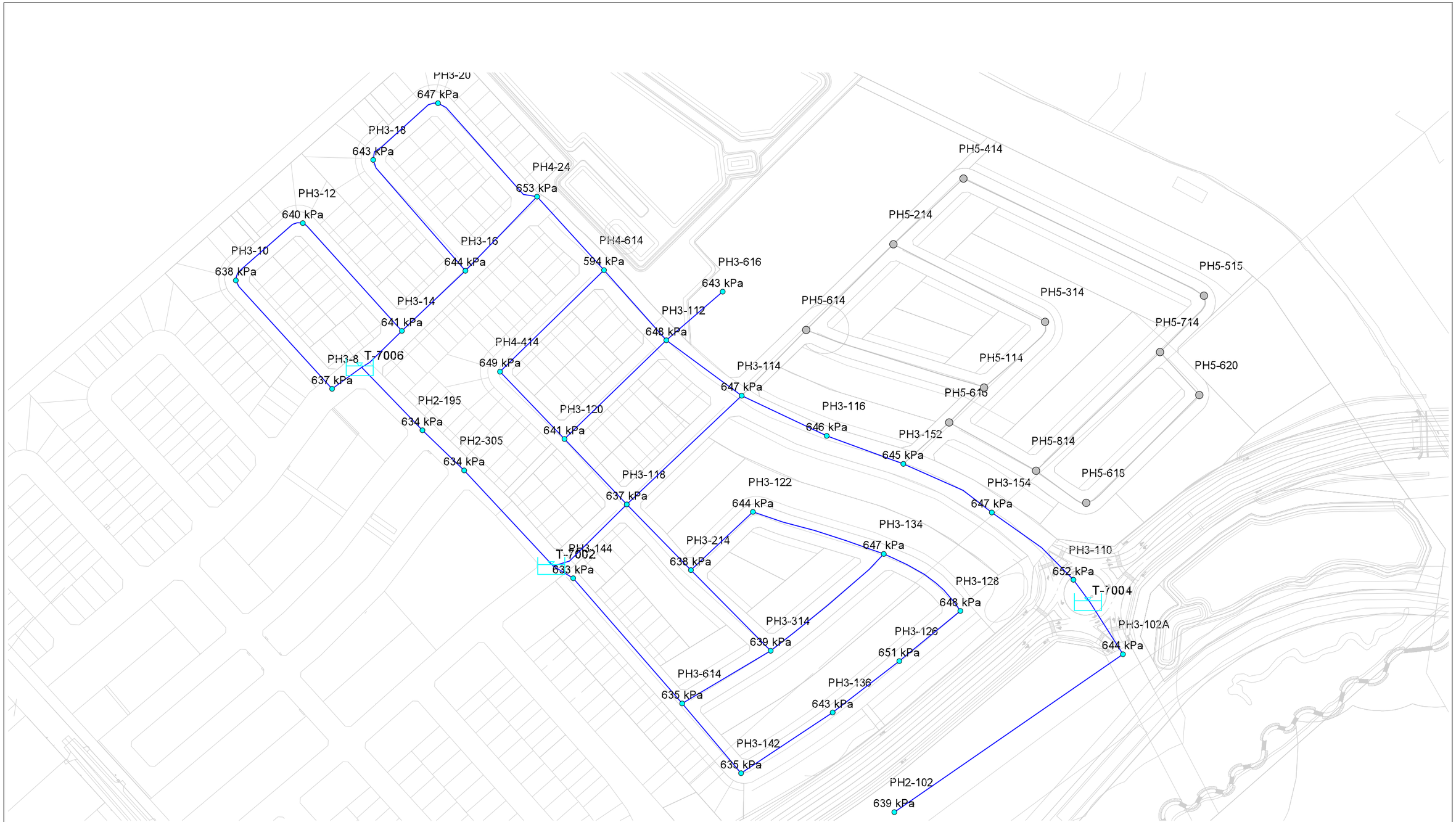
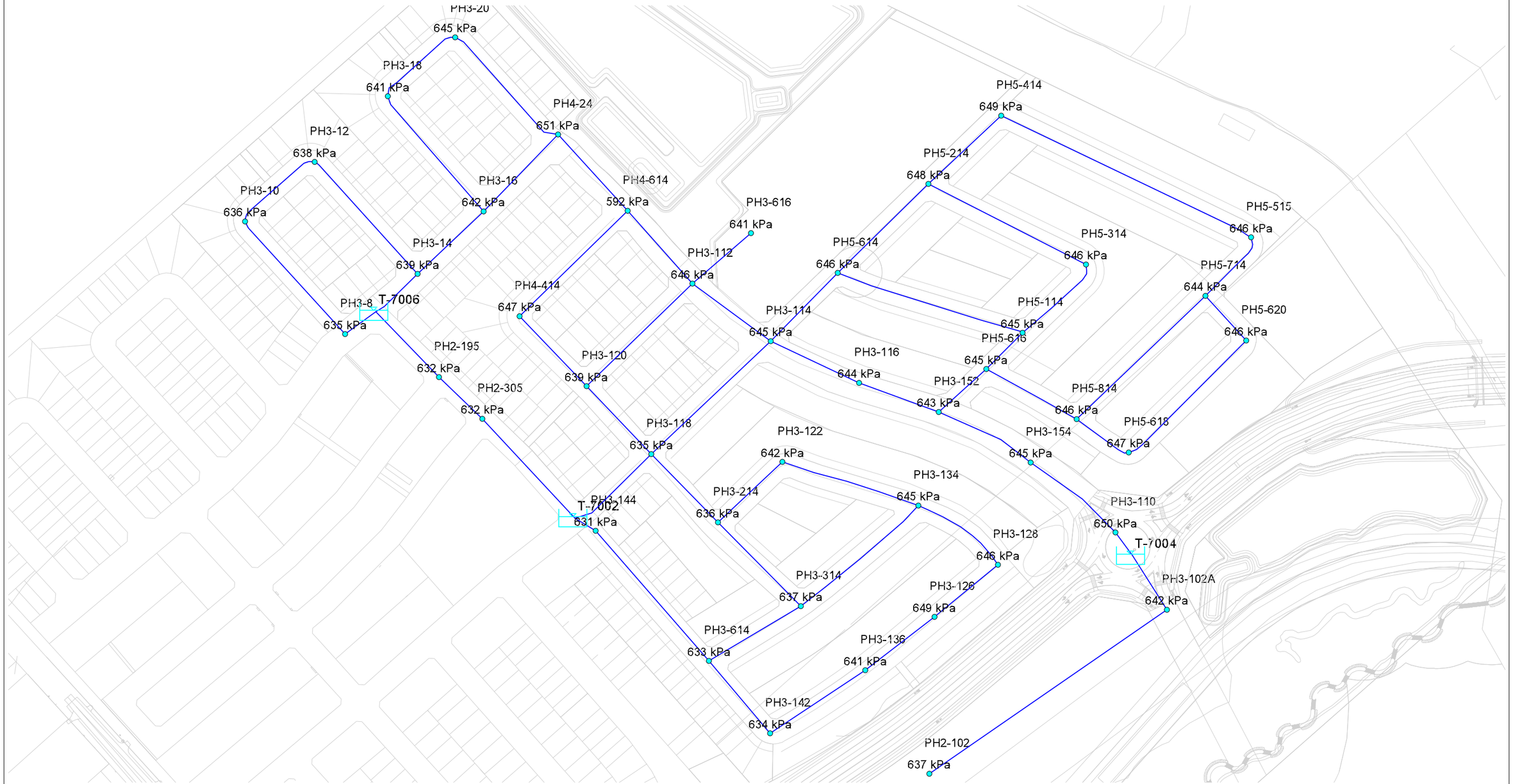


Prepared By: Ivan Dzeparoski

Date: Thursday, May 17, 2018

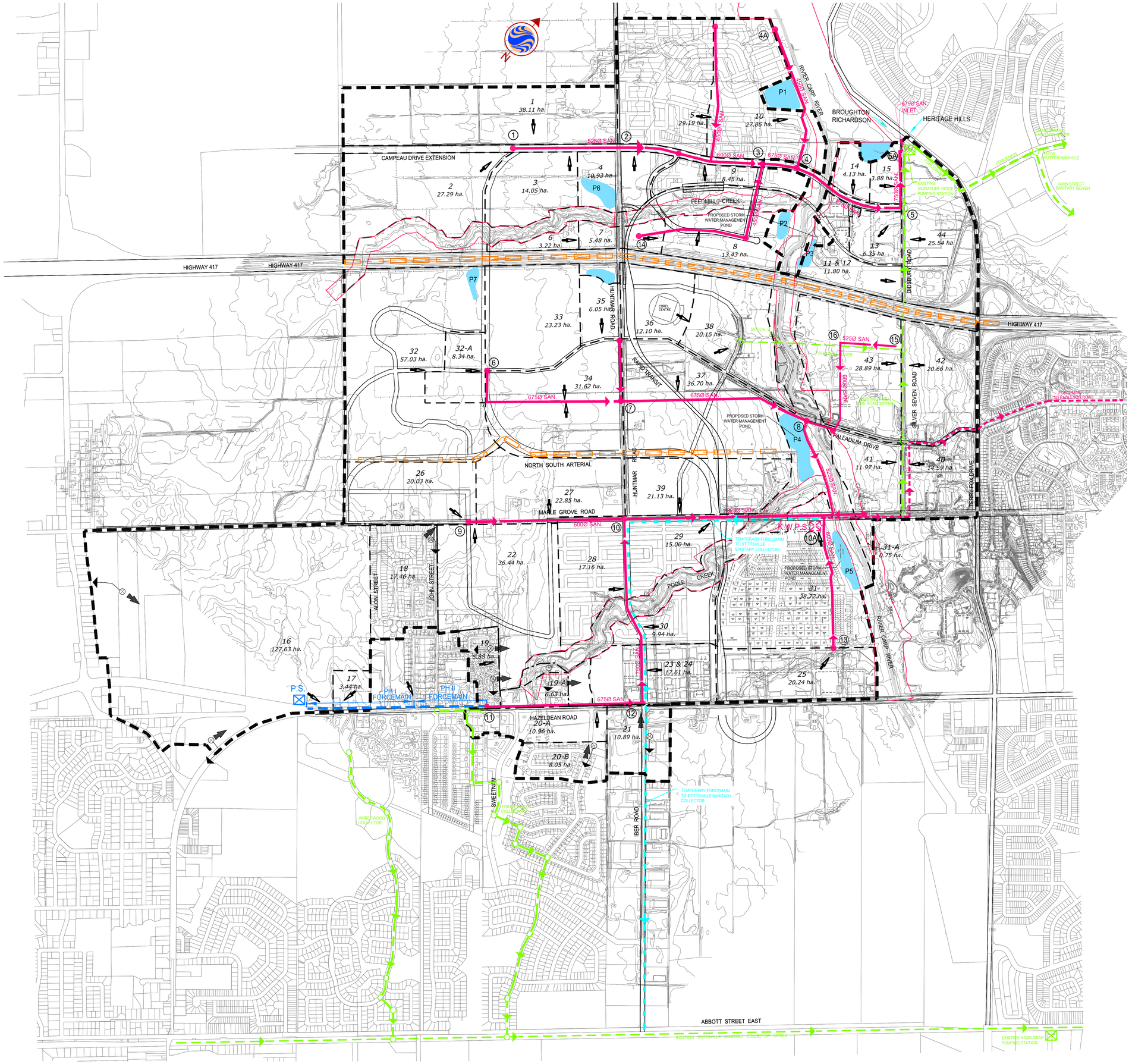


Prepared By: Ivan Dzeparoski

Date: Thursday, May 17, 2018

A P P E N D I X ‘C’

BACKGROUND WASTEWATER SERVICING DOCUMENTS



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Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225-1311

Legend

- ULTIMATE MAJOR DRAINAGE LIMIT
- SUBCATCHMENT AREAS
- PROPOSED TRUNK SEWER
- PROPOSED FORCEMAIN
- TEMPORARY FORCEMAIN
- PROPOSED STITTSVILLE PUMPING STATION AND FORCEMAIN
- EXISTING TRUNK SEWER
- MAJOR DRAINAGE SPLIT
- (1) NODES
- EXISTING PUMPING STATION AND FORCEMAIN (TO BE DECOMMISSIONED)
- 44 / 25.54 ha. INPUT POINT AND AREA IN HECTARES
- EXISTING PUMPING STATION GRAVITY OUTLET

5	REVISED FOR DEC.21/05 SUBMISSION	G.B.U.	S.J.P.	05:12:21
4	REVISED TRUNK SEWER FROM 16 TO KWPS	R.W.W.	R.W.W.	05:10:05
3	ARROWS FOR EXIST. PUMP STATIONS ADDED	R.W.W.	R.W.W.	05:08:09
2	REPORT JUNE 2005	R.W.W.	R.W.W.	05:06:07
1	REPORT APR. 2005	R.W.W.	R.W.W.	05:04:20
Revision		By	Appd.	Date

File Name:	Dwn.	Chkd.	Dsgn.	Date

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

Preferred Waste-Water Option

Project No.	Scale	Revision
60400406	1:7500 0 75 225 375m	5
Drawing No.	Sheet	
S-I	7 of 7	

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Layout Name: S-I
Last Saved By: Kanata Feb 20, 2007 - 10:02am

PHASE 2
SINGLE FAMILY 122
TOWNHOUSE 116
AREA 11.045 ha

CARP RIVER

EMPLOYMENT AREA 65.4ha
AREA 1 & 2 FROM MSS
BUSINESS PARK AREA 19.1 ha
AREAS 3 & 4 FROM MSS

COMMERCIAL
0.85 ha

MIXED USE
8.99 ha

PHASE 3 & 4
SINGLE FAMILY 160
TOWNHOUSE 200
AREA 19.72 ha

0.59
46.0

0.57
55.2

0.85
96.6

0.82
87.4

MIXED USE
12.95 ha

0.43
0

0.31
0

MIXED USE
9.37 ha

EMPLOYMENT AREA 22.13 ha
AREAS 6, 7 & 8 FROM MSS

LEGEND:

0.77
72.5

AREA IN HECTARES
POPULATION

No.	REVISIONS	By	Date
14			
13			
12			
11			
10			
9			
8			
7			
6			
5			
4	REVISED PER CITY COMMENTS		12:06:27
3	REVISED PER LEGAL & CITY COMMENTS	LME	12:05:15
2	REVISED PER NEW LEGAL	LME	12:02:17
1	ISSUED FOR SUBMISSION	LME	10:11:26

IBI GROUP
333 Preston Street
Tower 1, Suite 400
Ottawa, Ontario
Canada K1S 5N4
Tel (613)225-1311
FAX (613)225-9868

Project Title
ARCADIA
KANATA WEST
PHASE I

L. M. ERION
LICENSED PROFESSIONAL ENGINEER
PROVINCE OF ONTARIO

Drawing Title
EXTERNAL SANITARY
DRAINAGE AREA PLAN

Scale
1:2000

Design	Date
L.M.E.	MARCH '09
Drawn	Checked
M.M.	R.W.W.
Project No.	Drawing No.
3775	501A

Plotted At: 6/27/2012 3:53 PM Last Saved By:
J:\3775_Kanata West\5.0 Drawings\5b\cw\current\Jan '12 design\layout\501A SANITARY DRAINAGE.dwg Layout Name: EXTERNAL SANITARY Plot Style: AIA STANDARD-HALF.CTB Plot Scale: 1:1

IBI Group
333 Preston Street - Suite 400
Ottawa, Ontario
K1S 5N4

SANITARY SEWER DESIGN SHEET

PROJECT: ARCADIA PHASE 1
DEVELOPER: MINTO

JOB #: 3775-5.7
DATE PRINTED: 16-Aug-13
DESIGN: LE

LOCATION			INDIVIDUAL					CUM. RES. FLOW			INSTIT., INDUST., & COMM. FLOW						INFILTRATION			TOTAL	PROPOSED SEWER						
STREET	FROM MH	TO MH	RESID. UNITS Sngls	Towns Semis	Stacked Towns	RES. AREA (Ha)	POP.	POP.	PEAK FACT.	PEAK FLOW (l/s)	Indust. AREA (Ha)	Comm. AREA (Ha)	Average FLOW (l/s)	CUM. Ave. Flow (l/s)	PEAK FACT.	PEAK FLOW (l/s)	INCR. AREA (Ha)	CUM. AREA (Ha)	FLOW (l/s)	DESIGN FLOW (l/s)	CAP. l/s	PIPE (mm)	LGTH. (m)	SLOPE %	VEL. (full) m/s	AVAIL. CAP. (l/s)	AVAIL. CAP. (%)
Phase 2	Stub	104 A	122	116		11.05	728.0	728	3.88	11.59							11.05	11.05	3.09	14.69	166.68	375	12.0	0.83	1.46	151.99	91%
Paine Avenue	104 C	104 A	19			0.71	64.6	65	4.00	1.06							0.71	0.71	0.20	1.26	135.67	375	25.7	0.55	1.19	134.41	99%
Clonrush Walk	104 A	200 A		7		0.27	18.9	812	3.86	12.83							0.27	12.03	3.37	16.20	77.64	375	76.8	0.18	0.68	61.44	79%
Calvington Avenue	Stub	200 A		5		0.19	13.5	14	4.00	0.22							0.19	0.19	0.05	0.27	26.72	200	16.5	0.61	0.82	26.45	99%
Calvington Avenue	200 A	201 A		7		0.29	18.9	844	3.85	13.31							0.29	12.51	3.50	16.81	85.85	375	75.7	0.22	0.75	69.04	80%
Mission Trail Crescent	208 A	207 A	8			0.41	27.2	27	4.00	0.45							0.41	0.41	0.11	0.56	28.02	200	79.7	0.67	0.86	27.46	98%
Mission Trail Crescent	207 A	206 A	5			0.26	17.0	44	4.00	0.72							0.26	0.67	0.19	0.91	27.37	200	79.6	0.64	0.84	26.46	97%
Mission Trail Crescent	206 A	205 A		2		0.08	5.4	50	4.00	0.81							0.08	0.75	0.21	1.02	28.83	200	113	0.71	0.89	27.81	96%
Calvington Avenue	205 A	204 A		15		0.43	40.5	90	4.00	1.48							0.43	1.18	0.33	1.81	52.24	200	65.7	2.33	1.61	50.44	97%
Mission Trail Crescent	209 A	210 A	14			0.76	47.6	48	4.00	0.76							0.76	0.76	0.21	0.99	27.37	200	90.3	0.64	0.84	26.38	96%
Mission Trail Crescent	210 A	204 A	6	1		0.42	23.1	71	4.00	1.16							0.42	1.18	0.33	1.49	22.44	200	84.0	0.43	0.69	20.95	93%
Calvington Avenue	204 A	203 A		15		0.46	40.5	201	4.00	3.30							0.46	2.82	0.79	4.09	24.19	200	69.4	0.50	0.75	20.10	83%
Brettonwood Crescent	212 A	211 A	15			0.75	51.0	51	4.00	0.84							0.75	0.75	0.21	1.05	28.21	200	90.3	0.68	0.87	27.17	96%
Brettonwood Crescent	211 A	203 A	7			0.37	23.8	75	4.00	1.23							0.37	1.12	0.31	1.54	29.45	200	83.3	0.74	0.91	27.91	95%
Calvington Avenue	203 A	202 A		15		0.47	40.5	317	4.00	5.19							0.47	4.41	1.23	6.43	24.19	200	75.8	0.50	0.75	17.77	73%
Brettonwood Crescent	213 A	214 A	1			0.11	3.4	3	4.00	0.06							0.11	0.11	0.03	0.09	32.82	200	12.0	0.92	1.01	32.73	100%
Brettonwood Crescent	214 A	215 A	13			0.67	44.2	48	4.00	0.78							0.67	0.78	0.22	1.00	28.21	200	87.2	0.68	0.87	27.21	96%
Brettonwood Crescent	215 A	202 A	8	1		0.46	29.9	78	4.00	1.27							0.48	1.26	0.35	1.62	26.07	200	87.7	0.58	0.80	24.45	94%
Calvington Avenue	202 A	201 A		8		0.31	21.6	416	4.00	6.82							0.31	5.98	1.67	8.49	21.92	200	72.8	0.41	0.68	13.43	61%
Country Glen Way	201 A	216 A	5	4		0.43	27.8	1287	3.73	19.67							0.43	18.92	5.30	24.97	83.80	375	96.1	0.21	0.74	58.83	70%
Country Glen Way	216 A	217 A	13	10		0.92	71.2	1359	3.71	20.67							0.92	19.84	5.56	26.22	77.64	375	119.5	0.18	0.68	51.42	66%
Country Glen Way	217 A	303 A				0.33	19.8	1378	3.71	20.94							0.33	20.17	5.65	26.59	114.24	375	46.0	0.39	1.00	87.65	77%
Campeau Drive	300 A	301 A		15		0.65	40.5	41	4.00	0.66	19.10	65.40	45.60	45.60	1.50	68.40	85.15	85.15	23.84	92.91	124.04	375	105.0	0.46	1.09	31.13	25%
Commercial Site	Stub	301 A				0.0		0	4.00	0.00		0.85	0.49	0.49	1.50	0.74	0.85	0.85	0.24	0.98	24.19	200	24.0	0.50	0.75	23.22	96%
Campeau Drive	301 A	302 A		14		0.51	37.8	78	4.00	1.28				46.09	1.50	69.14	0.51	86.51	24.22	94.65	131.91	375	76.9	0.52	1.16	37.26	28%
Campeau Drive	302 A	303 A		5		0.51	13.5	92	4.00	1.51				46.09	1.50	69.14	0.51	87.02	24.37	95.01	118.57	375	104.7	0.42	1.04	23.56	20%
Future Street	Stub	303 A				~~3.82~~ 1.53	~~229.2~~ 92	~~229~~ 92	4.00	~~3.76~~ 1.49	~~3.82~~ 1.53	~~1.36~~ 0.55	~~2.33~~ 0.94	~~2.33~~ 0.94	1.50	~~3.49~~ 1.41	~~8.99~~ 3.61	8.99 3.61	2.52 1.01	~~9.77~~ (3.91)	58.81	300	20.6	0.34	0.81	49.04	83%
Campeau Drive	303 A	304 A			20	0.59	46.0	1745	3.63	25.98				48.42	1.50	72.63	0.59	116.77	32.70	131.31	210.50	525	85.0	0.22	0.94	79.18	38%
Campeau Drive	304 A	305 A			24	0.57	55.2	1801	3.62	26.73				48.42	1.50	72.63	0.57	117.34	32.86	132.22	179.44	525	79.8	0.16	0.80	47.22	26%
Campeau Drive	305 A	306 A			42	0.85	96.6	1897	3.60	28.03				48.42	1.50	72.63	0.85	118.19	33.09	133.76	215.19	525	117.0	0.23	0.96	81.43	38%
Campeau Drive	306 A	307 A			38	0.82	87.4	1985	3.59	29.20				48.42	1.50	72.63	0.82	119.01	33.32	135.16	219.88	525	117.0	0.24	0.98	84.73	39%
			Stage 3 units fronting Campeau:			2.85			4.00	4.62							1.41	1.41	0.40	(5.02)							
Future north	Stub	307 A	160	200		19.72	1084.0	1084																			
						5.50	330.0	1414	3.70	21.44	5.50	1.95	3.36	3.36	1.50	5.03	32.67	32.67	9.15	35.62	180.92	450	13.5	0.37	1.10	145.30	80%
Future south	Stub	307 A				3.98	238.8	239	4.00	3.87	3.98	1.41	2.43	2.43	1.50	3.64	9.37	9.37	2.62	(10.13)							
							0.0	239	4.00	3.92		22.13	12.81	15.24	1.50	22.86	31.50	31.50	8.82	35.60	89.61	375	25.5	0.24	0.79	54.01	60%
Campeau Drive	307 A	308 A				0.43	0.0	3637	3.37	50.26				67.02	1.50	100.53	0.43	183.61	51.41	202.20	447.33	675	115.0	0.26	1.21	245.13	55%
Campeau Drive	308 A	309 A				0.31	0.0	3637	3.37	50.26				67.02	1.50	100.53	0.31	183.92	51.50	202.29	328.02	675	66.0	0.14	0.89	125.73	38%
Campeau Drive	309 A	310 A					0.0	3637	3.37	50.26				67.02	1.50	100.53	0.00	183.92	51.50	202.29	382.32	675	97.0	0.19	1.04	180.03	47%
Campeau Drive	310 A	311 A					0.0	3637	3.37	50.26				67.02	1.50	100.53	0.00	183.92	51.50	202.29	438.47	675	117.0	0.25	1.19	236.18	54%
Campeau Drive	311 A	312 A					0.0	3637	3.37	50.26				67.02	1.50	100.53	0.00	183.92	51.50	202.29	401.90	675	67.0	0.21	1.09	199.61	50%
Campeau Drive	312 A	SAN B					0.0	3637	3.37	50.26				67.02	1.50	100.53	0.00	183.92	51.50	202.29	438.47	675	34.0	0.25	1.19	236.18	54%

South of Campeau (Comm. Stage 3) →
North of Campeau →
Arcadia (north of Campeau) →
South of Campeau →

Where Q = average daily per capita flow (350 l/cap d) or (0 0041l/sec /cap)
I = Unit of peak extraneous flow (0 28 l/sec/ha)
M = Residential Peaking factor = Harmon Peaking Factor , M = 1+(14/(4+P^0.5)) , where P = population in thousands
Q(p) = Peak population flow (l/s)
Q(i) = peak extraneous flow (l/s)

Population Density = 3 4 per single family, 2 7 per semi-detached and row townhouse units and 2.3 per stacked townhouse unit
Commercial, Employment Area - Average flow 50,000 l/day/ha (0 579 l/s/ha) with Peaking Factor = 1 5
Light Industrial, Business Park - Average flow 35,000 l/day/ha (0 405 l/s/ha) with Peaking Factor = 1 5
Gross Residential Lands = 60 persons/gross hectare

LICENSED PROFESSIONAL ENGINEER
L. M. ERION
2 Sept 05
PROVINCE OF ONTARIO

Total allocated for Arcadia Development
North of Campeau = 35.02 l/s + 5.02 l/s = 40.04 l/s

Total allocated for Arcadia development
South of Campeau = 10.13 + 3.91 = 14.04 l/s

As Built Pipe Lengths and Slopes

includes 37 townhouse units for Stage 1A

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

ARCADIA STAGE 2
370, 404, 410, 450 Huntmar Drive
CITY OF OTTAWA
MINTO COMMUNITIES INC.

JLR NO. 26299

SANITARY SEWER DESIGN SHEET

Designed by: H.M.
Checked by: K.F.

Date : September 2014

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 Sewers

STREET	M.H. #		RESIDENTIAL										SEWER DATA						RESIDUAL	UPSTREAM						DOWNSTREAM					
			NUMBER OF UNITS			CUMULATIVE		PEAKING	POPUL.	PEAK EXTR.	PEAK DES.	Actual																			
			SING.	MULT.	AREA	POPUL.	AREA	FACTOR	FLOW	FLOW	FLOW	DIA.	DIA.	SLOPE	CAPAC.	VEL.	LENGTH	CAP.	Center	Obvert	Obvert	Invert	Cover	Center	Obvert	Obvert	Invert	Cover				
	FROM	TO			ha	peop.	ha		l/s	l/s	l/s	mm	mm	%	l/s	m/s	m	l/s	Line	Drop				Line	Drop						
Paine Avenue	1	2	2	5	0.25	20	0.25	4.00	0.33	0.07	0.40	203	200	1.50	41.9	1.29	38.21	41.51	100.25		96.45	96.243	3.80	99.20	0.018	95.87	95.670	3.33				
Westover Crescent	13	14	11		0.47	37	0.47	4.00	0.61	0.13	0.74	203	200	0.40	21.7	0.67	63.12	20.93	99.03		96.46	96.256	2.57	99.15	0.005	96.21	96.003	2.94				
Westover Crescent	14	2	9		0.37	68	0.84	4.00	1.10	0.24	1.34	203	200	0.40	21.6	0.67	71.66	20.28	99.15		96.20	95.998	2.95	99.20	0.06	95.92	95.712	3.28				
Paine Avenue	2	3	3	10	0.46	126	1.55	4.00	2.03	0.43	2.47	203	200	1.00	34.2	1.06	74.06	31.77	99.20		95.8553	95.652	3.34	98.35	0.013	95.11	94.911	3.24				
Westover Crescent	13	15	2		0.17	7	0.17	4.00	0.11	0.05	0.16	203	200	0.68	28.2	0.87	11.55	28.06	99.03		96.44	96.238	2.59	98.95	0.03	96.36	96.159	2.59				
Westover Crescent	15	16	5		0.29	24	0.46	4.00	0.39	0.13	0.51	203	200	0.68	28.2	0.87	57.76	27.70	98.95		96.33	96.129	2.62	98.55	0.03	95.94	95.737	2.61				
Westover Crescent	16	17	3		0.20	34	0.66	4.00	0.55	0.18	0.74	203	200	0.68	28.3	0.87	11.33	27.52	98.55		95.91	95.707	2.64	99.48	0.03	95.83	95.629	3.65				
Westover Crescent	17	18	13		0.53	78	1.19	4.00	1.27	0.33	1.60	203	200	0.40	21.6	0.67	67.40	20.04	99.48		95.80	95.599	3.68	98.58	0.005	95.53	95.330	3.05				
Westover Crescent	18	3	8		0.33	105	1.52	4.00	1.71	0.43	2.13	203	200	0.40	21.6	0.67	69.02	19.51	98.58		95.53	95.325	3.05	98.35	0.15	95.25	95.049	3.10				
Paine Avenue	3	4	3		0.25	241	3.32	4.00	3.91	0.93	4.84	203	200	0.56	25.6	0.79	74.06	20.75	98.35		95.101	94.898	3.25	97.30	0.008	94.69	94.484	2.61				
Saddleback Crescent	19	20	12		0.48	41	0.48	4.00	0.66	0.13	0.80	203	200	0.35	20.2	0.62	63.46	19.45	97.12		95.23	95.023	1.89	97.58	0.004	95.00	94.801	2.58				
Saddleback Crescent	20	4	9		0.37	71	0.85	4.00	1.16	0.24	1.39	203	200	0.35	20.2	0.62	74.53	18.85	97.58		95.00	94.797	2.58	97.30	0.06	94.74	94.536	2.56				
Paine Avenue	4	5	1	5	0.21	329	4.38	4.00	5.34	1.23	6.56	203	200	0.35	20.2	0.62	36.58	13.68	97.30		94.68	94.476	2.62	96.75	0.03	94.55	94.348	2.20				
Paine Avenue	5	6	2	5	0.27	350	4.65	4.00	5.67	1.30	6.97	203	200	0.35	20.2	0.62	37.99	13.27	96.75		94.52	94.318	2.23	96.85	0.002	94.39	94.185	2.46				
Saddleback Crescent	19	21	2		0.16	7	0.16	4.00	0.11	0.04	0.15	203	200	0.35	20.2	0.62	11.62	20.09	97.12		95.25	95.049	1.87	97.19	0.004	95.21	95.009	1.98				
Saddleback Crescent	21	22	5		0.28	24	0.44	4.00	0.39	0.12	0.51	203	200	0.35	20.2	0.62	57.78	19.73	97.19		95.21	95.004	1.98	97.10	0.03	95.01	94.802	2.09				
Saddleback Crescent	22	23	3		0.21	34	0.65	4.00	0.55	0.18	0.73	203	200	0.35	20.2	0.62	11.34	19.51	97.10		94.98	94.772	2.12	97.02	0.03	94.94	94.732	2.08				
Saddleback Crescent	23	24	13		0.53	78	1.18	4.00	1.27	0.33	1.60	203	200	0.35	20.2	0.62	70.68	18.65	97.02		94.91	94.702	2.11	97.00	0.004	94.66	94.455	2.34				
Saddleback Crescent	24	6	6		0.28	99	1.46	4.00	1.60	0.41	2.01	203	200	0.35	20.2	0.62	59.45	18.24	97.00		94.65	94.451	2.35	96.85	0.06	94.45	94.243	2.40				
Paine Avenue	6	7	4	8	0.44	484	6.55	3.98	7.80	1.83	9.63	254	250	0.26	31.6	0.62	65.18	22.00	96.85		94.39	94.132	2.46	96.57	0.03	94.22	93.963	2.35				
Paine Avenue	7	8			0.00	484	6.55	3.98	7.80	1.83	9.63	254	250	0.26	31.6	0.62	9.86	22.00	96.57		94.19	93.933	2.38	96.63	0.003	94.16	93.907	2.47				
Paine Avenue	8	9	2		0.16	490	6.71	3.98	7.90	1.88	9.78	254	250	0.26	31.6	0.62	27.94	21.85	96.63		94.16	93.904	2.47	96.75	0.06	94.09	**93.831**	2.66				
Clonrush Way	9	41	5	7	0.46	526	7.17	3.96	8.45	2.01	10.45	254	250	0.26	31.6	0.62	74.61	21.18	96.75		**94.03**	93.771	2.72	96.90	0.003	93.83	**93.577**	3.07				
Fallengale Crescent	33	34		2	0.09	5	0.09	4.00	0.09	0.03	0.11	203	200	2.62	55.4	1.71	11.75	55.27	99.72		96.87	96.668	2.85	99.46	0.60	96.56	96.360	2.90				
Fallengale Crescent	34	35		19	0.41	57	0.50	4.00	0.92	0.14	1.06	203	200	0.65	27.6	0.85	66.25	26.53	99.46		95.96	95.760	3.50	98.30	0.008	95.53	95.329	2.77				
Fallengale Crescent	35	36		11	0.26	86	0.76	4.00	1.40	0.21	1.61	203	200	0.40	21.6	0.67	65.38	20.03	98.30		95.52	95.322	2.78	98.10	0.005	95.26	95.060	2.84				
Brettonwood Ridge	37	36		16	0.48	43	0.48	4.00	0.70	0.13	0.83	203	200	0.35	20.2	0.62	69.05	19.41	97.82		95.56	95.362	2.26	98.10	0.06	95.32	95.120	2.78				
Sweetwater Lane	36	38		9	0.21	154	1.45	4.00	2.49	0.41	2.90	203	200	0.35	20.2	0.62	56.14	17.34	98.10		95.26	95.060	2.84	97.53	0.03	95.07	94.864	2.46				
Sweetwater Lane	38	39		14	0.30	192	1.75	4.00	3.11	0.49	3.60	203	200	0.35	20.2	0.62	49.06	16.65	97.53		95.04	94.834	2.49	97.00	0.03	94.87	94.662	2.13				
Sweetwater Lane	39	40		16	0.44	235	2.19	4.00	3.81	0.61	4.42	203	200	0.35	20.2	0.62	68.09	15.82	97.00		94.84	94.632	2.16	96.90	0.004	94.60	94.393	2.30				
Sweetwater Lane	40	41		6	0.16	251	2.35	4.00	4.07	0.66	4.73	203	200	0.35	20.2	0.62	46.99	15.52	96.90		94.59	94.389	2.31	96.90	0.60	94.43	94.225	2.47				
Clonrush Way	41	32	5		0.23	794	9.75	3.86	12.43	2.73	15.16	254	250	0.26	31.6	0.62	46.03	16.48	96.90		93.83	93.574	3.07	96.95	1.32	93.71	93.454	3.24				
Fallengale Crescent	25	26		2	0.12	5	0.12	4.00	0.09	0.03	0.12	203	200	2.57	54.9	1.69	11.21	54.73	99.20		96.16	95.961	3.04	98.95	0.03	95.88	95.673	3.07				
Fallengale Crescent	26	27		19	0.42	57	0.54	4.00	0.92	0.15	1.07	203	200	0.50	24.2	0.75	66.60	23.12	98.95		95.85	95.642	3.10	98.22	0.006	95.51	95.309	2.71				
Fallengale Crescent	27	28		15	0.45	97	0.99	4.00	1.58	0.28	1.85	203	200	0.35	20.2	0.62	65.71	18.39	98.22		95.51	95.303	2.71	97.25	0.004	95.28	95.073	1.97				
Halyard Way	28	29		6	0.26	113	1.25	4.00	1.84	0.35	2.19	203	200	0.35	20.2	0.62	33.30	18.06	97.25		95.27	95.069	1.98	96.97	0.004	95.16	94.952	1.81				
Halyard Way	29	30		16	0.36	157	1.61	4.00	2.54	0.45	2.99	203	200	0.35	20.2	0.62	56.21	17.25	96.97		95.15	94.948	1.82	97.00	0.03	94.95	94.751	2.05				
Halyard Way	30	31		9	0.22	181	1.83	4.00	2.93	0.51	3.44	203	200	0.35	20.2	0.62	62.78	16.80	97.00		94.92	94.721	2.08	97.02	0.001	94.70	94.501	2.32				
Halyard Way	31	32		9	1.05	205	2.88	4.00	3.33	0.81	4.13	203	200	0.35	20.2	0.62	70.93	16.11	97.02		94.70	94.500	2.32	96.95	2.07	94.46	94.252	2.49				
Clonrush Way	32	EX 104A	2		0.11	1006	12.74	3.80	15.48	3.57	19.05	254	250	0.30	34.0	0.67	29.20	14.93	96.95		92.39	92.131	4.56	96.75	0.004	92.30	92.044	4.45				
Block 251 - Park Block	Ex. Stub	EX 104A				0	0.00	4.00	0.00	0.00	0.00	381	375	0.83	166.6	1.46	12.00	166.64	97.00		92.57	92.190	4.43	96.75		92.47	92.090	4.28				
Ex. Overflow Pipe to Interim Pond	EX 104C	EX 104A				0	0.00	4.00	0.00	0.00	0.00	381	375	0.55	135.7	1.19	25.68	135.65	97.00		92.61	92.231	4.39	96.75		92.47	92.090	4.28				
Clonrush Way	EX 104A	EX 200A	5		0.33	1023	13.07	3.79	15.73	3.66	19.38	381	375	0.18	77.6	0.68	76.75	58.22	96.75		92.42	92.038	4.33	96.97		92.28	91.900	4.69				
																					EX.	**92.040**				**EX.**	**91.900**				

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS

ARCADIA STAGE 2
370, 404, 410, 450 Huntmar Drive
CITY OF OTTAWA
MINTO COMMUNITIES INC.

JLR NO. 26299

SANITARY SEWER DESIGN SHEET

Designed by: H.M.
Checked by: K.F.

Date : September 2014

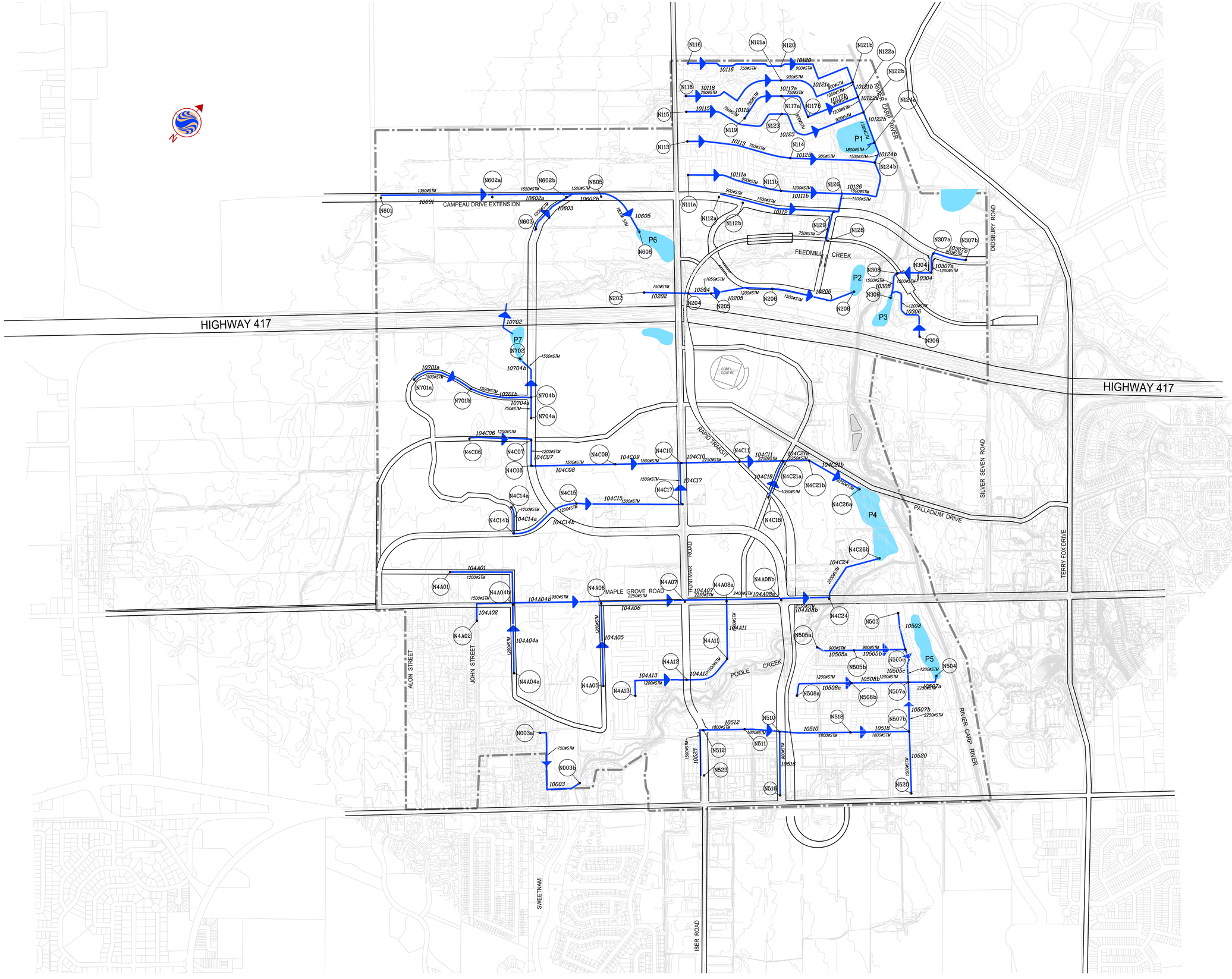
Single Family	3.4	pers/unit	q =	350	L/cap/day
Semi-Detached/Townhouse (row)	2.7	pers/unit	I =	0.280	L/s/ha
			Inst. =	50000	L/ha/day
Manning's Coeff. N =	0.013				

Denotes Existing Sewers

STREET	M.H. #		RESIDENTIAL									Actual	SEWER DATA						RESIDUAL	UPSTREAM					DOWNSTREAM				
			NUMBER OF UNITS			CUMULATIVE		PEAKING	POPUL.	PEAK EXTR.	PEAK DES.																		
			SING.	MULT.	AREA	POPUL.	AREA	FACTOR	FLOW	FLOW	FLOW	DIA.	DIA.	SLOPE	CAPAC.	VEL.	LENGTH	CAP.	Center	Obvert	Obvert	Invert	Cover	Center	Obvert	Obvert	Invert	Cover
	FROM	TO			ha	peop.	ha		l/s	l/s	l/s	mm	mm	%	l/s	m/s	m	l/s	Line	Drop				Line	Drop			
Calvington Avenue	EX. Stub	EX 200A		5	0.19	14	0.19	4.00	0.22	0.05	0.27	203	200	0.61	26.7	0.82	16.50	26.43	97.06		93.81	93.610	3.25	96.97		93.71	93.510	3.26
Calvington Avenue	EX 200A	EX 201A		7	0.29	1056	13.55	3.78	16.19	3.79	19.98	381	375	0.22	86.6	0.76	75.74	66.59	96.97	0.05	92.23	91.850	4.74	97.24		92.06	91.680	5.18
Calvington Avenue	EX 202A	EX 201A		11	0.38	424	6.05	4.00	6.87	1.69	8.56	203	200	0.41	22.0	0.68	72.79	13.40	97.18		93.21	93.010	3.97	97.24		92.91	92.710	4.33
Country Glen Way	EX 201A	EX 216A	9	2	0.49	1516	20.09	3.68	22.57	5.63	28.19	381	375	0.21	83.4	0.73	96.10	55.23	97.24	0.09	91.97	91.590	5.27	97.30		91.77	91.390	5.53
Country Glen Way	EX 216A	EX 217A	15	8	0.91	1588	21.00	3.66	23.56	5.88	29.44	381	375	0.18	76.6	0.67	119.53	47.19	97.30		91.77	91.390	5.53	97.48		91.56	91.180	5.92

A P P E N D I X ‘D’

BACKGROUND STORM SERVICING AND STORMWATER MANAGEMENT DOCUMENTS



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Legend

- KANATA–WEST CONCEPT PLAN BOUNDARY
- 1500#STM — PROPOSED STORM SEWER & SIZE
- N100 — STORM NODE
- 10304 — STORM SEWER IDENTIFICATION

CCL/IBI
Cumming Cockburn Limited
1770 WOODWARD DR., OTTAWA (613)225–1311

2 REVISED FOR DEC.21/05 SUBMISSION	GBU	SJP	DEC.21/05
1 REVISED AS PER CITY COMMENTS (Sept.16/05)	GBU	MAF	OCT.28/05
Revision	By	Appd.	Date

File Name: 160400406	LM	MAF	MAF	AUG./05
	Dwn.	Chkd.	Dsgn.	Date

Seals

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

MODEL SCHEMATIC
STORM SEWER MINOR SYSTEM

Project No.	Scale	Sheet	Revision
60400406	1:7500 (0, 75, 225, 375m)	6 of 7	2

Drawing No. ST-MN

\\01-ott\active\160400570_transportation\design\drawing\160400570_08-Phase_2_Rev_11.dwg
2010-Oct-15 10:04PM By: mcosta

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1505 Laperriere Avenue
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KANATA–WEST CONCEPT PLAN BOUNDARY

POND DRAINAGE BOUNDARY

STORM SEWER DRAINAGE LIMIT

A-1	DRAINAGE AREA IDENTIFICATION
A= 72.31 ha.	AREA IN HECTARES
C= 0.60	RUNOFF COEFFICIENT
I= 246 L/s	100yr. INLET CAPACITY (L/s)
MNR= N4A01	MINOR SYSTEM NODE NUMBER
MJR= 4A01	MAJOR SYSTEM SEGMENT NUMBER
INF=73 mm/yr	INFILTRATION

Notes

* REFER TO FIGURE 3.2 IN KANATA WEST MASTER SERVICING STUDY FOR FURTHER INFILTRATION DETAILS

1. THOSE AREAS WHICH ARE COMPLETELY SURROUNDED BY ARTERIAL ROADWAYS (SPECIFICALLY AREAS A-9, C-9, C-12, C-15, C-17, C-18) MUST PROVIDE SURFACE STORAGE IN THE AMOUNT OF 360m³/ha, OR IN SUFFICIENT QUANTITY TO DEMONSTRATE COMPLETE CONTAINMENT OF THE 100yr EVENT. (i.e. NO MAJOR SYSTEM FLOW IN THE 1:100yr EVENT)

CCL/IBI

Revision	By	Appd.	Date
2 REVISED FOR DEC.21/05 SUBMISSION	GBU	SJP	DEC.21/05
1 REVISED AS PER CITY COMMENTS (Sept.16/05)	GBU	MAF	OCT.28/05

Client/Project

Kanata West Concept Plan
Master Servicing Study

Ottawa, Ontario

Title

STORM DRAINAGE AREA PLAN
NORTH PONDS

Project No. 60400406

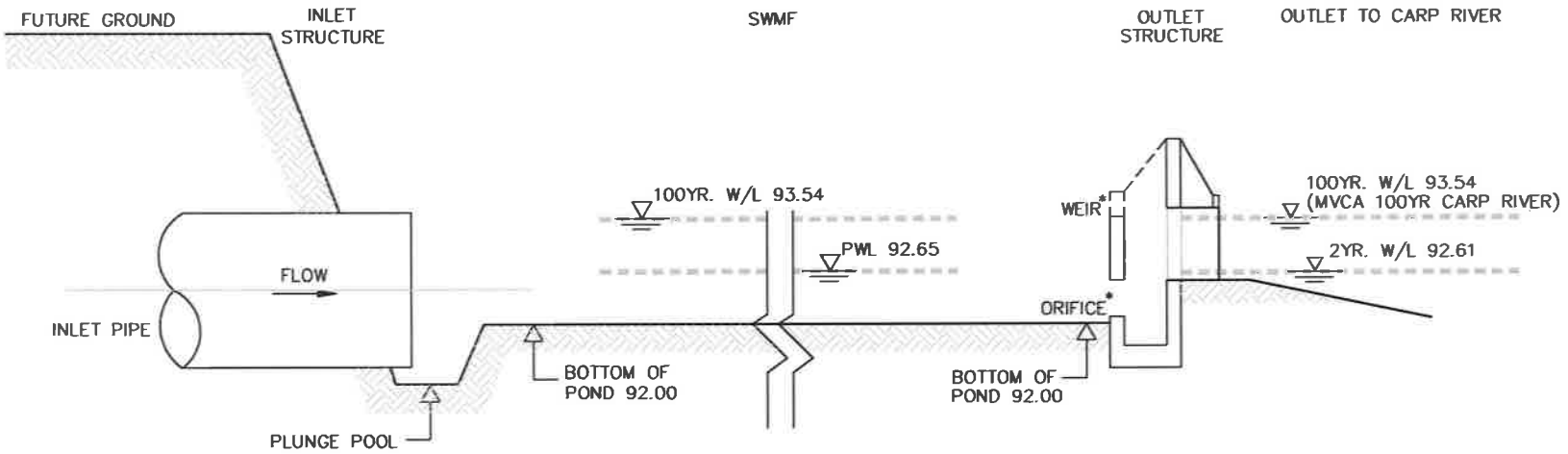
Scale 1:3000 (0, 30, 90, 150m)

Drawing No. ST-PN

Sheet 4 of 7

Revision 2

Plotted By: Stantec Consulting Ltd. 2005-12-20 10:30:32 AM
Last Saved By: mfarrell 2005-12-20 10:30:32 AM
File Name: \\ottawa1\projects\60400406\drawings\servicing\Plan\ST-PN.dwg



NOTE:

* WEIR ELEVATION AND ORIFICE SIZE TO BE ADJUSTED TO PROVIDE EXTENDED DETENTION RELEASE FOR QUALITY TREATMENT.

J:\3775_KanataWest\5.9 Drawings\59swm\current\Phase2\3775 SWM-Figures_ph2-2013-08-21.dwg Layout Name: FIGURE 6

Plot Style: AIA STANDARD COLOR-HALF.CTB Plot Scale: 1:1 Plotted At: Oct. 1, 13 12:27 PM Printed By: PETER DEIR Last Saved By: PDEIR Last Saved At: Sep. 20, 13

IBI GROUP

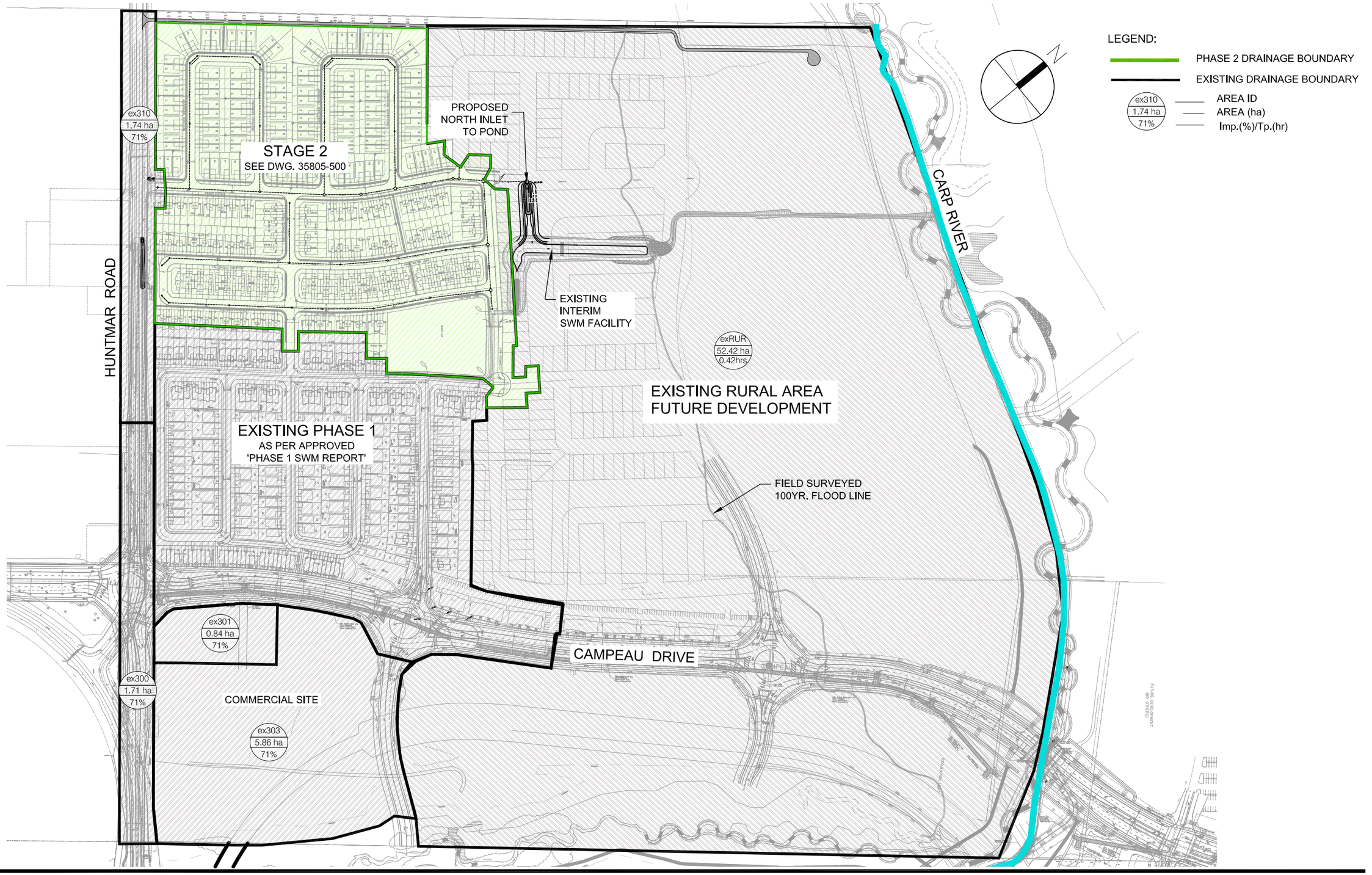
ULTIMATE POND CONCEPTUAL SECTION

FIGURE 6

Sheet No.

PROJECT No. 3775
DATE: 18-09-2013
SCALE: N.T.S.

J:\35805-ArcadiaSWM\5.0 Drawings\50swm\current\35805_ Model Drainage area.dwg Layout Name: 2hur Plot Style: ---- Plot Scale: 1:2.5849 Plotted At: 9/23/2014 12:50 PM Last Saved By: SYukic Last Saved At: Sep. 23, 14



Scale	Project Title	Drawing Title	Sheet No.
1:4000	ARCADIA STAGE 2 SWM REPORT	INTERIM DEVELOPMENT SCENARIO DRAINAGE AREA PLAN	FIGURE 2-RUR

IBI GROUP

AREA TO CAMPEAU DRIVE STORM SYSTEM

CAMPEAU DRIVE

HUNTMAR DRIVE

BLOCK 500

BLOCK 600

BLOCK 700

BLOCK 400

BLOCK 300

BLOCK 800

CRU 901
BLOCK 900

CRU 902

BLOCK 2

FUTURE RAPID TRANSIT

COUNTRY

AREA TO COUNTRY GLEN WAY STORM SYSTEM

UNC 1A 0.02|0.20
UNC 1B 0.02|0.20
UNC 1C 0.02|0.20
UNC 1D 0.02|0.20
110A 0.08|0.90
110B 0.04|0.90
100A 0.03|0.90
100B 0.03|0.90
BLK500 0.09|0.90
BLK600 0.06|0.90
120 0.11|0.90
BLK700 0.10|0.90
122 0.06|0.90
123 0.06|0.90
BLK800 0.06|0.90
201A 0.18|0.75
201B 0.12|0.75
202 0.12|0.75
EXT-1 0.73|0.70
BLK400 0.15|0.90
221A 0.16|0.90
221B 0.03|0.90
221C 0.02|0.90
221D 0.08|0.90
231A 0.11|0.90
232A 0.10|0.90
233A 0.09|0.90
231B 0.11|0.90
232B 0.12|0.90
233B 0.15|0.90
230A 0.06|0.90
230B 0.13|0.90
230C 0.03|0.90
230D 0.04|0.90
230E 0.09|0.90
230F 0.07|0.90
230G 0.10|0.90
230H 0.07|0.90
230I 0.03|0.90
240A 0.05|0.90
240B 0.02|0.90
240C 0.05|0.90
204A 0.07|0.75
204B 0.06|0.75
205A 0.10|0.75
205B 0.06|0.75
BLK300 0.04|0.90
223A 0.15|0.90
223B 0.12|0.90
222A 0.05|0.90
222B 0.07|0.90
BLK200 0.04|0.90
210A 0.12|0.90
210B 0.02|0.90
212A 0.03|0.90
212B 0.03|0.90
206A 0.24|0.90
206B 0.14|0.90
206C 0.07|0.90
206D 0.04|0.90
206E 0.05|0.75
BLK100 0.06|0.90
216A 0.03|0.20
216B 0.04|0.90
215 0.04|0.90
BLK900 0.46|0.90
EXT-2 2.82|0.70
EXT-3 1.11|FLOOD

LEGEND:

210A 0.12|0.90 — AREA ID / RUN OFF COEFFICIENT / AREA IN HECTARES
DRAINAGE AREA LIMITS
MH110 — STORM MANHOLE & NUMBER
STORM SEWER & FLOW DIRECTION
21.6 l/s — CONTROLLED FLOW RATE FROM BUILDINGS
EMERGENCY OVERLAND FLOW ROUTE

EXTERNAL DRAINAGE AREA

KEY PLAN

SITE
CAMPEAU
HWY 417
CYCLONE TAYLOR
HUNTMAR
FRANK TARNOWSKI

APPROVED ☐ REFUSED ☐

DATE _____

Felice Petti, P.Eng., Manager, Development Review
Suburban Services
City of Ottawa

No.	Description	Date	Checked
4	Revised as per City Comments	14:10:02	DGY
3	Revised as per City Comments	14:08:22	DGY
2	Issued for SPA Resubmission	14.06.27	DGY
1	Issued for SPA	13.11.18	DGY

Issued for

All measurements and conditions must be checked on the work by the contractor. This drawing not to be used for construction until signed.

Date

plotted J:\35355-ArcadiaComm\5.9 Drawings\59civil\layouts\C-500.dwg
Layout Name: Storm Drainage Plot Style: AIA STANDARD-FULL.CTB
Plot Scale: 1:1 Plotted At: 10/8/2014 3:42 PM Last Saved By: dslurno Last Saved At: Oct. 3, 14

TN PN

14/10/02

drawn by DPS	scale 1:500
checked by DGY	date NOV. 2013
printed	file 35355

Arcadia Retail Development

Kanata, Ontario

Minto Properties

200 Kent Street • Suite 180 • Ottawa, Ontario • K1P 0B6
Telephone: (613)782-3137 Fax: (613)782-5777

drawing title:
STORM DRAINAGE AREA PLAN
370 HUNTMAR DRIVE
OTTAWA, ON.

IBI GROUP

drawing no.
C-500

333 Preston Street Tower 1, Suite 400
Ottawa, Ontario Canada K1S 5N4 Tel (613)225-1311 FAX (613)225-9868

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

March 26, 2018
Our File No.: 26299-01

VIA: E-MAIL

Mr. Curtiss Scarlett, P.Eng.
Land Development Manager
Minto Communities
200-180 Kent Street
Ottawa, ON K1P 0B6

Dear Mr. Scarlett:

Re: Arcadia Residential Stages 3, 4 and 5 and Commercial Stages 2 and 3
Proposed Stormwater Management Strategy
Proposed Minor Deviation to the Kanata West Master Servicing Study

In 2006, the Kanata West Master Servicing Study (KWMSS) was prepared on behalf of the Kanata West Owners Group (KWOG) to investigate servicing requirements for the mixed-use community known as Kanata West. In terms of stormwater servicing and stormwater management (SWM), the KWMSS recommended that the ±725 ha area be serviced by seven (7) water stormwater management facilities spread over the entire Kanata West Study Area. The largest facility in Kanata West, Pond 1, was identified to serve as the dedicated stormwater outlet for approximately 77 ha, which included all of Minto Communities' Arcadia development (east of Huntmar Drive and west of the Carp River), the future Transitway corridor (north of Feedmill Creek), and the Campeau Drive right-of-way (between Huntmar Drive and the Carp River), refer to Figure 1 – Location Plan.

An 'interim' wet pond facility was designed by IBI and subsequently constructed in 2012 to allow for the development of Arcadia Stage 1 residential and commercial, Stage 2, and a portion of the Campeau Drive right-of-way (ROW) to proceed in advance of the construction of Pond 1, since construction of Pond 1 could not proceed until the Carp restoration works were completed. It was intended that this existing 'interim' pond would be decommissioned once the Carp River restoration works were completed and the permanent Pond 1 was constructed to service future phases.

Since 2015, JLR has been working to develop an optimal stormwater servicing solution for the remainder of the Minto Arcadia lands referred to as residential Stages 3, 4 and 5 and Commercial Stages 2 and 3. This work culminated with a the issuance of a Stormwater Management (SWM) Strategy Report dated April 2017 (revised January 2018) which outlined a recommended stormwater servicing strategy for the remaining undeveloped Arcadia lands, which included two wet ponds that would provide quantity and quality control prior to outletting to the Carp River.

Prior to deriving the recommended two-pond SWM strategy, JLR completed a stormwater servicing design for the Arcadia lands based on the KWMSS Pond 1 concept. This design was

CANADA'S BEST MANAGED COMPANIES

completed in accordance with the latest design criteria, many of which had changed since the issuance of the 2006 KWMSS. The following design criteria have been revised since the 2006 KWMSS was issued:

- The City of Ottawa Sewer Design Guidelines was re-issued in October 2012.
- The City completed a calibrated PCSWMM model of the Carp River in 2017 and developed target hydrographs that are to be respected under post-development conditions.
- The detailed design for the Campeau Drive ROW and the Campeau Bridge was completed by the City's consultant Stantec that included a minimum centreline elevation of 94.30.
- Arcadia residential Stages 1 and 2 were constructed and Minto developed a concept plan for the remainder of the subdivision that differed from the concept referenced in the KWMSS.
- A pre-loading program was carried out (and is still being carried out) and more detailed grade raise restrictions were identified by Minto's geotechnical consultant, Paterson Group.

JLR completed a conceptual stormwater servicing design for the Arcadia lands based on the KWMSS Pond 1 concept and the aforementioned revised design criteria. In completing this design, some significant constraints were identified, as outlined in Appendix 'C' of the January 2018 SWM Strategy Report and as summarized below:

1. A crossing conflict between the Paine Avenue trunk storm sewer and the Riverchase sanitary sewer would exist.
2. The 1:100 year HGL would exceed the centreline road elevation on Campeau Drive at the proposed low point elevation of 94.30.
3. The Riverchase Road trunk sewer and a portion of the Campeau Drive storm sewer would be completely submerged.
4. There would be extensive standing water along the storm sewer system.
5. There would be a high 1:100 year HGL along the southern portion of the subdivision adjacent to Campeau Drive and consequently a grade difference greater than two metres between the subdivision and the Campeau ROW would be expected.

Three (3) storm servicing and SWM alternatives were subsequently developed to mitigate the constraints identified in the updated KWMSS Pond 1 strategy developed by JLR and included in the January 2018 SWM Strategy Report. Of the options evaluated, a two-pond strategy consisting of one pond at Paine Avenue and one pond south of Campeau Drive immediately west of the Carp River corridor (refer to Figure 1), was found to successfully mitigate the constraints identified in the other options evaluated. Details associated with the proposed two-pond strategy are summarized in Table 3-3 and Figure 3-3 of the January 2018 SWM Strategy Report.

It is acknowledged that the recommended two-pond strategy slightly deviates from the Pond 1 strategy recommended in the 2006 KWMSS; however, the spirit of the Class Environmental Assessment is maintained. It is also acknowledged that an eight pond alternative was evaluated as part of the 2006 KWMSS and was ultimately rejected for the recommended seven pond strategy for Kanata West. It should be noted that both the seven and eight pond options included a single facility servicing the 77 ha drainage area consisting of the Minto lands and the Campeau and Transitway ROWs.

The selection of the seven pond option over the eight pond option in the KWMSS was predominantly due to the increased land requirements as well as the capital, operation and maintenance costs associated with having an additional pond, as per Table 5.2 of the 2006 KWMSS. Based on the findings presented in the January 2018 SWM Strategy Report, however, an additional pond servicing the subject 77 ha drainage area would be advantageous to both land owners (i.e., Minto and the City of Ottawa) for the following reasons:

1. Although two ponds would require more capital, operational and maintenance costs compared to a single pond, two ponds would allow for the following:
    - Reduced operation and maintenance costs due to reduced length of standing water along the storm sewer system (by 130 m).
    - Reduced operation and maintenance costs as well as replacement costs associated with smaller and shallower trunk storm sewers.
    - Reduced lengths of storm sewers to be cost shared between the City and Minto to service the Campeau Drive and Transitway ROWs as well as Minto's commercial lands located south of Campeau Drive (from approximately 600 m to 170 m).

2. While the two-pond option requires ±0.6 ha more land compared to the single KWMSS Pond 1 option based on the conceptual designs presented in the January 2018 SWM Strategy Report, the Campeau Pond block makes use of essentially undevelopable land resulting from the limitations imposed by the parcel's narrow width adjacent to the Transitway corridor and limited accessibility (i.e., site entrance).

3. The Campeau Pond provides a reduced 1:100 year HGL along the storm sewer system at critical locations including:
    - The Campeau Drive low point of 94.30 located 120 m east of Riverchase (the Campeau Pond allows for the 1:100 year HGL to be below the low point elevation of 94.30 whereas the HGL in the Pond 1 strategy would exceed the proposed centreline elevation).
    - The Campeau Pond provides the lowest possible HGL at the southern limit of the subdivision, thus minimizing the grade difference between the subdivision and Campeau Drive.

For the aforementioned reasons, the two-pond SWM strategy as outlined in the January 2018 SWM Strategy Report is recommended to service the Arcadia Development, the Campeau Drive ROW and the future Transitway corridor. It is suggested that the advantages identified herein outweigh the additional land use impacts and costs associated with the additional pond, as identified in the 2006 KWMSS evaluation. Furthermore, it is

suggested that the inclusion of the second pond is considered to be a minor deviation from the original 2006 KWMSS recommended strategy as the overall intent of the SWM strategy for the subject area is maintained. Furthermore, the proposed minor deviation impacts only two land owners (Minto and the City) and offers key advantages to both.

Should you have any questions, please do not hesitate to call.

Yours very truly,

J.L. RICHARDS & ASSOCIATES LIMITED

Prepared by:

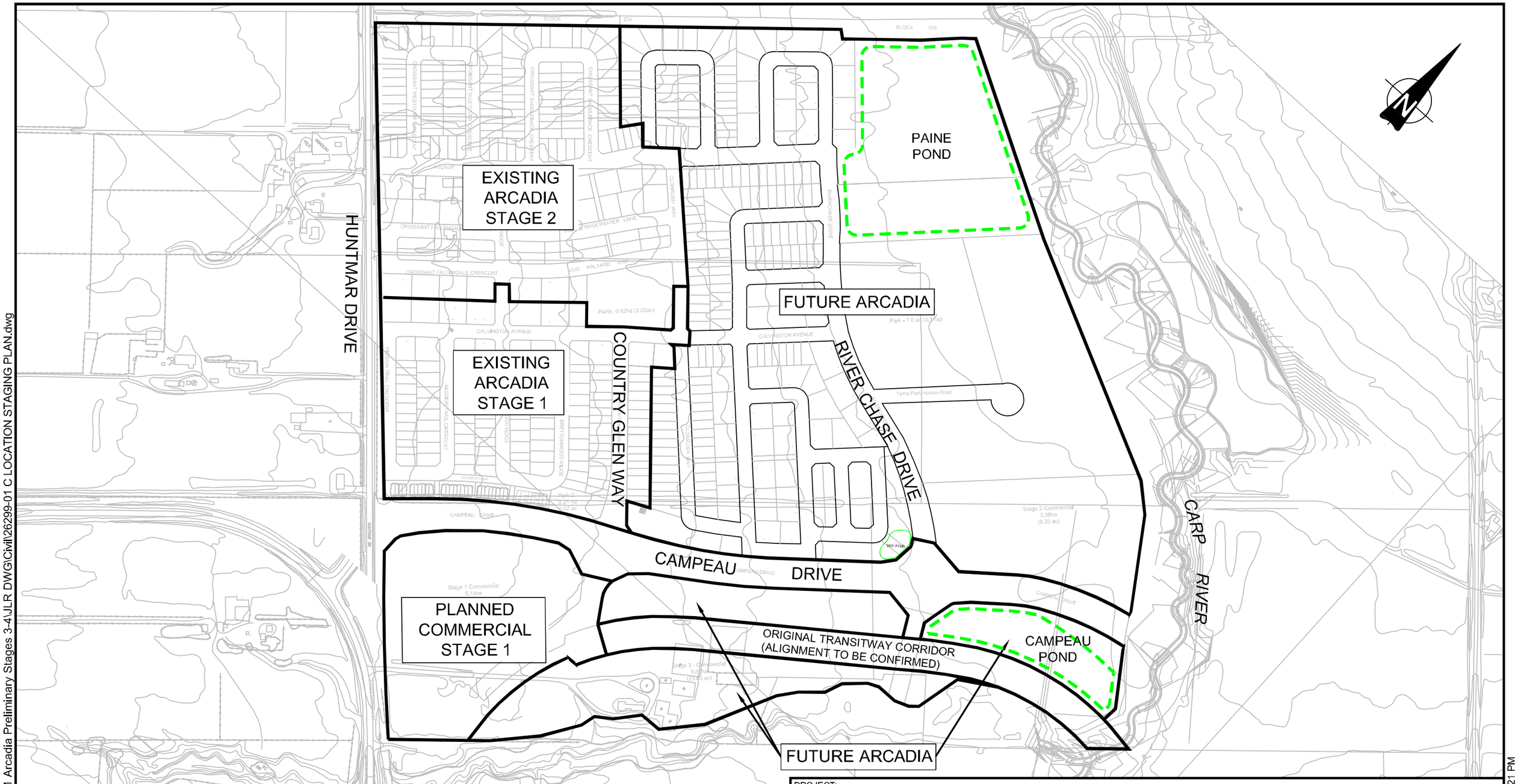
Hilary MacKay, P.Eng.
Civil Engineer

Reviewed by:

Guy Forget, P.Eng., LEED AP
Associate
Senior Water Resources Engineer

HM:jd

cc: Ms. Sue Murphy, Minto Communities Inc.
Ms. Lucie Dalrymple, J.L. Richards & Associates Limited



PROJECT:

MINTO COMMUNITIES INC.
ARCADIA LANDS

DRAWING:

LOCATION PLAN

J.L.Richards
ENGINEERS · ARCHITECTS · PLANNERS
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DESIGN:	HM
DRAWN:	TB
CHECKED:	LD
JLR #:	26299-01

NOT TO SCALE

DRAWING #:

FIGURE 1

File Location: R:\26000\26299-01 Arcadia Preliminary Stages 3-4\JLR DWG\Civil\26299-01 C LOCATION STAGING PLAN.dwg

PLOT DATE: March 23, 2018 1:15:21 PM

LEGEND

- PROPOSED STORM SEWER & MANHOLE
- PROPOSED SANITARY SEWER & MANHOLE
- PROPOSED WATERMAIN
- EXISTING STORM SEWER & MANHOLE
- EXISTING SANITARY SEWER & MANHOLE
- EXISTING WATERMAIN
- STAGE LIMIT

No.	ISSUE / REVISION	DD/MM/YY
1	ISSUED WITH SERVICING BRIEF	18/05/18

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SCALE: 1:2000

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.
ARCADIA RESIDENTIAL STAGES 3, 4, 5; AND COMMERCIAL STAGE 2
450 HUNTMAR DRIVE

DRAWING:
CONCEPTUAL
SITE SERVICING

OPTION 8

DESIGN: LD	
DRAWN: TB	DRAWING #: CS8
CHECKED: LD	
JLR #: 26299-01	

PLOT DATE: May 23, 2018 3:26:14 PM

File Location: R:\26000\26299-01 Arcadia Preliminary Stages 3-4\JLR DWG\Civil\CONCEPTUAL OPTIONS\26299-01 C Stages3-4 CS8.dwg

REGULATION LIMIT
(FROM MVCA)

CARP RIVER
100 YEAR FLOOD PLAIN
(FROM MVCA)

EXISTING STAGE 2

EXISTING STAGE 1

STAGE 3

STAGE 4

STAGE 3

Commercial
Stage 1

Commercial
Stage 2

FUTURE
STAGE 5
CONCEPTUAL

BLOCK 222
PARK

BLOCK 58
8m Service Block/Pathway

Block 59
Grading Easement

REGULATION LIMIT
(FROM MVCA)

FEEDMILL CREEK
100 YEAR FLOOD PLAIN
(FROM MVCA)

CITY'S PREFERRED
LRT CORRIDOR
(FROM CITY'S ON-GOING EA)
AND CONSTRUCTION EASEMENT

CAMPEAU STATION

BLOCK 19
RESERVE

rue Journeyman Street

CARP RIVER

PRELIMINARY

LEGEND

GRADE RAISE RESTRICTIONS PER PATERSON DWG NO. PG0539-16

95.45	MAXIMUM ROAD CENTRELINE GRADE WITH LWP REQUIRED FOR HOUSING
95.15	MAXIMUM ROAD CENTRELINE GRADE WITH CONVENTIONAL HOUSE BACKFILL
95.90	MAXIMUM ROAD CENTRELINE GRADE WITH HOUSING ON IN SITU OR ENGINEERED FILL
94.70	ESTIMATED IN SITU SOIL OR ENGINEERED FILL LEVEL
95.85	PROPOSED CENTERLINE GRADE
	MAJOR OVERLAND FLOW DIRECTION

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CONSULTANT:

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PROJECT NORTH

PROJECT:
MINTO COMMUNITIES INC.
ARCADIA RESIDENTIAL STAGES
3, 4, 5; AND
COMMERCIAL STAGE 2
450 HUNTMAR DRIVE

DRAWING:
CONCEPTUAL
GRADING PLAN

DESIGN: HM	
DRAWN: TB	DRAWING #: CG8
CHECKED: HM/LD	
JLR #: 26299-01	

PLOT DATE: May 23, 2018 10:46:45 AM

File Location: R:\26000\26299-01 Arcadia Preliminary Stages 3-4\JLR DWG\Civil\CONCEPTUAL OPTIONS\26299-01 C Stage3-4 CG8.dwg

PROJECT NORTH:

HUNTMAR DR
WESTOVER CRES
PAINE AVE
SADDLEBACK CRES
BRETTONWOOD RIDGE
SWEETWATER LANE
FALLENGALE CRES
CLONRUSH WAY
CALVINGTON AVE
MISSION TRAIL CRES
SILVERTIP LANE
COUNTRY GLEN WAY
CAMPEAU DR
TERRY FOX DR

1	ISSUED WITH SERVICING BRIEF	23/05/18
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SCALE: 0 20 40 80 120 Meters

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CONSULTANT:

PROFESSIONAL STAMP

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PROJECT:
MINTO COMMUNITIES INC.
ARCADIA RESIDENTIAL STAGES 3, 4, 5, AND COMMERCIAL STAGE 2
450 HUNTMAR DRIVE

DRAWING:
SANITARY HGL RESULTS ONE OVERFLOW
OPTION 8

DESIGN: BP	
DRAWN: TB	DRAWING #:
CHECKED: BP	**SAN1**
JLR #: 26299-01	

FILE LOCATION: R:\26000\26299-01 Arcadia Preliminary Stages 3-4\Design\Civil\SWM Servicing Strategy Report - 2 Pond Options\May 2018\FIGURES\26299-01 FIGURE1 SAN 1.mxd

PLOT DATE: May 23, 2018 3:40:14 PM

PROJECT NORTH:

HUNTMAR DR
WESTOVER CRES
SADDLEBACK CRES
PAINE AVE
BRETTONWOOD RIDGE
SWEETWATER LANE
FALLENGALE CRES
CLONRUSH WAY
TERRY FOX DR
CALVINGTON AVE
MISSION TRAIL CRES
SILVERTIP LANE
COUNTRY GLEN WAY
CAMPEAU DR

No.	ISSUE / REVISION	DD/MM/YY
1	ISSUED WITH SERVICING BRIEF	23/05/18

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SCALE: 0 20 40 80 120 Meters

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CONSULTANT:

PROFESSIONAL STAMP

PROFESSIONAL STAMP

PROJECT:
MINTO COMMUNITIES INC.
ARCADIA RESIDENTIAL STAGES 3, 4, 5, AND COMMERCIAL STAGE 2
450 HUNTMAR DRIVE

DRAWING:
SANITARY HGL RESULTS TWO OVERFLOWS

OPTION 8

DESIGN: BP	
DRAWN: TB	DRAWING #: SAN2
CHECKED: BP	
JLR #: 26299-01	

FILE LOCATION: R:\26000\26299-01 Arcadia Preliminary Stages 3-4\Design\Civil\SWM Servicing Strategy Report - 2 Pond Options\May 2018\FIGURES\26299-01 FIGURE2 SAN2.mxd

PLOT DATE: May 23, 2018 3:39:28 PM

PROJECT NORTH:

LEGEND:

1.29
MH-172-160

AREA IN HECTARES

PIPE REACH UPSTREAM MAINTENANCE HOLE TO DOWNSTREAM MAINTENANCE HOLE

WESTOVER CRES
HUNTMAR DR
SADDLEBACK CRES
PAINE AVE
BRETTONWOOD RIDGE
FALLENGALE CRES
SWEETWATER LANE
HALYARD WAY
CLONRUSH WAY
CALVINGTON AVE
MISSION TRAIL CRES
SILVERTIP LANE
COUNTRY GLEN WAY
CAMPEAU DR
TERRY FOX DR

MH70 MH56 MH57 MH69 MH73 MH74 MH54 MH72 MH66 MH58 MH59 MH60 MH52 MH75 MH76 MH44 MH46 MH43 MH45 MH38 MH41 MH22 MH456 MH452 MH454 MH42 MH24 MH20 MH457 MH450 MH451 MH455 MH33 MH35 MH14 MH453 MH32 MH31 MH12 MH10 MH461 MH460 MH458 MH459 MHSA65343 MHSA65330 MHSA65348 MHSA65349 MHSA65350 MHSA65351 MHSA65352

0.55 | MH166-168
1.4 | MH170-156
0.92 | MH172-160
1.29 | MH173-174
5.3 | POND_AREA_PAINE
0.46 | MH159-160
0.33 | MH160-512
0.33 | MH146-150
0.86 | MH151-150
0.91 | MH144-151
0.69 | MH144E-146
2.64 | PAINE_POND_PARK
0.29 | MH143-144
0.31 | MH122-146
0.68 | MH141-122
0.29 | MH138-140
0.61 | MH120-122
1.69 | MH552-554
0.83 | MH551-552
1.76 | MH553-554
0.25 | MH140-142
0.34 | MH142E-124
0.82 | MH136-134
0.46 | MH142-135
0.73 | MH124-114
0.61 | MH111-120
0.64 | MH550-551
0.54 | MH133E-135
0.81 | MH135-114
1.22 | MH557-561
0.54 | MH133-132
0.78 | MH110-111
0.77 | MH132-131
0.73 | MH131-112
0.37 | MH114-112
0.2 | MH112-113A
1.2 | MH559-560
0.83 | MH559-560_PARK
0.43 | 201-OUTLET_S
0.47 | 201-OUTLET_N
2.48 | FUTURE_WEST
0.18 | 113a-115
0.26 | 117-100
0.61 | CAP-117_S
0.62 | CAP-117_N
2.29 | POND_AREA_CAMPEAU
1.46 | TRANSITWAY

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SCALE: 0 20 40 80 120 Meters

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CONSULTANT:

PROFESSIONAL STAMP

PROFESSIONAL STAMP

PROJECT:
MINTO COMMUNITIES INC.
ARCADIA RESIDENTIAL STAGES 3, 4, 5, AND COMMERCIAL STAGE 2
450 HUNTMAR DRIVE

DRAWING:
SANITARY DRAINAGE
OPTION 8

DESIGN: BP
DRAWN: TB
CHECKED: BP
JLR #: 26299-01
DRAWING #: D-SAN

FILE LOCATION: R:\26000\26299-01 Arcadia Preliminary Stages 3-4\Design\Civil\SWM Servicing Strategy Report - 2 Pond Options\May 2018\FIGURES\26299-01 FIGURE3 DSAN.mxd

PLOT DATE: May 23, 2018 3:41:59 PM

PROJECT NORTH:

LEGEND:

1.29 / 0.65 / MH-172-160	AREA IN HECTARES RUNOFF COEFFICIENT PIPE REACH UPSTREAM MAINTENANCE HOLE TO DOWNSTREAM MAINTENANCE HOLE

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SCALE: 0 20 40 80 120 Meters

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CONSULTANT:

PROFESSIONAL STAMP

PROFESSIONAL STAMP

PROJECT:
MINTO COMMUNITIES INC.
ARCADIA RESIDENTIAL STAGES 3, 4, 5, AND COMMERCIAL STAGE 2
450 HUNTMAR DRIVE

DRAWING:
STORM DRAINAGE
OPTION 8

DESIGN: BP	
DRAWN: TB	DRAWING #:
CHECKED: BP	**D-STORM**
JLR #: 26299-01	

FILE LOCATION: R:\26000\26299-01 Arcadia Preliminary Stages 3-4\Design\Civil\SWM Servicing Strategy Report - 2 Pond Options\May 2018\FIGURES\26299-01 FIGURE4_DSTM.mxd

PLOT DATE: May 24, 2018 9:45:23 AM