



Sunningdale Road East Condominiums

Preliminary Servicing Report

Project Location:

1338, 1352, 1376 & 1388 Sunningdale Road East,
London, ON

Prepared for:

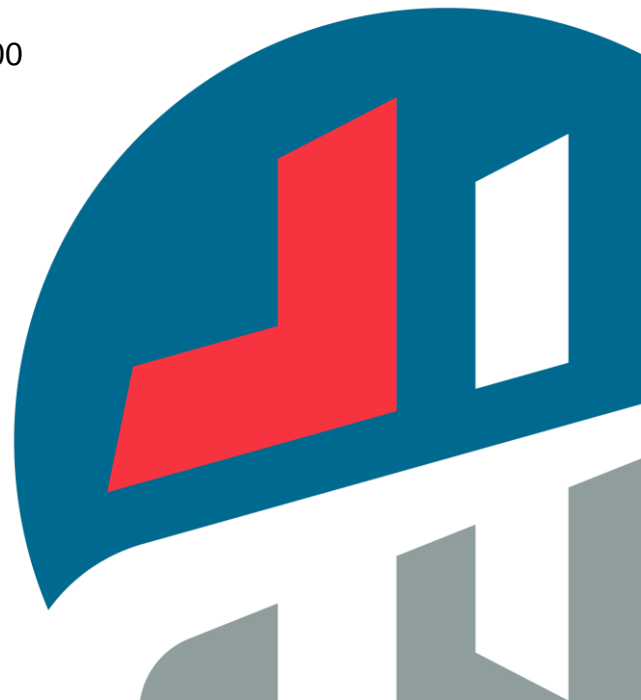
Auburn Homes Inc.
640 Colborne Street
London, ON

Prepared by:

MTE Consultants Inc.
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London, ON N6A 3A1

March 18, 2024

MTE File No.: 44476-100





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1.0 INTRODUCTION

MTE Consultants Inc. (MTE) was retained by Auburn Homes Inc. to complete a Servicing Report for their properties at 1338-1388 Sunningdale Road East. The proposed development is a small, residential development approximately 2.8 Ha in size.

The site is located at the north side of Sunningdale Road approximately 150m east of North Wenige Drive in the City of London. The property is bounded to the north by an existing wetland, to the south by Sunningdale Road E., and to the west and east by existing residential properties.

This report addresses the municipal servicing (water, sanitary, storm) for the proposed development. The development concept for the site indicates 106 townhouse units. The conceptual site plan is provided in **Appendix 'A'**, the site location is illustrated in **Figure 1.0**.

1.1 Background Documents:

The following background materials were reviewed and referenced for the subject development:

- Stoney Creek Subwatershed Study (Paragon, 1995).

2.0 WATER

2.1 General

Water servicing is available from the existing 1200mm watermain located on Sunningdale Road. A connection to the 1200mm watermain is proposed to service the site.

Based on information obtained from the city, the site lies within the City's Low Level System and has an HGL of 301.8masl.

A hydrant flow test was obtained from the City. The test was completed at an existing hydrant on Sunningdale Road located approximately 480m west of the site. The test indicated that the existing watermain is able to supply 112 L/s at a residual pressure of 413.7 kPa (60psi). Refer to **Appendix 'B'** for the hydrant flow test report. A conceptual layout of the internal water distribution system is illustrated on **Figure 2.0**.

2.2 Design Flows

2.2.1 Domestic Flow

Grades across the property generally range from 267.5-264.5 masl. Based on the boundary condition HGL, it is expected that static pressure at the site will generally exceed 336 kPa (48.8 psi) which is within the City's preferred operating ranges (275-550 kPa).

Based on City record drawing 23462, the proposed site was accounted for in the design of the sanitary sewer with a population of 504 persons (Refer to **Section 3.1** for details). Utilizing the City's typical daily usage allowance (255 L/cap/day) and peak hour demand factor (7.8), the peak domestic demand for that population is anticipated to be:

$$504 \text{ persons} \times 255 \text{ L/cap/day} \times 7.8 / 86400 \text{ s/day} = 11.6 \text{ L/s}$$

Based on this flow rate and assuming a service size of 250mm, the anticipated flow rate can be supplied through the service at a velocity of:

$$11.6 \text{ L/s} / (\text{Pi} * (250\text{mm}/2000)^2) = 0.24 \text{ m/s (Less than max 1.5m/s allowable)}$$

As the peak hour scenario is the worst-case scenario in terms of velocity and pressure for domestic usage, it is concluded that the proposed service can adequately supply all the site's domestic needs. The internal distribution system will be fully analysed as part of the detailed design process.

2.2.2 Quality Turnover

Based on the information provided above, the daily water usage for the site is estimated to be:

$$504 \text{ persons} \times 255 \text{ L/cap/day} = 128.0\text{m}^3$$

It is assumed that under full buildout conditions there will be sufficient turnover to ensure the longest expected residency time in the distribution mains subceeds 72 hours. An age analysis can be completed at time of detailed design to confirm.

2.2.3 Fire Demand

The maximum footprint of the dwellings indicated on the proposed site plan is approximately 586m². As the building footprints are less than 600m², the buildings are not subject to section A-3.2.5.7 of the OBC (water supply for fire fighting).

Given that the buildings are not subject to OBC fire supply requirements it was assumed that the minimum OBC required flow rate of 45 L/s would be sufficient. However, considering that the site will be used as a medium density development and the development concept may change, the connection was assessed assuming a fire flow of 90 L/s which is typically used for medium/high density residential blocks in the City of London. It was determined that the required flow rate (90 L/s) can be provided through a 250mm main at a velocity of 1.8 m/s which subceeds the City's maximum allowable velocity requirement (2.4 m/s). Given the results of the flow test conducted nearby, it is concluded that adequate fire flow can be provided for the site at an acceptable residual pressure. The final requirements of the site can be calculated and the internal distribution system fully analysed as part of the detailed design process.

3.0 SANITARY

3.1 General

Sanitary servicing is proposed to be provided by connection to the existing 200mm sanitary sewer on South Wenige Road. A 200mm service connection is proposed to service the site.

As per City record Dwg 23462, the site was included in the design of the sanitary sewer on South Wenige Drive. The sanitary drainage plan included an area of 3.76ha assuming a population of 576 persons (~153 ppha). Given the area of the site considered in the sanitary sewer design (3.3 ha) a total population of 504 ($3.3 \times 153 = 504$) persons would have been allocated for the site. Thus sufficient capacity is available in the downstream sewer to support up to either 210 Town house units ($504 / 2.4 \text{ ppu} = 210$) or 315 apartment units ($504 / 1.6 \text{ ppu} = 315$).

An extension of the trunk sanitary sewer on Sunningdale Road will be required for this site. Conceptual servicing is illustrated in **Figure 3.0**. The sanitary drainage plan for the area is included in **Appendix 'C'**.

3.2 Design Flow

Using the City's standard consumption rate of 230 L/person/day and a peaking factor of 4.5, a peak sanitary flow of 6.0 L/s ($504 \text{ persons} \times 230 \text{ L/day} / 86,400 \text{ s/day} \times 4.5 = 6.0 \text{ L/s}$) is expected from the site.

4.0 STORMWATER

4.1 General

As per City record drawing 23461, 0.66ha of land was included in the design of the downstream SWM infrastructure with a runoff coefficient of 0.5. Approximately 0.26ha of this area belongs to the neighbouring property to the west of the proposed site (1334 Sunningdale Road) and a portion of Sunningdale Road. Thus, roughly 0.40 hectares of the proposed property are included in the downstream sewer at the indicated coefficient.

The site lies within the Stoney Creek subwatershed. As per Map 1 of the Subwatershed study, the site is located within Management Areas 5 & 6. The SWM targets for the subwatershed are discussed in general within the body of the report and note that quantity control as a minimum should target post-to-pre control for the 2 through 100 year storm events. Specific SWM targets for the individual management areas are summarized in factsheets appended to the subwatershed study and indicate that at-source controls should provide storage volume in the amount of $100\text{m}^3/\text{ha}$ of development and infiltrate 25mm of roof runoff where soils are conducive to infiltration. As per Map C3 of the report the site is located in an area of Sand and Gravel which are suitable for infiltration purposes. Excerpts of the Subwatershed Study are included in **Appendix 'D'**.

4.2 Stormwater Management Controls

4.2.1 Proposed Area Breakdown

The entire property owned by the client is approximately 4.7 ha in size of which only 2.8 ha is developable. Area take offs were completed by MTE considering only the developable areas for the site and are summarized as follows:

Roof Area:	8,501 m ²
Other Impervious:	9,876 m ²
Grass / Plantings:	<u>9,938 m²</u>
Total:	28,315 m ²

Thus, the site is approximately 65% impervious which corresponds to a runoff coefficient of approximately 0.65. The existing topography of the site falls to the east through the neighbouring residential properties to the Ballymote tributary which conveys flow south to Stoney Creek. It is proposed that the site be controlled and released to an existing watercourse at the north-east corner of the site which flows from the wetland to the Ballymote tributary. Due to relatively shallow groundwater elevations along the east side of the site, it is anticipated that the east side of the site will be raised ~2.0m (+/-).

It is anticipated that the site will be divided into four general catchments (refer to **Figure 4.0**). A portion of the site will flow uncontrolled to the wetland (denoted as U1 on the attached figure). The main portion of the internal site will be collected, controlled, and treated with on-site facilities prior to release to the existing watercourse. The area along the eastern edge of the site may be allowed to drain to the east per existing conditions due to the grade differential across the site (202B) and a portion of the frontage along Sunningdale Road may be drained to the existing storm sewers if controlled to the allocated capacity discussed in **Section 4.1** (201). It should be noted that areas represented on the attached figure are conceptual and may change during detailed design of the site.

On-site controls will be provided in keeping with the SWM targets laid out in the subwatershed study. Quantity control is recommended to be provided via a dry-pond SWM facility located toward the north end of the site between units 52 & 53. Based on an extended rational analysis using the 2.8 ha of developable site area, a minimum requirement of 542m³ of on-site storage is expected to be needed to attenuate the post-development 100-year flow rate to the pre-development condition. Storage requirements may be higher based on changes to the design and the design requirements of the City and UTRCA at the time of development. Quality control may be provided via an OGS unit. The SWM features will be fully analysed and considered at the detailed design stage.

Geotechnical and hydrogeological investigations of the site were completed in 2017 and 2021 respectively. It is noted that the hydraulic conductivities of the native soils below the surficial topsoil were tested and showed conductivities corresponding to infiltration rates ranging from 56 to 207 mm/hr (unfactored). While the measured rates are conducive to infiltration it is noted that there is a layer of stiff clay till underlying the site. Infiltration measures may be proposed within the dry pond, if so, the base of the pond should be founded in the upper layer of native soils or else provided with an underdrain.

As noted, the site is intended to contribute to an on-site SWM facility and released to an existing watercourse in the northeast. The existing watercourse should be reviewed at time of detailed design to determine if erosion control measures should be implemented within the existing watercourse. Permission from the neighbour will be required to perform any work within their property.

A portion of the frontage of the site may contribute flow to Sunningdale Road. As a portion of the site was included in the design of the downstream storm sewers on South Wenige Drive it is concluded that there would be no negative impacts resulting from the frontage of the site discharging to Sunningdale Road if controlled to the allocated rate. The final analysis of the site will demonstrate the area draining to Sunningdale Road and how it compares to the allowance used in the design of the downstream sewers. Conceptual SWM servicing is illustrated in **Figure 4.0**. The storm drainage plan for the area is provided in **Appendix 'D'**.

5.0 CONCLUSIONS

The proposed site is a residential development located within the Stoney Creek subwatershed in North London.

Water servicing is available from the existing 1200mm water main on Sunningdale Road and adequate pressure and flow is available for both domestic and fire suppression purposes.

The site was allocated for in the design of the downstream sanitary sewers and the proposed density of development does not exceed the population allocated for in the sewer design. An extension of the trunk sanitary sewer will be required to service the site.

Stormwater management can be completed on-site and runoff from the majority of the site will be released to the northeast. Allocation for a portion of the site was provided for in the design of the storm sewers on South Wenige Drive. Stormwater management controls will be provided in keeping with the targets identified in the Stoney Creek Subwatershed Report.

Final servicing will be analyzed and detailed in full as part of the detailed design process.

All of which is respectfully submitted,

MTE Consultants Inc.



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Design Engineer

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JJM:azp

\\mte85.local\mte\Proj_Mgmt\44476\100\REPORTS\MTE REPORTS\Servicing Brief\zz Documents\44476-100 Site Servicing Report.docx



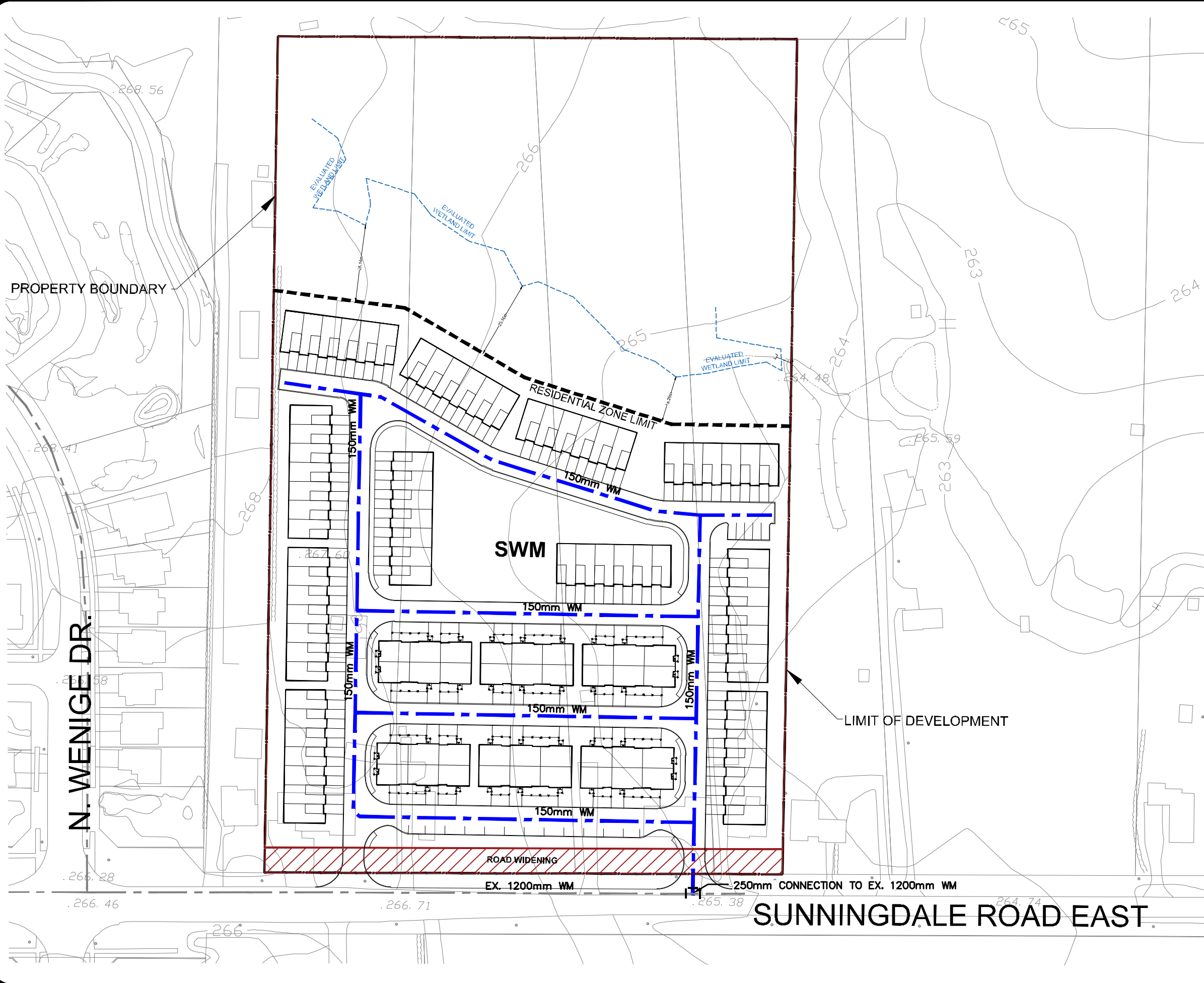
FIG 1.0 Date: FEB/22
Scale: NTS



FIG 1 - LOCATION PLAN



Engineers, Scientists, Surveyors

Project No.: 44476-100



KEY	
	PROPOSED WATERMAIN
	EXISTING WATERMAIN

Auburn Homes Inc.

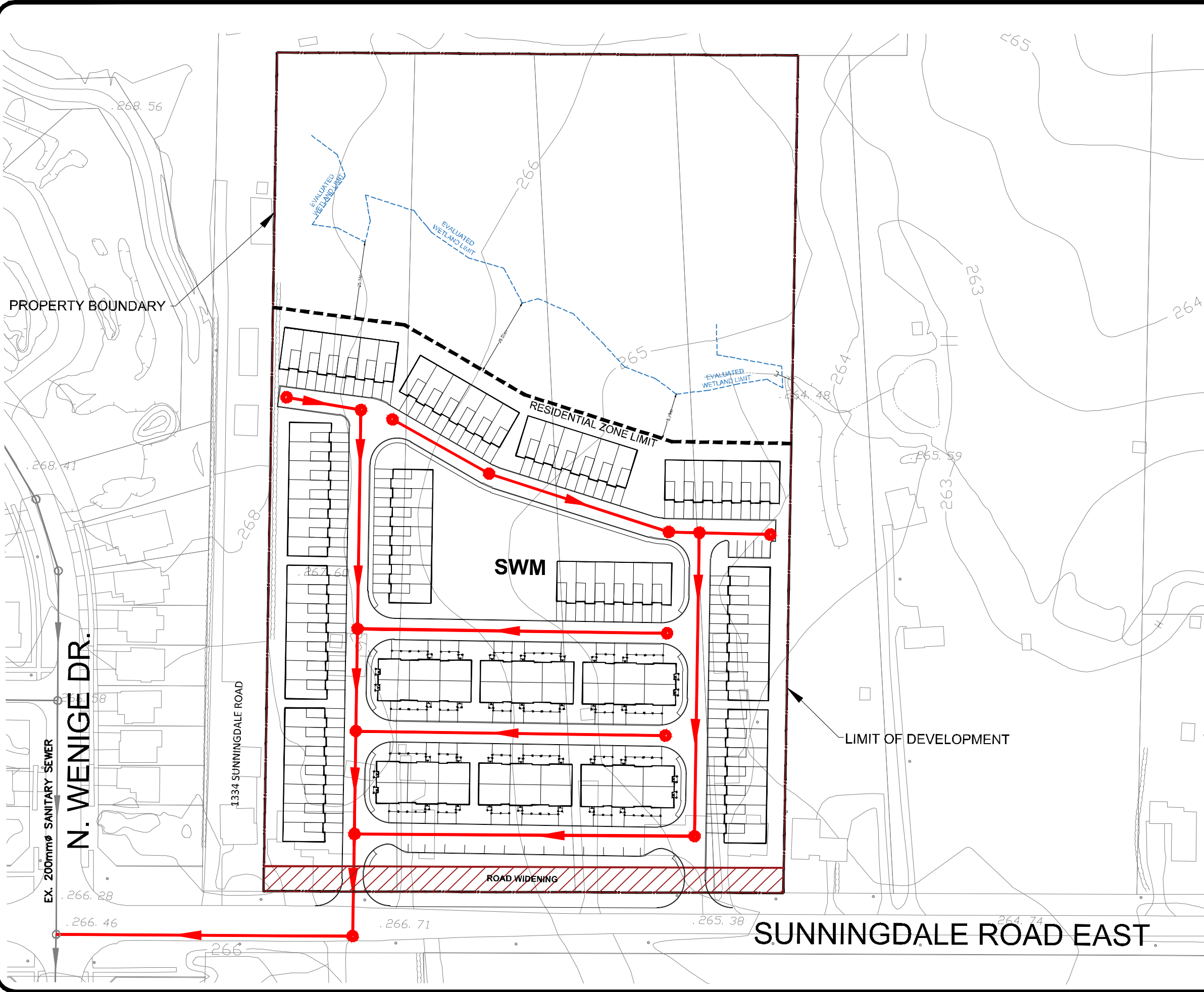


PROJECT
**1338, 1352, 1376, & 1388
 Sunningdale Road East.**



TITLE
**CONCEPTUAL WATER
 DISTRIBUTION PLAN**

Drawn	MTE	Scale	1:2000	Figure
Checked	JJM	Project No.	44476-100	
Date	12/FEB/24	Rev No.	0	

2.0



KEY

-  PROPOSED SANITARY
-  EXISTING SANITARY

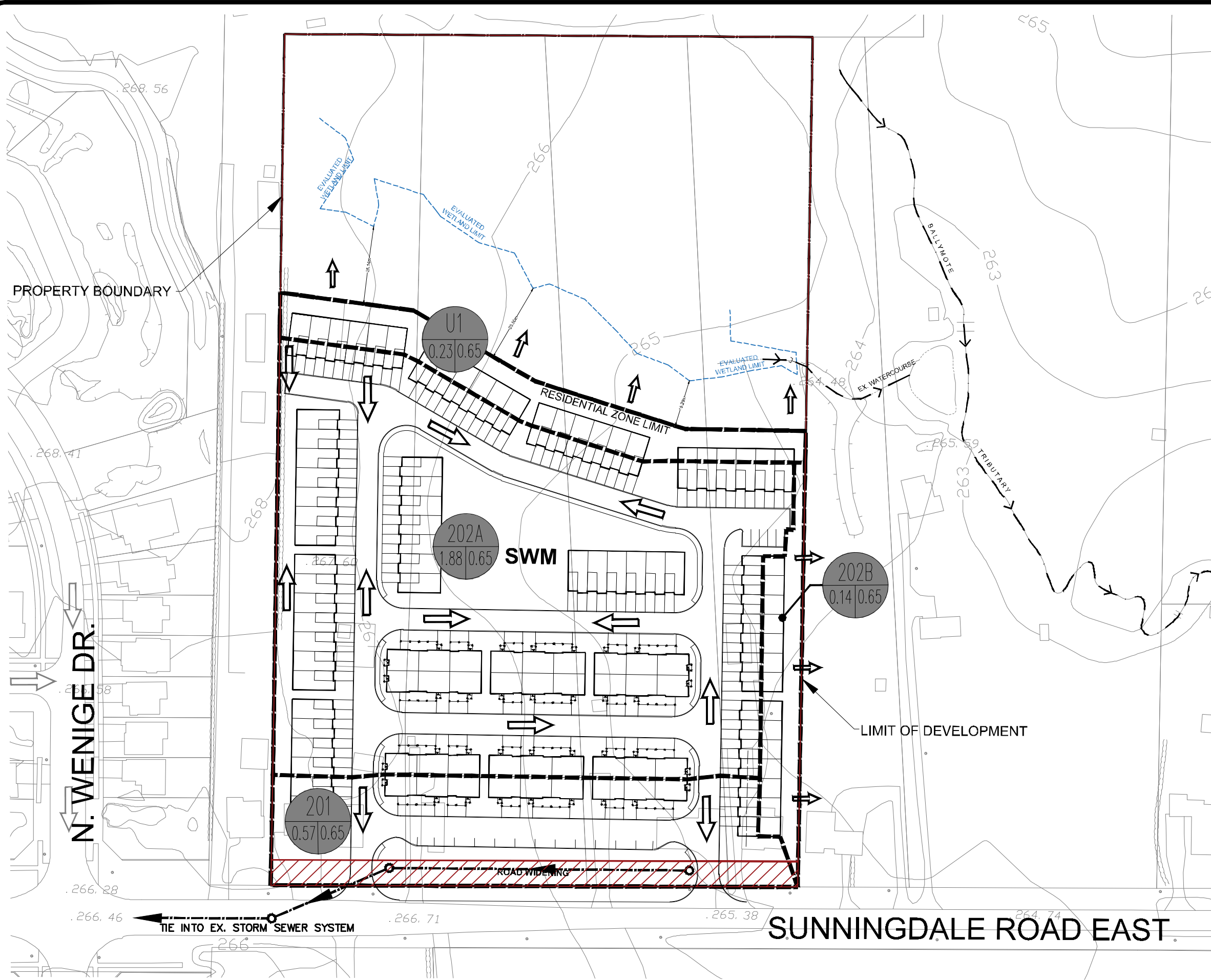
Auburn Homes Inc.



PROJECT
**1338, 1352, 1376, & 1388
Sunningdale Road East.**

TITLE
**CONCEPTUAL SANITARY
SERVICING**

Drawn	MTE	Scale	1:2000	Figure
Checked	JJM	Project No.	44476-100	3.0
Date	12/FEB/24	Rev No.	0	



KEY

- SUB-CATCHMENT NUMBER
- C FACTOR
- AREA (ha.)
- STORM CATCHMENT AREA
- MAJOR/MINOR FLOW DIRECTION
- PROPOSED STORM SEWER
- EX. MAJOR/MINOR FLOW DIRECTION

Auburn Homes Inc.



PROJECT
1338, 1352, 1376, & 1388 Sunningdale Road East.

TITLE
CONCEPTUAL STORM SERVICING

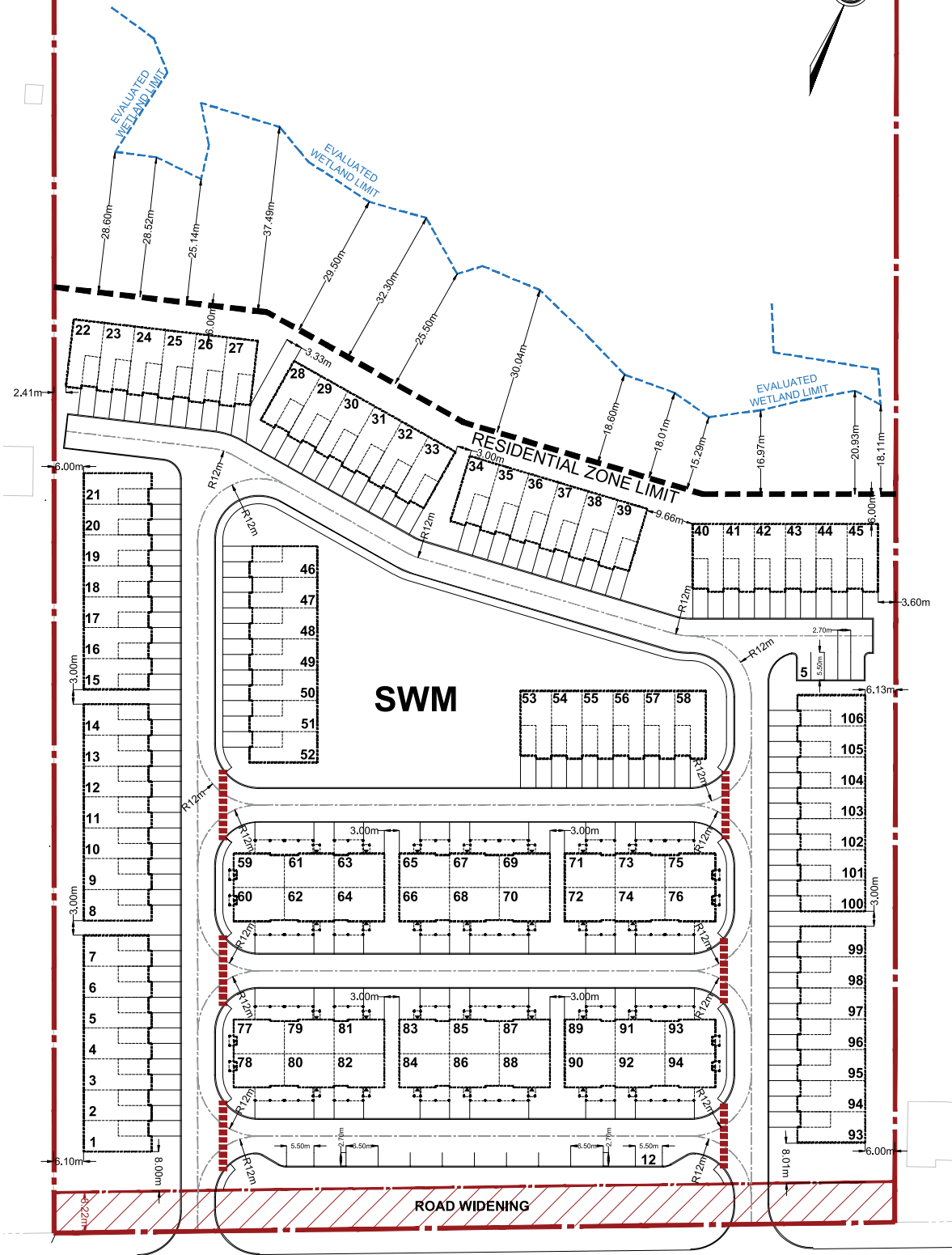
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Checked	JJM	Project No.	44476-100	4.0
Date	18/MAR/24	Rev No.	0	



APPENDIX A

CONCEPTUAL SITE PLAN

February 7, 2024



SUNNINGDALE ROAD EAST



APPENDIX B

WATER SERVICING INFORMATION

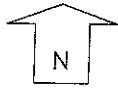
**WATER SUPPLY DEPARTMENT
FLOW TESTS**

08-16
H1788

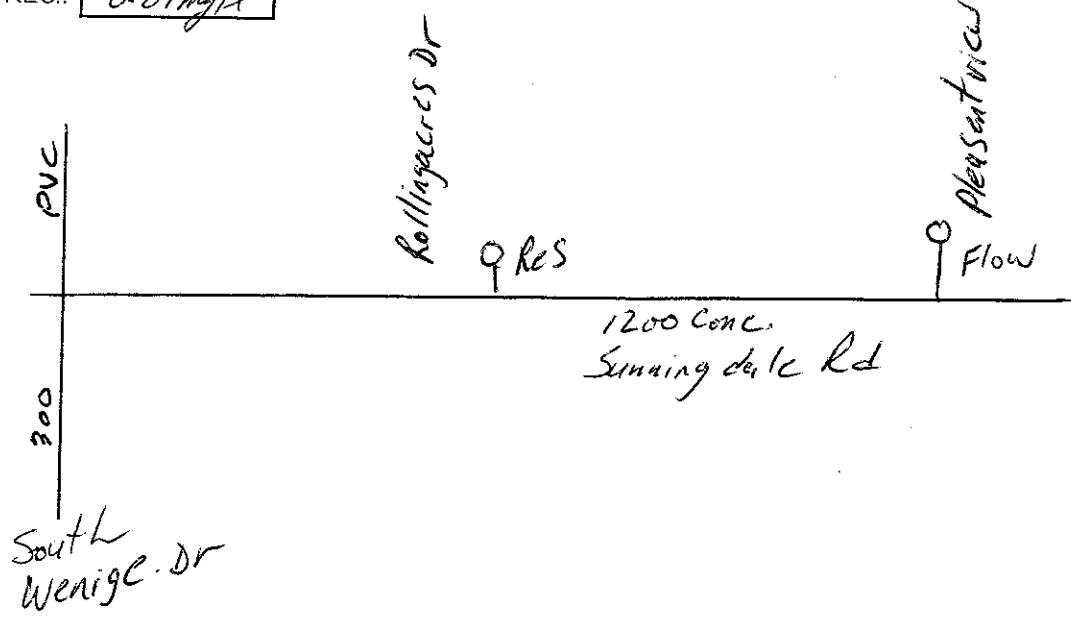
DATE June 11-2008
 TIME 11:30 Am
 TEST BY R. Horton, G. Allison
 REQUESTED BY Development Eng. Ed W301 Fax 519-672 4182
 LOCATION Sunningdale Rd

TEST NUMBER	FLOW				RESIDUAL PRESSURE P.S.I.	STATIC PRESSURE P.S.I.
	OUTLET SIZE	PITOT READING P.S.I.	INDIVIDUAL FLOW U.S.G.P.M.	TOTAL FLOW U.S.G.P.M.		
1	2 1/2	48	1160	1160	60	60
2	2 1/2	28	890	1780	60	
	2 1/2	28	890			
3						
4						

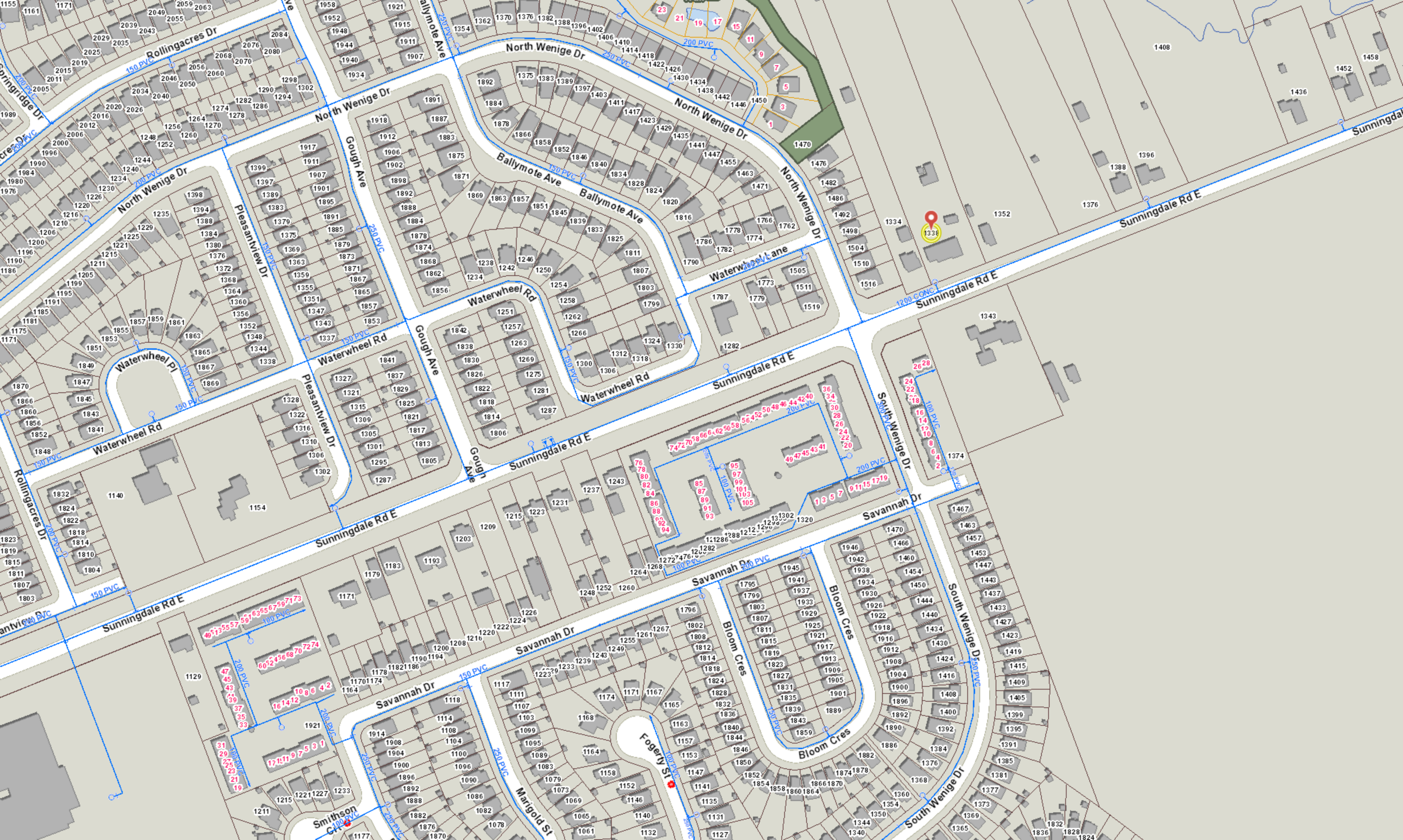
VALVE SHEET: 79-66
 CHLORINE RES.: 0.89 mg/L



SKETCH



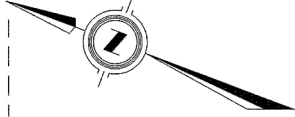
The attached information on City of London water services does not purport to set forth all information nor to indicate that other information does not exist. By issuing this information report, neither the City nor any of its employees makes any warranty, express or implied, concerning the location, type or extent of services described in this report. Furthermore, neither the City nor any of its employees shall be liable in any manner for any personal injury or property damage or loss of any kind arising from or connected with this information or incomplete information.



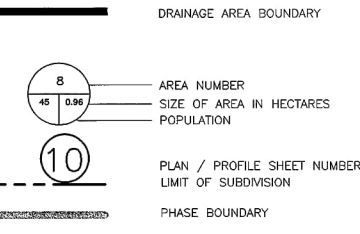


APPENDIX C

SANITARY SERVICING INFORMATION

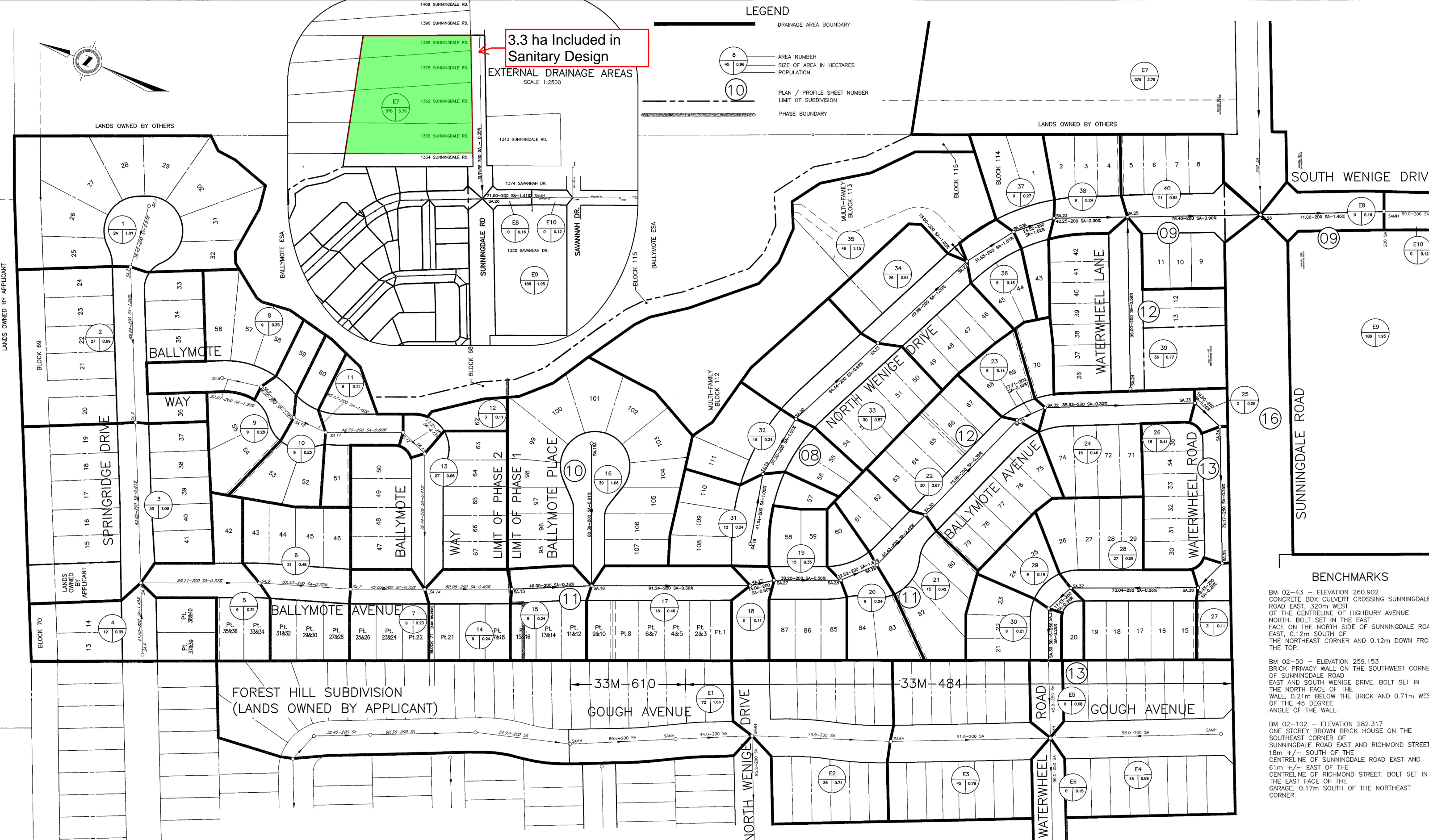


LEGEND



3.3 ha Included in Sanitary Design

EXTERNAL DRAINAGE AREAS
SCALE 1:2500



BENCHMARKS

BM 02-43 - ELEVATION 260.902
CONCRETE BOX CULVERT CROSSING SUNNINGDALE ROAD EAST, 320m WEST OF THE CENTRELINE OF HIGHBURY AVENUE NORTH. BOLT SET IN THE EAST FACE ON THE NORTH SIDE OF SUNNINGDALE ROAD EAST, 0.12m SOUTH OF THE NORTHEAST CORNER AND 0.12m DOWN FROM THE TOP.

BM 02-50 - ELEVATION 259.153
BRICK PRIVACY WALL ON THE SOUTHWEST CORNER OF SUNNINGDALE ROAD EAST AND SOUTH WENIGE DRIVE. BOLT SET IN THE NORTH FACE OF THE WALL, 0.21m BELOW THE BRICK AND 0.71m WEST OF THE 45 DEGREE ANGLE OF THE WALL.

BM 02-102 - ELEVATION 282.317
ONE STOREY BROWN BRICK HOUSE ON THE SOUTHEAST CORNER OF SUNNINGDALE ROAD EAST AND RICHMOND STREET. 18m +/- SOUTH OF THE CENTRELINE OF SUNNINGDALE ROAD EAST AND 61m +/- EAST OF THE CENTRELINE OF RICHMOND STREET. BOLT SET IN THE EAST FACE OF THE GARAGE, 0.17m SOUTH OF THE NORTHEAST CORNER.

AS CONSTRUCTED NOTES	DRAWING #, SOURCE	DATE	AS CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT
1 SEE DRAWING No. FOR FURTHER DETAILS.			SANITARY SEWER AND APPURTENANCES	MARCH 2012	DESIGN	SPB	1. REVISED PER CITY COMMENTS	MARCH 2011	AGM
2 SEWER DESIGN/TRANSITION WIDTH OR AS NOTED.			STORM SEWERS AND APPURTENANCES	MARCH 2012	DRAWN BY	AGM	2. PER CITY COMMENTS / CALC PLAN	JULY 2011	AGM
3 REFERENCE B.M. 02-50 ELEVATION 259.153			WATERMAIN AND APPURTENANCES	APRIL 2012	CHECKED	DTW	3. PER CITY COMMENTS	AUG 5, 2011	AGM
4 SAN P.D.C.'s 100mm DIA. UNLESS OTHERWISE NOTED			CURB AND GUTTER	JUNE 2012	APPROVED	SPB	4. FOR CONSTRUCTION	AUG 24, 2011	AGM
			BASE ASPHALT (1L-8)	JUNE 2012	DATE	JANUARY 2011	5. RELOTTING, NWD REALIGNMENT	DECEMBER 2011	AGM
			GRANULAR 'A'	JUNE 2012			6. REVISED TO AS CONSTRUCTED	AUGUST 2012	AGM
			GRANULAR 'B'	APRIL 2012					AGM

AGM SURVEYING • ENGINEERING

ARCHIBALD, GRAY & McKAY ENGINEERING LTD.
3514 WHITE OAK ROAD, LONDON, ON, N6E 2Z9
PHONE 519-685-5300 FAX 519-685-5303
EMAIL eng@agm.on.ca WEB www.agm.on.ca



SCALE
1:1000

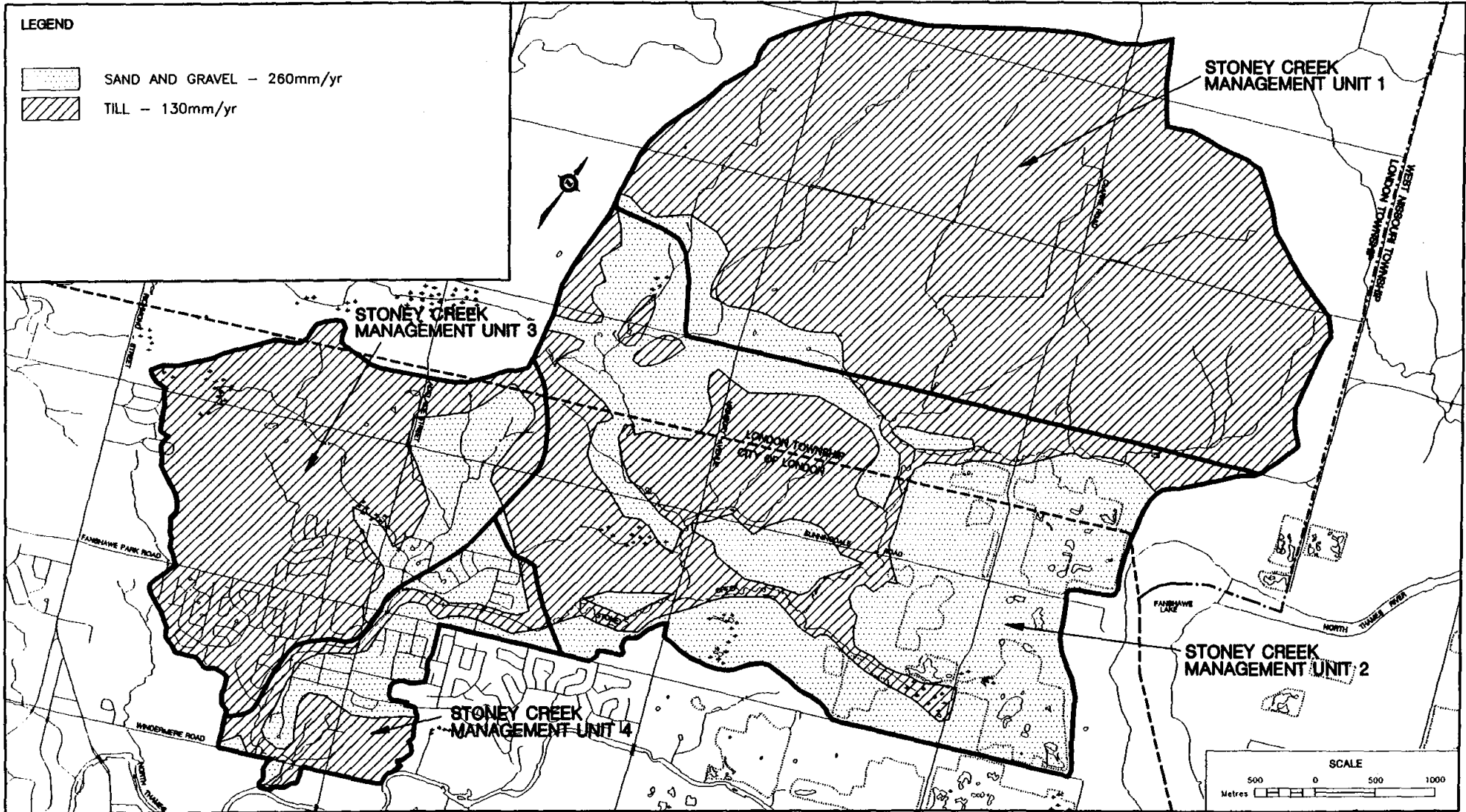
TITLE
BALLYMOTE WOODS - PHASE 1
SIFTON PROPERTIES LIMITED 33M-631
SANITARY DRAINAGE PLAN

PROJECT No.
1072-2
SHEET No.
04
PLAN FILE No.
23462



APPENDIX D

STORMWATER SERVICING INFORMATION

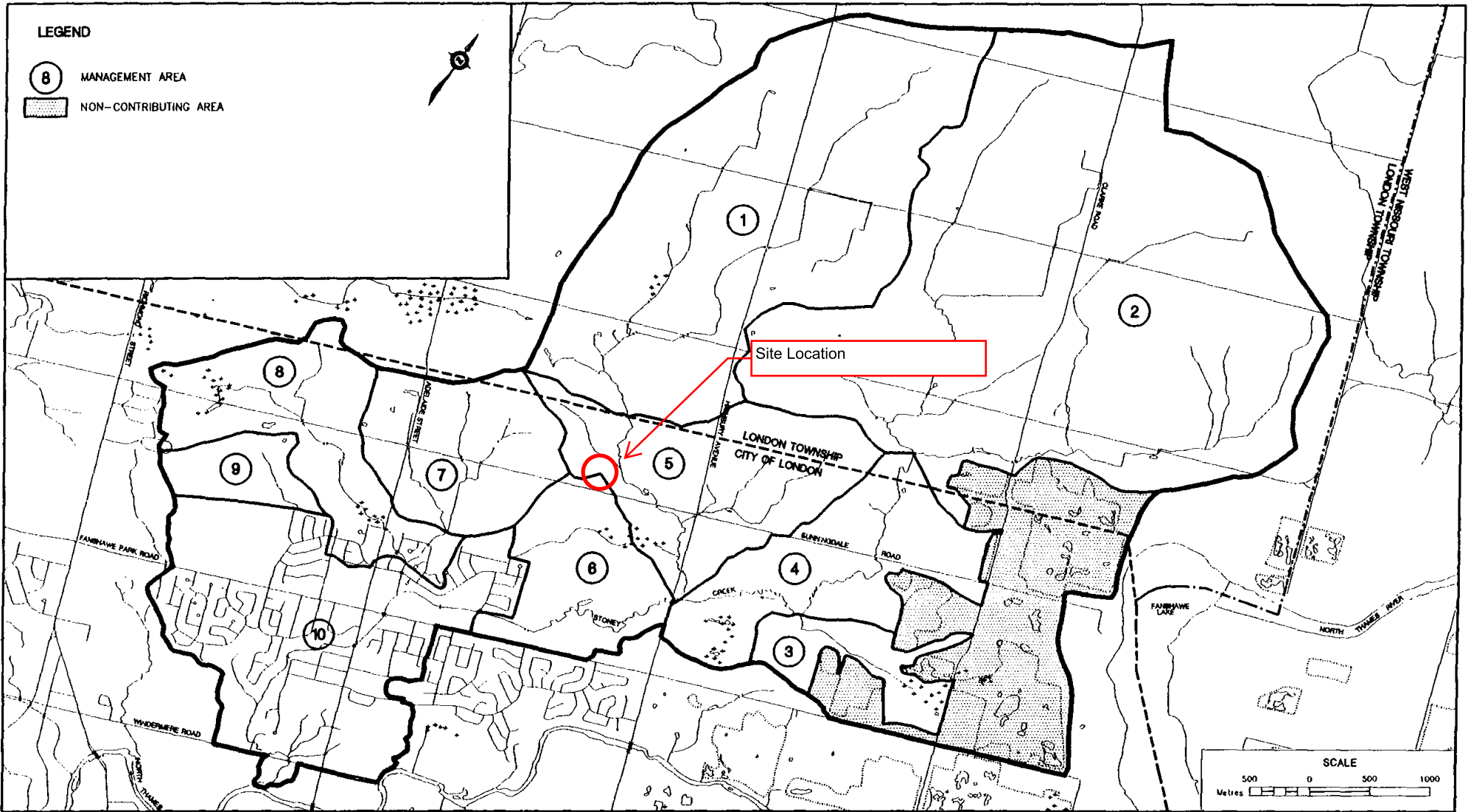


PARAGON ENGINEERING CONSULTING ENGINEERS
 SUITE 300 871 VICTORIA ST. N. KITCHENER ONTARIO N2B 3S4

INFILTRATION POTENTIAL

STONEY CREEK SUBWATERSHED STUDY

PROJECT NO.	1-5215
SCALE: AS SHOWN	DATE: MAY 1995
MAP C3	



MANAGEMENT AREAS OF STONEY CREEK SUBWATERSHED

STONEY CREEK SUBWATERSHED STUDY

PROJECT NO. 1-5215

SCALE: AS SHOWN DATE: MAY 1995

MAP 1

STONEY CREEK

Tributary and Catchment Area Factsheet

AREA 5

RESOURCES

Water Resources

- 253 ha drainage area
- 1950 m of natural watercourse with permanent streamflow
- 1890 m of agricultural drains (Shoebottom Award Drain)

Aquatic Resources (refer to Map C7 for location of aquatic communities and Section B7 for translation to habitat types)

- 1890 m watercourse supports Type V aquatic communities
- 1950 m watercourse with tolerant warmwater fishery (Type III)

Stream Morphology

- 1950 m of natural watercourses
- 1890 m of agricultural drains

Terrestrial Resources

- Category 1:
 - Candidate ESA - Part of 2030, 2020
 - woodlots contiguous to watercourses (part of 2028)
- Category 2:
 - significant recharge areas
 - anti-fragmentation areas
 - Type 3 terrestrial patches (2051)

KEY BEST MANAGEMENT PRACTICES

(refer to Table D.3 and Map D1 for details)

Storm Water Management Practices

- storm water management facilities designed to satisfy the subwatershed development criteria (250 m³/ha for peak flow attenuation, 100 m³/ha for extended detention, and 100 m³/ha at-source controls)
- maintain/establish grassed swales for agricultural drains
- infiltrations of 25 mm roof runoff where permeable soils exist



SWM Calculations

DATE: February 9, 2024
 JOB NO.: 44476-100

Client: Auburn Homes
 Project: 1338-1388 Sunningdale Road East Condominiums
 Location: London, Ontario

PRE-DEVELOPMENT CONDITIONS

TOTAL PRE-DEVELOPMENT AREA (A1)

	Area (m ²)	C	A*C
Total Site Area:	28315.000		
Building Area:	0.00	0.9	0
Concrete/Asphalt:	0.00	0.9	0
Landscaped/Open:	28315.00	0.2	5663
Totals:	28315.00		5663
$C_{eq} = \text{Sum}(A*C)/\text{Sum}(A) =$	0.20		

2 Year Pre-Development Flows

C = 0.20
 **Time to concentration t_c = 19.00 min
 Intensity, i (@ t_c) = 55.60 mm/hr
 Post Development Flow, $Q_r = 2.78 * C * i * A =$ 87.54 l/s

100 Year Pre-Development Flows

C = 0.20
 **Time to concentration t_c = 19.00 min
 Intensity, i (@ t_c) = 131.48 mm/hr
 Post Development Flow, $Q_r = 2.78 * C * i * A =$ 207.00 l/s

CITY OF LONDON - 3 HOUR CHICAGO RAINFALL DISTRIBUTION PARAMETERS*

Return Period (years)	A	B	C
25mm	538.850	6.331	0.809
2	754.360	6.011	0.810
2**	1290.000	8.500	0.860
5	1183.740	7.641	0.838
10	1574.382	9.052	0.860
25	2019.372	9.824	0.875
50	2270.665	9.984	0.876
100	2619.363	10.500	0.884
250	3048.220	10.030	0.888

*Intensity $i = A / (t+B)^C$ (mm/hr)

* Refer to the City of London Design Specification & Requirements Manual (DS&RM), Section 6.

**City's Former Storm Sewer Design Curve (2-Year MacLaren Storm Curve)

POST-DEVELOPMENT CONDITIONS

POST-DEVELOPMENT CONTROLLED CATCHMENT A1

	Area (m ²)	C	A*C
Total Site Area:	28315.000		
Building Area:	8501.00	0.9	7650.9
Concrete/Asphalt:	9876.00	0.9	8888.4
Landscaped/Open:	9938.00	0.2	1987.6
Totals:	28315.00		18526.9
$C_{eq} = \text{Sum}(A*C)/\text{Sum}(A) =$	0.65		

FLOW RESTRICTOR CALCULATIONS

Orifice diameter is based on Bernoulli's equation, $Q=C_d*A*(2gH)^{0.5}$

Rearranging, $A= Q/[C_d*(2gH)^{0.5}]$, where:

Required Restriction Flow Rate, Q =	87.54	l/s
Orifice Coefficient, C _d =	0.63	
Gravitational Acceleration, g =	9.81	m/s ²
Top of Flooding =	263.70	m
Orifice Invert =	261.45	m
Hydraulic Head on Orifice, H =	2.250	m
Required Cross-Sectional Area, A =	0.02090	m ²
Required Diameter, d = $((4*A)/\pi)^{0.5}$ =	0.163	m
Minimum orifice diameter =	75	mm
Therefore, Use Orifice Restrictor =	163.00	mm
Max Flow Rate, Q =	87.35	

RAINFALL DATA

Rainfall Data - London Rainfall Intensity Duration

2YR Storm Event

Duration (min.)	Intensity "i" (mm/hr)
5	108.07
10	79.80
15	64.03
30	41.39
60	25.33
120	15.01
180	10.95

100 Yr Stm Event

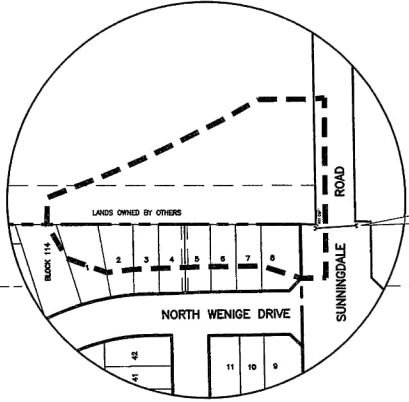
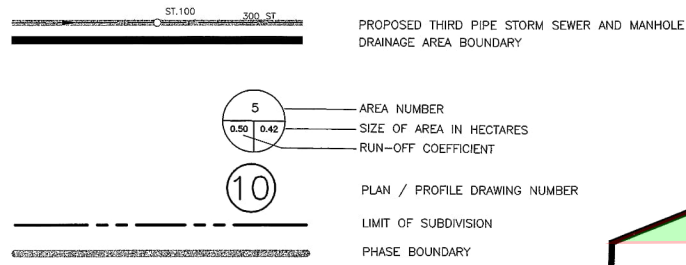
Duration (min.)	Intensity "i" (mm/hr)
5	232.24
10	181.39
15	149.56
30	99.36
60	60.87
120	35.32
180	25.28

STORAGE CALCULATIONS

Inflow, Q _i $2.78*C*i*A$ (l/s)	Volume In $Q_i*t*60/1000$ (m ³)	Orifice Restrictor Outflow, Q _o (l/s)	Surface Outflow Q _o (l/s)	Allowable Release, Q _o (l/s)	Volume Out $Q_o*t*60/1000$ (m ³)	Difference/ Storage (m ³)
552.93	165.88	87.54	0.00	87.54	26.26	139.62
408.30	244.98	87.54	0.00	87.54	52.52	192.46
327.62	294.86	87.54	0.00	87.54	78.78	216.08
211.76	381.17	87.54	0.00	87.54	157.56	223.60
129.62	466.62	87.54	0.00	87.54	315.13	151.50
76.78	552.78	87.54	0.00	87.54	630.26	-77.47
56.01	604.85	87.54	0.00	87.54	945.38	-340.53
Max. Storage Volume (m ³) =						223.60

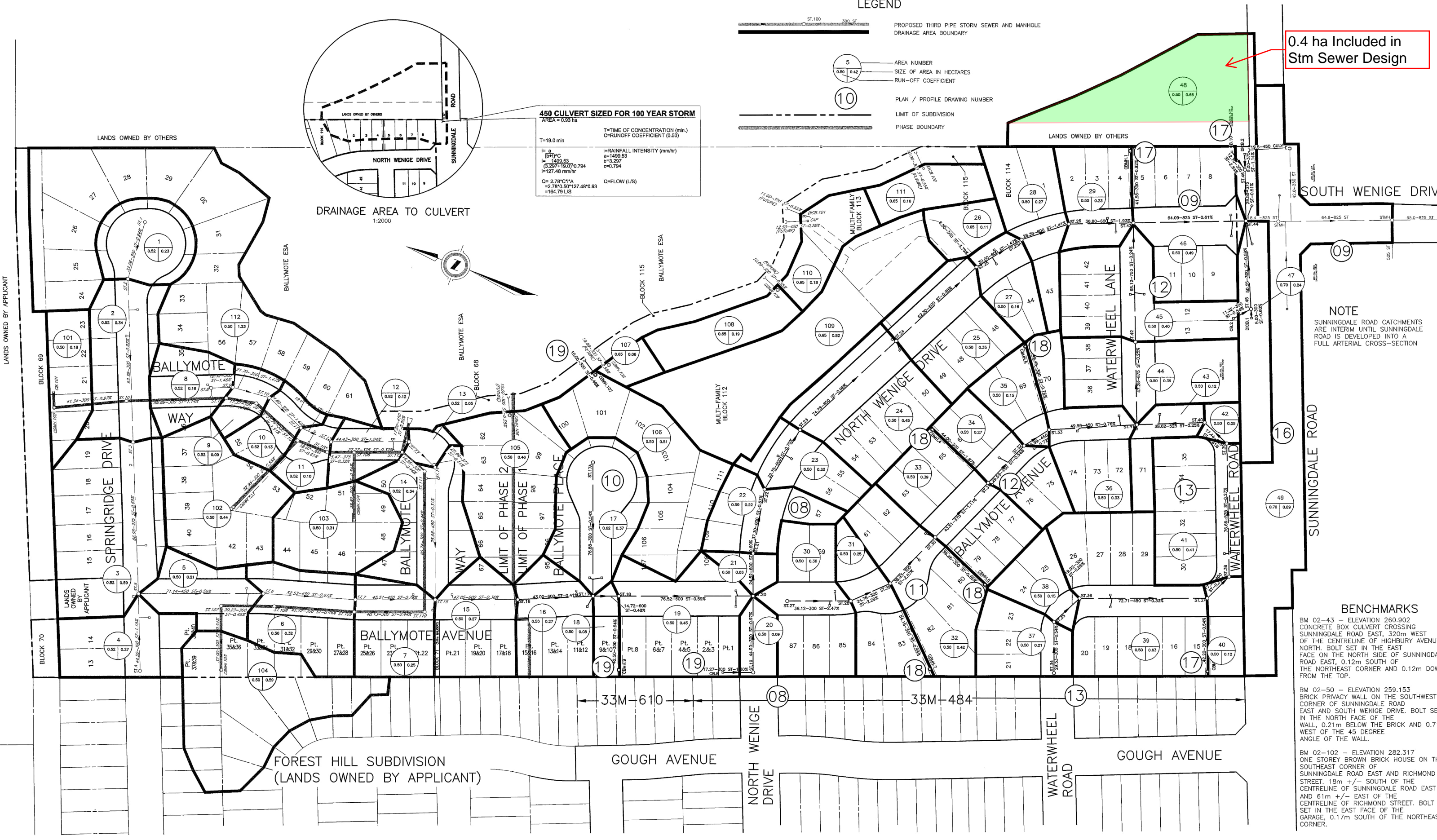
Inflow, Q _i $2.78*C*i*A$ (l/s)	Volume In $Q_i*t*60/1000$ (m ³)	Orifice Restrictor Outflow, Q _o (l/s)	Surface Outflow Q _o (l/s)	Allowable Release, Q _o (l/s)	Volume Out $Q_o*t*60/1000$ (m ³)	Difference/ Storage (m ³)
1188.28	356.48	207.00	0.00	207.00	62.10	294.38
928.07	556.84	207.00	0.00	207.00	124.20	432.64
765.22	688.70	207.00	0.00	207.00	186.30	502.40
508.37	915.07	207.00	0.00	207.00	372.59	542.47
311.44	1121.18	207.00	0.00	207.00	745.19	375.99
180.71	1301.08	207.00	0.00	207.00	1490.38	-189.30
129.34	1396.91	207.00	0.00	207.00	2235.57	-838.66
Max. Storage Volume (m ³) =						542.47

LEGEND



450 CULVERT SIZED FOR 100 YEAR STORM
 AREA = 0.93 ha
 T=19.0 min
 I=RAINFALL INTENSITY (mm/hr)
 a=1499.53
 b=3.297
 c=0.794
 Q=FLOW (L/S)
 Q=2.78 C^{0.47}
 =2.78*0.50^{0.47}*127.48^{0.93}
 =164.79 L/S

0.4 ha Included in Stm Sewer Design



NOTE
 SUNNINGDALE ROAD CATCHMENTS ARE INTERIM UNTIL SUNNINGDALE ROAD IS DEVELOPED INTO A FULL ARTERIAL CROSS-SECTION

BENCHMARKS
 BM 02-43 - ELEVATION 260.902
 CONCRETE BOX CULVERT CROSSING SUNNINGDALE ROAD EAST, 320m WEST OF THE CENTRELINE OF HIGHBURY AVENUE NORTH. BOLT SET IN THE EAST FACE ON THE NORTH SIDE OF SUNNINGDALE ROAD EAST, 0.12m SOUTH OF THE NORTHEAST CORNER AND 0.12m DOWN FROM THE TOP.
 BM 02-50 - ELEVATION 259.153
 BRICK PRIVACY WALL ON THE SOUTHWEST CORNER OF SUNNINGDALE ROAD EAST AND SOUTH WENIGE DRIVE. BOLT SET IN THE NORTH FACE OF THE WALL, 0.21m BELOW THE BRICK AND 0.71m WEST OF THE 45 DEGREE ANGLE OF THE WALL.
 BM 02-102 - ELEVATION 282.317
 ONE STOREY BROWN BRICK HOUSE ON THE SOUTHEAST CORNER OF SUNNINGDALE ROAD EAST AND RICHMOND STREET. 18m +/- SOUTH OF THE CENTRELINE OF SUNNINGDALE ROAD EAST AND 61m +/- EAST OF THE CENTRELINE OF RICHMOND STREET. BOLT SET IN THE EAST FACE OF THE GARAGE, 0.17m SOUTH OF THE NORTHEAST CORNER.

AS CONSTRUCTED NOTES	DRAWING #, SOURCE	DATE	AS CONSTRUCTED SERVICES	COMPLETION	DETAILS	No.	REVISIONS	DATE	CONSULTANT	CONSULTANT OR DIVISION	ENGINEER'S SIGNATURE	SCALE	TITLE	PROJECT No.	SHEET No.	PLAN FILE No.	
1 SEE DRAWING No. FOR FURTHER DETAILS.			SANITARY SEWER AND APPURTENANCES	MARCH 2012	DESIGN	1.	REVISED PER CITY COMMENTS	MARCH 2011	AGM	ARCHIBALD, GRAY & MCKAY ENGINEERING LTD.	<i>S.P. Brown</i>	1:1000	BALLYMOTE WOODS - PHASE 1	1072-2	03	23461	
2 SEWER DESIGN/TRANSITION WIDTH OR AS NOTED.			STORM SEWERS AND APPURTENANCES	MARCH 2012	DRAWN BY	2.	PER CITY COMMENTS / CALC PLAN	JULY 2011	AGM	3514 WHITE OAK ROAD, LONDON, ON, N6E 2Z9	Aug 31/12		SIFTON PROPERTIES LIMITED	33M-631			
3 REFERENCE B.M. 02-50 ELEVATION 259.153			WATERMAIN AND APPURTENANCES	APRIL 2012	CHECKED	3.	FOR CITY COMMENTS	AUG 5, 2011	AGM	PHONE 519-685-5300			STORM DRAINAGE PLAN				
4 SAN.P.D.C.'s 100mm DIA. UNLESS OTHERWISE NOTED			CURB AND GUTTER	JUNE 2012	APPROVED	4.	FOR CONSTRUCTION	AUG 24, 2011	AGM	FAX 519-685-5303							
			BASE ASPHALT (4#-8)	JUNE 2012	DATE	5.	RELOTING, NWD REALIGNMENT	DECEMBER 2011	AGM	WEB www.agm.on.ca							
			GRANULAR 'A'	JUNE 2012		6.	REVISED TO AS CONSTRUCTED	AUGUST 2012	AGM								
			GRANULAR 'B'	APRIL 2012													