



FUNCTIONAL SERVICING REPORT

**VILLALAGO RESIDENCES INC.
PROPOSED RESIDENTIAL DEVELOPMENT**

**BOLTON SOUTH HILL DEVELOPMENT AREA
SOUTHEAST OF QUEENSGATE BLVD. AND HIGHWAY 50**

**TOWN OF CALEDON
REGIONAL MUNICIPALITY OF PEEL**

PROJECT NO. 16984

MAY 2016

**RAND ENGINEERING CORPORATION
5285 SOLAR DRIVE
MISSISSAUGA, ONTARIO L4W 5B8**

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(REFER TO REAR POCKET)

DRAWING No. S-01 - PRELIMINARY SERVICING PLAN
DRAWING No. G-01 - PRELIMINARY GRADING PLAN

1.0 INTRODUCTION

RAND Engineering Corporation has been retained by Villalago Residences Inc. to complete a Functional Servicing Report (FSR) for the proposed residential development located within the Bolton South Hill Development Area in the Town of Caledon and Regional Municipality of Peel. The property encompasses a total area of 2.82 ha and is located on Part of Lot 5, Concession 7 and Blocks 118, 152-154, 165, 167, 178, 181 and 182 of the Registered Plan 43M-1251.

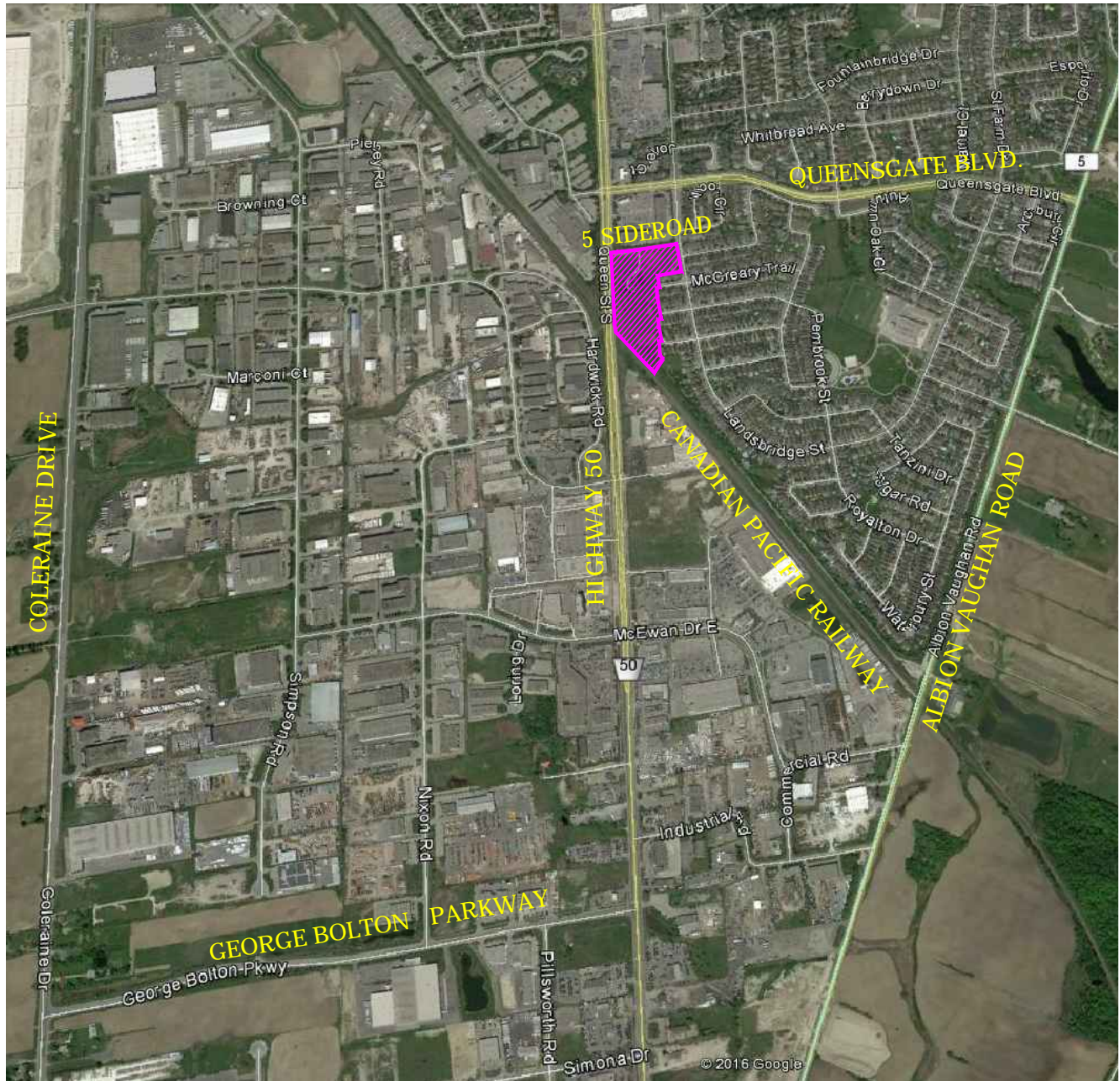
The proposed Draft Plan of Subdivision for the property was prepared by KLM Planning Partners Inc. on March 31, 2016. The development will consist of 118 townhouse units and 1 single detached unit. The development site plan for the property was prepared by One Riser Designs on May 19, 2016.

As shown in **Figure 1**, the Villalago property is located southeast of the intersection of 5th Sideroad and Highway 50 and is bounded by the Canadian Pacific Railway to the southwest and the existing South Hill Village residential subdivision to the east.

The development lies within the limits of the drainage area of the existing SWM Pond 4, located within the Rainbow Creek subwatershed. The facility was designed by Aquafor Beech in March 1998 as part of the stormwater management plan for the Gates of Bolton (Phase III & IV) subdivision. It is intended that the proposed development will conform to the stormwater management criteria and design requirements, established by Aquafor Beech.

The purpose of this report is to provide stormwater, sanitary and water servicing requirements for the proposed Villalago development. The recommended grading and servicing plans have been prepared in accordance with the design criteria of the Town of Caledon, Toronto Region Conservation Authority (TRCA), and the Regional Municipality of Peel.

The information provided in this report is intended to assist the municipality and other regulatory agencies in their review of the draft plan application for the development.



LEGEND



PROPOSED DEVELOPMENT

VILLALAGO RESIDENCES INC.

FIGURE No. 1

CITY OF CALEDON

LOCATION PLAN

NOT TO SCALE

PROJECT No. 16984



2.0 BACKGROUND INFORMATION

The following is a list of the background studies and reference documents used in the preparation of the grading and servicing design for the subject development:

- ❑ **Aquafor Beech Ltd.**, *“1113486 Ontario Limited – General Plan, Plan & Profiles, Storm Drainage Plans As Constructed Drawings No. 1, 2A, 6-9, 12 & 13”*, 1997.
- ❑ **Aquafor Beech Ltd.**, *“Bolton South Hill – Drawing No. 1 - Pond 4 General Plan”*, May 1995.
- ❑ **Aquafor Beech Ltd.**, *“Tormina Homes – Gates of Bolton – Phase III & IV – Stormwater Management Report”*, March 1998.
- ❑ **Anton Kikas Ltd.**, *“Highway No. 50 Bolton/Brampton Trunk Sewer, Plan and Profiles”*, 1982.
- ❑ **Exp Services Inc.**, *“Geotechnical Investigations Proposed Residential Development – Villalago Residences Inc. c/o Treasure Hill Homes – Landsbridge Street & Sideroad 5, Caledon, Ontario”*, March 2016.
- ❑ **GGHACA**, *“Erosion and Sediment Control Guidelines for Urban Construction”*, December 2006
- ❑ **Region of Peel**, *“Public Works, Design, Specifications & Procedures Manual”*, September 2007.
- ❑ **Toronto and Region Conservation Authority**, *“Stormwater Management Criteria”*, August 2012.
- ❑ **Town of Caledon**, *“Development Standards, Policies and Guidelines”*, January 2009.
- ❑ **Town of Caledon**, *“Village Villas – Storm Sewer Design Sheets – As Constructed Information”*, received from the Town in April 2016.

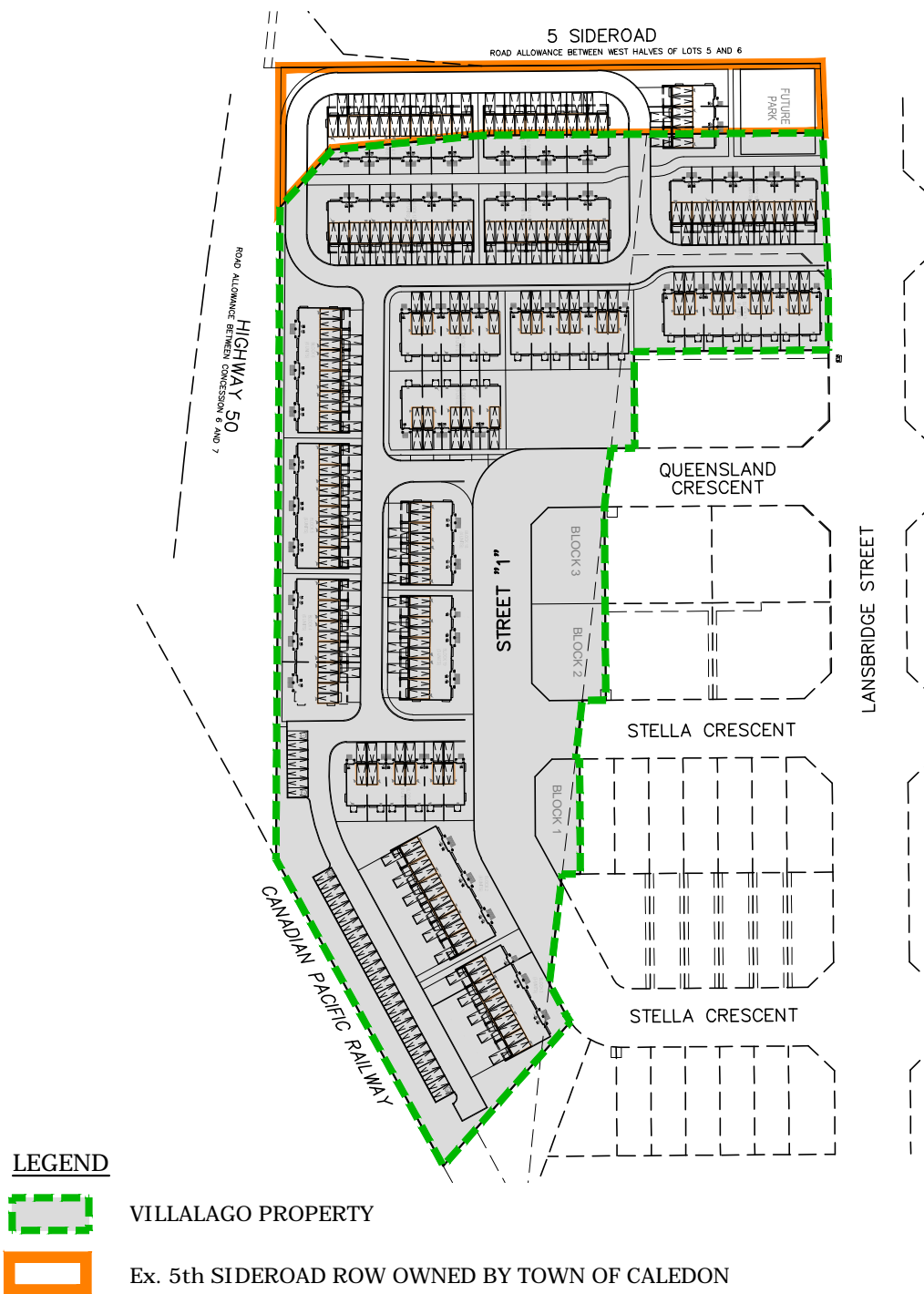
3.0 PROPOSED DEVELOPMENT

The general layout of the proposed 2.82 ha medium density residential development is shown in **Figure 2**. The Draft Plan of Subdivision for the property was prepared by KLM Planning Partners Inc. on March 31, 2016. The proposed development will consist of 118 townhouse units and 1 single detached unit. The site plan for the property was prepared by One Riser Designs on May 19, 2016 and has been provided in Appendix A.

Figure 2 shows that the proposed development will include a portion of the existing 5th Sideroad right-of-way to the north. As recommended by the Town of Caledon this area has been included in the development plan for the Villalago subdivision.

Primary access to the development will be provided via Stella Crescent and Queensland Crescent from the adjacent South Hill Village residential subdivision (Registered Plan 43M-1251).

Stormwater quality, erosion and quantity control for the subject development will be provided within the existing SWM Pond 4 located approximately 150 m northeast of the intersection of the CP Rail line and Albion-Vaughan Road.



VILLALAGO RESIDENCES INC.

FIGURE No. 2

SCALE 1:2,000

CITY OF CALEDON

DEVELOPMENT PLAN

PROJECT No. 16984



4.0 EXISTING CONDITIONS

4.1 Topography and Drainage

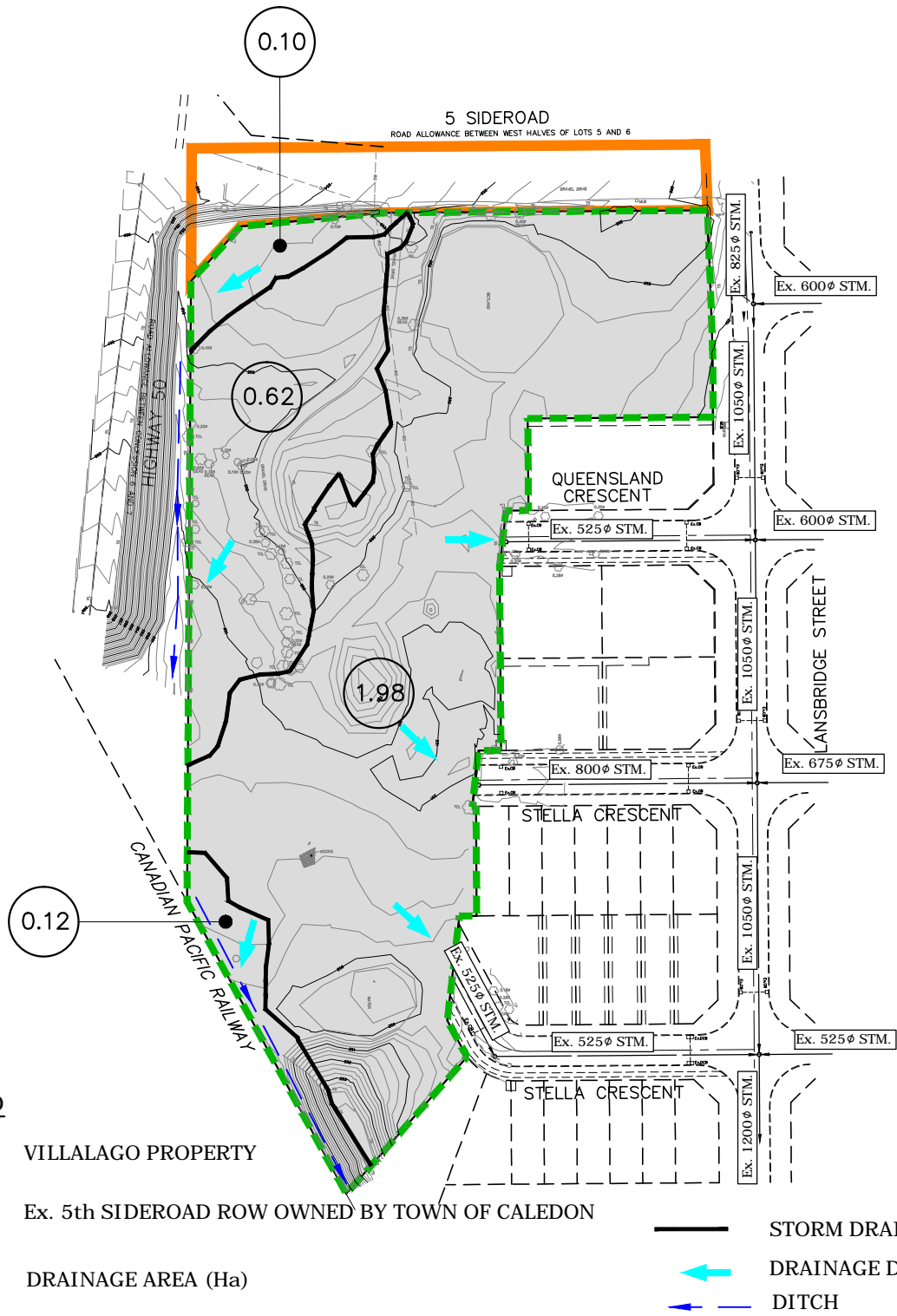
A review of the property's site conditions was carried out using topographic information and site inspection. Topographic information for the property and immediate surrounding area was obtained from the detailed survey plan completed by Holding Jones Vanderveen Inc. on March 11, 2016.

The property occupies a vacant parcel of land consisting of an open field with scattered trees in the north and central parts of the property. As shown in **Figure 3**, the ground surface is moderate in slope (0 to 6%) with the exception of an approximately 3 m high CPR berm in the southeast corner of the development. A review of the topographic conditions indicate that the majority of the property slopes easterly at an average gradient of 3% towards the existing South Hill Village subdivision. The topographic relief across the property is approximately 10 metres.

The drainage from the subject property and portion of the South Hill Village is conveyed to the existing SWM Pond 4 located approximately 150 m northeast of the intersection of the CP Rail line and Albion-Vaughan Road. The Pond 4 outlets to Robinson Creek, a tributary to the Rainbow Creek subwatershed.

All drainage within the property and immediate surrounding area is tributary to the existing drainage system of the Bolton South Hill Development Area. The drainage areas internal to the property may be discretized as follows (refer to **Figure 3**):

- ❑ 1.98 Ha drains east to the existing storm sewer system of South Hill Village subdivision towards Queensland Crescent and Stella Crescent;
- ❑ 0.12 Ha drains south-west towards the ditch along the Canadian Pacific Railway and
- ❑ 0.72 Ha drains towards the ditches along Highway 50 and 5th Sideroad right-of-ways



VILLALAGO RESIDENCES INC.

FIGURE No. 3

CITY OF CALEDON

EXISTING CONDITIONS

SCALE 1:2,000

PROJECT No. 16984



4.2 Soils and Hydrogeology

A review of the property's subsurface site conditions was carried out using the geotechnical information for the property provided in the March 2016 "*Geotechnical Investigation*", prepared by exp Services Inc.

The results of the investigation indicate that the soil stratigraphy of the site consists of 0.15m to 0.30m layer of topsoil over a stratum of fill extending to depths of approximately 0.7m to 2.2m, overlaying a native clayey silt till.

The groundwater was observed at approximately 0.2m below grade in the northern part of property (Borehole No. 1) and approximately 7.1m in the central part of property (Borehole No. 4). The near surface water level recorded in the north part is likely associated with the wet sandy silt layer at that location.

5.0 STORMWATER MANAGEMENT PLAN

The storm drainage system for the development has been designed in accordance with the standards and requirements of the Town of Caledon and TRCA. The information pertaining to the water quality, erosion and quantity control from the site has been obtained from the 1998 “*Tormina Homes – Gates of Bolton – Phase III & IV – Stormwater Management Report*” prepared by Aquafor Beech.

5.1 Stormwater Management Criteria

The following storm drainage criteria have been adopted for the stormwater conveyance system within the proposed development:

- ☐ The minor drainage system within the proposed development should be designed for the 10-Year storm event using the Rational Method and the Town of Caledon’s IDF curves.
- ☐ The major drainage system should be designed to convey flows from the 100-Year or Regional Storm event, whichever is larger. The major system should be contained within road allowances and designated easements.
- ☐ Runoff from roof leaders within residential lots should discharge to surface pre-cast splash pads and be directed towards pervious areas.
- ☐ Water quality, erosion and quantity control for the subject property will be provided within existing SWM Pond 4, located approximately 150 m northeast of the intersection of the CP Rail line and Albion-Vaughan Road.

5.2 Minor and Major Drainage Systems

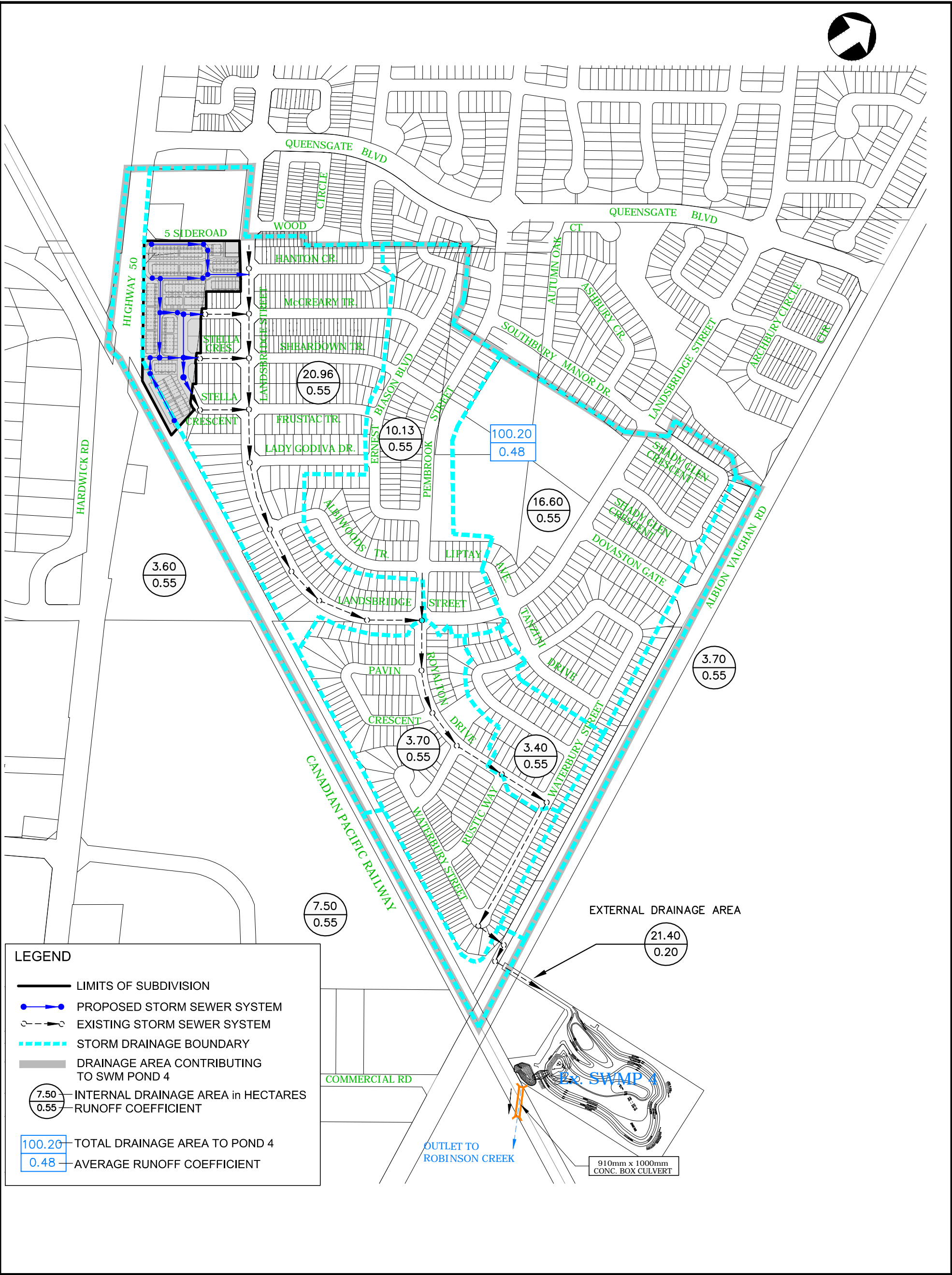
Post-development storm drainage will be managed using a combination of minor (storm sewers) and major (overland) systems.

As shown in **Figure 4**, the storm sewer system for the 2.82 Ha development will discharge to the existing storm sewer system within the South Hill Village subdivision.

Additional details of the storm sewer system are shown on the **Preliminary Servicing Plan** (Dwg. S-01), included in the Report's rear pocket. The proposed storm sewer system from the Villalago development will be connected to the existing storm sewer system at Queensland Crescent via Ex. MHs 6 and 11 and a 450mm diameter storm sewer and Stella Crescent via Ex. MH 16 and a 450mm diameter storm sewer. As a minimum, the storm sewer system will provide conveyance of the 10-Year storm event, i.e.: the "minor system". The storm sewer design sheet for the South Hill Village subdivision has been updated to include the information for the Villalago development and is included in Appendix B. The sizes and locations of storm sewers within the subject property will be verified at the time of detailed engineering design in accordance with current Town of Caledon standards.

The condo driveways will accommodate and convey all runoff (via overland flow) exceeding the storm sewer's capacity for all flows up to and including the 100-Year or Regional storm event. This overland flow routing is generally directed towards the existing South Hill Village subdivision and subsequently to the existing SWM Pond 4.

SWM Pond 4, located approximately 150 m northeast of the intersection of the CP Rail line and Albion-Vaughan Road, was sized to accommodate up to and including the 100-year storm flows from the approximately 100.20 ha contributing drainage area including the subject development. The pond lies within the Rainbow Creek subwatershed and drains to Robinson Creek via a 910 mm x 1000 mm concrete box culvert under the CP Rail line. The pond provides a maximum storage of approximately 36,200 m³.



VILLALAGO RESIDENCES INC.

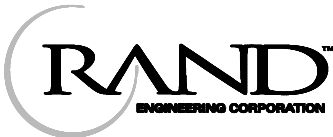
FIGURE No. 4

CITY OF CALEDON

SCALE 1:6,000

PROJECT No. 16984

STORM DRAINAGE PLAN



SWM Pond 4 was designed to accommodate the drainage from the subject development assuming a runoff coefficient of 0.55. Considering the fact that the Villalago development consists of medium density residential units, the runoff coefficient has been revised from 0.55 to 0.75. Based on the calculations provided in **Table B.2** in Appendix B, it has been determined that the higher runoff coefficient within the subject development will increase the imperviousness within the total drainage area to Pond 4 by approximately 2% which will have negligible impact on the capacity and performance of the existing facility.

5.3 Erosion and Sediment Control

Erosion and sediment control measures to be implemented during and following construction will comply with the December 2006 “*Erosion and Sediment Control Guideline for Urban Construction*” and recommendations from the Town of Caledon engineering staff. The details of the proposed erosion and sediment control works will be provided at the final design stage.

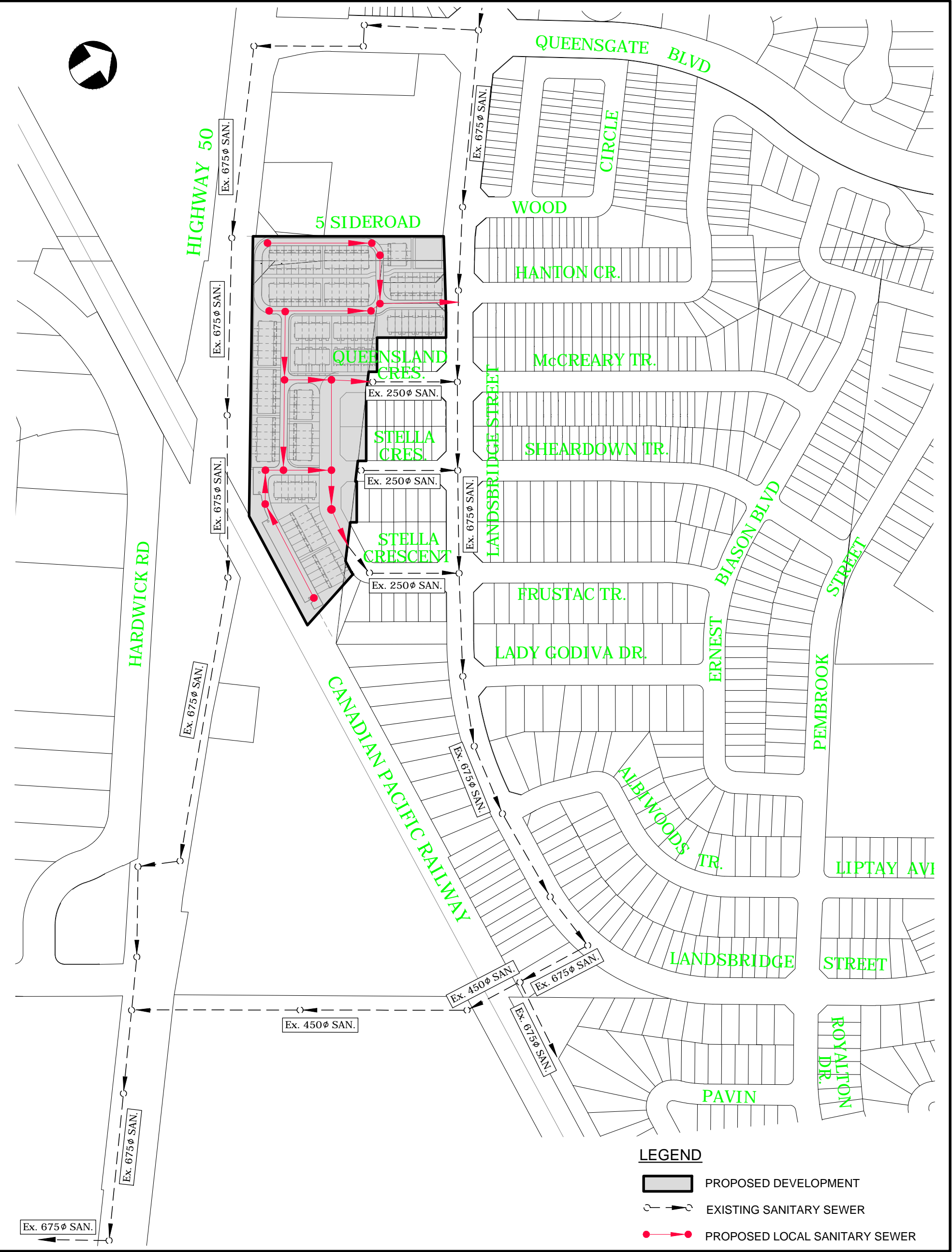
6.0 SANITARY SERVICING PLAN

As shown in **Figure 5**, the sanitary flow from the subject property will discharge to the existing 250 mm diameter sanitary sewers on Queensland Crescent (via Ex. MH 5A and 10A) and Stella Crescent (via Ex. MH 15A), located within the South Hill Village subdivision (Registered Plan 43M-1251).

Ultimately, the sanitary flows will be conveyed via the existing 450 mm diameter sewer located west of CP Rail within an outlet to the 675 mm diameter sanitary trunk sewer on Highway 50.

The sanitary servicing network within the proposed development will be designed as a conventional gravity system in accordance with the Region of Peel standards. The sizes and locations of sanitary sewers within the subject property will be verified at the time of detailed engineering design.

Additional details of the sewer system are shown on the **Preliminary Servicing Plan** (Dwg. S-01), included in the Report's rear pocket.



VILLALAGO RESIDENCES INC.

FIGURE No. 5

CITY OF CALEDON

SCALE 1:3,000

SANITARY SERVICING PLAN

PROJECT No. 16984



7.0 WATER DISTRIBUTION PLAN

The subject property will be serviced by Pressure Zone 6 of the Region of Peel's Lake Based Water Supply System. The layout of the network is outlined in the **Preliminary Servicing Plan** (Dwg. S-01), as provided in the Report's rear pocket.

The sizes and locations of proposed watermain within the subject property will be verified at the time of detailed engineering design. The water distribution system for the proposed development will be designed in accordance with current Region of Peel standards.

8.0 GRADING PLAN

A grading plan for the subject property has been prepared in conjunction with the preliminary storm and sanitary design for the subject development, and with consideration of the existing grading for the adjacent lands.

The site's grading has been designed to generally follow the existing topography and provide adequate cover for the underground services. As such, the majority of site drainage is directed south east towards the South Hill Village subdivision (Registered Plan 43M-1251).

The property's grading is outlined in the **Preliminary Grading Plan** (Dwg. G-01) provided in the Report's rear pocket.

9.0 CONCLUSIONS


Based on the findings of this study, it is concluded that:

1. A technical assessment of the municipal servicing requirements indicates that the development plan may be adequately serviced by the proposed storm drainage, sanitary and water distribution systems.
2. The existing SWM Pond 4, located southeast of the intersection of Albion Vaughn Road and the CPR rail line, has the sufficient capacity to accommodate the drainage from the proposed Villalago subdivision. The facility provides water quality, erosion and quantity control for the development.
3. A detailed Stormwater Management Implementation Report will be prepared in conjunction with the final engineering design.

This report is being submitted to the Town of Caledon and Regional Municipality of Peel in support of the draft plan application for the Villalago subdivision.

Respectfully Submitted,

RAND Engineering Corporation



Doug Campbell, B. Eng., EIT



P. Szponar, P. Eng.

A. SITE PLAN

Site Plan (1 Sheet)

CANADIAN PACIFIC RAILWAY

HIGHWAY 50
ROAD ALLOWANCE BETWEEN CONCESSION 6 AND 7

DEPOSITED
PLAN P-2093-25

3.76

ROAD ALLOWANCE BETWEEN WEST HALVES OF LOTS 5 AND 6

5 SIDEROAD

SITE STATISTICS

LOT AREA:
METERS SQ.- 26,337.18
AC- 6.66
HA- 2.69

UNIT COUNT:
CONDO
6.00m UNITS- 74
5.55m UNITS- 30
TOTAL 104
FREEHOLD
BLOCK 2- 4
BLOCK 3- 4
BLOCK 5- 6
TOTAL 14

DETACHED
BLOCK 1- 1

TOTAL UNITS: 119

DENSITY:
U/PA- 17.87
U/PH- 44.24

6	REVISED AS PER CLIENT COMMENTS	MAY 19/16	KA
5	REVISED AS PER COMMENTS	APR. 7/16	KA
4	REVISED AS PER COMMENTS	APR. 6/16	KA
3	REVISED AS PER COMMENTS	APR. 4/16	KA
2	REVISED AS PER COMMENTS	MAR. 24/16	KA
1	ISSUED FOR CLIENT REVIEW	MAR. 24/16	KA

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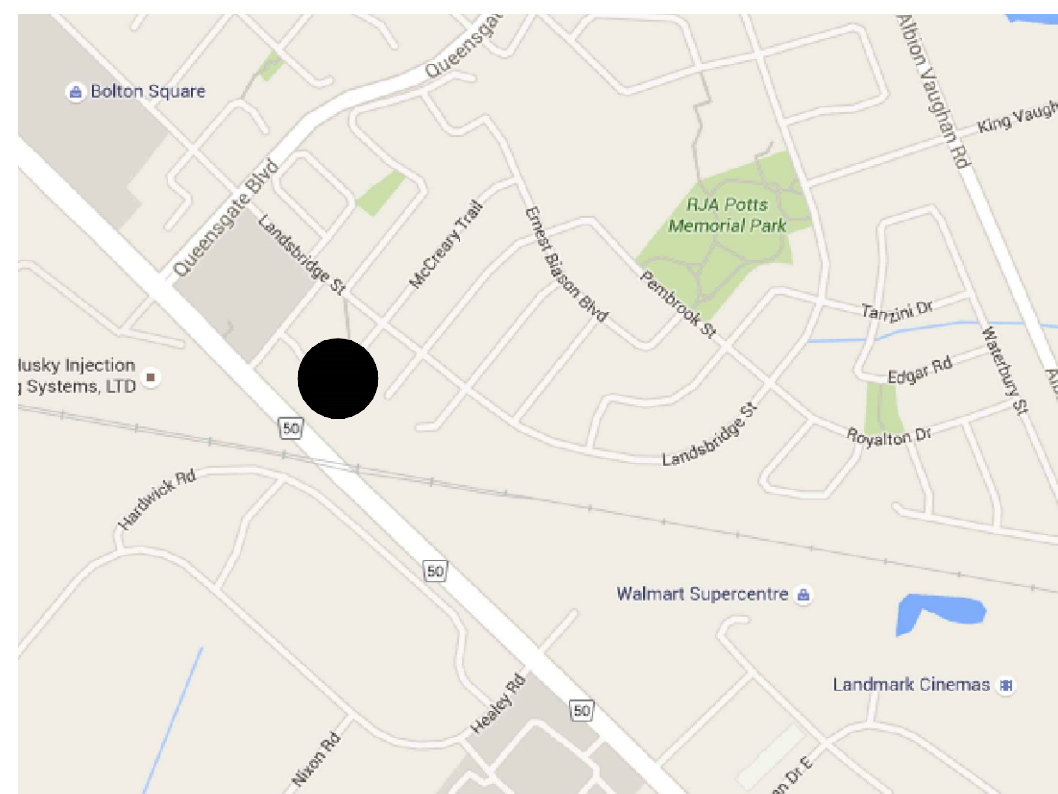
TREASURE HILL

VILLALAGO RESIDENCES INC.

SITEPLAN

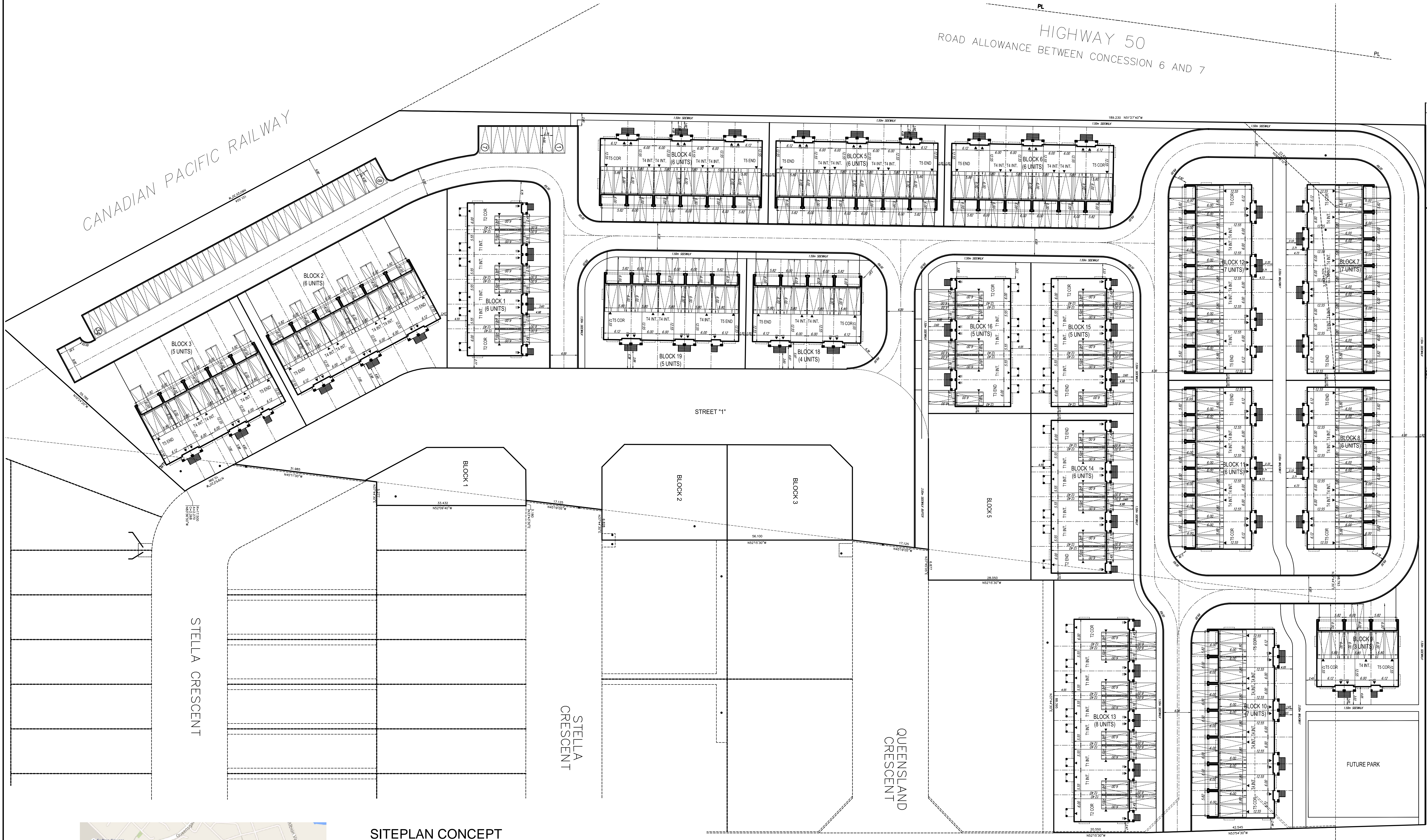
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Checked by:
CP-1



KEY MAP

SITEPLAN CONCEPT



B. SWM BACKGROUND INFORMATION

Table B.1: SWM Pond 4 Drainage Revision Impact Assessment (1 Sheet)

Table B.2: Excerpts from “*Tormina Homes – Gates of Bolton – Phase III & IV – Stormwater Management Report*”, prepared by Aquafor Beech in March 1998. (12 Sheets)

Table B.1: SWM Pond 4 Drainage Revision Impact Assessment (1 Sheet)

APPENDIX B: SWM Pond 4 - Drainage Revision Impact Assessment

Project No.: 16984
 Date: 26-May-16
 Prepared by: Doug Campbell

Existing Drainage Aquafor Beech, 1994				Proposed Drainage RAND, 2016		
Area (Ha)	Runoff Coefficient (C)	AxC		Area (Ha)	Runoff Coefficient (C)	AxC
3.7	0.55	2.04		3.7	0.55	2.04
16.6	0.55	9.13		16.6	0.55	9.13
3.4	0.55	1.87		3.4	0.55	1.87
7.5	0.55	4.13		7.5	0.55	4.13
10.13	0.55	5.57		10.13	0.55	5.57
3.6	0.55	1.98		3.6	0.55	1.98
18.14	0.55	9.98		18.14	0.55	9.98
2.82	0.55	1.55	Villalago Development	2.82	0.75	2.12
12.91	0.55	7.10		12.91	0.55	7.10
21.4	0.2	4.28		21.4	0.2	4.28
100.2	0.48	47.62	Total	100.2	0.48	48.18

Existing SWM Pond 4 Summary	
Drainage Area	100.2 ha
Imperviousness	39 %
Impervious Area	39.40 ha

Villalago Development Summary	
Aquafor Beech, 1994	
Drainage Area	2.82 ha
Imperviousness	50 %
Impervious Area	1.41 ha
RAND Engineering, 2016	
Drainage Area	2.82 ha
Imperviousness	79 %
Impervious Area	2.22 ha

Revised SWM Pond 4 Summary	
Drainage Area	100.2 ha
Imperviousness	40 %
Impervious Area	40.21 ha

Increase in impervious area: 0.81 ha

Percent increase in total impervious area:

2.02%

Notes:

1. Imperviousness calculated using $I = (C - 0.2) / 0.7$ Where I = Imperviousness (%) and C = Runoff coefficient
2. SWM Pond 4 drainage area obtained from "Tormina Homes – Gates of Bolton – Phase III & IV – Stormwater Management Report", prepared by Aquafor Beech in March 1998

Table B.2: Excerpts from “*Tormina Homes – Gates of Bolton – Phase III & IV – Stormwater Management Report*”, prepared by Aquafor Beech in March 1998. (12 Sheets)

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**STORMWATER MANAGEMENT
REPORT**

**GATES OF BOLTON - PHASE III
& PHASE IV M 1306
DRAFT PLAN 21T-96004
TOWN OF CALEDON**

DISCLAIMER
**THESE RECORDS ARE BASED UPON AVAILABLE AND
UNVERIFIED INFORMATION AND MAY PROVE
INACCURATE. THE TOWN OF CALEDON DISCLAIMS
ANY RESPONSIBILITY SHOULD
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DETRIMENT OF ANY PERSON.**

Report Prepared for:

**TORMINA HOMES
562 Chrislea Road
WOODBIDGE, Ontario
L4L 8K9**

Prepared by:

**AQUAFOR BEECH LIMITED
2 Marconi Court #14
Bolton, Ontario
L7E 1E5**

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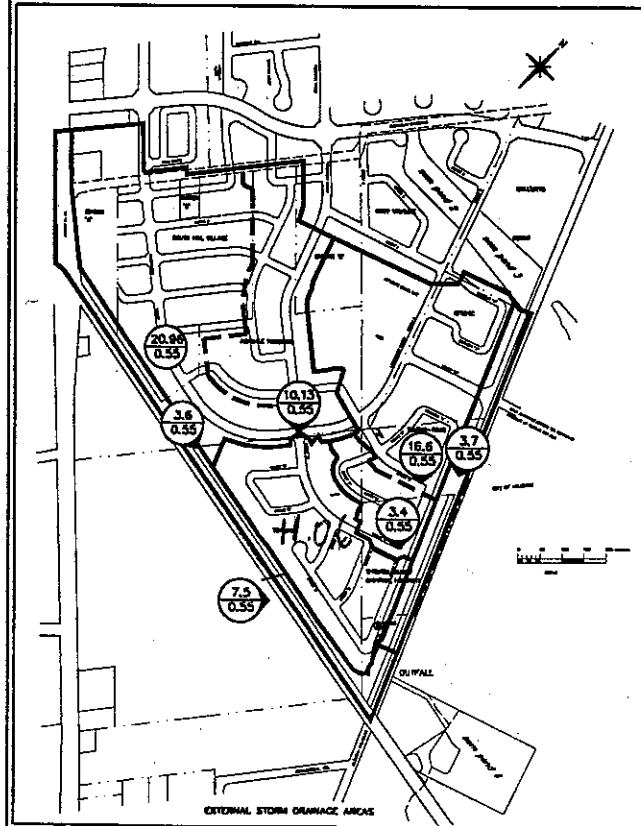
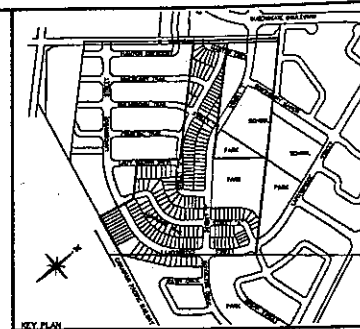
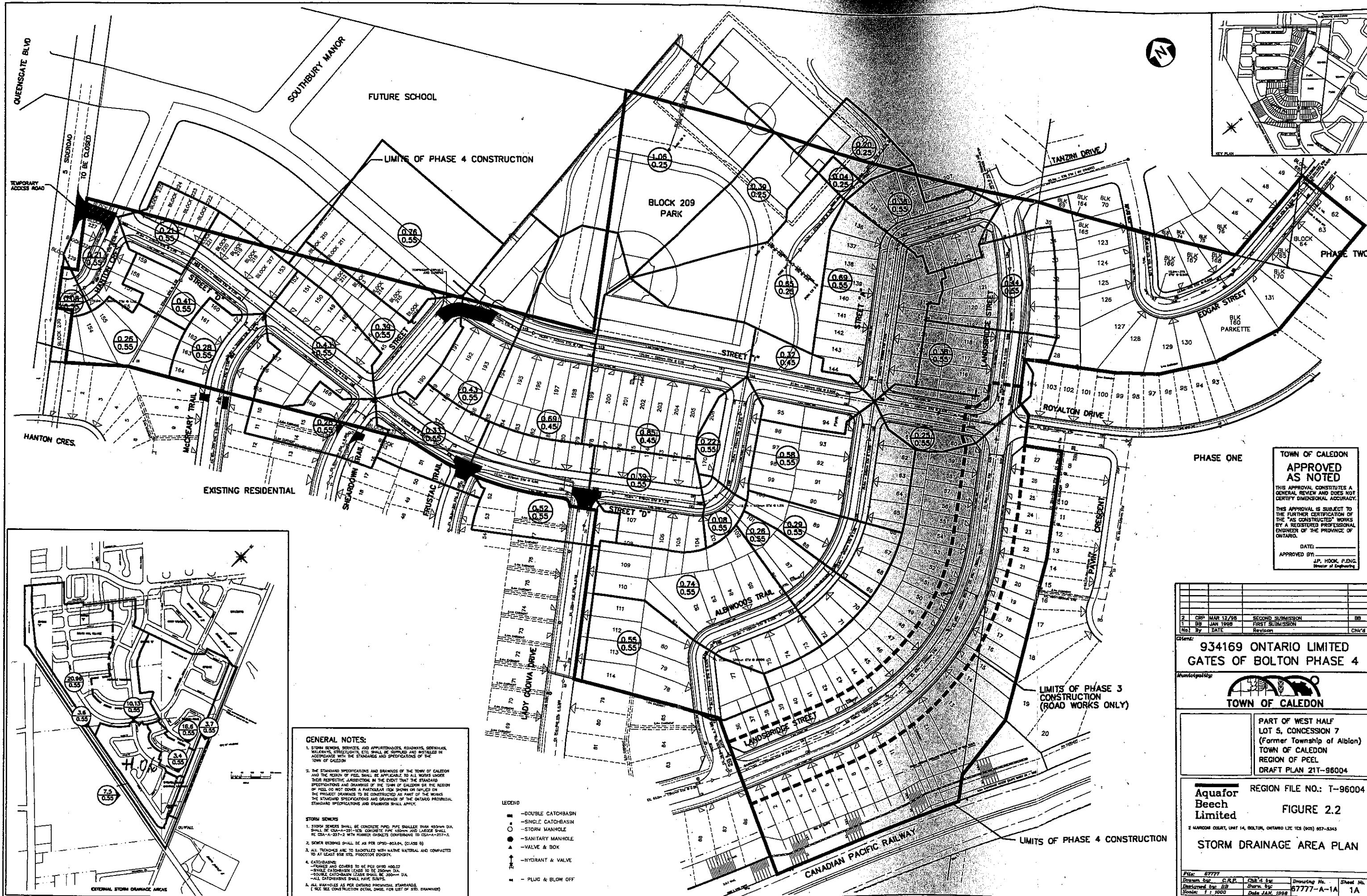
**TOWN OF CALEDON
ENGINEERING DEPARTMENT**

March 1998 (R0)

Aquafor Reference: 67777

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GENERAL NOTES:

1. STORM SEWERS, SERVICES, AND APPURTENANCES, ROADWAYS, SIDEWALKS, MURKINS, STREETLIGHTS, ETC. SHALL BE SUPPLIED AND INSTALLED IN ACCORDANCE WITH THE STANDARDS AND SPECIFICATIONS OF THE TOWN OF CALEDON.
2. THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE TOWN OF CALEDON AND THE REGION OF PEEL SHALL BE APPLICABLE TO ALL WORKS UNDER THEIR RESPECTIVE JURISDICTION. IN THE EVENT THAT THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE TOWN OF CALEDON OR THE REGION OF PEEL DO NOT COVER A PARTICULAR ITEM SHOWN OR IMPLIED ON THE PROJECT DRAWINGS TO BE CONSTRUCTED AS PART OF THE WORKS, THE STANDARD SPECIFICATIONS AND DRAWINGS OF THE TOWN OF CALEDON SHALL APPLY.

STORM SEWERS

1. STORM SEWERS SHALL BE CONCRETE PIPE, PIPE SMALLER THAN 400mm DIA. SHALL BE CSA-A-231-125, CONCRETE PIPE 400mm AND LARGER SHALL BE CSA-A-237-2 WITH RUBBER JOINTS CONFORMING TO CSA-A-237-2.
2. SEWER BODIES SHALL BE AS PER CPD-80-04, (CLASS B).
3. ALL TRENCHES ARE TO BACKFILL WITH NATIVE MATERIAL AND COMPACTED TO AT LEAST 95% STD. PRODUCTION DENSITY.
4. CATCHBASINS:
 - FRAMES AND COVERS TO BE PER CPD-80-04, (CLASS B).
 - SINGLE CATCHBASIN LEADS TO BE 250mm DIA.
 - DOUBLE CATCHBASIN LEADS SHALL BE 300mm DIA.
 - ALL CATCHBASINS SHALL HAVE SLOPS.
5. ALL MANHOLES AS PER ONTARIO PROVINCIAL STANDARDS. (SEE SEE CONSTRUCTION DETAIL DWGS. FOR LIST OF STD. DRAWINGS)

LEGEND

- DOUBLE CATCHBASIN
- SINGLE CATCHBASIN
- STORM MANHOLE
- SANITARY MANHOLE
- ▲ VALVE & BOX
- HYDRANT & VALVE
- PLUG & BLOW OFF

TOWN OF CALEDON
APPROVED AS NOTED
 THIS APPROVAL CONSTITUTES A GENERAL REVIEW AND DOES NOT CERTIFY DIMENSIONAL ACCURACY.
 THIS APPROVAL IS SUBJECT TO THE FURTHER CERTIFICATION OF THE "AS CONSTRUCTED" WORKS BY A REGISTERED PROFESSIONAL ENGINEER OF THE PROVINCE OF ONTARIO.
 DATE: _____
 APPROVED BY: _____
 J.P. HOOK, P.ENG.
 Director of Engineering

No.	By	Date	Revision	Chk'd
1	BB	JAN 1998	FIRST SUBMISSION	
2	CHP	MAR 12/98	SECOND SUBMISSION	BB

Client: **934169 ONTARIO LIMITED**
GATES OF BOLTON PHASE 4



TOWN OF CALEDON
 PART OF WEST HALF
 LOT 5, CONCESSION 7
 (Former Township of Albion)
 TOWN OF CALEDON
 REGION OF PEEL
 DRAFT PLAN 21T-96004

Aquafor
Beech
Limited
 REGION FILE NO.: T-96004
FIGURE 2.2
 2 MARION COURT, UNIT 14, BOLTON, ONTARIO L7E 1E3 (905) 827-3343
STORM DRAINAGE AREA PLAN
 File: 67777
 Drawn By: C.R.P. Chk'd By: _____
 Checked By: BB Date: JAN. 1998
 Scale: 1:1000 Drawing No.: 67777-A-1A Sheet No.: 1A

3.0 STORMWATER MANAGEMENT

3.1 General

Stormwater management requirements for the subject site are outlined in the Master Drainage Plan Amendment for the Bolton South Hill Development Area (Aquafor Beech Limited, 1994). This site is situated in *Area 3*, for which 1 central stormwater management facility is recommended for both water quantity and quality control (Pond 4). The Master Drainage Plan Amendment recommended that Pond 4 construction be staged or constructed to final configuration either prior to or in conjunction with future development in the upstream drainage area.

3.2 Major-Minor Drainage Systems

The minor system for the site is illustrated in Figure 2.2. The minor system consists of storm sewers ranging in size from 250mm to 1050mm in diameter, with grades varying from 0.50% to 4.80%. The minor system has been designed using the *Rational Method* to convey the 10-Year design flow without surcharge (Appendix A).

The major (overland) system consists of the road network and has been designed to convey excess runoff for flows up to the 100-Year return period design storm. The majority of the major system flows from the development will ultimately be conveyed via Landsbridge Street, Royalton Drive, and Waterbury Street which is located in the southeast corner of the Gates of Bolton (Phase I and Phase II) developments. The routed overland flow will then be conveyed via the box culvert under the Albion-Vaughan Road to the Pond 4 inlet channel and subsequently to Pond 4. Accordingly, the storm sewer system from Manhole 11 to the proposed box culvert

at the Albion-Vaughan Road has been designed to collect and convey the 100-Year design flow (see Figure 2.2).

The remaining undeveloped land within the Bolton South Hill Development Area (Area 3) will remain as unused agricultural fields until the final phases of development commence. Since the area upstream of the proposed development is already constructed, there will be no undeveloped lands draining to the site.

3.3 Drainage Outlet

The drainage outlet for runoff from the site will be Pond 4. The *minor* flows from the site will be conveyed via the storm sewer system and box culvert under the Albion-Vaughan Road and subsequently via an inlet channel to Pond 4. The *major* flows from the site will be conveyed via roadway to the box culvert under the Albion-Vaughan Road and subsequently via an inlet channel to Pond 4.

3.4 Runoff Control

Runoff control to address flood control and environmental design considerations will be provided by Pond 4. Consistent with the Master Drainage Plan Amendment, *Stage 3* construction of Pond 4 will be undertaken in conjunction with the Gates of Bolton (Phase III & Phase IV) subdivision.

The *Stage 3* pond configuration is shown in Figure 3.1 and provides water management requirements for Tormina Homes Gates of Bolton (Phase III & Phase IV), Ritchie Brothers subdivision, and Tanzini development. The previous *Stage 2* pond provided water management for Gates of Bolton (Phase II), South Hill Village, and Gates of Bolton (Phase I). A summary of the operational characteristics for the *Stage 3* pond is provided in Table 3.1. The stage-

TABLE 3.1
POND 4 OPERATIONAL CHARACTERISTICS - STAGE 3
BOLTON SOUTH HILL AREA

Design Storm	Rainfall Depth (mm) 1hr storm (6hr storm)	Summary of Peak Flows (cms)			Live Storage Used (cu. m)	Maximum Pool Elevation (m)	Freeboard Available (m)
		Pre-Development 1hr storm (6hr storm)	Post-Development 1 hr Design Storm inflow (outflow)	Post-Development 6 hr Design Storm inflow (outflow)			
25 mm	25.0 (25.0)	1.31 (1.31)	3.89 (0.11)	3.89 (0.11)	9,150	236.48	1.11
2-year	24.4 (35.9)	1.26 (1.63)	3.74 (0.10)	3.24 (0.57)	13,150	236.66	0.93
5-year	33.6 (47.9)	2.23 (2.65)	6.38 (0.64)	5.20 (1.63)	16,580	236.80	0.79
10-year	39.8 (55.7)	2.98 (3.39)	8.32 (1.43)	6.67 (2.50)	18,710	236.89	0.70
25-year	47.5 (65.6)	3.99 (4.41)	10.24 (2.74)	8.58 (3.75)	21,430	237.00	0.59
50-year	53.3 (73.1)	4.81 (5.20)	10.66 (4.01)	9.73 (4.79)	23,460	237.08	0.51
100-year	59.0 (80.3)	5.64 (6.00)	12.61 (5.22)	11.01 (5.89)	25,510	237.16	0.43

Notes:

1. Rainfall depths are based on IDF data from the Toronto Bloor Street Meteorology Station.
2. Pre-development peak flows are at the C.P.R. Line east of the Albion-Vaughan Road (i.e., downstream of proposed Pond 4) and as reported in the Bolton South Hill Development Area M.D.P. Amendment. These flow estimates do not include any routing effects through the existing farm ponds.
3. Maximum pool elevation is based upon the proposed grading concept for Pond 4 and 6 hr duration design storm.
4. Available freeboard represents the difference between the perimeter berm crest (assumed @ elevation 237.59 metres) and maximum pool elevation.
5. Pond 4 - Stage 3 is designed to control flows generated by the 25 mm, 2 year, 5 year, 10 year, 25 year, 50 year, and 100 year design storms. The limits of the watershed boundary are shown in Figure 1.1 and include Gates of Bolton (Phase I)(Tormina Homes), Gates of Bolton (Phase II)(Tormina Homes), South Hill Village (Sanator Homes), Gates of Bolton (Phase III & IV)(Tormina Homes), Ritchie Brothers Subdivision, and Tanzini development.

storage-discharge relationship is shown in Table 3.2. A schematic for the hydrologic model is provided in Figure 3.2. Supporting INTERHYMO documentation is attached in Appendix A.

Stage 1 construction of Pond 4 was to include the following:

- inlet channel construction to final configuration;
- outlet structure construction to final configuration;
- excavation of the *Stage 1* pond to the lines and grades required to meet target pre development release rates as outlined in Table 3.1;
- access road construction to at least the northeast corner of the facility where topsoil and excavated material will be stockpiled; and
- temporary stabilization of all areas affected by construction activities.

Stage 2 construction of Pond 4 was to include the following:

- excavation of the *Stage 2* pond to the lines and grades required to meet target pre development release rates as outlined in Table 3.1; and
- temporary stabilization of all areas affected by construction activities.

Stage 3 construction of Pond 4 will consist of the following:

- completion of outstanding *Stage 1* and *Stage 2* pond construction works;
- excavation of the pond to final configuration (see Figure 3.1);
- final site grading;
- stabilization of all areas affected by construction activities; and

storage-discharge relationship is shown in Table 3.2. A schematic for the hydrologic model is provided in Figure 3.2. Supporting INTERHYMO documentation is attached in Appendix A.

Stage 1 construction of Pond 4 was to include the following:

- inlet channel construction to final configuration;
- outlet structure construction to final configuration;
- excavation of the *Stage 1* pond to the lines and grades required to meet target pre development release rates as outlined in Table 3.1;
- access road construction to at least the northeast corner of the facility where topsoil and excavated material will be stockpiled; and
- temporary stabilization of all areas affected by construction activities.

Stage 2 construction of Pond 4 was to include the following:

- excavation of the *Stage 2* pond to the lines and grades required to meet target pre development release rates as outlined in Table 3.1; and
- temporary stabilization of all areas affected by construction activities.

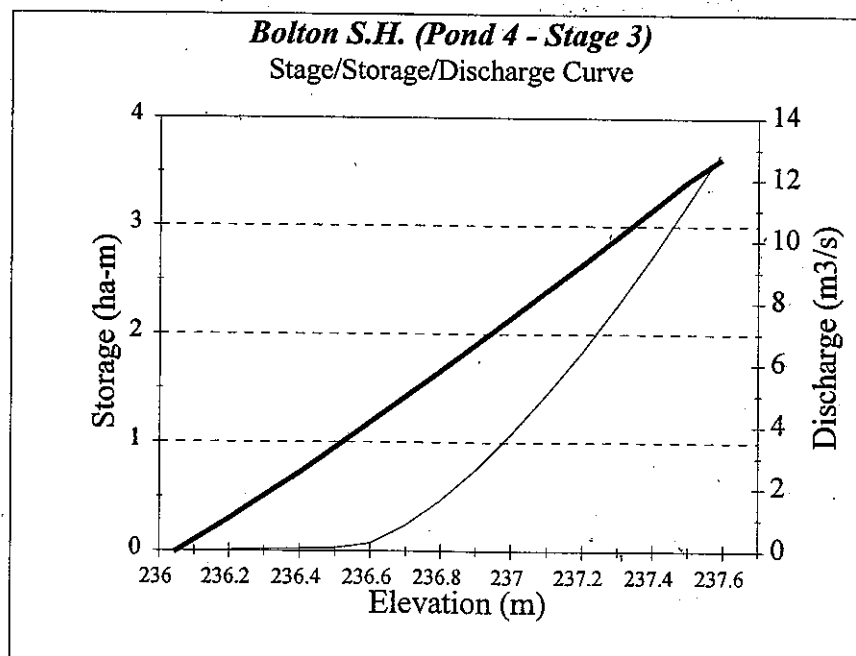
Stage 3 construction of Pond 4 will consist of the following:

- completion of outstanding *Stage 1* and *Stage 2* pond construction works;
- excavation of the pond to final configuration (see Figure 3.1);
- final site grading;
- stabilization of all areas affected by construction activities; and

TABLE 3.2
STAGE-STORAGE-DISCHARGE RELATIONSHIP
POND 4 - STAGE 3

Invert of Extended Outlet Control Structure (Orifice) (m)	236.05
Obvert of Extended Outlet Control Structure (Orifice) (m)	236.35
Elevation of Centre of Orifice (m)	236.2
Invert of Overflow Spillway (m)	236.55
Diameter of Orifice Plate Opening (m)	0.3
Basewidth of Spillway (m)	7
Sideslopes on Spillway (h:v)	4

Stage (m)	Storage (ha-m)	Head on Orifice Centre (m)	Q Orifice (cms)	Head on Weir (m)	Q Weir (cms)	Q Total (cms)
236.05	0.00	0.00	0.00	0.00	0.00	0.00
236.20	0.30	0.15	0.04	0.00	0.00	0.04
236.40	0.72	0.20	0.09	0.00	0.00	0.09
236.50	0.95	0.30	0.11	0.00	0.00	0.11
236.60	1.18	0.40	0.12	0.05	0.13	0.26
236.70	1.42	0.50	0.14	0.15	0.69	0.83
236.80	1.66	0.60	0.15	0.25	1.49	1.64
236.90	1.90	0.70	0.16	0.35	2.46	2.63
237.00	2.15	0.80	0.17	0.45	3.59	3.77
237.10	2.39	0.90	0.18	0.55	4.85	5.04
237.20	2.65	1.00	0.19	0.65	6.24	6.43
237.30	2.90	1.10	0.20	0.75	7.73	7.93
237.40	3.16	1.20	0.21	0.85	9.33	9.54
237.50	3.42	1.30	0.22	0.95	11.02	11.24
237.59	3.62	1.39	0.23	1.04	12.62	12.85



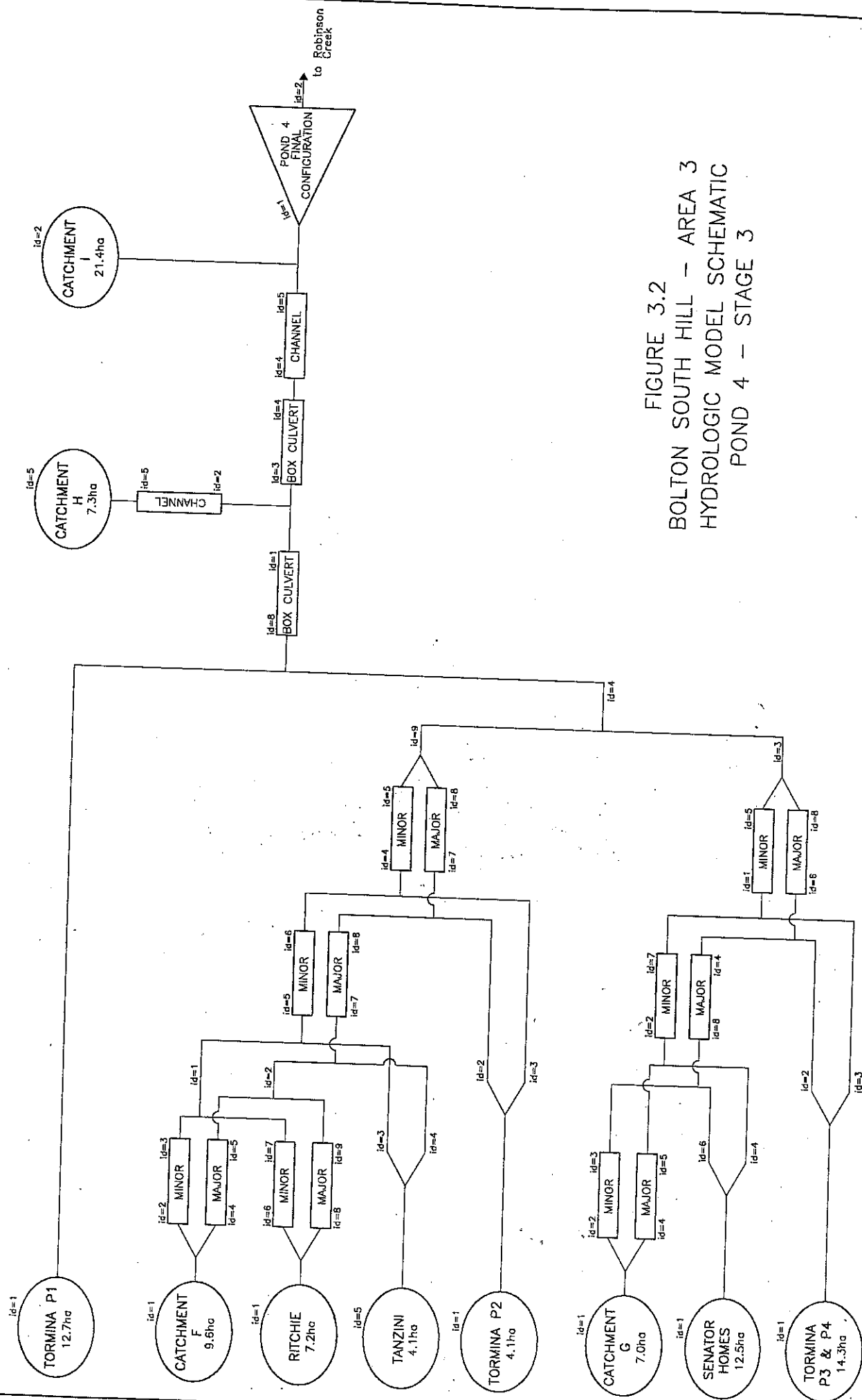


FIGURE 3.2
BOLTON SOUTH HILL - AREA 3
HYDROLOGIC MODEL SCHEMATIC
POND 4 - STAGE 3

- installation of wetland plantings and landscaping per Drawing 6567-A-8 (see Figure 3.3) during the planting season after grading of the stormwater management facility to final configuration.

3.5 Site Best Management Practices

The following *Best Management Practices* will be implemented for the subject site:

- roof down spouts will be directed to pervious lawn areas to promote infiltration;
- where applicable, grassed swales will be constructed along the rear lot lines; and
- an *Erosion and Sediment Control Plan* will be implemented to minimize release of sediment from the site during construction activities (see Section 3.7).

3.6 Storm Sewer Capacity Analysis

An analysis of storm sewer capacity was completed to identify any locations where the potential for surcharging may exist. The 100-year flow in the storm sewer system was determined by calculating the 100-year surface flow and the storm sewer inlet capacities. The 100-year surface flow was calculated with the Rational Method. Storm sewer inlet capacities were calculated using Ministry of Transportation Ontario (MTO) drainage charts consistent with the proposed type of catch basin inlets and sag depths. The pertinent MTO drainage charts can be found in Appendix B. The inlet capacities were subtracted from the surface flow to obtain a "net" surface flow available for discharge to the storm sewer inlets at subsequent downstream locations. The cumulative inlet capacity was carried down the system and checked against the sewer pipe capacity at each location. In this manner, the *surplus* pipe capacity was calculated. Pipes for which a negative *surplus* capacity was calculated were considered to have the potential for

surcharging. In such cases where the potential for surcharging was established, flow restrictors were recommended as a safety measure.

A flow restrictor is proposed for catchbasin 3 (CB3) located in the park northwest of Street "A". The recommended flow restrictor is an IPEX Type "A" inlet control device (ICD) (or equivalent) which limits the flow to 22 Litres/sec at the assumed operating head. The ICD is a tapered plug which is inserted in the lead from the catchbasin. This will ensure that the capacity of the downstream pipes will not be exceeded for the 100-year event. As shown in Table 3.3, the storm sewers will not surcharge during the 100-year event and, therefore, there is no risk of basement flooding to houses within the development.

3.7 Erosion and Sediment Control Plan

Outlined in Figure 3.4 is the *Erosion and Sediment Control Plan* for the site. Details are provided on this drawing of the following:

- locations of siltation fencing;
- access points for construction equipment (primary and secondary);
- measures to minimize construction equipment from tracking mud off-site;
- proposed topsoil stockpile location;
- siltation control measures for rear lot catchbasins; and
- siltation control measures for catchbasins within roadways.