

July 14th, 2023

Our File: **2017-4610**

City of Barrie
Development Services
70 Collier Street
Barrie, Ontario
L4M 4T5



SCHAEFFERS
CONSULTING ENGINEERS

6 Ronrose Drive, Vaughan, Ontario L4K 4R3
Tel: (905) 738-6100 Fax: (905) 738-6875
Tor. Line: (416) 213-5590 E-mail: general@schaeffers.com

Attention: Larry Klein

Dear Mr. Klein

Re: Functional Servicing Verification Memorandum – Townhouse Layout Change
Watersand Residential Subdivision Phase 1 - Salem Secondary Plan Area
City of Barrie

1. Introduction

This memorandum examines the impact of architectural changes to townhouse blocks in the Watersand Residential Subdivision development within the Salem Secondary Plan area. The investigation focuses on grading, above-ground structures, and servicing, with specific attention given to townhouses along Bellot Lane and Sable Lane. It should be noted that the proposed layout will be applied to townhouse blocks in the future phases west of the NHS area.

Originally, the townhouse blocks on the south side of the laneway featured single detached garages and grassed backyards, however, the latest architectural revision suggests widening the garages to create double garages and expanded driveways. The townhouse blocks on the north side of the laneways will undergo minor modifications, including adjustments to the driveway length and attached garage depth. Please find the latest townhouse layout in **Attachments**.

2. Grading and Above Ground Structures

It is confirmed that alterations to the townhouses on both sides of the laneways will have minimal impact on grading design. Regarding above-ground structure clearances, the only utility on the south side of Bellot Lane and Sable Lane are streetlights, while utilities on the north side are proposed to be located within an easement alongside the laneways. It has been verified that

the revised layout will not cause any conflicts with the streetlight easements on the south side or the utility easement on the north side.

3. Servicing

Water Supply Servicing

The latest architectural plan has been verified to comply with the approved Daft Plan of the Subdivision prepared by KLM on October 16, 2018, in terms of the number of proposed units. Consequently, the non-emergency water demands of the townhouse units remain unchanged. Furthermore, the original approved fire demand of 155 L/s for townhouse units is still applicable. Therefore, the previously proposed water supply servicing plan for the subdivision will adequately meet the needs of the townhouses with the new layout. The approved Daft Plan of the Subdivision (October 16, 2018) and the Water Supply Analysis Report prepared by Schaeffers in July 2020 are included in the **Attachments**.

Sanitary Servicing

The proposed number of units in the latest architectural plan aligns with the previously approved Draft Plan of the Subdivision (October 16, 2018). As such, the sanitary demand of the townhouses will remain unchanged, and the previously proposed sanitary servicing plan will remain valid and sufficient. The approved Functional Servicing Report for the subdivision prepared by Schaeffers and dated December 2018 is included in the **Attachments**.

Stormwater Management Plan

Modified building layout with double garage and expanded driveways will result in additional impermeable surfaces, leading to an increased volume of runoff discharged into the proposed SWM Pond A. SWM Pond A proposed at the southern boundary of the subdivision is designed to receive the runoff from the townhouse blocks. The original pond design is detailed in the Stormwater Management Report prepared by Schaeffers in August 2021 for the design of SWM Pond A/ External Roadworks Watersand Residential Subdivision Phase 1 Salem Secondary Plan. Relevant excerpts from the SWM report are attached for reference.

In the original pond design, the affected townhouse blocks were calculated to have an imperviousness of 74% and were assigned a higher imperviousness of 79% based on the NVCA

runoff coefficient for multiple attached residential developments. According to the area breakdown attached to this memo, using the latest architectural plan, the imperviousness of the modified townhouse blocks has been calculated to range from 75% to 77%.

Given that the original pond design already considered a higher imperviousness level for the townhouse blocks, the proposed modification to the layout will not result in additional runoff beyond what was initially designed. Therefore, it is confirmed that SWM Pond A can accommodate the modified townhouses in terms of quality, quantity, and erosion controls, and the storm sewers and Low Impact Developments (LID's) proposed for the subdivision are adequately sized.

4. Future Townhouse Blocks West of Thornton Creek

The same townhouse design concept will be implemented for the future phases of the Watersand Subdivision, located west of Thornton Creek. The number of units will remain unchanged, and the revised layout is not expected to exceed the design guideline value for imperviousness. Therefore, it is anticipated that the proposed alteration will not have an impact on the servicing plans for the western area. However, it is important to ensure that the future servicing plans for the west are appropriately designed to accommodate the new layout.

We trust that the provided information is sufficient for your review and approval. If you have any comments, please do not hesitate to contact us.

Respectfully submitted,

SCHAEFFER & ASSOCIATES LTD.

Ming Gao

Ming Gao, M.Eng., E.I.T.

Water Resources Analyst



Sadh Katukurunde, P.Eng.

Junior Associate



ATTACHMENTS

Estimating Sheet - TIMP for Townhouse Block 210, 211, 212 (represents the Worst Case)

Block 210

Total Block Area = 1559.64 sqm
Roof Area = 890.48 sqm
Outdoor Driveway Area = 279.95 sqm
Porch Area = 35.65 sqm
Grassed Area = 353.56 sqm



Block 210

Total Impervious Areas = 1206.08 sqm
Total Pervious Areas = 353.56 sqm
TIMP = 77%
C-Value = 0.74

Block 211

Total Block Area = 1200.19 sqm
Roof Area = 551.47 sqm
Outdoor Driveway Area = 321.10 sqm
Porch Area = 25.20 sqm
Grassed Area = 302.41 sqm



Block 210

Total Impervious Areas = 897.78 sqm
Total Pervious Areas = 302.41 sqm
TIMP = 75%
C-Value = 0.72

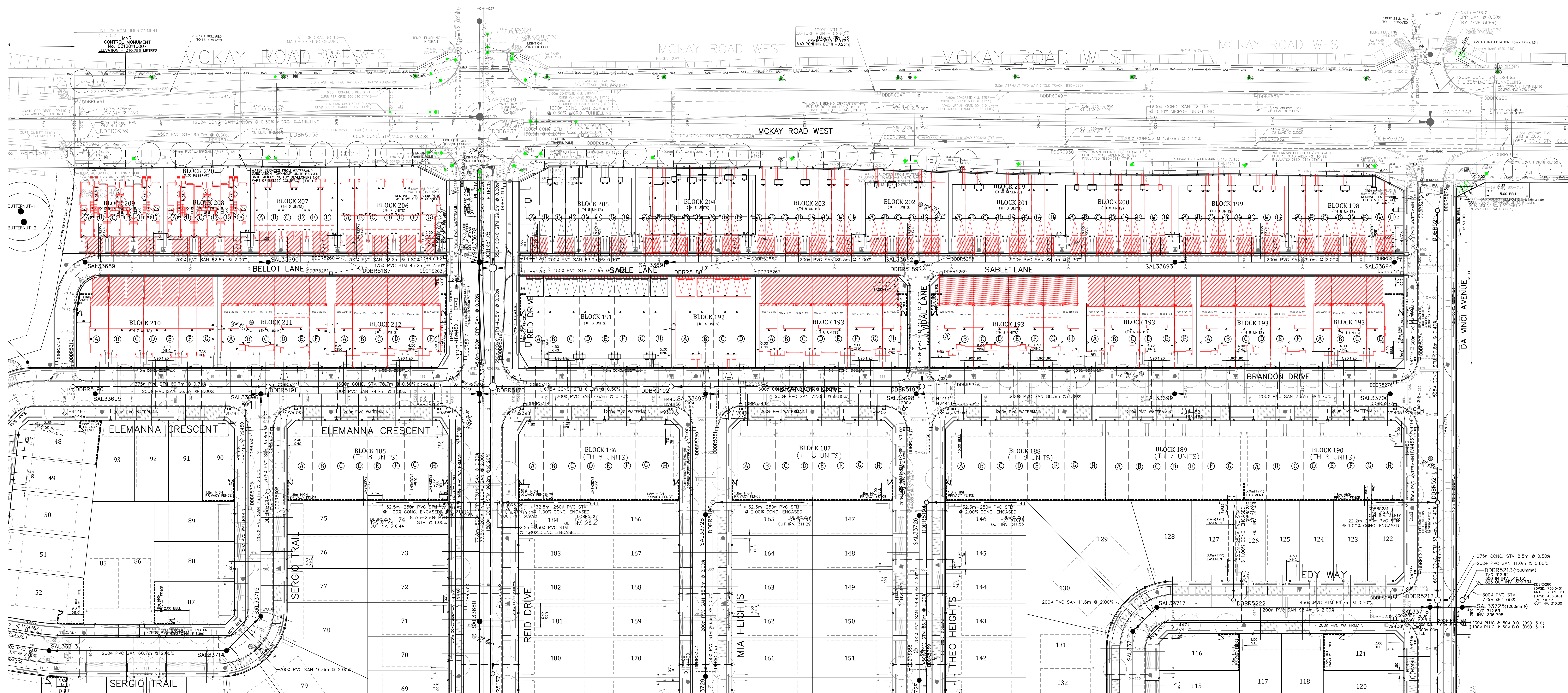
Block 212

Total Block Area = 1219.03 sqm
Roof Area = 584.51 sqm
Outdoor Driveway Area = 321.10 sqm
Porch Area = 28.69 sqm
Grassed Area = 284.73 sqm



Block 210

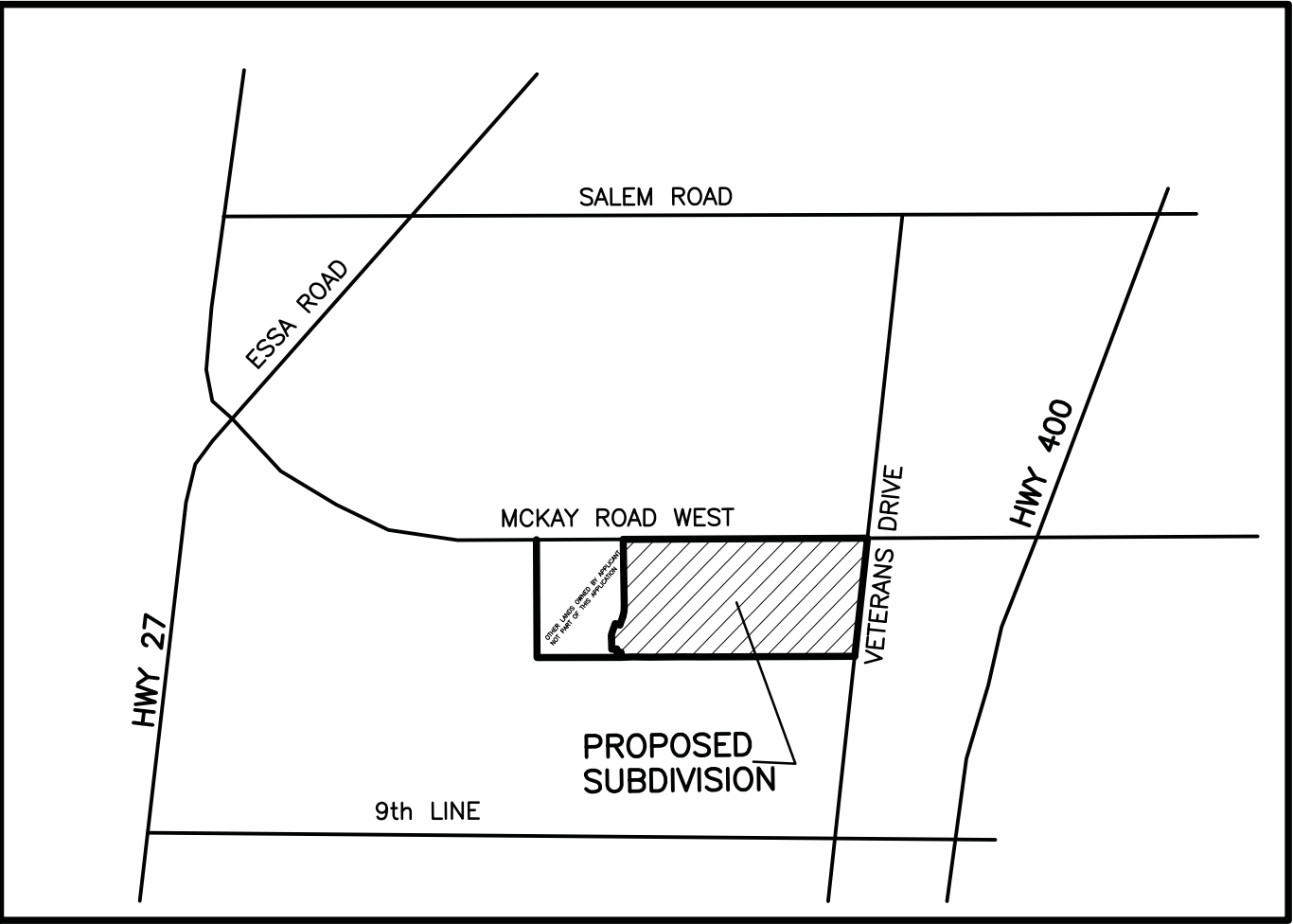
Total Impervious Areas = 934.30 sqm
Total Pervious Areas = 284.73 sqm
TIMP = 77%
C-Value = 0.74



DRAFT PLAN OF SUBDIVISION
PART OF THE NORTH HALF OF LOT 3,
ALL OF THE NORTH HALF OF LOT 4
AND PART OF LOT 5, CONCESSION 9
(GEOGRAPHIC TOWNSHIP OF INNISFIL)
CITY OF BARRIE
COUNTY OF SIMCOE

SCALE 1:2000

DRAFT PLAN T-



KEY PLAN

SECTION 51, PLANNING ACT,
ADDITIONAL INFORMATION

- A. AS SHOWN ON DRAFT PLAN
- B. AS SHOWN ON DRAFT PLAN
- C. AS SHOWN ON DRAFT PLAN
- D. SEE SCHEDULE OF LAND USE
- E. AS SHOWN ON DRAFT PLAN
- F. AS SHOWN ON DRAFT PLAN
- G. AS SHOWN ON DRAFT PLAN
- H. MUNICIPAL PIPED WATER AVAILABLE AT TIME OF DEVELOPMENT
- I. CLAY-LOAM
- J. AS SHOWN ON DRAFT PLAN
- K. SANITARY AND STORM SEWERS, GARBAGE COLLECTION, FIRE PROTECTION
- L. AS SHOWN ON DRAFT PLAN

SURVEYOR'S CERTIFICATE

I HEREBY CERTIFY THAT THE BOUNDARIES OF THE LAND TO BE
SUBDIVIDED AS SHOWN ON THIS PLAN, AND THEIR RELATIONSHIP TO
THE ADJACENT LAND ARE ACCURATELY AND CORRECTLY SHOWN.

DATE SEPT. 20, 2016 2018

GARY B. VANDERVEEN
ONTARIO LAND SURVEYOR

HOLDING JONES VANDERVEEN INC.

OWNER'S CERTIFICATE

I AUTHORIZE KLM PLANNING PARTNERS INC. TO PREPARE AND SUBMIT
THIS DRAFT PLAN OF SUBDIVISION TO THE CITY OF BARRIE FOR APPROVAL.

OWNER

WATERSAND CONSTRUCTION LTD.

C/O

DG GROUP
30 FLORAL PARKWAY
SUITE 300
CONCORD, ONTARIO
L4K 4R1

ROBERT D. GASPERIS
A.S.O.

SCHEDULE OF LAND USE

TOTAL AREA OF LAND = 119.032±Ha. (294.134±Acs.)

[PHASE 1]

TOTAL AREA FOR PHASE 1 = 88.557±Ha. (218.829±Acs.)

LOTS FOR SINGLE FAMILY DWELLINGS

LOTS	2, 3, 5-13, 15, 43, 53-56, 292, 397-399, 402-410, 412, 413, 422-425, 458, 604, 635-640, 652-665 and 670	59	59	3.002	7.418
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LOTS	14, 16, 17, 21-36, 40-42, 44, 51, 52, 57, 73-87, 109-121, 141-151, 160-163, 180-189, 197, 198, 206-215, 223, 224, 232-241, 249, 250, 258-267, 275-280, 288, 297, 298, 303, 304, 310, 311, 317-319, 327, 328, 334, 336-339, 348-352, 358, 359, 366-370, 392, 393, 396, 400, 401, 411, 414-418, 426, 427, 432-436, 442-457, 459, 466-472, 474-477, 495-499, 502, 505-518, 520-527, 550-557, 560-565, 592-600, 603, 605-610, 631-634, 648-651, 668, 669, 673-675, 683-690, 692-700, 716-718, 724-726, 735-737, 743-745, 753-755, 765-768, 781-782, 786, 787, 791-793, 817-819, 823-826, 840-843, 846-848, 868-871, 876-878, 888-893, 903-905, 927-930 and 951	345	345	13.906	34.363
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LOTS	1, 4, 18-20, 37-39, 45-50, 58-60, 63-72, 86-95, 100-108, 122-128, 133-140, 152-157, 164-170, 175-179, 190-196, 199-205, 216-222, 225-231, 242-248, 251-257, 268-274, 281-287, 289-291, 293-296, 299-302, 305-309, 312-316, 320-326, 329-333, 335, 340-347, 353-357, 360-365, 371-391, 394, 395, 419-421, 428-431, 437-441, 460-465, 473, 478-485, 489-494, 500, 501, 503, 504, 519, 528-535, 539-549, 558, 559, 566-583, 585-591, 601, 602, 611-620, 626-630, 641-647, 666, 667, 671, 672, 676-678, 680-682, 691, 701, 703-715, 722, 723, 727-734, 738, 739, 746-749, 756-764, 769, 770, 773-778, 780, 783, 785, 788-790, 794-804, 808-816, 827-830, 834-839, 844, 845, 849-859, 863-867, 872-875, 879-880, 884-887, 894-896, 900-902, 906-912, 931-950, 952-955, 972-980, 984-990, 998-1006, 1010-1018, 1023-1029, 1033-1038, 1061-1068, 1072-1079, 1092-1095 and 1099-1106	551	551	17.865	44.145
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LOTS	61, 62, 96-99, 129-132, 158, 159, 171-174, 486-488, 536-538, 584, 621-625, 679, 702, 719-721, 740-742, 750-752, 771, 772, 779, 784, 805-807, 820-822, 831-833, 860-862, 881-883, 897-899, 913-926, 956-971, 981-983, 991-997, 1007-1009, 1019-1022, 1030-1032, 1039-1060, 1069-1071, 1080-1091, 1096-1098 and 1107-1113	158	158	4.426	10.937
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MEDIUM DENSITY

STREET TOWNHOUSES

BLOCKS	1014-1128 and 1151-1156	21	157	3.119	7.707
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LANEWAY TOWNHOUSES

BLOCKS	1129-1138 and 1157-1162	16	103	2.143	5.295
BLOCKS	1139-1150 and 1163-1169	19	143	2.008	4.962

SUBTOTAL	56	1,113	1,516	46.469	114.827
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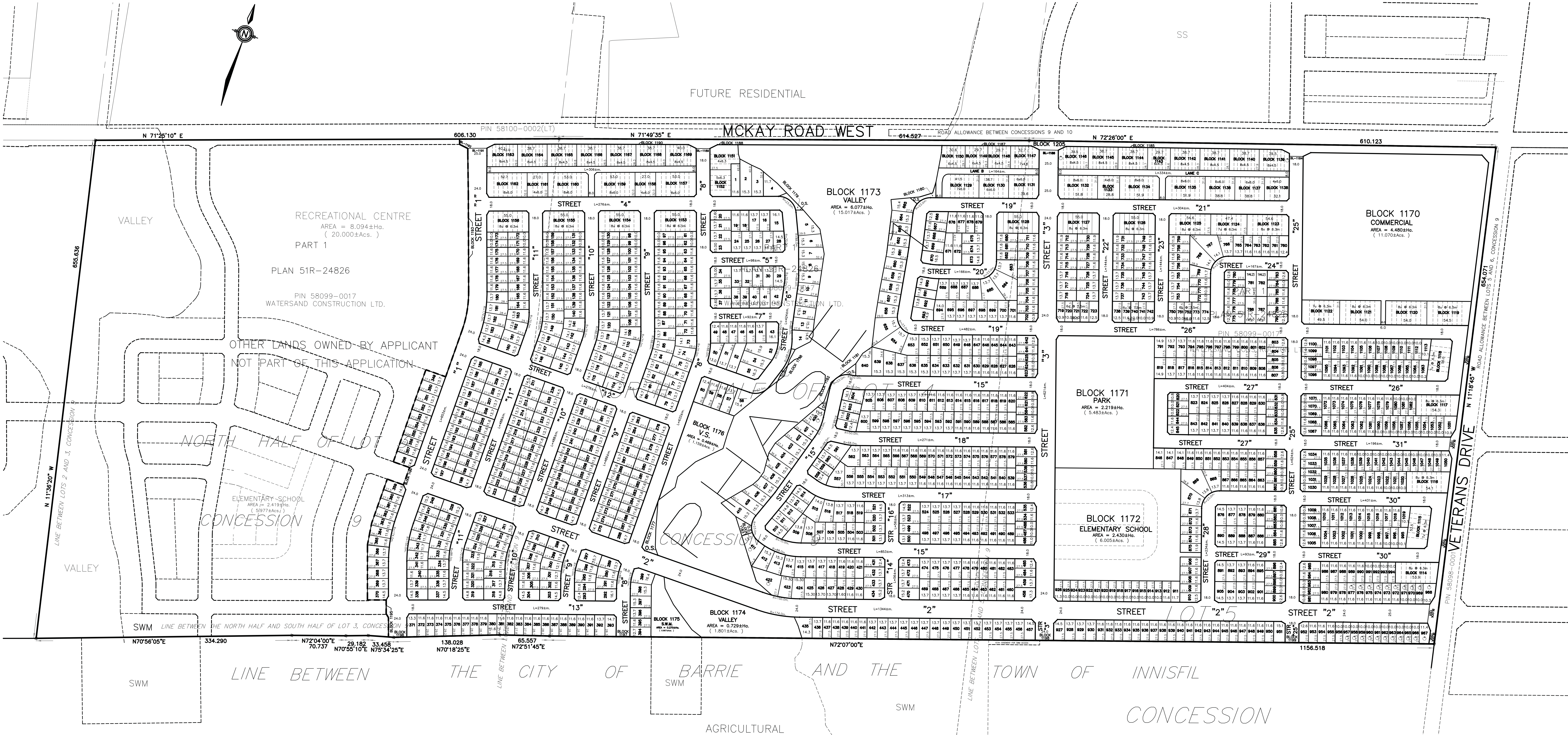
BLOCK	1170	1	4.480	11.070
BLOCK	1171	1	2.219	5.483
BLOCK	1172	1	2.430	6.005
BLOCKS	1173 and 1174	2	6.806	16.818
BLOCK	1175	1	0.270	0.667
BLOCK	1176	1	0.469	1.159
BLOCKS	1177 - 1183	7	0.176	0.435
BLOCKS	1184 - 1204	21	0.051	0.126
BLOCK	1205	1	1.572	3.885

STREETS AND LANEWAYS	23.615	58.354
25.0m. WIDE TOTAL LENGTH= 806m. AREA= 0.204±Ha.		
24.0m. WIDE TOTAL LENGTH= 2,538m. AREA= 6.091±Ha.		
18.0m. WIDE TOTAL LENGTH= 9,202m. AREA= 16.981±Ha.		
8.0m. WIDE TOTAL LENGTH= 804m. AREA= 0.643±Ha.		
TOTAL TOTAL LENGTH= 12,689m. AREA= 23.615±Ha.		

TOTAL	92	1,113	1,516	88.557	218.829
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NOTE — ELEVATIONS RELATED TO CANADIAN GEODETIC DATUM MAY REQUIRE SPECIAL BUILDING FOOTPRINT

PROJECT No. P-190
SCALE 1:2000 OCT 16, 2018
(190DES41) X-REF: (190MAS2 & 190MTOPO)
KLM DWG. No. - 18:5
PLANNING PARTNERS INC. 64 JARDIN DRIVE - UNIT 1B, CONCORD, ONTARIO L4K 3P3
Planning • Design • Development
TEL: (905) 669-4055 FAX: (905) 669-0097 design@klmplanning.com



WATER SUPPLY ANALYSIS REPORT

**WATERSAND RESIDENTIAL SUBDIVISION
PHASE 1**

CITY OF BARRIE

PROJECT 2017-4610

**NOVEMBER 2018
REVISED: DECEMBER 2019
JANUARY 2020
MAY 2020
JULY 2020**



SCHAEFFERS
CONSULTING ENGINEERS

6 Ronrose Drive
Concord, Ontario L4K 34R

1.0 MUNICIPAL SERVICING

1.1 Introduction

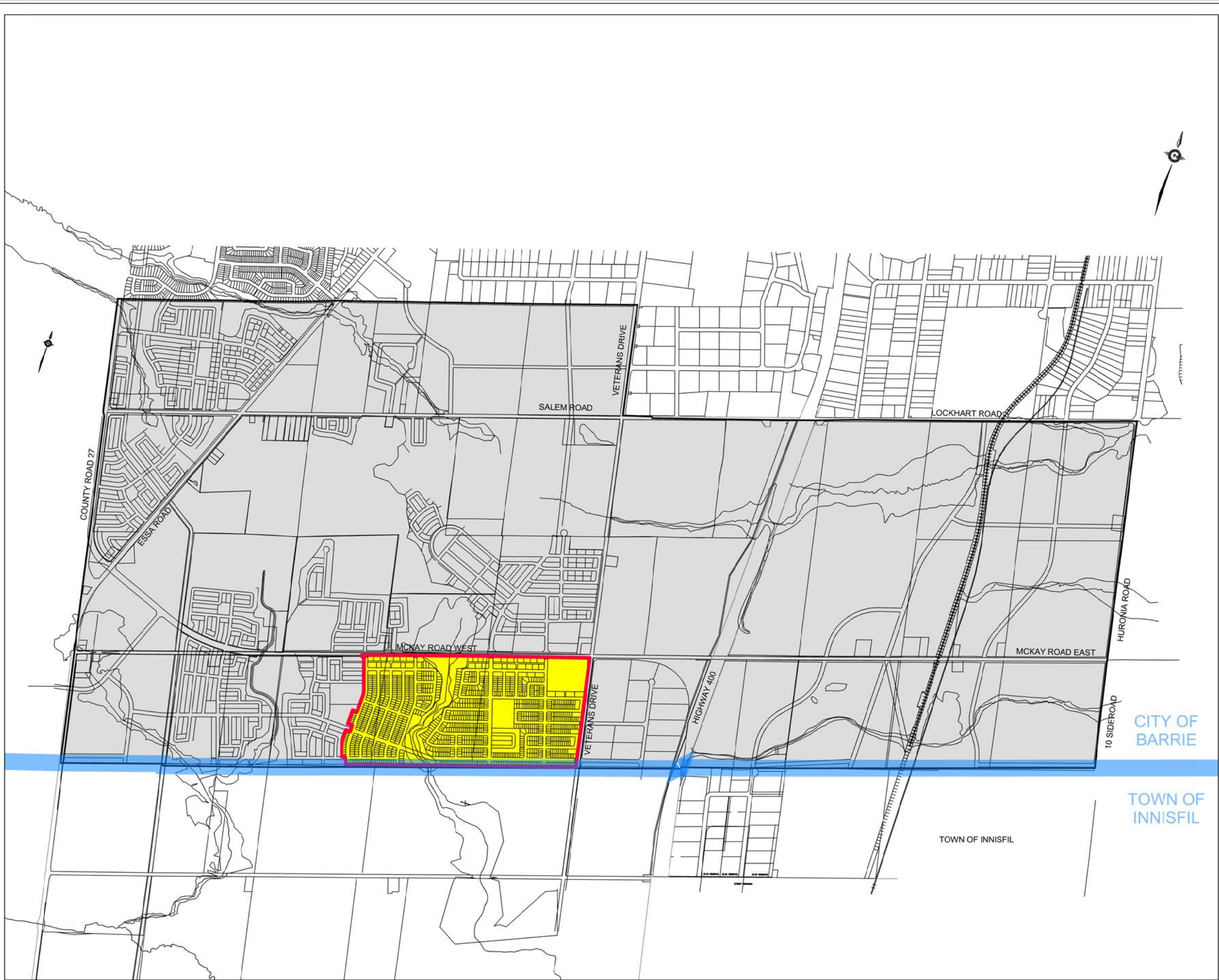
The following sections demonstrate that the proposed water distribution plan can adequately supply potable drinking water to the proposed Watersand residential subdivision. The proposed subdivision is located within Phase 1 Stage 1 of the Salem Secondary Plan Area and is within the boundaries of McKay Road West to the north; highway 400 to the east; the municipal border between City of Barrie and Town of Innisfil to the south; and Crown Avenue to the west. Phase 1 of the subject site is within the boundaries of McKay Road West to the North; Da Vinci Avenue to the east; Reid Drive to the west; and Walker Street, Norma Street and Arrabella Marie Crescent to the south. The location plan is provided in **Figure 1.1**. The draft plan is provided in **Appendix A**. The subject site was previously analyzed as part of the *Sub-watershed Impact Study (SIS), Salem Annexed Lands, City of Barrie* completed by Schaeffers Consulting Engineers dated December 2017.

1.2 Existing Conditions

Currently, the City of Barrie has five pressure districts:

- District 1 (High Water level (HWL) = 281.2 meters above sea level (masl)) [PD1]
- District 2 North (324.09 masl) [PD2N]
- District 3 North (347 masl) [PD3N]
- District 2 South (308 masl) [PD2S]
- District 3 South (350.2 masl) [PD3S]

The subject site falls into PD3S with predevelopment elevations ranging from approximately 310 masl to 313 masl. The existing infrastructure present within the vicinity of the site includes a 300mmØ watermain along Salem Road east of Veterans Drive and a 500mmØ watermain along Veterans Drive north of Salem Road. There is currently no distribution system within the subject lands. Two pump stations and the Maplevue reservoir storage facility that services the pre-annexation area are on the Maplevue road, west of Veterans Drive.



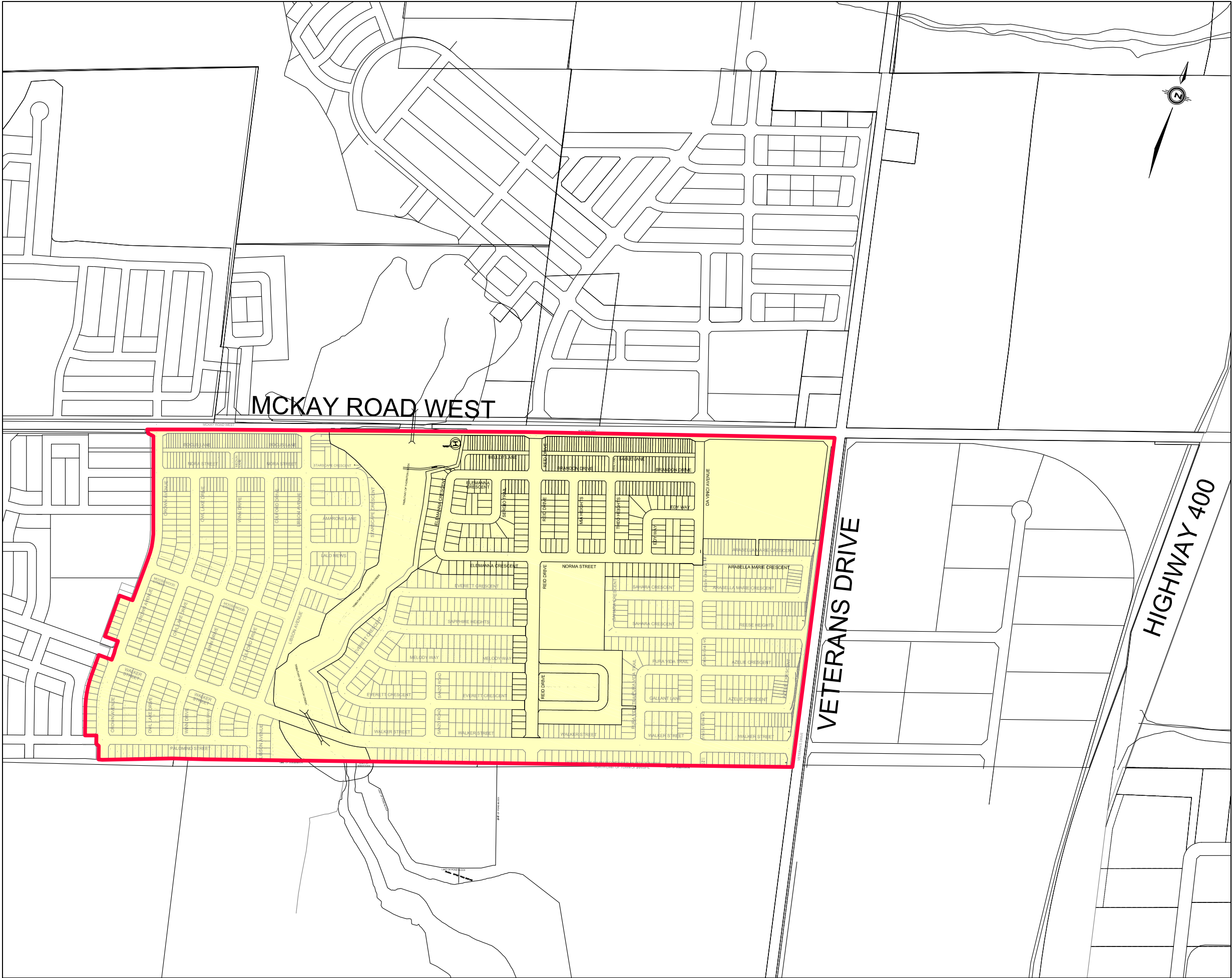
WATERSAND RESIDENTIAL SUBDIVISION
SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

LEGEND

-  SUBJECT AREA
-  SALEM SECONDARY PLAN (SSP) DEVELOPMENT PLAN AREA

 **SCHAEFFERS**
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

FIGURE 1.1
LOCATION PLAN



WATERSAND RESIDENTIAL SUBDIVISION
SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

LEGEND

SUBJECT AREA



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CONSULTING ENGINEERS

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FIGURE 1.2
DEVELOPMENT PLAN

1.3 Boundary Conditions

The subject site will be connected to the existing system via two proposed watermain along Veterans Drive, from McKay Road to Salem Road. The 500mmØ concrete watermain is the main watermain, while the 400mmØ PVC watermain will be a temporary watermain used to ensure looping in the interim system before the ultimate buildout.

City of Barrie Water Supply model was provided by the City in order to analyze the proposed system under various demand scenarios (Average Day, Max Day + Fire Flow, Peak Hour, and Minimum Hour) as per the City criteria. Maximum Day Demand 2016 model was used to determine the boundary conditions and make the model of the water supply system for the subject site. Mapleview 3 tank has the maximum level of 350.15 meters above sea level (masl) and that level is used for the Minimum Hour Demand scenario. The Mapleview 3 tank initial level of 348.65 masl was used for other scenarios as that is the level at which the pumps in the City of Barrie system are set to turn on and resupply the Mapleview 3 tank.

1.4 Design Criteria

Water distribution criteria based on City of Barrie Water Distribution Policies and Design Guidelines (2012) are summarized as the following:

- Watermains for the ultimate development shall be designed in accordance with the current City of Barrie Water Storage and Distribution Master Plan.
- The average residential daily demand of 225 L per capita per day and 28 m³/ha*day for institutional and commercial land use.
- Peaking factors per MOE guidelines are as follows: Maximum Daily Flow = 2.5, Minimum Hour Flow = 0.45, Peak Hour Flow = 3.75
- Fire flow demands: 100 L/s for single family homes, 155 L/s for townhouses, 200 L/s for institutional and convenience, and 283 L/s for commercial as per the recommendation of City of Barrie based on the recently updated design criteria. The architectural details are not available for townhouses, school block and commercial block, therefore, the water supply for public fire protection calculation was not done. All flows must arrive with a minimum pressure of 140 kPa.

- Allowable pressure range under operating conditions (peak hour – min hour) shall be within 275 kPa – 700 kPa.
- The watermain size shall be determined by fire flow plus maximum day use.
- Minimum size of watermain is 150mmØ.

Water Demands were calculated for the proposed development based on unit types and counts derived from the latest draft plan. The population was calculated assuming a density of 2.34 person per unit (ppu) for townhouses and 3.13 ppu for single-family houses. Daily demands for institutional, commercial, and employment blocks were calculated based on the area using 28 m³/ha/day flow per City of Barrie criteria. Detailed water demand calculations for the proposed development can be found in **Appendix B** for reference.

The Hazen Williams coefficients used in the model are listed in **Table 1-1**.

Table 1-1: Hazen Williams Coefficients

Pipe Diameter (mm)	Coefficient
150	100
200-250	110
300-600	120
600+	130

The following minimum and maximum pressures apply to all watermains.

- a) The minimum pressure during the peak hourly demand – 275 kPa.
- b) Maximum pressure during the minimum hourly demand – 690 kPa.
- c) Minimum Fire Flow pressure when the system is tested for Fire Flow during Max daily flow – 140 kPa.

1.5 Phase 1 - Proposed Water Supply System

Phase 1 will be serviced by the 500mmØ and 400mmØ watermain on Veterans Drive and the 400mmØ watermain on McKay Road. Phase 1 will be serviced internally by 200mmØ watermain and two 300mmØ watermain, one on Reid Dr and another one on Da Vinci Ave. Watersand Phase 1 will connect to the McKay watermain at the intersections of McKay and Reid Dr, and McKay and Da Vinci Ave. Phase 1 will connect to the Veterans Drive at Arabella Marie Crescent. The water supply demands for the Watersand Phase 1 are summarized in **Table 1-2** below including each design demand scenario. Further detail of the water demands please refer to the calculations provided in **Appendix B** and the WaterCAD modeling provided in **Appendix C**.

Table 1-2: Watersand Phase 1 Water Supply Demand Scenarios

Watersand Phase 1 Residential Subdivision	Demand				Fire Flow	Critical Scenario Max Day + Fire
	Average Day	Min Hour	Peak Hour	Max Day		
	L/s	L/s	L/s	L/s		
	5.49	2.74	14.14	9.81		292.81

1.6 Ultimate Buildout – Proposed Water Supply System

The Ultimate buildout will be serviced by the 500mmØ and 400mmØ watermain on Veterans Drive (from Salem Road to McKay Road West) and 400mmØ watermain on McKay Road West and Veterans Drive (south of McKay Road West). Watersand subdivision will be serviced internally by 200mmØ watermain and three (3) 300mmØ watermain on Walker Street, Reid Drive and Da Vinci Ave. The water supply demands for the ultimate buildout of the Watersand subdivision are summarized in **Table 1-3** below including each design demand scenario. For further details on the water demand please refer to the calculations provided in **Appendix B** and the WaterCAD modeling provided in **Appendix C**.

Table 1-3: Watersand Ultimate Buildout Water Supply Demand Scenarios

Watersand Residential Subdivision	Demand				Fire Flow	Critical Scenario Max Day + Fire
	Average Day	Min Hour	Peak Hour	Max Day		
	L/s	L/s	L/s	L/s		
	14.35	7.17	40.73	27.54		310.54

1.7 WaterCAD Modelling and Results for Phase 1 and Ultimate

WaterCAD (CONNECT Edition) water supply modeling was prepared in order to analyze the proposed system under various demand scenarios (Average Day, Max Day, Peak Hour, Fire Flow) as per the City criteria. The base of the model was the imported EPANET model from the City of Barrie. The base was not changed or manipulated; City's model was updated with the proposed Watersand subdivision. WaterCAD modeling outputs for the various demand scenarios are included in **Appendix C** for reference.

WaterCAD modeling of the proposed water supply system demonstrated that Phase 1 of the Watersand subdivision can be serviced in accordance with the City of Barrie's requirements. **Table 1-4** below presents the pressure range expected as per the WaterCAD modeling.

Table 1-4: Expected Pressure Range in Watersand Phase 1

Servicing Scenario	Maximum Pressure (kPa)	Minimum Pressure (kPa)
Average Day	382	355
Peak Hour	380	353
Max Day	380	353

Fire flow simulations showed that the required fire flows at a minimum of 140 kPa are achieved at each node.

WaterCAD modeling of the proposed water supply system demonstrated that Phase 1 of the Watersand subdivision can be serviced in accordance with the City of Barrie's requirements. **Table 1-5** below presents the pressure range expected as per the WaterCAD modeling.

Table 1-5: Expected Pressure Range in Watersand Ultimate Buildout

Servicing Scenario	Maximum Pressure (kPa)	Minimum Pressure (kPa)
Average Day	384	348
Peak Hour	379	343
Max Day	381	345

1.8 Water Age Analysis

Water age analysis was performed in the InfoWater software for the entire Phase 1. There is no available data on the occupancy phasing, therefore the analysis was performed for the 100% occupancy of Phase 1, with the City of Barrie's demand pattern PAT3S-CAL-RES and the average demand. The simulation duration was 240 hours. The required water age is 3 to 5 days. The dead-end on the south end of Reid Dr shows water age of over five (5) days (135 hours), while other areas of the Phase 1 also show water age in the range of four (4) to five (5) days (98 hours to 120 hours). Therefore, it is recommended to install two autoflusher units; one at the south end of Reid Drive, and another in the middle of Norma Street that should be operated regularly in order to alleviate the water age issue in Phase 1.

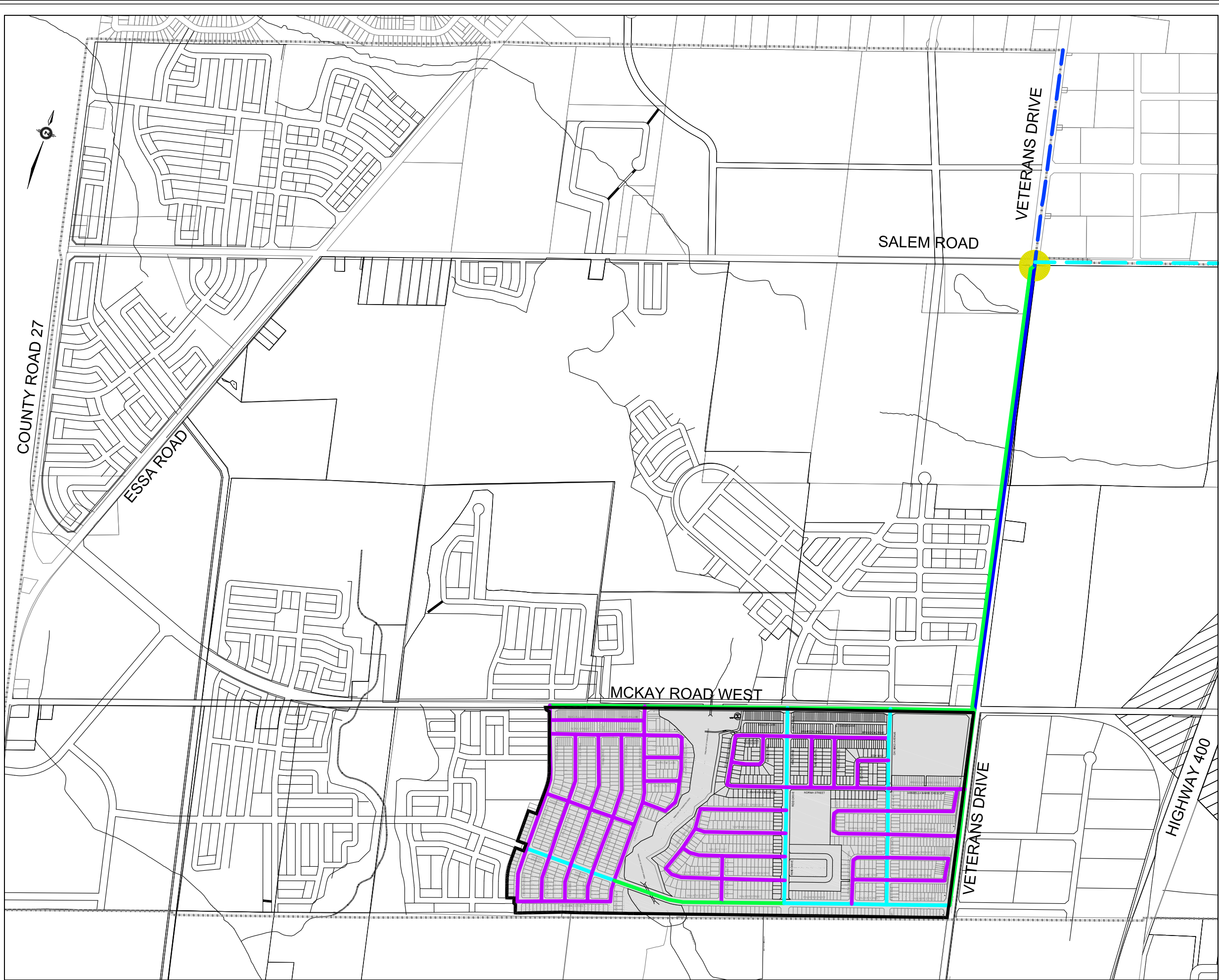
The proposed autoflushers are presented in detail in the Autoflusher Units Summary memo which will be supplied together with this report. Water age analysis results for Phase 1 and 2 at 100% occupancy show maximum water age of 114 hours; therefore, autoflusher stations will only be necessary until Phase 2 is constructed and occupied.

The water age analysis for each phase 1 and subsequent phases is presented in **Appendix B**.

In summary, the analysis determined that:

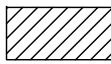
- Minimum pressures can be met during all demand scenarios (e.g. minimum hour, peak hour, and max day plus fire flow demands)
- Sufficient supply can be provided to meet both normal operating demands as well as fire flow demands.
- Maximum pressures (during minimum hour conditions) are below the target value of 690 kPa.

For detailed results, please refer to **Appendix C** for modeling output.



WATERSAND RESIDENTIAL SUBDIVISION
SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

LEGEND

-  SUBJECT SITE
-  HIGHWAY / INTERCHANGE
-  200mmØ WATERMAIN
-  300mmØ WATERMAIN
-  400mmØ WATERMAIN
-  500mmØ WATERMAIN
-  EXISTING 300mmØ WATERMAIN
-  EXISTING 500mmØ WATERMAIN
-  CONNECTION TO EXISTING WATERMAIN

 **SCHAEFFERS**
CONSULTING ENGINEERS
6 Ronrose Drive, Concord, Ontario L4K 4R3
Tel: (905) 738-6100 Email: general@schaeffers.com
www.schaeffers.com

FIGURE 1.3
WATER SUPPLY

2.0 SUMMARY AND CLOSING REMARKS

This report provides the City of Barrie with the necessary water supply analysis to support the design of water supply network for the Phase 1 as well as the Ultimate buildout of the Watersand Subdivision in Stage 1 of Phase 1 of Salem Secondary Plan. Water supply to the Phase 1 and the Ultimate buildout of the Watersand Subdivision will be provided by the PD3S system via the proposed pipeline south of Veterans Drive and Salem Road connecting it to existing watermain. The proposed water distribution system will meet all of the City water supply servicing requirements during all demand scenarios. Water age is exceeding the required five days in Phase 1 at the dead-end on Reid Drive. Two autoflusher stations are proposed to alleviate this water age issue until Phase 2 is constructed and occupied.

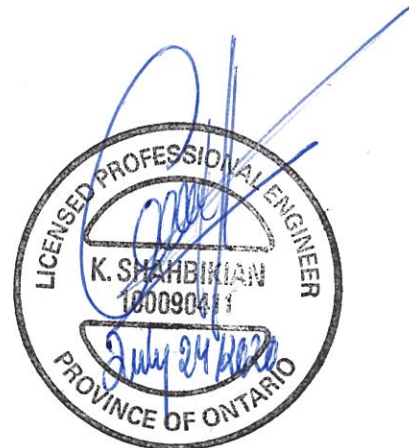
We trust that you will find the contents of this report satisfactory. Please contact the undersigned if you have any questions or concerns.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.



Bogdan Pavlovic, MEng, E.I.T.,
Water Resources Analyst



Koryun Shahbikian, LLM, M. Eng., P.Eng., PMP
Partner

FUNCTIONAL SERVICING REPORT

**WATERSAND CONSTRUCTION C/O DG GROUP
PHASE 1 SALEM SECONDARY PLAN**

PROPOSED RESIDENTIAL DEVELOPMENT

CITY OF BARRIE

PROJECT 4610

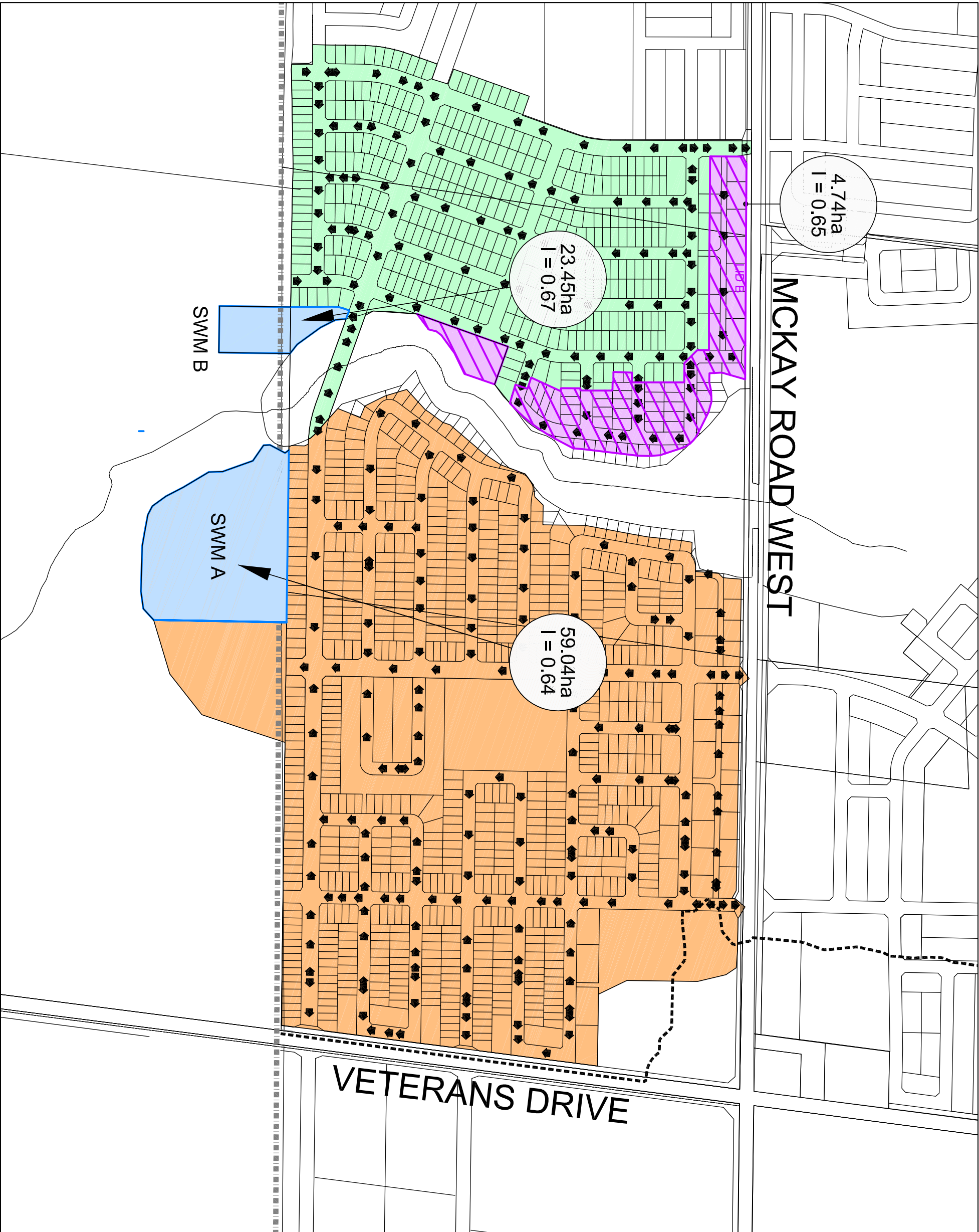
**REVISED: DECEMBER 2018
JULY 2017**

Revision	Description	Prepared		Approved	
		By	Date	By	Date
1.	Revised FSR Submission	S.Katukurunde	Dec. 2018	K. Shahbikian	Dec. 2018
0.	FSR Submission	S. Monteith	Oct. 2016	S. Monteith	Oct. 2016



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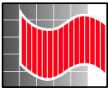
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WATERSAND RESIDENTIAL SUBDIVISION
SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

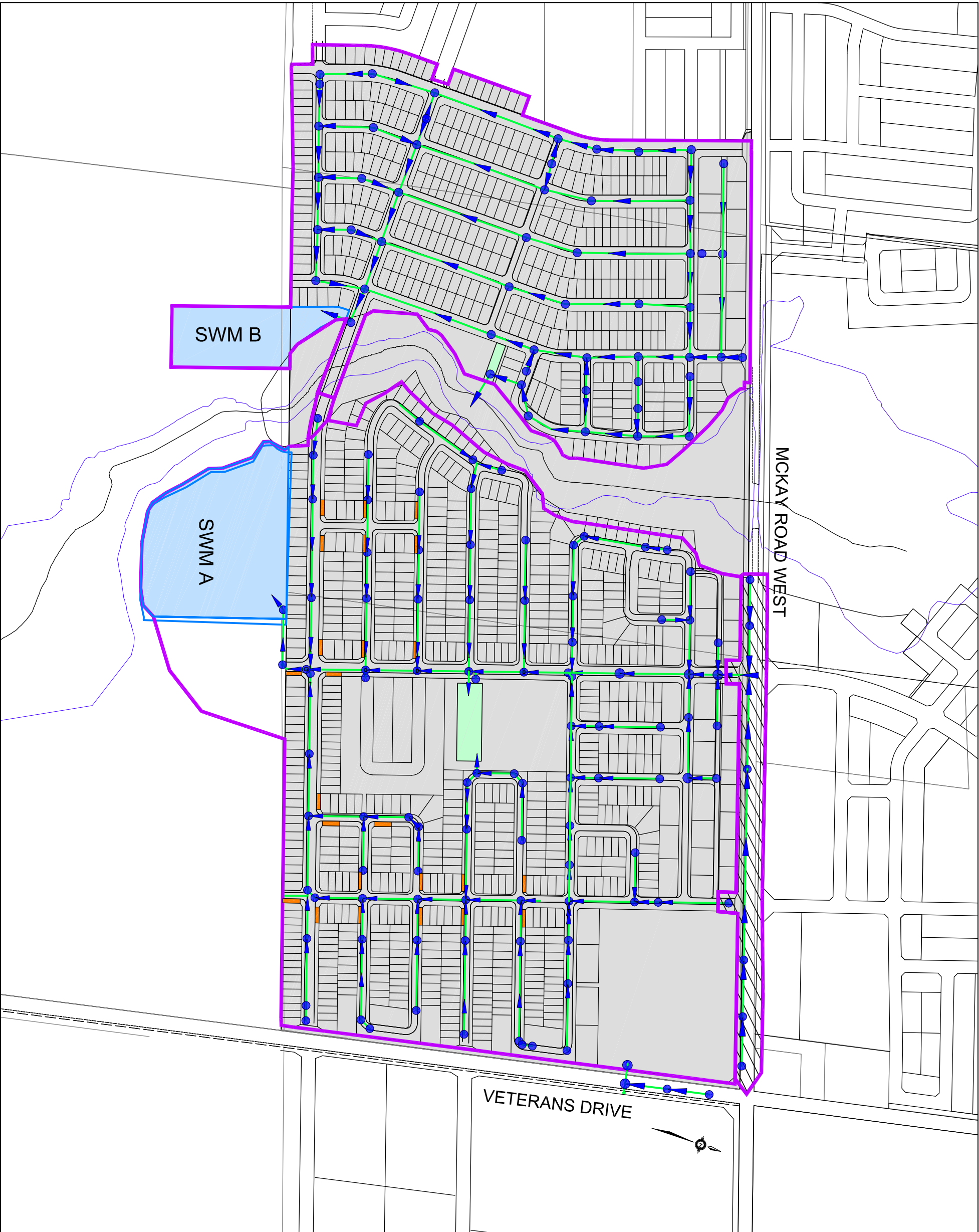
LEGEND

- POTENTIAL SWM FACILITY
- POTENTIAL AREAS DRAINING TO LID
- SWM POND A TRIBUTARY AREA
- SWM POND B TRIBUTARY AREA



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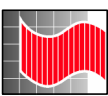
FIGURE 2.2
SWM POND & LID AREA
SALEM SECONDARY PLAN - MASTER PLAN



WATERSAND RESIDENTIAL SUBDIVISION
SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

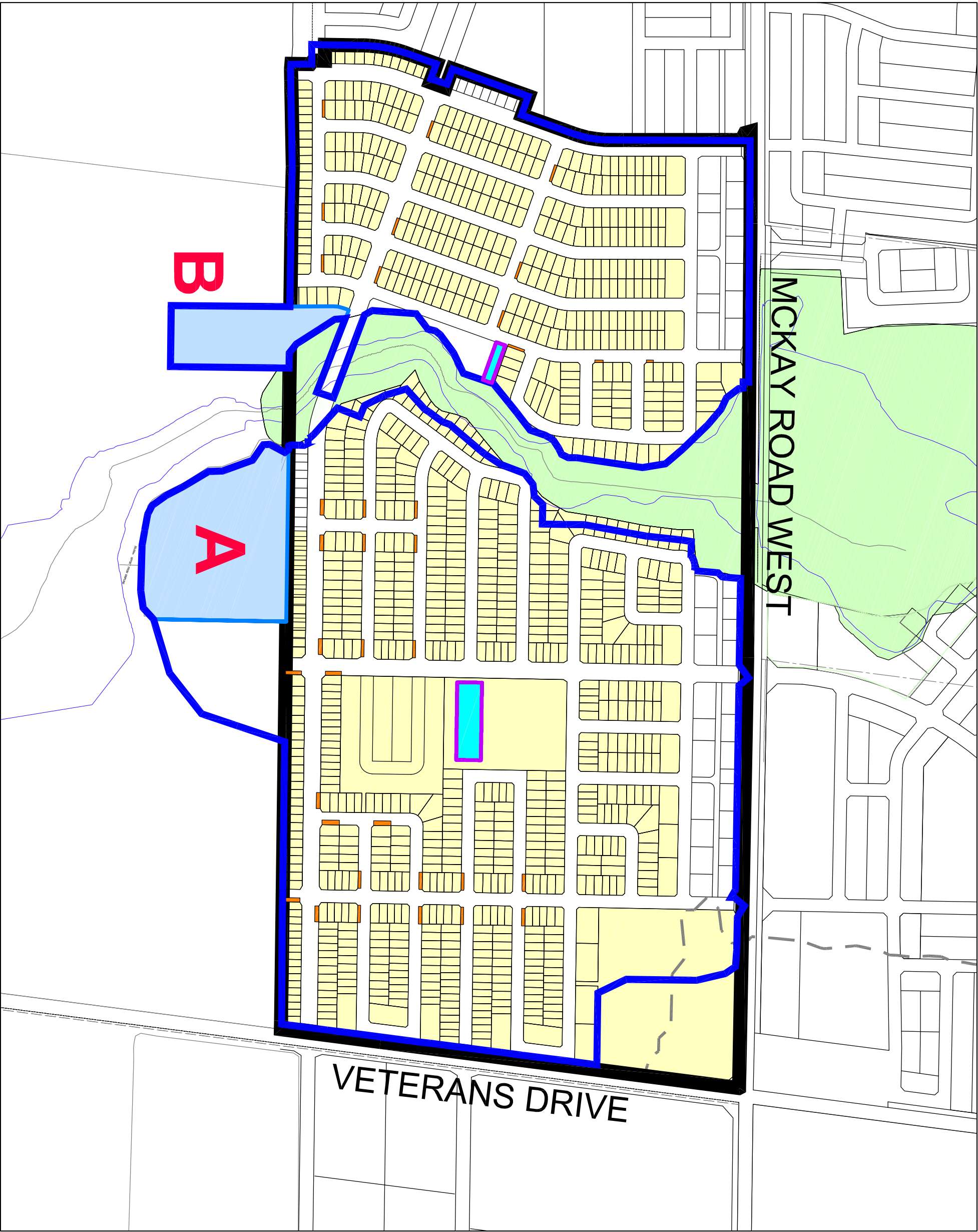
LEGEND

- SUBJECT AREA
- PROPOSED STORM SEWERS
- PROPOSED SWM TRIBUTARY BOUNDARY
- PROPOSED SWM PONDS
- EXTERNAL TRIBUTARY AREA TO SWM POND A
- ATLANTIS CELL INFILTRATION
- PROPOSED INFILTRATION FACILITY



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FIGURE 2.3
STORMWATER SERVICING PLAN

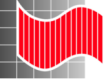


WATERSAND RESIDENTIAL SUBDIVISION
SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

LEGEND

- SITE LOCATION
- SWM POND DRAINAGE BOUNDARY
- PROPOSED SWM POND LOCATION
- NATURAL HERITAGE SYSTEM
- OPPORTUNITIES FOR INFILTRATION TYPE LIDS
- INSUFFICIENT GROUND WATER DATA
- ON-SITE INFILTRATION
- POTENTIAL ATLANTIS CELL INFILTRATION

NOTE:
ALL RESIDENTIAL AREAS ARE PROPOSED TO HAVE DOWNSPOUT DISCONNECTION AND THICKER TOPSOIL LAYERS (300mm)



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FIGURE 2.4
LID APPLICATION &
BACK YARD INFILTRATION AREAS

PROJECT NO.: 4610
 PROJECT NAME: WATERSAND CONSTRUCTION
 LOCATION: CITY OF BARRIE



Runoff Coefficient, TIMP & XIMP calculations for Watersand Construction

SWM POND A- Drainage Areas

Land Use	Area (ha)	C	A*C	TIMP	A x TIMP	XIMP	A x XIMP
Residential Detached House (Mix)	24.00	0.62	14.88	0.60	14.40	0.45	10.80
Townhouses	4.85	0.75	3.64	0.79	3.81	0.45	2.18
Park & Open Space	2.22	0.25	0.56	0.07	0.16	0.07	0.16
Pond	4.24	0.55	2.33	0.50	2.12	0.50	2.12
Large Grass Area Near SWM Pond A	2.36	0.25	0.59	0.07	0.17	0.07	0.17
School	2.41	0.80	1.93	0.86	2.07	0.86	2.07
Commercial	1.95	0.80	1.56	0.86	1.67	0.86	1.67
ROW	14.24	0.76	10.82	0.80	11.39	0.80	11.39
External ROW (Mckay Road Drainage)	2.77	0.76	2.11	0.80	2.22	0.80	2.22
Total Area	59.04	0.65	38.41	0.64	38.00	0.56	32.77

* Runoff coefficients are based on detailed calculations and City of Barrie Design Criteria

Runoff Coefficient, TIMP & XIMP calculations for Watersand Construction

SWM POND A- Uncontrolled Drainage Areas

Land Use	Area (ha)	C	A*C	TIMP	A x TIMP	XIMP	A x XIMP
Residential Backyards to Watercourse	0.80	0.57	0.45	0.53	0.42	0.53	0.42
Total Area	0.80	0.57	0.45	0.53	0.42	0.53	0.42

* Runoff coefficients are based on detailed calculations and City of Barrie Design Criteria

Runoff Coefficient, TIMP & XIMP calculations for Watersand Construction

SWM POND A- External Drainage Area

Land Use	Area (ha)	C	A*C	TIMP	A x TIMP	XIMP	A x XIMP
External ROW	2.77	0.76	2.11	0.80	2.22	0.80	2.22
Total Area	2.77	0.76	2.11	0.80	2.22	0.80	2.22

* Runoff coefficients are based on detailed calculations and City of Barrie Design Criteria

Runoff Coefficient, TIMP & XIMP calculations for Watersand Construction							
SWM POND B- Drainage Areas							
Land Use	Area (ha)	C	A*C	TIMP	A x TIMP	XIMP	A x XIMP
Residential Detached House (Mix)	12.60	0.62	7.81	0.60	7.56	0.45	5.67
Townhouses	1.02	0.75	0.77	0.79	0.80	0.45	0.46
Pond	1.70	0.55	0.94	0.50	0.85	0.50	0.85
ROW	8.13	0.76	6.18	0.80	6.50	0.80	6.50
Total Area	23.45	0.67	15.69	0.67	15.72	0.57	13.48

* Runoff coefficients are based on detailed calculations and City of Barrie Design Criteria

Runoff Coefficient, TIMP & XIMP calculations for Watersand Construction							
SWM POND B- LID Area							
Land Use	Area (ha)	C	A*C	TIMP	A x TIMP	XIMP	A x XIMP
Residential Detached House (Mix)	1.55	0.62	0.96	0.60	0.93	0.60	0.93
Townhouses	1.38	0.75	1.04	0.79	1.08	0.45	0.62
ROW	1.28	0.76	0.97	0.80	1.03	0.45	0.58
Village Square	0.47	0.25	0.12	0.07	0.03	0.07	0.03
Open Space	0.05	0.25	0.01	0.07	0.00	0.07	0.00
Total Area	4.74	0.66	3.10	0.65	3.08	0.46	2.17

* Runoff coefficients are based on detailed calculations and City of Barrie Design Criteria

Runoff Coefficient, TIMP & XIMP calculations for Watersand Construction							
SWM POND B- Uncontrolled Drainage Areas							
Land Use	Area (ha)	C	A*C	TIMP	A x TIMP	XIMP	A x XIMP
Residential Detached House (Mix)	0.29	0.62	0.18	0.60	0.17	0.60	0.17
Townhouses	0.03	0.75	0.02	0.79	0.03	0.45	0.01
Total Area	0.32	0.63	0.20	0.62	0.20	0.58	0.19

3 SANITARY SERVICING

The wastewater servicing plan for SSP lands was initially addressed in the Barrie's Wastewater Collection Master Plan (WCMP) for Intensification Areas and Annexed Lands, prepared by AMEC (October 2013). The ultimate servicing strategy for the subject site follows the Sanitary servicing plan explored in the referenced SIS, dated 2017 with some changes.

3.1 Existing Sanitary Servicing

Currently there are no existing sanitary infrastructure within the vicinity of the site. As per the SIS, sanitary servicing for the subject site will be provided by the future McKay Road trunk Sewer. Based on drawings received from other consultants, it has been confirmed that a 600 mm sewer will be in place along McKay Road prior to the development of the subject site.

3.2 Sanitary Design Criteria

As per the City of Barrie's Design Criteria for sewers, the following guidelines were used in the design calculations for the sanitary sewers:

- A sewage flow rate of 225 L/cap/day for residential;
- 28 L/ha/day for commercial and institutional;
- 35 L/ha/day for industrial;
- An infiltration rate (extraneous flow) of 0.1 L/sec/ha;
- Peaking Factor: based on Harmon's Peaking Factor;
- Population Density of 3.13 ppu for low density and 2.34 ppu for medium density;
- Maximum velocity shall not be greater than 3.0 m/s with pipe flowing full;
- Minimum velocity shall not be less than 0.6 m/s at actual flow, and
- Minimum pipe diameter of 200 mm (as agreed with City in areas where cleaning velocity cannot be achieved).

3.3 Proposed Sanitary Servicing Plan

The SIS for the Salem Annexed Lands explores an interim and an ultimate sanitary servicing plan which will be utilized to service the Annex lands. However, this servicing strategy involved pumping sewage from McKay Road from Phase 1 of the development (Includes the subject site) to sewers on Veterans Drive until McKay/ Huronia Trunk sewers have been fully constructed. This

strategy utilized spare capacity of the existing sewers on veterans drive until the McKay/Hurononia Trunk Sewers were in place. As the construction timing of the trunk line has been shifted prior to the development of Phase 1 of Salem lands, the temporary pump will not be required.

The updated servicing strategy for Phase 1 of the development, and the ultimate strategy are described in the sections below. Necessary infrastructure required to complete the wastewater servicing plan shall be provided by the owner.

3.3.1 Phase 1- Stage 1

Servicing for Phase 1, Stage 1 is proposed to be provided through construction of a trunk sewer on McKay Road connecting to the McKay/Hurononia Sanitary Trunk Sewers. This system can provide sanitary servicing for Phase 1-stage 1 of the development. It is to note that the southwest corner of the subdivision will be serviced by the McKay Road Trunk without utilizing the pump station as previously planned in the SIS. Figure 3.1 highlights this scheme.

3.3.2 Phase 1 – Stage 2

Preliminary design considerations have revealed that it is feasible to drain sewerage from the south half of SWM Pond B subdivision to the McKay Road trunk sewer. This servicing scheme would require crossing under the watercourse. Based on the client's preference, the design will be altered accordingly to proceed with a gravity system. Otherwise, a pump station will be utilized as proposed in the SIS for Stage 2 of Phase 1. Please refer to Figure 3.2.

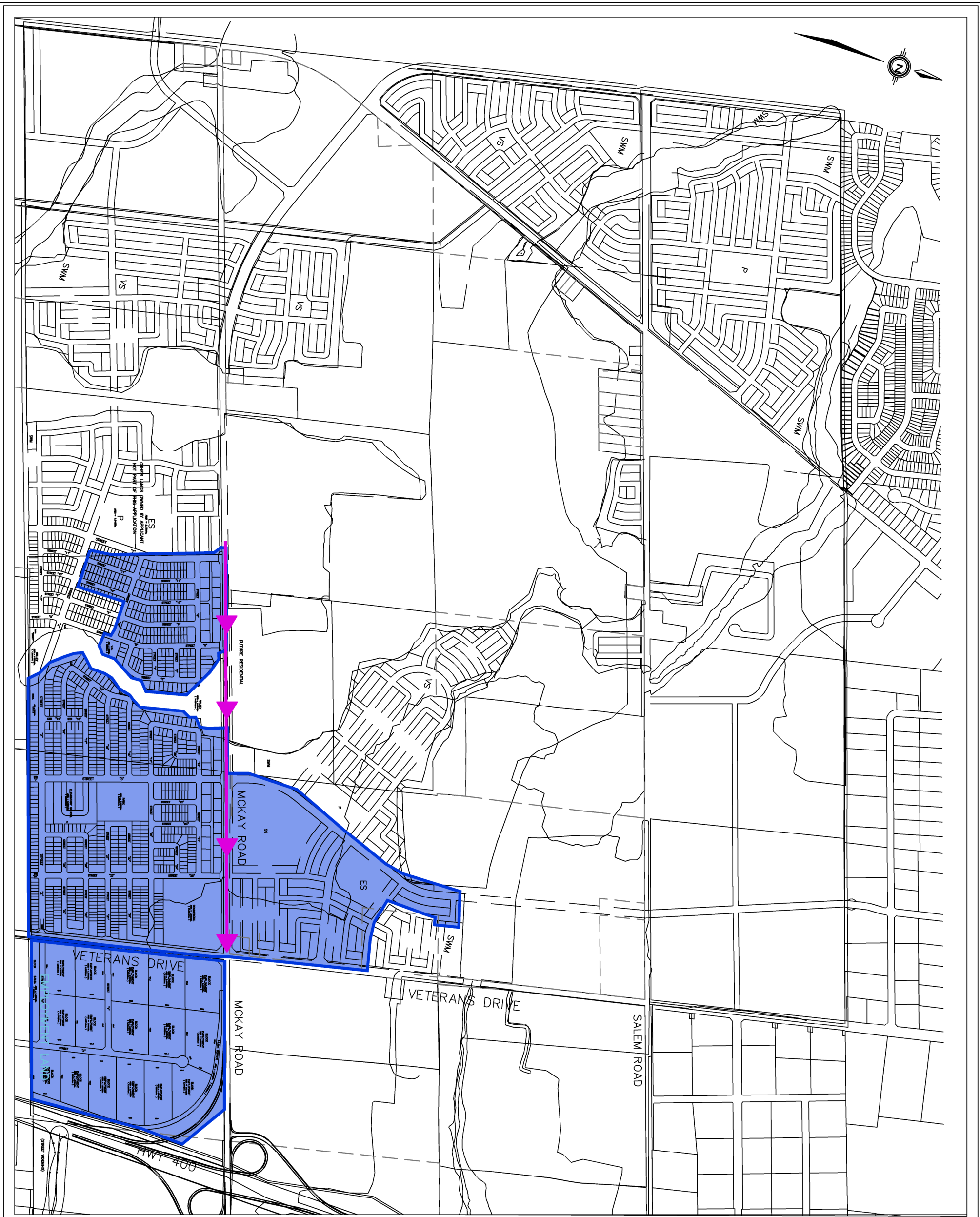
3.3.3 Ultimate Servicing

The ultimate sanitary servicing strategy is illustrated in Figure 3.3. The total subject site (residential to SWM Pond A and SWM Pond B) will be serviced by the trunk sewers along McKay Road to Huronia Road. Estimated sanitary demands are presented below in Table 3.1 and sanitary calculations are provided in Appendix B.

Table 3-1 - Sanitary Servicing Requirements

Average Residential Demand (L/ s)	Residential Population (persons)	Harmon's Peaking Factor (M)*	Commercial Demand (L/ha/s)	Commercial Area (ha)	Infiltration (L/ha/s)	Total Area (ha)	Total Peak Flow (L/s)
11.523	4562	3.28	0.32	1.95	0.10	85.99	47.05

* Based on Harmon's Peaking Factor equation for a population of 4562. Please note that the population is slightly higher than the calculated population as population in park is added in the table above.



SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

LEGEND

- MCKAY / HURONA TRUNK SAN. SEWER BY OTHERS
- TRIBUTARY AREA IN PHASE 1 (WEST OF HWY 400) DRAINING TO THE TEMP. PUMP STATION AT THE INTERIM STAGE

NOTES:

1. INSTALL PERMANENT GRAVITY SANITARY SEWER ALONG MCKAY ROAD TO THE FUTURE SANITARY SEWER BY OTHERS

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FIGURE 3.1
PHASE 1 (STAGE 1)
SANITARY SERVICING



CITY OF BARRIE

LEGEND

- MCKAY / HURON TRUNK SAN. SEWER
(BUILT AT STAGE 1 OF PHASE 1)

(BUILT AT STAGE 1 OF PHASE 1)

TRUNK SAN. SEWER
(BILL T AT STAGE 2 OF PHASE 1)

POTENTIAL LOCAL SAN. SEWER
IN PHASE 2 AND 3

(BUILT AT STAGE 2 OF PHASE 1)

TRIBUTARY AREA IN PHASE 1

POTENTIAL TRIBUTARY AREA IN PHASE 1
(WEST OF HWY 400) DRAINING TO THE
PERMANENT PUMP STATION

NOTES:

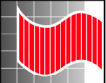
1. INSTALL A PORTION OF GRAVITY SEWER IN PHASE 2.

2. INSTALL PERMANENT PS AND PUMP TO

STAGE

3. INSTALL A COLLECTOR SEWER FROM PHASE 1 (STAGE 2) TO PERMANENT PUMP STATION. ONLY IF REQUIRED

4. TRIBUTARY AREA IN RED MAY BE ANALYSED TO DRAIN EAST THROUGH SUBDIVISION TO MCKAY/HURONIA TRUNK SEWER

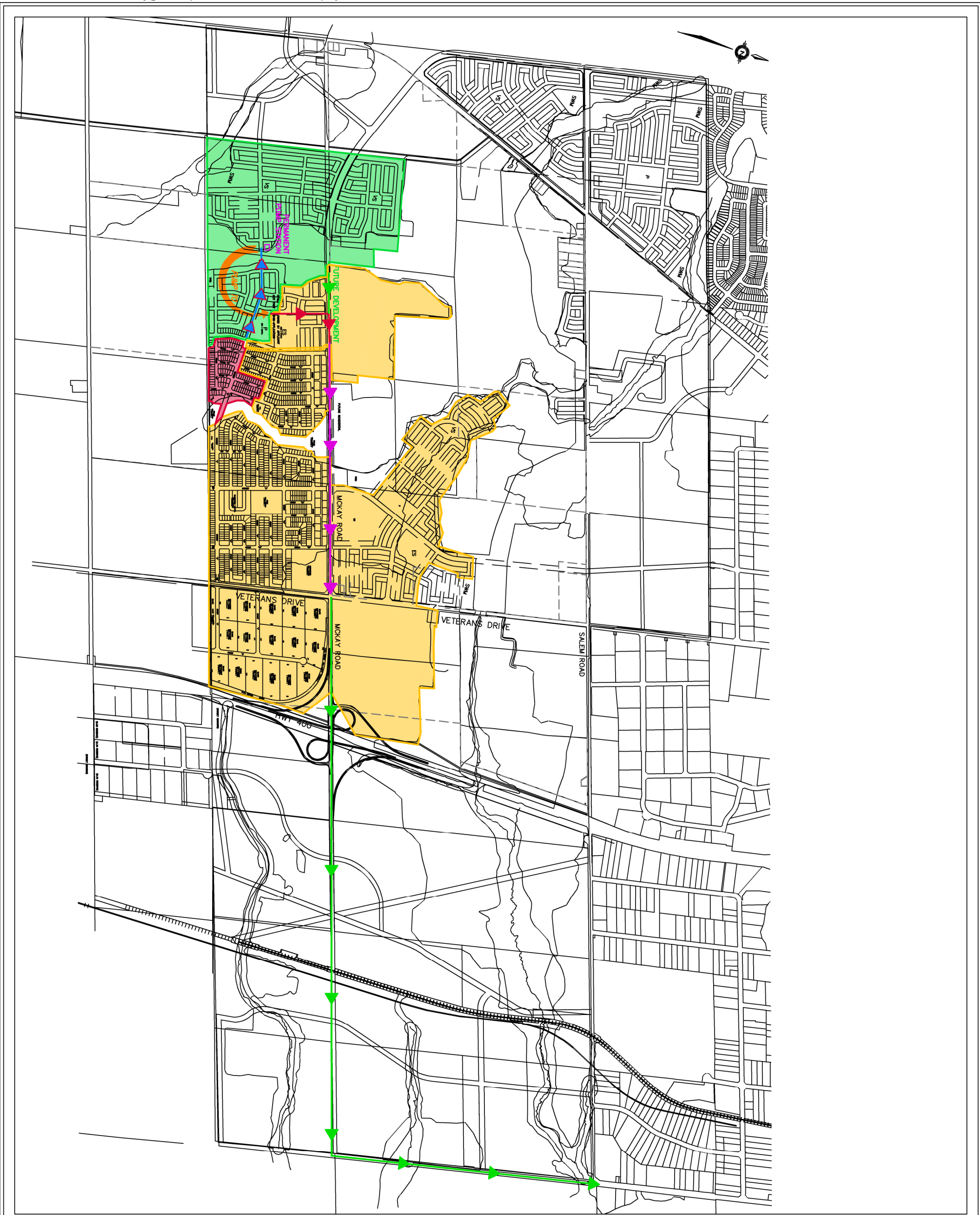


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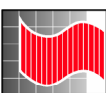
FIGURE 3.2
PHASE 1 (STAGE 2)
SANITARY SERVICING



SALEM COMMUNITY DEVELOPMENT AREA
CITY OF BARRIE

LEGEND

- MCKAY / HURONA TRUNK SAN. SEWER
(BUILT AT STAGE 1 OF PHASE 1)
- TRUNK SAN. SEWER
(BUILT AT STAGE 2 OF PHASE 1)
- LOCAL SAN. SEWER IN PHASE 2 AND 3
(BUILT AT STAGE 2 OF PHASE 1)
- MCKAY / HURONA TRUNK SAN. SEWER
- TRIBUTARY AREA (WEST OF HWY 400)
DRAINING TO MCKAY TRUNK SAN. SEWER
BY GRAVITY AT THE ULTIMATE STAGE.
- POTENTIAL TRIBUTARY AREA IN PHASE 1
(WEST OF HWY 400) DRAINING TO THE
PERMANENT PUMP STATION
- TRIBUTARY AREA OF PHASE 2, 3 AND
POST 2031 (WEST OF HWY 400) DRAINING
TO THE PERMANENT PUMP STATION

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FIGURE 3.3
ULTIMATE PHASES
SANITARY SERVICING

6 CONCLUSIONS

This Functional Servicing Report presents a municipal servicing scheme for the proposed Watersand subdivision located within the Salem Annexed Lands in the City of Barrie.

Stormwater Management

Two SWM Ponds (SWM Pond A and B) area proposed to provide water quantity, quality and erosion control. An area of 59.04 ha drains to SWM Pond A, which includes a 2.77 ha of external ROW area. An area of 0.80 ha drains uncontrolled from residential backyards.

SWM Pond B has a tributary area of 28.51 ha. LID techniques are proposed for the low-lying area (LID B) that cannot drain to SWM pond B via gravity flow. An underground storage tank, StormTech (or an approved equivalent design), is proposed to be placed within the village square.

For the subject site, the minor system will convey stormwater runoff from storms up to and including the 5- year design storm to the SWM Ponds. Stormwater runoff in excess of the minor system up to the flows generated from the 100-year storm event will be conveyed via the major system and controlled by the SWM Pond.

Sanitary Servicing

The wastewater servicing plan for SSP lands was initially addressed in the Barrie's Wastewater Collection Master Plan (WCMP) for Intensification Areas and Annexed Lands, prepared by AMEC (October 2013). A phased sanitary servicing plan is proposed for the subject site. The ultimate sanitary servicing plan is to service the subject site by the trunk sewers along McKay Road to Huronia Road.

Water Supply

The site is located in Pressure District PD3S. The proposed development will connect to the existing watermain on Veterans Drive, north of Salem Road as shown on Figure 4.1. Parallel watermain 500 mm and 300 mm in size are proposed to extend from the existing connection, south on Veterans Drive, to McKay Road and a 400 mm extending along McKay Road. The 300 mm watermain is proposed to act in place of the 500 mm watermain during emergencies should the 500 mm watermain experience failure. For the subject site, a looping watermain network is proposed with connections to the proposed watermain on McKay Road and Veterans Drive.

Should you have any questions or comments please do not hesitate to call the undersigned.

Respectfully Submitted,

SCHAEFFER & ASSOCIATES LTD.



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