Functional Servicing Review

Densmore Road
Town of Cobourg
Engage Project No. 20078

Engage Engineering Ltd.

May 2021

Issued for Rezoning

REVISION SUMMARY

Revision No.	Revision Title	Date	Revision Summary
1	Issued for Rezoning	May 7th, 2021	Final

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1.0 Introduction

1.1 Purpose

Engage Engineering Limited (Engage) has been retained to prepare a Functional Servicing (FSR) Brief in support of the proposed development located on Densmore Road in Cobourg. The proposed condominium development includes townhomes, roadways, parking areas, landscaped areas and a SWM facility. A portion of the existing roadways, underground infrastructure and the SWM facility and outlet have been constructed. The purpose of this report is to support the rezoning application by quantifying the impact that the changes to the proposed development will have on the existing services previously installed on the site and that they will satisfy the requirements for the development.

Recommendations made in this report are in accordance with the Town of Cobourg and Lakeshore Utilities Services Inc. (LUSI) requirements. This FSR report builds on previous infrastructure that has been constructed on site and reviews the servicing configuration changes required to support the revised site plan.

1.2 Site Description

The Densmore Meadows site was partially developed with deep servicing and road construction to base asphalt in 2015. Since that time the site has been dormant, and no further construction activity has been completed. Both Lane A and Crescent A were constructed to base asphalt.

Prior to the development of the roadways, underground infrastructure and SWM facility, it is believed that the site was undeveloped and consisted of vegetated areas. The subject site is bounded to the north by an on-ramp to Highway 401, to the east and south by Densmore Road and to the west by a retirement facility. The location of the subject property is identified on the Error! Reference source not found. included as **Figure 1**.

Figure 1 - Location Plan

2.0 Sanitary Servicing

2.1 Existing Conditions

The existing sanitary collection system and sewage treatment plant that services the site is owned and operated by the Town of Cobourg.

Based on plan and profile drawings prepared for the original site design, included in **Appendix A**, Engage confirmed that there is an existing 250mm sanitary sewer within an easement along the north property line adjacent the MTO right-of-way (ROW) available to service the development.

Internal sanitary sewer along Lane A and Crescent A was constructed in 2015 to service the proposed Townhouse lots along those roads. This internal sanitary sewer consists of 200mm diameter sewer with a network of maintenance hole structures and sanitary services that connects to the existing 250mm sanitary sewer along the north property line. At the time of construction, no sanitary sewer was installed for the former Apartment Block which is now being proposed as stacked Townhouse units.

2.2 Proposed Conditions

The site plan has been modified from the original concept proposed for the site. The site plan modifications include:

- Commercial Block in the SW corner has been revised to 5 additional Townhouse units
- The Apartment Block in the N/NE corner has been revised to include 84 Stacked Townhouse units

The revised site plan has been included as **Figure 2**.

Proposed sanitary sewer for the revised areas of the site will have connection points to the existing internal 200mm sanitary sewer at two locations. Servicing for the 5 additional Townhouse units on Crescent A will require an extension of sanitary sewer southerly connecting to SANMH109. The existing servicing stub for the former Commercial Block will be removed and replaced with five new residential services. Servicing for the 84 Stacked Townhouse units will require a small network of proposed 200mm sanitary sewer to collect domestic sewage. This proposed network will connect to the existing internal 200mm sanitary sewer upstream of SANMH104. The proposed sanitary services will consist of three 200mm diameter PVC DR35 pipes with a hydrostatic rating of 345 kPa (50psi).

The proposed sanitary services will be installed at a minimum depth of 1.80m to the top of the pipes to provide frost cover and gravity service and will have minimum 2.5m horizontal and 0.5m vertical clearance to both water and storm sewers. Sanitary maintenance holes will be provided at all intersections and change in pipe directions.

Further design details of the proposed sanitary sewer system will be prepared at the detailed design phase.

The locations of the existing sanitary sewer and proposed sanitary sewer are shown on the **Preliminary Servicing Plan** included as **Figure 4**. The drainage areas contributing to the sewers are shown on the **Sanitary Drainage Area Plan** included as **Figure 5**. The sanitary sewer design sheet is included in **Appendix B**.

2.3 Design Criteria

Design criteria to analyze the wastewater flow for the site has been assembled from MOE and the Town of Cobourg Engineering Design Standards. Criteria includes:

- Residential sewage flow of 364 L/person/day
- Residential Townhouse units to have capacity of 2.68 persons/unit
- Development unit count – 84 stacked townhouse & 39 Townhouse units
- Harmon peaking formula to be applied to residential flows
- Infiltration rate of 0.26 L/ha/s for inflow and infiltration

2.4 Sewage Flow Rates

Sewage flow rates for the proposed flows were analyzed based on Town guidelines. Based on the design criteria listed above, the sewage flows for the proposed site have been calculated and summarized in **Table 1** below. The proposed sewage flow calculations are included in **Appendix B**.

Table 1 – Proposed Sewage Flow

Flow Type	Flow (m^3/day)
Peak Residential Flow	487.28
Infiltration Flow	52.79
Peak Design Flow	**540.07**

3.0 Water Servicing

3.1 Existing Conditions

The existing water distribution system that services the Town of Cobourg is owned and operated by the Lakeshore Utilities Services Inc. (LUSI).

Based on plan and profile drawings prepared for the original site design, included in **Appendix A**, Engage confirmed that there is an existing 300mm watermain fronting the site within the Densmore Road ROW available to service the development.

Internal watermain along Lane A and Crescent A was constructed in 2015 to service the proposed Townhouse lots along those roads. This existing internal watermain consists of 150mm diameter watermain with fire hydrants and water services that connect to the existing 300mm watermain on Densmore Road. At the time of construction, no watermain was installed for the former Apartment Block which is now being proposed as stacked Townhouse units.

3.2 Proposed Conditions

The site plan has been modified from the original concept proposed for the site as identified in Section 2.2.

The revised site plan has been included as **Figure 2**.

Proposed water servicing for the stacked townhouse units will connect to the existing watermain in two locations. Water servicing for the proposed stacked townhouse units will connect to the existing 150mm watermain located on Crescent A in the area of the cul-de-sac. Through discussions with LUSI and the County of Northumberland Plumbing Inspector a servicing configuration for the stacked townhouse units has been proposed. LUSI policy requires a single metered service be provided for these units; this has been accommodated through the addition of a meter room that will house both the water meter and a backflow prevention device. From the meter room a 150mm watermain is proposed throughout the Block to provide services to the buildings. The building code requires individual shut offs to each unit accessible without entering the unit. To accommodate this individual services and external shut offs will be provided to each unit from the 150mm main. The second connection will be to accommodate the hydrant extension. To service the 5 additional Townhouse units in the SW corner of the site new water services will be connected to the existing 150mm watermain fronting those units.

All services will be installed at a minimum depth of 1.8m to the top of pipe with minimum 2.5m horizontal and 0.5m vertical clearance to both sanitary and storm sewers. Pipe specifications will be 150mm diameter PVC DR18 watermains with a pressure class rating of 1034 kPa (150 psi).

The location of the existing watermain and the proposed watermains and water service configuration for the development are shown on the **Preliminary Servicing Plan** included as **Figure 4**.

3.3 Design Criteria

Design criteria to analyze the water demand of the development and municipal water system has been assembled from MOECC and LUSI requirements. Criteria to include:

- Residential water demand of 364 L/person/day.
- Residential Townhouse units to have capacity of 2.68 persons/unit
- Unit count – 123
- Maximum day factor of 1.90 (from MOE based on population of 19,031)
- Peak hour factor of 2.85 (from MOE based on population of 19,031)
- Minimum fire flow of 2000 L/min (minimum fire flow from FUS)

3.4 Design Flow Rates

Based on a Statistics Canada Census Profile from 2016 the Town of Cobourg has a current population of 19,031.

Calculations for the domestic water demand and fire demand for the proposed development were determined based on the design criteria listed above. Detailed calculations have been provided in **Appendix C** and the results have been summarized in **Table 3** below.

Table 2 – Proposed Domestic Water Flow

Flow Type	Flow (L/min)
Average Day Flow (Residential)	83.3
Maximum Day Flow	158.3
Peak Hour Flow	237.5
Fire Flow	2,000
Maximum Day + Fire Flow	**2158.3**

4.0 Summary

Sanitary servicing to the proposed development can be accommodated through two connections to existing internal sanitary sewer. The addition of proposed 200mm diameter PVC sanitary sewer and residential services will provide the required infrastructure to service the proposed units. The existing internal sanitary sewer has adequate capacity to provide service for the change of unit type.

Water servicing to the proposed development can be accommodated through an extension of the 150mm internal watermain. Proposed stacked townhouse units will be connected to proposed watermain through individual services connected to a main line that is controlled through a meter room. The additional 5 townhouse units at the SW corner of the property will be accommodated through the addition of new service connections to the existing 150mm watermain.

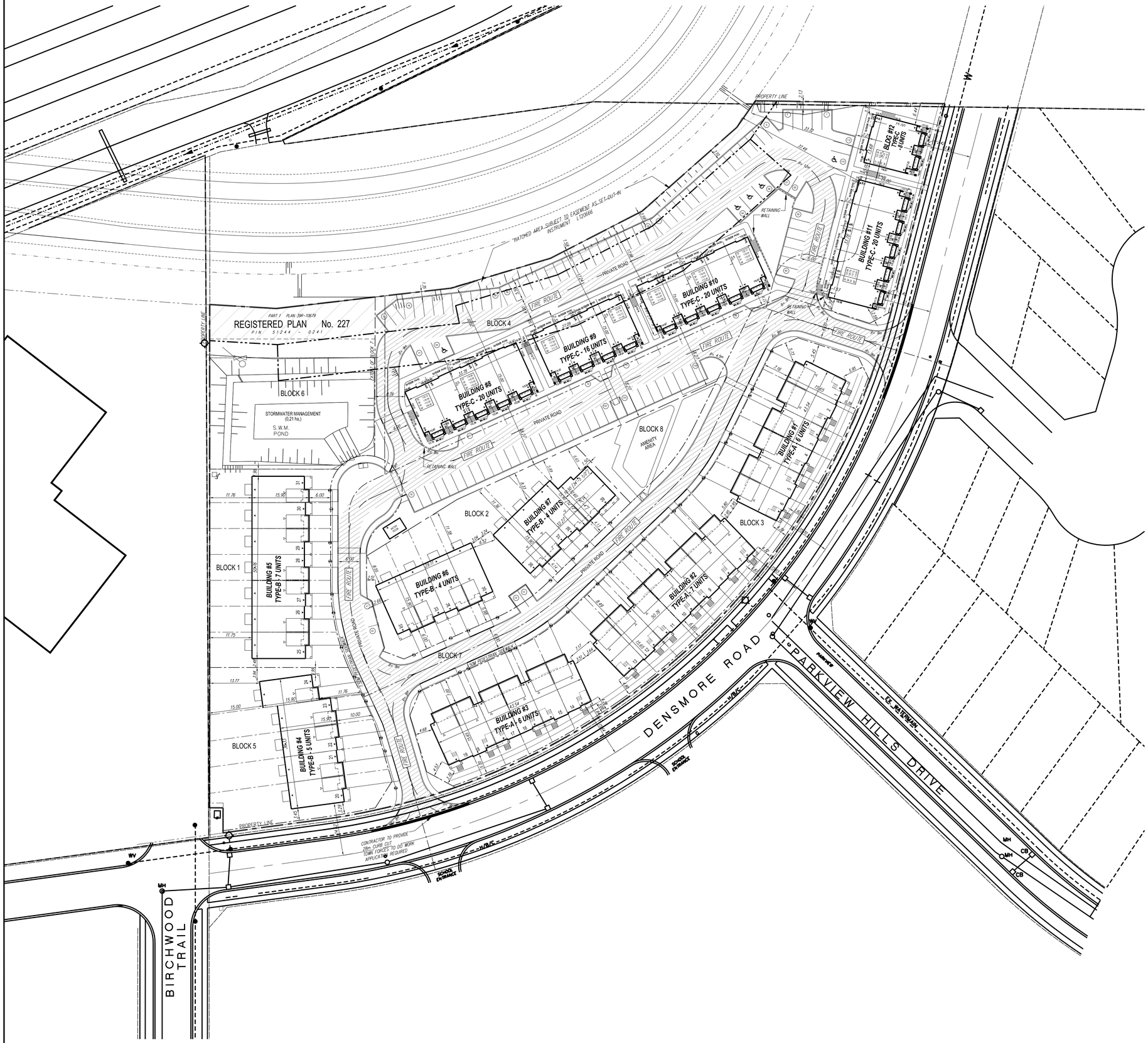
Prepared by:

Jason Armstrong
Project Manager

Reviewed by:

Aaron Hill, P.Eng
Principal

Figure 2 - Site Plan



SITE STATISTICS

STANDARDS REFLECT PARENT BYLAW REQUIREMENTS UNLESS DENOTED OTHERWISE
NUMBERS IN SQUARE BRACKETS INDICATES ZONING BYLAW ASSOCIATED WITH SPECIFIED STANDARD

PARENT BYLAW: ZONING BY-LAW NO #85-2003
SITE SPECIFIC BYLAW: TBD
PROPOSED ZONING DESIGNATION: R4-XX

1.0 SITE STANDARDS

SITE AREA	25348.51 sm (6.26 ac) [2.53 ha]				
NET LOT AREA	19993.9 sm (4.94 ac) [2.00 ha]	(INCLUDING BLOCK 1, 2, 3, 4, 5 & 8)			
	BLOCK 1 (1903.23 sm)[0.19 ha]	BLOCK 2 (2311.07 sm)[0.23ha]	BLOCK 3 (4874.48 sm)[0.49 ha]	BLOCK 4 (8906.67 sm)[0.89 ha]	
	BLOCK 5 (1944.86 sm)[0.19 ha]	BLOCK 6 (SWM)	BLOCK 7 (PRIVATE LANDWAY)	BLOCK 8 (519.34 sm)[0.05ha]	
GROSS FLOOR AREA	PROPOSED				
	BLOCK 1 1532 sm	BLOCK 2 1538 sm	BLOCK 3 2851 sm	BLOCK 4 7317 sm	
	BLOCK 5 956 sm	BLOCK 6 N/A	BLOCK 7 N/A	BLOCK 8 N/A	
PROPOSED DENSITY	BLOCK 1 7 UNITS (36.8uv/ha)	BLOCK 2 8 UNITS (18.3uv/ha)	BLOCK 3 15 UNITS (41.35uv/ha)	BLOCK 4 34 UNITS (65.45uv/ha)	
	BLOCK 5 5 UNITS (26.2uv/ha)	BLOCK 6 N/A	BLOCK 7 N/A	BLOCK 8 N/A	
	123 units / 2.53 ha = 49 units per hectare (ha)				

2.0 LOT STANDARDS

TOWNHOUSE	REQUIRED	PROPOSED							
		BLOCK 3		BLOCK 1	BLOCK 1	BLOCK 2			
ZONING STANDARD		BLDG #1	BLDG #2	BLDG #3	BLDG #4	BLDG #5	BLDG #6	BLDG #7	BLDG #8
NUMBER OF DWELLING UNITS	-	6	7	6	5	7	4	4	
MINIMUM LOT FRONTAGE (PER UNIT)	7 m	7.2 m	7.2 m	7.2 m	7.2 m	7.2 m	7.2 m	7.2 m	
MINIMUM LOT AREA (PER UNIT)	190 sm	201 sm	210 sm	201 sm	320 sm	242 sm	229 sm	199 sm	
MINIMUM FLOOR AREA (PER DWELLING UNIT)	70 sm (1 BEDROOM)	202 (sm)	202 (sm)	202 (sm)	188 (sm)	188 (sm)	188 (sm)	188 (sm)	
MAXIMUM BUILDING HEIGHT	3 STOREYS	3 STOREYS			2 STOREYS				
MAXIMUM COVERAGE (PER UNIT/PER LOT)	60 %	57 %	54 %	57 %	37 %	49 %	51 %	59 %	
GROSS FLOOR AREA		1227 (sm)	1429 (sm)	1227 (sm)	956 (sm)	1332 (sm)	767 (sm)	790 (sm)	
BUILDING AREA	LEFT	341sm	454sm	341sm	592 (sm)	473sm (sm)	475 (sm)	489 (sm)	
	RIGHT	341sm	341sm	341sm		355sm (sm)			
YARD SETBACKS TOWNHOUSES FRONT YARD (FRONTING DENSMORE RD)	3 m	4.39 m	4.32 m	4.28 m	3.29 m	>10m	>10m	>10m	>10m
EXTERIOR SIDE YARD	2 m	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
INTERIOR SIDE YARD	1.5 m	>10m	>10m	>10m	>10m	>10m	>10m	>10m	>10m
REAR YARD	7 m	>10m	>10m	>10m	>10m	>10m	>10m	>10m	>10m
MINIMUM SETBACK FROM CENTRELINE OF STREET	13 m	15.70 m	15.65 m	15.64 m	14.62 m	-	-	-	
MINIMUM LANDSCAPE OPEN SPACE (PER LOT)	10 %	24%	24%	24%	53%	43%	39%	33%	

STACKED, BACK TO BACK	REQUIRED (NUMBERS IN BRACKETS CONVERTED TO METRIC AS REQUIRED)	PROPOSED				
		BLOCK 4				
ZONING STANDARD		BLDG #8	BLDG #9	BLDG #10	BLDG #11	BLDG #12
NUMBER OF DWELLING UNITS		20	16	20	20	8
	84 DWELLING UNITS	84 DWELLING UNITS				
MINIMUM LOT FRONTAGE (PER BLOCK)	60 m	64.45 m FACING DENSMORE RD.				
MINIMUM LOT AREA (PER BLOCK)	0.80ha	0.88 ha				
MINIMUM FLOOR AREA (PER DWELLING UNIT)	56 sm (1 BEDROOM)	76 (sm)	76 (sm)	76 (sm)	76 (sm)	76 (sm)
MAXIMUM BUILDING HEIGHT	3 STOREYS	3 STOREYS				
MAXIMUM COVERAGE (INCLUDING ALL BUILDINGS)	40 %	24 %				
GROSS FLOOR AREA		1858 (sm)	1489 (sm)	1858 (sm)	1858 (sm)	751 (sm)
BUILDING AREA		507 (sm)	406 (sm)	507 (sm)	507 (sm)	205 (sm)
YARD SETBACKS TOWNHOUSES FRONT YARD (FRONTING DENSMORE RD	2 m	>10m	>10m	>10m	2.4 m	2.4 m
EXTERIOR SIDE YARD	2 m	N/A	N/A	N/A	N/A	N/A
INTERIOR SIDE YARD	2.5m	>10m	>10m	>10m	>10m	3.38 m
REAR YARD	7 m	20.01 m	17.24 m	17.98 m	37.40 m	33.32 m
MINIMUM SETBACK FROM CENTRELINE OF STREET	13 m	N/A	N/A	N/A	13.59 m	13.59 m
MINIMUM LANDSCAPE OPEN SPACE	20 %	24 %				

3.0 SITE CIRCULATION

ZONING STANDARD	REQUIRED	PROPOSED
VEHICULAR PARKING REQUIREMENTS		
RESIDENT PARKING		
TOWNHOUSE DWELLING 2/ UNIT	78	82
STACKED TOWNHOUSE DWELLING 1.25/ UNIT	105	112
REQUIRED RESIDENT PARKING RANGE	183	194
MINIMUM PARKING SPACE WIDTH	2.7 m	2.7 m
MINIMUM PARKING SPACE LENGTH	5.5 m	5.5 m
ACCESSIBLE PARKING (APARTMENT DWELLING)		
MINIMUM NUMBER OF ACCESSIBLE PARKING SPACES	5 SPACES	5 SPACES

ACCESSIBLE PARKING SIGN N.T.S.

NOTE: SIGNS TO BE PLACED TO BE VISIBLE AND CLEARLY DIRECT USERS TO ACCESSIBLE PARKING AREAS THROUGHOUT THE SITE

BY-LAW 2005-188

NOTE:
- SIGNS TO BE SET AT 4N ANGLE OF NOT LESS THAN 30 DEGREES AND NOT MORE THAN 45 DEGREES, TO A LINE PARALLEL TO THE FLOW OF TRAFFIC AND SHOULD ALWAYS BE VISIBLE TO APPROACHING TRAFFIC
- SIGNS TO BE PLACED ON EITHER SIDE (STAGGERED) OF THE FIRE ACCESS ROUTE AT INTERVALS OF NOT MORE THAN 30.0 METRES (100 FEET) APART.
- SIGNS SHALL NOT EXCEED 2.0 METRES (7 FEET) AND NOT LESS THAN 1.5 METRES (5 FEET) MEASURED FREE FROM THE BOTTOM OF THE SIGN TO THE FINISHED PAVEMENT GRADE.
- SIGNS SHALL BE INSTALLED AT MINIMUM OF 3 METRES (10 FEET) AND A MINIMUM OF 10 METRES (33 FEET) MEASURED HORIZONTALLY FROM THE CURB.
- SIGNS SHALL BE INSTALLED SO THAT THERE ARE NO OBSTRUCTIONS WITHIN 6.0 METRES (20 FEET) OF THE SIGN AND BE VISIBLE TO APPROACHING TRAFFIC.
- SIGNS SHALL DISPLAY SINGLE HEADED ARROWS POINTING IN THE DIRECTION WHICH THE REGULATION IS IN EFFECT. AT INTERMEDIATE POINTS THROUGHOUT THE REGULATED AREA, DOUBLE-HEADED ARROWS SHALL INDICATE THAT THE PROHIBITION OR RESTRICTION EXISTS IN EACH DIRECTION.
- ALL SIGNAGE AND INSTALLATION OF THE FIRE ACCESS ROUTE SIGN(S) MUST ALSO CONFORM TO THE REQUIREMENTS AS OUTLINED IN THE CITY OF _____ BY-LAW #2005-188 AS AMENDED (PARKING BY-LAW).

*** REFER TO CITY OF _____ FIRE ROUTE SIGNAGE AND INSTALLATION SPECIFICATIONS (CURRENT VERSION) FOR A COMPLETE LIST OF REQUIREMENTS ***

BICYCLE STORAGE SIGN

NOTE: SIGNS TO BE PLACED TO BE VISIBLE AND CLEARLY DIRECT USERS TO BICYCLE PARKING AREAS THROUGHOUT THE SITE

VAN ACCESSIBLE PARKING SIGN N.T.S.

NOTE: SIGNS TO BE PLACED TO BE VISIBLE AND CLEARLY DIRECT USERS TO ACCESSIBLE PARKING AREAS (VAN ACCESSIBLE) THROUGHOUT THE SITE

Existing and Proposed Walkways

a) pedestrian walkways must be raised approximately 15 cm from vehicular traffic to provide definition and protection for pedestrian traffic; b) standard minimum width of a pedestrian walkway is 1.5 m ; c) standard minimum width of a pedestrian walkway adjacent to the end of parking spaces is 1.8 m (6.0 ft.)

FIRE ROUTE

Ensure road is constructed to support expected load imposed by fire trucks. The fire route can only be asphalt or concrete.

Disabled Parking signs

Parking spaces reserved for people with disabilities must comply to the current By-Law and Legislation and must be identified by a sign, installed at the applicant' expense, in accordance with the design specifications of 11.4.2. in the Town of Cobourg Accessibility tandards

CMB NOTE:

Concrete pad for communily mailboxes as per canada post specifications – pad to be at level of sidewalk and be wheelchair accessible.

THE HYDRO TRANSFORMER

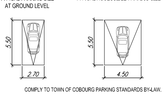
Ultimate location to be coordinated with electrical / utility consultants.

Fencing

Any fencing adjacent to municipal lands is to be located 15cm (6.0 in.) inside the property line.

Roadway, driveway & parking surface

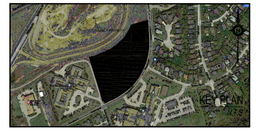
Roadway, driveway & parking areas surface materials, refer to site grading and landscape drawings for material finishes.



COMPLY TO TOWN OF COBOURG PARKING STANDARDS BY-LAW.

APPLICATION NUMBER:

-



LEGAL DESCRIPTION OF PROPERTY:

PART 1 – PLAN 39R–10679 REGISTERED PLAN NO. 227
TOWN OF COBOURG, ONTARIO

OWNER INFORMATION

MARSHALL HOMES
9-1295 WHARF ST
PICKERING, ON L1W 1A2

SITE LEGEND

- ENGINEERED FILL LOTS
- STREET TREE
- RETAINING WALL
- CURB STOP
- CATCH BASIN
- DOUBLE / SINGLE STM & SAN CONNECTION
- HYDRO TRANSFORMER
- PLAN/MOUNTED MOTOR
- 390.10 EXISTING GRADES
- 390.10 PROPOSED GRADES
- 2.0% SWALE DIRECTION
- EMBANKMENT / BERM MAX 3:1 SLOPE
- BELL PEDESTAL
- CABLE PEDESTAL
- HYDRO POLE
- HYDRO POLE GUY
- STREET SIGN
- COMMUNITY MAILBOX
- WATER SERVICE
- HYDRO SERVICE
- SHEET DRAINAGE
- STREET LIGHT PEDESTAL
- STREET LIGHT (L.S.)
- BUILDING LIGHT (W.L.)
- TRAFFIC SIGNAL POWER PEDESTAL
- DOWNSPOUTS
- WINDOWS PERMITTED
- 45 MINUTE FIRE RATED WALL SIDE YARD DISTANCE IS LESS THAN 1.2m TO LOT LINE (NO WINDOWS PERMITTED)
- EXTERIOR DOOR LOCATION
- # GARAGE PERMITS
- SANITARY LINE
- STORM WATER LINE
- WATERLINE
- HYDRO LINE
- GAS LINE
- CABLE LINE
- BELL
- HYDRO, GAS, BELL, CABLE LINE
- HYDRO METER LOCATION
- PROPOSED GAS METER LOCATION (TO BE CONFIRMED BY EMBROSE)
- SUMP PUMP (TO BE DISCHARGE AT GRADE)
- RAIN WATER LEADER (CONNECTED TO STORM SYSTEM (REFER TO SITE & SERVICING DRAWINGS))
- RAIN WATER LEADER DISCHARGE AT GRADE (REFER TO SITE & SERVICING DRAWINGS)
- TACTILE SURFACE INDICATOR
- SANITARY MANHOLE
- STORM MANHOLE
- VALVE & CHAMBER
- VALVE & BOX
- FIRE HYDRANT
- SUMP PUMP AND SURFACE DISCHARGE LOCATION
- UPGRADE ELEVATION
- CHAIN LINK FENCE
- FENCE AND GATE
- PRIVACY FENCE (REFER TO LANDSCAPE DWGS)
- ACOUSTIC FENCE
- FF FINISHED FLOOR
- TFW TOP OF FOUNDATION WALL
- BF BASEMENT FLOOR
- UF UNDERSIDE OF FOOTING
- WOD WALKOUT DECK
- WOB WALKOUT BASEMENT
- MOD MODIFIED
- REV REVISED
- HIGH LIGHTED GRADE
- DIRECTIONAL TRAFFIC ARROW
- SITE SIGNAGE
- BARRIER FREE PARKING STALL
- TRANSFORMER
- REFUSE BIN
- CU CONCRETE UNIT (REFER TO MECHANICAL)
- SWM/SE CONNECTION
- PEDESTRIAN ACCESS
- MECHANICAL GRATE
- SPLASH PAD
- FIRE ROUTE SIGN
- FIRE EXIT ONLY
- FIRE ROUTE SIGN (NO PARKING)
- BOLLARD LIN LIGHT
- FIRE ROUTE
- PROPERTY LINE
- 3m or 6m LANDSCAPE BUFFER
- SOFT LANDSCAPE
- SIDEWALK (MUNICIPAL)
- BUILDING FOOTPRINT
- S.P. SUMDEN PATIO (+/-0.5m BELOW GRADE)
- WW WINDOW WELL
- DENOTES EXTENT OF LAND DEEDED TO CITY
- DENOTES EXTENT OF LANDS TO BE ACQUIRED BY OWNER
- SANITARY SERVICE
- WATER SERVICE
- ELECTRIC SERVICE

REVISIONS			
AG.	-	-	-
A.	-	-	-
A.	-	-	-
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A.	-	-	-
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A.	-	-	-
A.	-	-	-
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A.	-	-	-
1.	REVISED AS PER -	-	-

SUBMITTALS			
10.	-	-	-
9.	-	-	-
8.	-	-	-
7.	-	-	-
6.	ISSUED FOR PLANNER & GRADING COORDINATION	2021.05.10	SL
5.	ISSUED FOR REVIEW	2021.03.26	SL
4.	ISSUED FOR REVIEW	2021.03.18	SL
3.	ISSUED FOR REVIEW	2021.03.16	SL
2.	ISSUED FOR REVIEW	2021.03.02	SL
1.	ISSUED FOR REVIEW	2021.02.02	HM
No.	Description	YYYY.MM.DD	By

NORTH: PROJECT NORTH / TRUE NORTH

STAMP:

4 ARCHITECTURE INC.
WWW.4ARCHITECTURE.CA
8966 Woodbine Avenue, Suite 100, Markham, ON L3R 0J7
T. (905) 470 7212 // F. (905) 737 7326 email: mail@4architecture.ca

MARSHALL HOMES
220082

COBOURG, ON — DENSMORE ROAD/ BIRCHWOOD TRAIL

SITE PLAN

2021.03.26

Scale	Drawn By	Checked By
1:500	SS/HM	SL

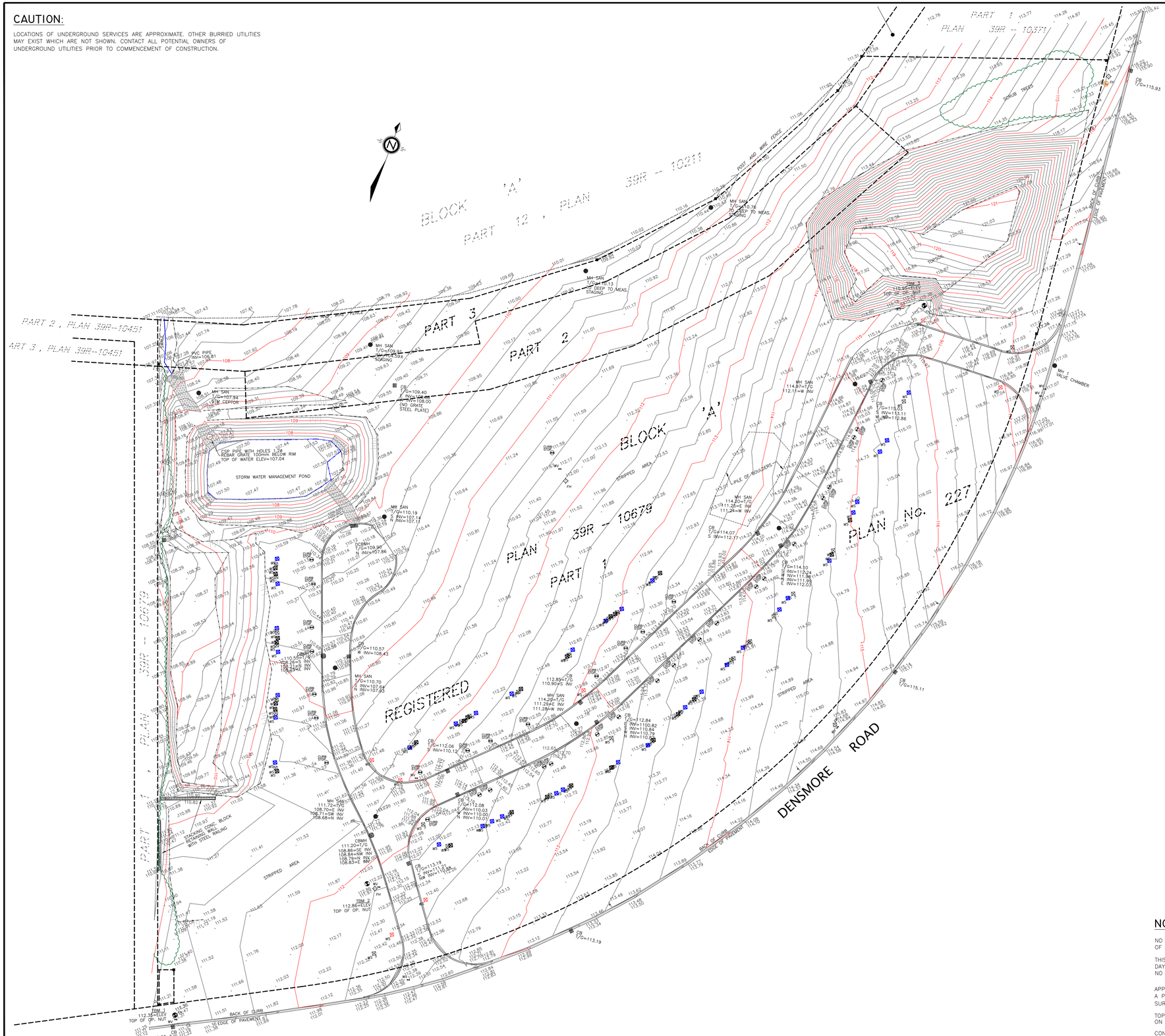
Drawing Number: 220082DSP01.dwg

SP1

Figure 3 - Topographic Survey Plan

CAUTION:

LOCATIONS OF UNDERGROUND SERVICES ARE APPROXIMATE. OTHER BURRIED UTILITIES MAY EXIST WHICH ARE NOT SHOWN. CONTACT ALL POTENTIAL OWNERS OF UNDERGROUND UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.



KEY PLAN Scale: N.T.S.

PART OF
BLOCK 'A', REGISTERED PLAN No. 227
TOWN OF COBOURG
IN THE
COUNTY OF NORTHUMBERLAND

SKETCH

LEGEND:

- EX. BELL
- EX. CENTRELINE
- EX. DITCH/SWALE
- GAS — EX. GAS
- U/G — EX. UNDERGROUND UTILITY
- O/H — EX. OVERHEAD UTILITY
- W — EX. WATERMAIN
- TREELINE
- FENCE
- CULVERT
- B.BOX — EX. BELL BOX
- BELL UNDERGROUNG CABLE MARKER
- LIGHT STANDARD
- FIRE HYDRANT
- STANDARD IRON BAR
- WELL
- SIGN
- DECIDUOUS TREE
- CONIFIROUS TREE
- BUSH
- MH — MANHOLE
- RIPRAP
- CB — CATCHBASIN
- GM — GAS METER
- GV — GAS VALVE
- HM — HYDRO METER
- VALVE
- CURB STOP WATER VALVE
- HYDRO POLE WITH GUY WIRE
- HYDRO POLE
- CABLE CONNECTION PIT
- 253.93 — EXISTING ELEVATION
- EXISTING DROP CURB LOCATION
- 2X4 SERVICE MARKER (SANITARY SERVICE)
- WS — 2X4 SERVICE MARKER (ELECTRICAL OR STORM) SERVICE)
- WS — 2X4 SERVICE MARKER (WATER SERVICE)
- WS — 2X4 MARKER

No.	DESCRIPTION	DATE	BY	APROV.

SCALE: 1:400

5 4 3 2 1 0 5 10 20 30 40 metres

TEMPORARY BENCHMARKS

TBM 1

TOP OF OPERATION NUT OF FIRE HYDRANT AT THE SOUTH EASTERLY CORNER OF SITE, NORTH SIDE OF DENSMORE ROAD EAST OF ENTRANCE INTO EXTENDACARE NURSING HOME.

ELEVATION = 112.35

TBM 2

TOP OF OPERATION NUT OF FIRE HYDRANT AT THE INTERSECTION OF THE INTERNAL SITE ROADS. HYDRANT WESTERLY SIDE OF INTERSECTION.

ELEVATION = 112.86

TBM 3

TOP OF OPERATION NUT OF FIRE HYDRANT AT THE BOTTOM OF THE TOPSOIL PILE ON EAST SIDE OF INTERNAL SITE ROAD.

ELEVATION = 115.95

NOTES:

NO INTENT HAS BEEN OR IS EXPRESSED TO ESTABLISH THE BOUNDARIES OF THE SUBJECT LANDS, ADJACENT LANDS OR OTHERWISE DEFINE OWNERSHIP.

THIS SKETCH IS TO SHOW THE CURRENT "TOPOGRAPHIC CONDITIONS" AS OF THE DAY OF THE SURVEY. THE SKETCH IS NOT INTENDED FOR ANY OTHER USE AND NO PERSONS OTHER THAN THE CLIENT IS AUTHORIZED TO USE THIS SKETCH.

APPROXIMATE BOUNDARY LIMITS SHOW HERE ON HAS BEEN DERIVED FROM A PLAN OF SURVEY BEING PLAN 39R-10679.
SURVEY MONUMENTS SHOWN ON THIS PLAN HAVE NOT BEEN VARIFIED.

TOPOGRAPHIC SURVEY WAS DONE BY A.R.(SANDY) WAKELING ON MARCH 15th, 2021.

CONTOUR INTERVAL = 0.25 metres

BENCHMARK

ELEVATIONS SHOWN HERE ON ARE GEODETIC IN ORIGIN AND ARE REFERENCED TO SITE BENCH MARK (TBM 1) ELEVATION=112.35
COORDINATES HAVE BEEN DERIVED FROM GPS OBSERVATIONS ON THE POWER NET GPS REAL TIME NETWORK, UTM ZONE 17, NAD83 (CSRS), EPOCH (2010).

A.R.(SANDY) WAKELING
SURVEYING TECHNICAL SERVICES
1410 SETTLERS LINE , KEENE , ONTARIO , K0L 2G0
E-MAIL: alexakasandy@nexicom.net
Office (705)295-2670 Moble (705)933-6657

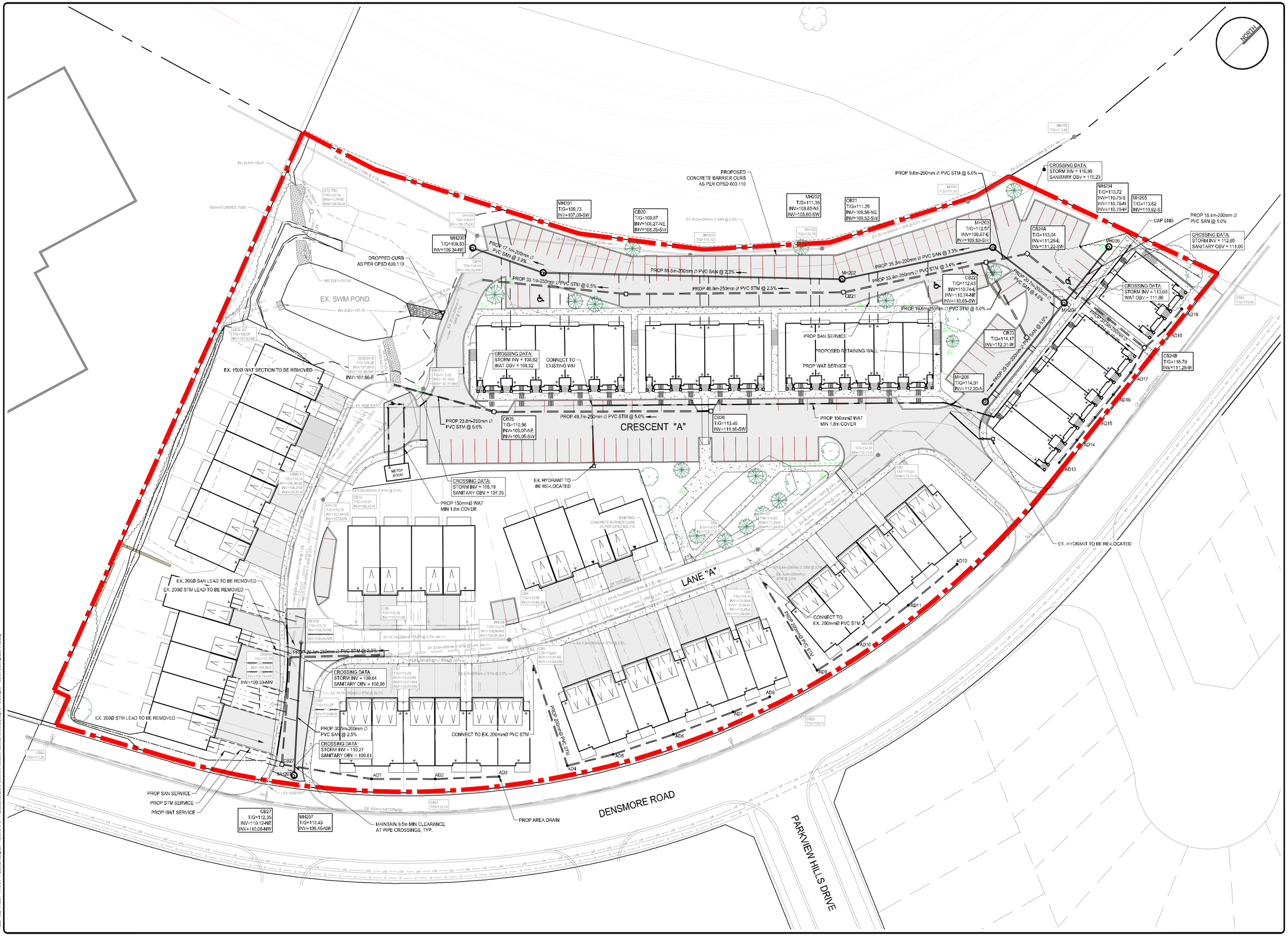
Client: ENGAGE ENGINEERING LTD.

Designed By:	Drawn By:	Checked By:
	S. Wakeling	S. Wakeling

Project No.:	Date:
EGE21-594	MARCH 17, 2021

Drawing Name:	Drawing No.:
EGE21-594	1

Figure 4 - Preliminary Servicing Plan



SURVEY

TOPOGRAPHIC SURVEY PROVIDED A.R. WAKELING SURVEYING TECHNICAL SERVICES. SURVEY COMPLETED ON MARCH 15, 2021

BENCHMARK

TOP OF OPERATION NUT OF FIRE HYDRANT AT THE SOUTH EASTERLY CORNER OF SITE, NORTH SIDE OF DUNMORE ROAD EAST OF ENTRANCE INTO EXTENDACARE NURSING HOME.

ELEV: 112.35m

NOTES:

PR.	EX.	FEATURE
		EDGE OF PAVEMENT
		BACK OF CURB
		EDGE OF GRAVEL
		CENTRELINE OF ROAD
		DITCH
		SIDEWALK
		FENCE LINE
		RETAINING WALL
		LIGHT DUTY ASPHALT
		HEAVY DUTY ASPHALT
		GRASS LANDSCAPED
		CONC. DRIVEWAY RAMP
		ASPH. DRIVEWAY RAMP
		INTERLOCK BRICK
		GAS MAIN
		OVERHEAD BELL
		UNDERGROUND BELL
		OVERHEAD HYDRO
		UNDERGROUND HYDRO
		WATERMAIN
		STORM SEWER
		SANITARY SEWER
		WATER SERVICE
		SANITARY SERVICE
		PROPERTY LINE
		RIGHT-OF-WAY
		WATER VALVE
		WELL
		SANITARY MANHOLE
		CATCH BASIN
		DOUBLE CATCH BASIN
		CATCH BASIN MANHOLE
		DOUBLE CB MANHOLE
		STORM MANHOLE
		FIRE HYDRANT
		IRON BAR
		LIGHT STANDARD
		MAILBOX
		ROAD SIGN
		CONIFEROUS TREE
		DECIDUOUS TREE
		OVERHEAD DOOR
		MAN DOOR
		ACCESSIBLE MAN DOOR

No.	REVISION	BY	DATE
1.	ISSUED FOR REZONING	SD	2021-05-14

ENGAGE ENGINEERING
www.engageeng.ca 171 King Street, Suite 100 Peterborough, ON Phone (705) 755-0427

DENSMORE MEADOWS

MARSHALL HOMES

SITE SERVICING PLAN

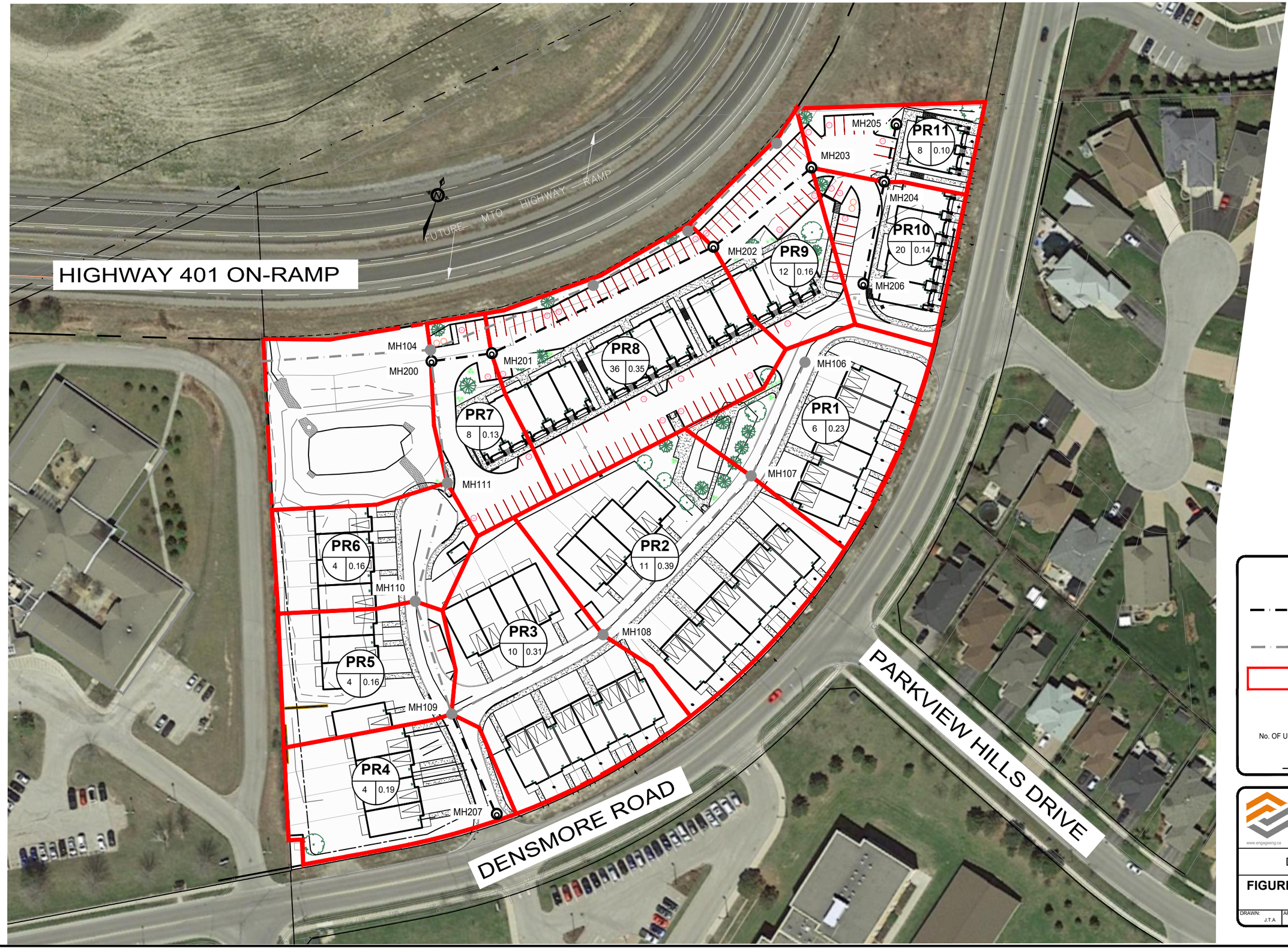
CITY OF COBOURG

DRAWN BY: S.DINGMAN	STAMP:
DESIGNED BY: S.DINGMAN	
APPROVED BY: L.PARSONS	
DATE: 2021-03-23	
SCALE: 1:400	

PROJECT NUMBER:	SHEET NAME:	SHEET:
20078	SS	2 of 2

20078-SS
Date: May. 14, 2021 - 11:40 a.m Plotted by: sdingman File name: S:\01-Projects\2020\20078- Bowmore Meadows- Marshall Homes\02-Design\01 - Drawings\07 - Current Drawings\20078-SS.dwg

Figure 5 - Sanitary Drainage Plan



ENGAGE ENGINEERING

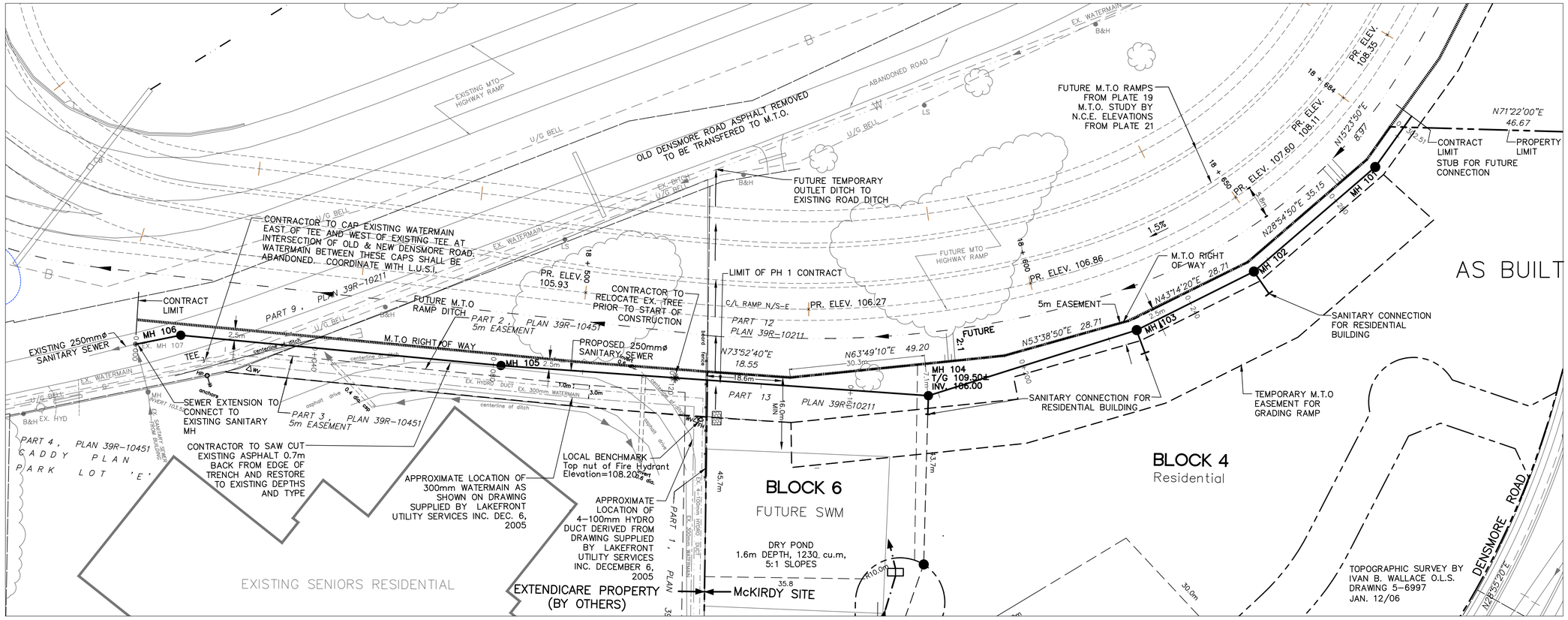
www.engageeng.ca • 171 King Street, Suite 120, Peterborough, ON • Phone: (705) 755-0427

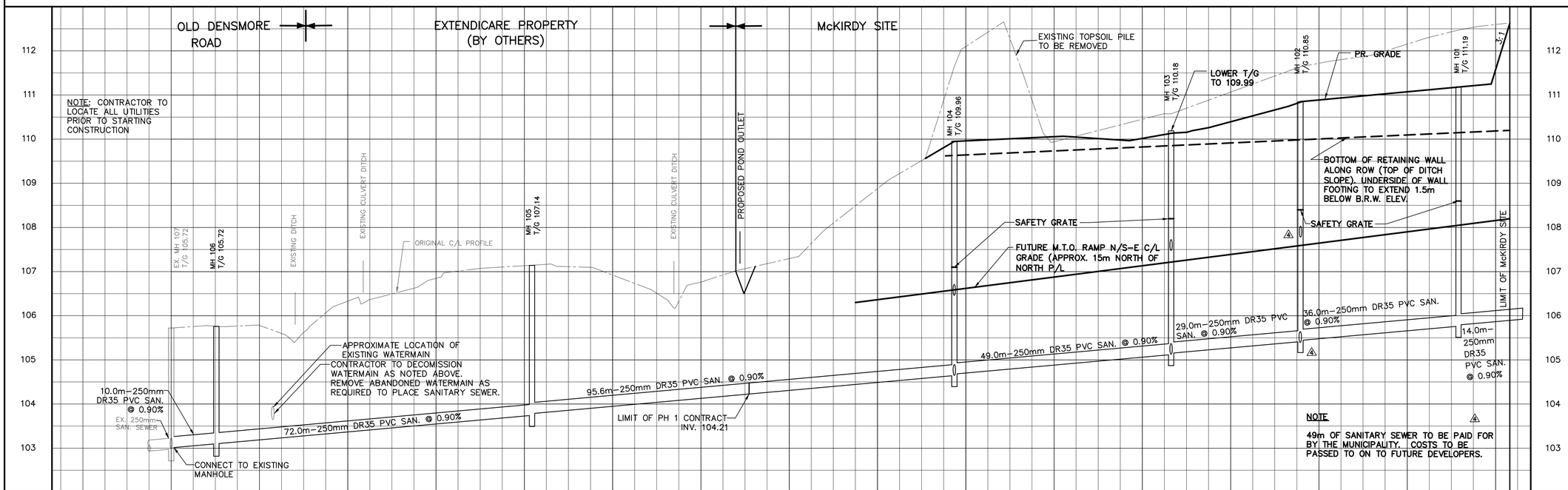
DENSMORE MEADOWS

FIGURE 5 - SANITARY DRAINAGE PLAN

DRAWN:	APPROVED:	SCALE:	DATE:	PROJECT No.:
J.T.A	J.T.A	1:1000	2021-04-30	20112

Appendix A: DM Wills Design Drawings

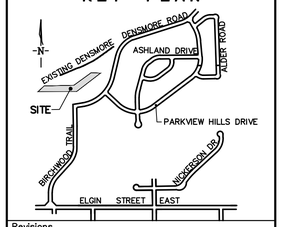




METRIC

Dimensions are in METRES and/or MILLIMETRES unless otherwise shown

KEY PLAN



Revisions

No.	Description	Date
7.	RE-ISSUED FOR DRAFT PLAN APPLICATION	JUN. 24/13
6.	ISSUED FOR DRAFT PLAN SUBDIVISION	OCT. 5/12
5	SUBMIT FOR SITE PLAN APPROVAL	OCT 28/11
4	SANITARY SEWER	JUNE 13/06
3.	ADDED MH 106 AS PER TOWN COMMENTS	APR 10/06
2.	REVISE PROPOSED GRADE	MAR 31/06
1.	SUBMIT FOR M.O.E. APPROVAL	JAN 30/06

LEGEND

TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES

- BRW — BOTTOM OF RETAINING WALL
- TRW — TOP OF RETAINING WALL
- PROPOSED STORM MANHOLE
- PROPOSED CATCH BASIN
- PROPOSED SANITARY MANHOLE
- EXISTING SANITARY MANHOLE
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- EXISTING BELL
- EXISTING HYDRO
- EXISTING WATERMAIN
- PROPOSED ROAD CENTERLINE
- PROPERTY LINE
- BOARD FENCE
- EXISTING TOP OF SLOPE
- EXISTING BOTTOM OF DITCH
- PROPOSED BOTTOM OF DITCH
- M.T.O. RIGHT OF WAY

LICENSED PROFESSIONAL ENGINEER — JUNE 24, 2013 — A. WILLS — 90064289 — PROVINCE OF ONTARIO

WILLS

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150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

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E. wills@dmwills.com

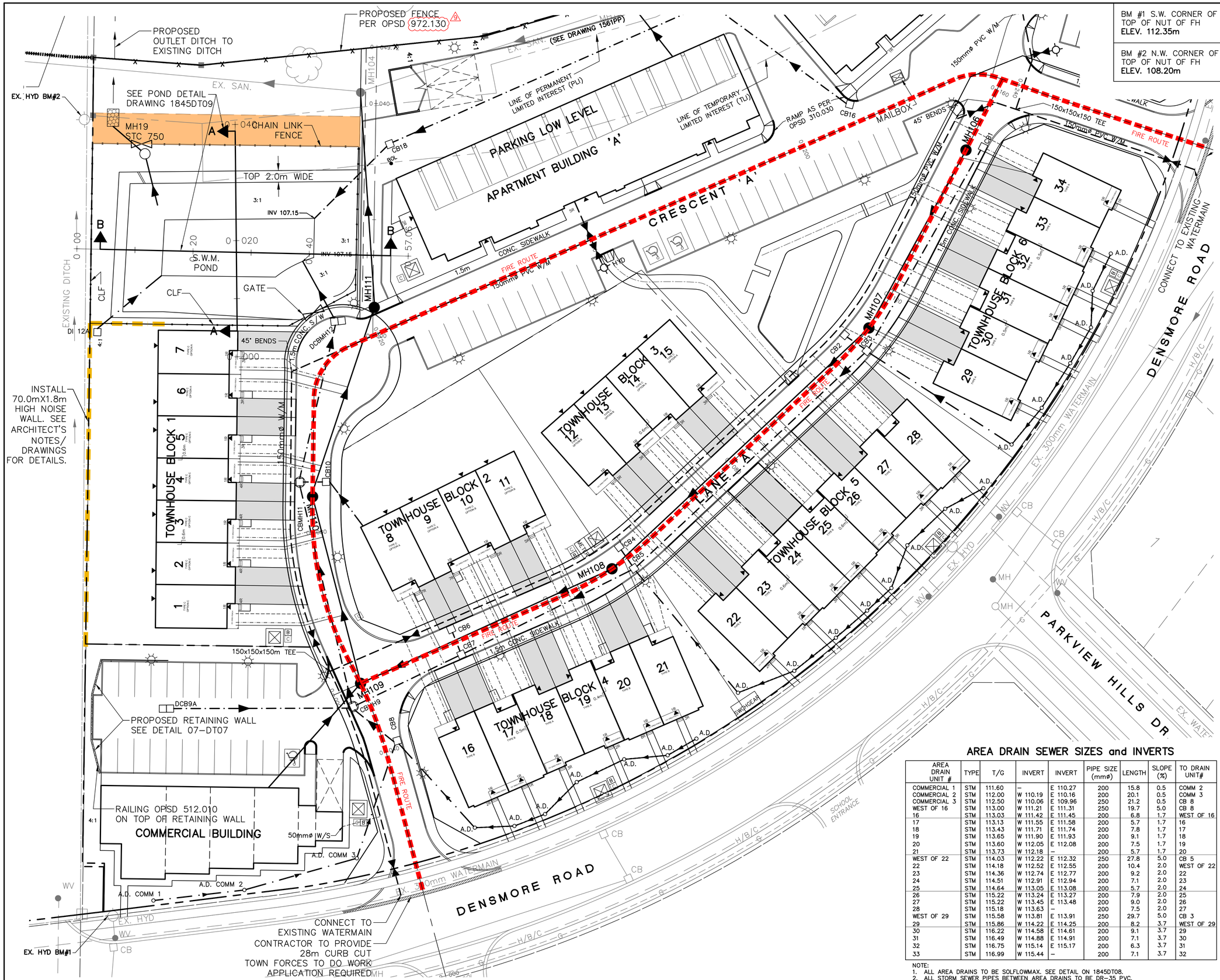
Project Name/Location

DENSMORE COMMON COBOURG

Drawing Title

SANITARY SEWER EXTENSION PLAN-PROFILE

Drawn By J.S.	Scale Horz. 1:500 Vert. 1:50
Designed By D.J.S.W.	
Checked By B.T.B	Plot Date JUNE 24, 2013
Project No. 05-1561	Drawing File No. 1561MP — Sht. No. 15



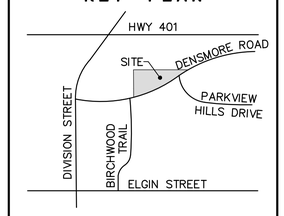
BM #1 S.W. CORNER OF SITE
TOP OF NUT OF FH
ELEV. 112.35m

BM #2 N.W. CORNER OF SITE
TOP OF NUT OF FH
ELEV. 108.20m

METRIC

Dimensions are in METRES and/or MILLIMETRES unless otherwise shown

KEY PLAN



Revisions

No.	Description	Date
9.	CHANGED FENCE OPSD	JULY 19/13
8.	RE-ISSUED FOR DRAFT PLAN APPLICATION	JUN. 24/13
7.	RE-ISSUED FOR DRAFT PLAN APPLICATION	JAN. 21/13
6.	ISSUED FOR DRAFT PLAN SUBDIVISION	OCT. 5/12

LEGEND

TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES

- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED REDUCER
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED DOUBLE CATCH BASIN
- A.D. PROPOSED AREA DRAIN
- PROPOSED SANITARY SEWER
- EXISTING SANITARY SEWER
- SANITARY MANHOLE
- PROPOSED EDGE OF PAVEMENT
- PROPOSED CURB CUT
- PROPOSED ROAD CENTERLINE
- PROPOSED FIRE ROUTE
- EXISTING EASEMENT LINE
- PROPOSED COMMUNITY MAILBOX
- RLCB REAR LOT CATCH BASIN
- PROPOSED RETAINING WALL
- PROPOSED STORM SERVICE
- PROPOSED SANITARY SERVICE
- PROPOSED WATER SERVICE
- 5 PROPOSED LOT NUMBER
- 5.0m MAINTENANCE ACCESS 150mm GRANULAR 'A'
- PROPOSED CHAIN LINK FENCE
- PROPOSED DRIVEWAY
- PROPOSED STREETLIGHT
- PROPOSED PADMOUNT TRANSFORMER
- PROPOSED CURB CUT & RAMP

AREA DRAIN SEWER SIZES and INVERTS

AREA DRAIN UNIT #	TYPE	T/G	INVERT	INVERT	PIPE SIZE (mmø)	LENGTH	SLOPE (%)	TO DRAIN UNIT#
COMMERCIAL 1	STM	111.60	–	E 110.27	200	15.8	0.5	COMM 2
COMMERCIAL 2	STM	112.00	W 110.19	E 110.16	200	20.1	0.5	COMM 3
COMMERCIAL 3	STM	112.50	W 110.06	E 109.96	250	21.2	0.5	CB 8
WEST OF 16	STM	113.00	W 111.21	E 111.31	250	19.7	5.0	CB 8
16	STM	113.03	W 111.42	E 111.45	200	6.8	1.7	WEST OF 16
17	STM	113.13	W 111.55	E 111.58	200	5.7	1.7	16
18	STM	113.43	W 111.71	E 111.74	200	7.8	1.7	17
19	STM	113.65	W 111.90	E 111.93	200	9.1	1.7	18
20	STM	113.60	W 112.05	E 112.08	200	7.5	1.7	19
21	STM	113.73	W 112.18	–	200	5.7	1.7	20
WEST OF 22	STM	114.03	W 112.22	E 112.32	250	27.8	5.0	CB 5
22	STM	114.18	W 112.52	E 112.55	200	10.4	2.0	WEST OF 22
23	STM	114.36	W 112.74	E 112.77	200	9.2	2.0	22
24	STM	114.51	W 112.91	E 112.94	200	7.1	2.0	23
25	STM	114.64	W 113.05	E 113.08	200	5.7	2.0	24
26	STM	115.22	W 113.24	E 113.27	200	7.9	2.0	25
27	STM	115.22	W 113.45	E 113.48	200	9.0	2.0	26
28	STM	115.18	W 113.63	–	200	7.5	2.0	27
WEST OF 29	STM	115.58	W 113.81	E 113.91	250	29.7	5.0	CB 3
29	STM	115.86	W 114.22	E 114.25	200	8.2	3.7	WEST OF 29
30	STM	116.22	W 114.58	E 114.61	200	9.1	3.7	29
31	STM	116.49	W 114.88	E 114.91	200	7.1	3.7	30
32	STM	116.75	W 115.14	E 115.17	200	6.3	3.7	31
33	STM	116.99	W 115.44	–	200	7.1	3.7	32

NOTE:
1. ALL AREA DRAINS TO BE SOLFLOWMAX. SEE DETAIL ON 1845DT08.
2. ALL STORM SEWER PIPES BETWEEN AREA DRAINS TO BE DR-35 PVC.

LICENSED PROFESSIONAL ENGINEER
JUNE 28, 2013
A. MAHT
100364289
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E. wills@dmwills.com

Project Name/Location

DENSMORE MEADOWS COBOURG

Drawing Title

SITE SERVICING PLAN (SOUTH)

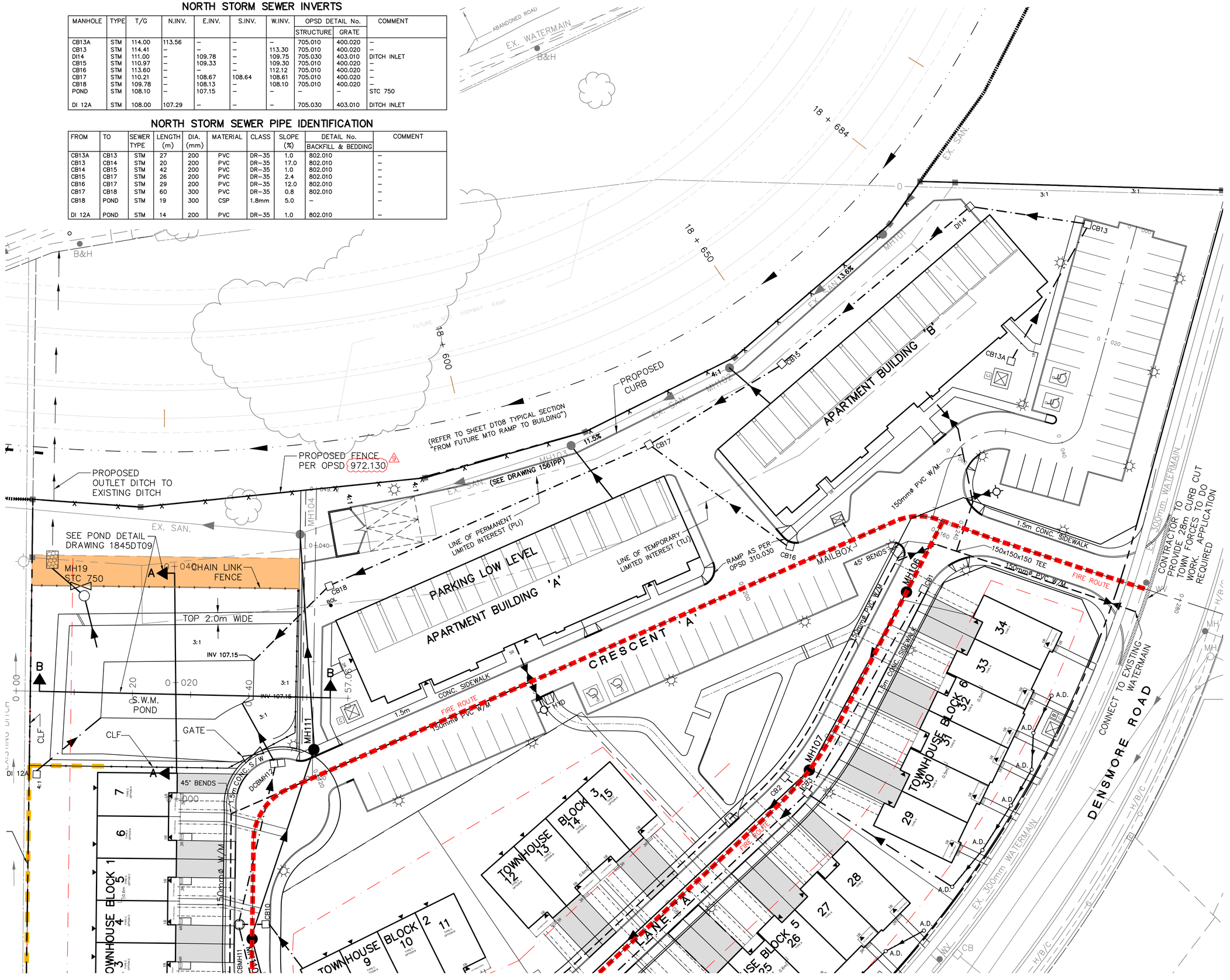
Drawn By B.K.C./A.R.	Scale Horz. 1:300 Vert. N/A
Designed By D.J.S.W.	
Checked By A.M.H.	Plot Date July 19, 2013
Project No. 05-1845	Drawing File No. 1845SS01 / Sht. No. 01

NORTH STORM SEWER INVERTS

MANHOLE	TYPE	T/G	N.INV.	E.INV.	S.INV.	W.INV.	OPSD DETAIL No.		COMMENT
							STRUCTURE	GRATE	
CB13A	STM	114.00	113.56	–	–	–	705.010	400.020	–
CB13	STM	114.41	–	–	–	113.30	705.010	400.020	–
DI14	STM	111.00	–	109.78	–	109.75	705.030	403.010	DITCH INLET
CB15	STM	110.97	–	109.33	–	109.30	705.010	400.020	–
CB16	STM	113.60	–	–	–	112.12	705.010	400.020	–
CB17	STM	110.21	–	108.67	108.64	108.61	705.010	400.020	–
CB18	STM	109.78	–	108.13	–	108.10	705.010	400.020	–
POND	STM	108.10	–	107.15	–	–	–	–	STC 750
DI 12A	STM	108.00	107.29	–	–	–	705.030	403.010	DITCH INLET

NORTH STORM SEWER PIPE IDENTIFICATION

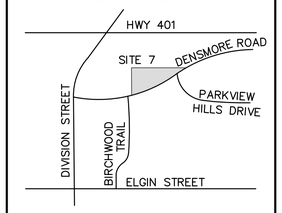
FROM	TO	SEWER TYPE	LENGTH (m)	DIA. (mm)	MATERIAL	CLASS	SLOPE (%)	DETAIL No. BACKFILL & BEDDING	COMMENT
CB13A	CB13	STM	27	200	PVC	DR-35	1.0	802.010	–
CB13	CB14	STM	20	200	PVC	DR-35	17.0	802.010	–
CB14	CB15	STM	42	200	PVC	DR-35	1.0	802.010	–
CB15	CB17	STM	26	200	PVC	DR-35	2.4	802.010	–
CB16	CB17	STM	29	200	PVC	DR-35	12.0	802.010	–
CB17	CB18	STM	60	300	PVC	DR-35	0.8	802.010	–
CB18	POND	STM	19	300	CSP	1.8mm	5.0	–	–
DI 12A	POND	STM	14	200	PVC	DR-35	1.0	802.010	–



METRIC

Dimensions are in METRES and/or MILLIMETRES unless otherwise shown

KEY PLAN



Revisions

No.	Description	Date
9.	CHANGED FENCE OPSD	JULY 19/13
8.	RE-ISSUED FOR DRAFT PLAN APPLICATION	JUN. 24/13
7.	RE-ISSUED FOR DRAFT PLAN APPLICATION	JAN. 21/13
6.	ISSUED FOR DRAFT PLAN SUBDIVISION	OCT. 5/12

LEGEND

TO BE READ IN CONJUNCTION WITH OPSD 100 SERIES

- PROPOSED WATER VALVE
- PROPOSED FIRE HYDRANT
- PROPOSED REDUCER
- PROPOSED WATERMAIN
- EXISTING WATERMAIN
- PROPOSED STORM SEWER
- EXISTING STORM SEWER
- PROPOSED CATCH BASIN MANHOLE
- PROPOSED DOUBLE CATCH BASIN
- A.D. PROPOSED AREA DRAIN
- PROPOSED SANITARY SEWER
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- PROPOSED STREETLIGHT
- PROPOSED PADMOUNT TRANSFORMER
- PROPOSED CURB CUT & RAMP

LICENSED PROFESSIONAL ENGINEER — JUNE 28, 2013 — A. MACKIE — 100364389 — PROVINCE OF ONTARIO

WILLS

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150 Jameson Drive
Peterborough, Ontario
Canada K9J 0B9

P. 705.742.2297
F. 705.741.3568
E. wills@dmwills.com

Project Name/Location

DENSMORE MEADOWS COBOURG

Drawing Title

SITE SERVICING PLAN (NORTH)

Drawn By G.M.H./A.R.	Scale Horz. 1:300 Vert. N/A	
Designed By D.J.S.W.		
Checked By A.M.H.	Plot Date July 19, 2013	
Project No. 05-1845	Drawing File No. 1845SS02	Sht. No. 02

Appendix B: Sanitary Design Sheets

Sanitary Sewer Design Sheet
Proposed

Project Name: Densmore Road
Project Number: 20078

Flow Rate: 364 L/person/day
Infiltration: 0.26 L/s/ha
Max Capacity: 80 %
Location: Town of Cobourg

Designed By: JA
Date: 2021-04-29

Flow	Type	Value	Unit
Single Family	Residence	3.23	person/unit
Townhomes	Residence	2.68	person/unit
Apartments	Residence	1.6	L/s/ha

Location			Single Family		Townhomes		Apartments		Area		Population		Flow							Pipe Properties					Hydraulics			
Location/Street Name	From Structure	To Structure	Number of Units	Population	Number of Units	Population	Number of Units	Population	Catchment Area (ha)	Cumulative Catchment Area (ha)	Cumulative Population	Harmon Factor	Resedential Peak Flow (L/s)	Commercial Peak Flow (L/s)	School Peak Flow (L/s)	InstitutionalPeak Flow (L/s)	IndustrialPeak Flow (L/s)	Infiltration Flow (L/s)	Total Peak Flow (L/s)	Pipe Diameter (mm)	Pipe Slope (%)	Pipe Length (m)	Pipe Material	Mannings 'n'	Velocity in Sewer (m/s)	Pipe Capacity (L/s)	% Capacity	Actual Velocity (m/s)
Lane A	MH106	MH107	0	0	6	16	0	0	0.230	0.230	16	4.31	0.29	0.00	0.00	0.00	0.00	0.06	0.35	200	2.40	35.1	PVC	0.013	1.62	50.8	1%	0.45
Lane A	MH107	MH108	0	0	11	29	0	0	0.390	0.620	46	4.31	0.83	0.00	0.00	0.00	0.00	0.16	0.99	200	2.30	80.7	PVC	0.013	1.58	49.7	2%	0.61
Lane A	MH108	MH109	0	0	10	27	0	0	0.310	0.930	72	4.31	1.31	0.00	0.00	0.00	0.00	0.24	1.56	200	2.40	47.7	PVC	0.013	1.62	50.8	3%	0.73
Crescent A	MH207	MH109	0	0	4	11	0	0	0.190	0.190	11	4.31	0.19	0.00	0.00	0.00	0.00	0.05	0.24	200	2.50	30.2	PVC	0.013	1.65	51.9	0%	0.41
Crescent A	MH109	MH110	0	0	4	11	0	0	0.160	1.280	94	4.31	1.70	0.00	0.00	0.00	0.00	0.33	2.04	200	2.60	33.2	PVC	0.013	1.68	52.9	4%	0.81
Crescent A	MH110	MH111	0	0	4	11	0	0	0.160	1.440	105	4.31	1.90	0.00	0.00	0.00	0.00	0.37	2.27	200	1.00	34.3	PVC	0.013	1.04	32.8	7%	0.60
Crescent A	MH111	MH200	0	0	0	0	0	0	0.000	1.440	105	4.31	1.90	0.00	0.00	0.00	0.00	0.37	2.27	200	2.20	35.0	PVC	0.013	1.55	48.7	5%	0.78
Crescent A	MH205	MH204	0	0	8	21	0	0	0.100	0.100	21	4.31	0.39	0.00	0.00	0.00	0.00	0.03	0.42	200	1.00	16.4	PVC	0.013	1.04	32.8	1%	0.36
Crescent A	MH206	MH204	0	0	20	54	0	0	0.140	0.140	54	4.31	0.97	0.00	8.88	0.00	0.00	0.04	9.89	200	5.00	29.0	PVC	0.013	2.33	73.3	13%	1.63
Crescent A	MH204	MH203	0	0	0	0	0	0	0.000	0.240	75	4.28	1.35	0.00	8.88	0.00	0.00	0.06	10.29	200	4.00	20.7	PVC	0.013	2.09	65.6	16%	1.52
Crescent A	MH203	MH202	0	0	12	32	0	0	0.160	0.400	107	4.24	1.91	0.00	8.88	0.00	0.00	0.10	10.90	200	3.30	35.3	PVC	0.013	1.90	59.6	18%	1.44
Crescent A	MH202	MH201	0	0	36	96	0	0	0.350	0.750	204	4.15	3.56	0.00	8.88	0.00	0.00	0.20	12.63	200	2.30	68.5	PVC	0.013	1.58	49.7	25%	1.32
Crescent A	MH201	MH200	0	0	8	21	0	0	0.130	0.880	225	4.13	3.92	0.00	8.88	0.00	0.00	0.23	13.02	200	3.90	17.1	PVC	0.013	2.06	64.8	20%	1.61
Crescent A	MH200	MH104	0	0	0	0	0	0	0.000	2.320	330	4.13	5.73	0.00	8.88	0.00	0.00	0.60	15.22	200	2.20	2.0	PVC	0.013	1.55	48.7	31%	1.37

Sewage Flows

Project Name:	Densmore Meadows	**Designed By:**	JA
Project No:	20078	**Date:**	2021-04-29

Design Criteria				
Residential Sewage Flows:		364	L/p/day	A
No. of Units (Residential):		123		B
No. of Persons/Unit (2 or 3 Bedroom):		2.7	persons/unit	C
Drainage Area		2.35	ha	D
Inflow and Infiltration Rate:		0.26	L/s/ha	E
Commercial Peak Flow		0.00	L/s/ha	F
Calculations				
Peaking Factor:				
K_H	=	1+(1/4 / 4+(B*C)^1/2)		
	=	4.06		
Residential Sewage Flows:				
F_{RES}	=	(B x C) *A		
	=	119989	L/day	
	=	1.39	L/s	
	=	119.99	m³/day	
Peaked Residential Sewage Flows:				
F_{PEAK}	=	(B x C)*A*K_H		
	=	487275	L/day	
	=	5.64	L/s	
	=	487.28	m³/day	
Inflow and Infiltration Rate:				
$F_{I\&I}$	=	(D x E)		
	=	52790	L/day	
	=	0.61	L/s	
	=	52.79	m³/day	
Total Proposed Sewage Flows:				
F_{TOT}	=	F_{PEAK} + $F_{I\&I}$		
	=	540066	L/day	
	=	6.25	L/s	
	=	**540.07**	**m³/day**	

Appendix C: Water Calculations

Densmore Meadows
Water Demand Calculations
Project No. 20078
29-Apr-21

ENGAGE ENGINEERING

Design Criteria:

Domestic Water Demand:	364	L/p/day	A
No. of Units (Single Family/Semi):	0	units	B
No. of Units (Townhouse):	123	units	C
No. of Units (Apartment):	0	units	D
No. of Persons/Unit (Single Family/Semi):	3.23	p/unit	E
No. of Persons/Unit (Townhouse):	2.68	p/unit	F
No. of Persons/Unit (Apartment):	1.62	p/unit	G
Max. Day Peak Factor(MOE):	1.90		H
Peak Hour Peak Factor(MOE):	2.85		I
Fire Flow:	2,000	L/min	J

Calculations:

Average Day Demand:

Q_{AVG} = ((B x E)+(C x F)+(D x G))A
= 119989 L/day
= 83.3 L/min
= 120.0 m³/day

Maximum Day Demand:

Q_{MDD} = Q_{AVG} x H
= 227979 L/day
= 158.3 L/min
= 228.0 m³/day

Peak Hour Demand:

Q_{PHD} = Q_{AVG} x I
= 341969 L/day
= 237.5 L/min
= 342.0 m³/day

Total Demand (MDD + Fire Flow):

Q_{TD} = Q_{MDD} + J
= 3107979 L/day
= 2158.3 L/min
= 3108.0 m³/day