C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

115 Sandford Fleming Drive, Suite 200
Collingwood, Ontario L9Y 5A6
Tel: (705) 444-2565
Fax: (705) 444-2327
Email: info@cctatham.com
Web: www.cctatham.com

December 22, 2017

via e-mail (krennie@georgianplanning.ca) & mail
CCTA File 117167

Krystin Rennie
Georgian Planning Solutions
17 Brock Crescent
Collingwood, ON L9Y 4A4

Re: Stonebrook, Phase 2 (Markdale) - Residential Development
Functional Servicing Letter

Dear Krystin:

C.C. Tatham & Associates Ltd. (CCTA) has previously completed a full engineering submission for the Stonebrook Residential Development (referred herein as Stonebrook Phase 1) in the community of Markdale, Municipality of Grey Highlands. In addition to engineering design drawings, the submission included the following:

- a *Functional Servicing Report* (dated February 2017) which addressed the proposed water distribution, sanitary sewer and storm sewer systems, the transportation network, and utility provisions;
- a *Preliminary Stormwater Management Report* (February 2017); and
- a *Final Stormwater Management Report* (June 2017).

Further to our Phase 1 work and submission, the owner/developer has acquired the land immediately adjacent (referred previously as the O'Brien Lands) and is proceeding with Stonebrook Phase 2 (refer to Figure 1 in Attachment A showing the delineation between Phase 1 and Phase 2).

Purpose

The purpose of this letter is to supplement the Phase 1 Functional Servicing Report (FSR) and address the incremental needs of the Phase 2 development. As per our consultation with the Municipality, a full FSR is not required in context of the limited development proposed in Phase 2 (24 townhouse units). Rather, the key elements of the initial FSR and implications to such, will be addressed herein.

Background

Existing Site

The subject property consists of approximately 1.20 hectares (2.47 acres) of undeveloped land located approximately 600 m north of the intersection of Grey Road 12 (Main Street) and Highway 10 (Toronto Street) within the Community of Markdale. The legal description of the site refers to Part of Lot 98, Concession 1, northeast of the Toronto and Sydenham Road, Municipality of Grey Highlands, County of Grey. Access to the proposed development will be from the southwest through the Phase 1 lands, and by a proposed right-of-way that connects to Grayview Drive.

The subject property currently consists of a portion of uncultivated pasture, consisting primarily of overgrown grasses with localized shrub and treed areas, and part of the green and fairway of one of Markdale Golf & Curling Club holes. There are no existing buildings on-site.

Site runoff generally sheet flows from southeast to northwest, with the majority of drainage from the site flowing to the agricultural lands to the north, and eventually outletting to a tributary of the Rocky Saugeen River.

Site Geology

A formal Geotechnical Investigation was completed for the subject property in April 2017, by Peto MacCallum Ltd. The field work within Phase 2 included one borehole to a depth of 3.1 metres. Based on the borehole investigation, the soils can generally be described as consisting of 0.3 metres of topsoil underlain by compact sand and gravel with traces of silt, clay, cobbles and boulders. No groundwater was encountered during the investigation.

Proposed Development Plan

24 townhouse (multi-attached) residential units in 5 blocks are proposed within the Phase 2 development. The proposed layout and preliminary servicing are illustrated on the Concept Site Development Plan (Dwg. CSD-1), which is provided in Attachment C.

If a household density of 2.2 persons per unit (rate applied per the *2015 Annual Report, Operation and Maintenance Markdale Wastewater Treatment Plant*) was applied, the development would yield a total population of 53 persons.

It is intended the Phase 1 road system (Street A) be extended easterly and then southerly, connecting into Grayview Drive, creating a new 'T' intersection.

Water Network

Water Demands

The proposed water demands for the development have been calculated based on *MOECC Design Guidelines for Drinking-Water Systems* and *Municipality Development Standards*. The proposed water demands using a household density of 2.2 persons/unit are summarized as follows (additional details are provided in Attachment B):

- Design Population (Residential) 53 people
- Average Day Demand (ADD) 23.9 m^3/d (0.63 L/s)
- Maximum Day Demand (MDD) 65.6 m^3/d (0.76 L/s)
- Peak Hour Demand (PHD) 1.14 L/s
- Maximum day plus fire flow 38.76 L/s (1.14 L/s + 38.0 L/s) for 2 hours

As stated in the Phase 1 FSR, there is uncommitted hydraulic reserve capacity within the existing water distribution system of approximately 2,878 m^3/day. When the Average Daily Demand of Phase 1 (254.4 m^3/d) and Phase 2 (23.9 m^3/d) are taken into account there is still sufficient capacity (approximately 44%) within the existing infrastructure to service both proposed developments. Supporting calculations are provided in Attachment B.

Water Distribution

The proposed internal water distribution network includes a 150 mm diameter PVC watermain, which will connect to the proposed 150 mm diameter PVC watermain from Phase 1 and looped to connect to the existing 150 mm diameter PVC watermain on Grayview Drive. A short section of watermain will terminate past the "hammerhead" turning basin at the northwest limits of the subject property, complete with a hydrant. The watermain, services, connections, fittings and fire hydrants will be installed per municipal standards.

Sanitary Sewer Network

Sewage Demands

As noted, the Phase 2 development will yield a total population of 53 persons. Sewage to be generated by the development equates to 52.9 m^3/s (0.61 L/s) for average flow and 211.5 m^3/d (2.44 L/s) for peak flow; supporting calculations for which are provided in included in Attachment B.

External Sewer Network

As per the Phase 1 FSR the Wastewater Treatment Plan (WWTP) is designed to process 1,122 m^3/day and is currently operating with a reserve capacity of 211.68 m^3/day. The combined, theoretical flows for Phase 1 and 2 are 170.5 m^3/day, which will result in the WWTP operating at 96% of its capacity. We understand the Municipality has already initiated the process of increasing the capacity of the WWTP to service future development and demand. Therefore, it can be concluded there is sufficient capacity within the existing wastewater treatment plant to service the proposed development. Supporting calculations are provided in Attachment B.

In 2011, a sewage pumping station (SPS) was constructed at the north bend of Grayview Drive to service existing and future developments in the area. Through discussions with Municipal staff, we understand Stonebrook Phase 1 and Phase 2 lands are located within the SPS catchment area and both the SPS and downstream sewer network have sufficient capacity to service the proposed development.

Proposed Sewer Network

Sanitary sewage from the proposed development will be conveyed via a 200 mm diameter gravity sewer that will accept flows from the Phase 1 development and outlet into the existing maintenance hole immediately upstream of the existing sewage pumping station. With the acquisition of the Phase 2 lands it will allow for a direct connection to the pump station via the proposed municipal right-of-way.

Stormwater Management

A *Preliminary Stormwater Management Report* (December 2017) that reviews the existing and proposed stormwater conditions for the Phase 2 development has been prepared by CCTA and is provided under separate cover. The SWM report should be read in conjunction with this report.

Stormwater Management Highlights

Key findings/conclusions of the *Preliminary Stormwater Management Report* as they relate to the proposed stormwater management system are as follows:

- The stormwater management plan developed for the subject lands is in accordance with the criteria set forth by the Municipality Development Standards (August 2014) and the Ministry of the Environment Stormwater Management Planning and Design Manual (March 2003).
- When implemented, the stormwater management plan will allow the development to proceed without negatively impacting the local drainage systems.
- Water quality to an Enhanced Level with 80% total suspended solids removal will be provided through the use of a conventional end-of-pipe facility (stormwater management pond) complete with a sediment forebay. The pond will be situated off-site on the neighbouring property and as such that landowner's approval will be obtained.

- Water quantity controls will be provided such that post-development peak flow rates for storm events ranging from 2-year to 100-year are less than pre-development conditions.

Siltation and Erosion Control

Siltation and erosion controls will be implemented for all construction activities, including topsoil stripping, material stockpiling, road construction and grading operations. The detailed erosion and sediment control measures proposed to be implemented during and after the construction will be identified during detailed design and will address the following requirements:

- Where necessary, heavy duty silt fence will be erected around the perimeter of the site before any grading operations commence to control sediment movement.
- A construction vehicle entrance will be constructed and maintained consisting of a stone mud mat to reduce the off-site tracking of material.
- Catch basins and inlet structures will be fitted with catch basin sediment traps during construction activities, and the storm sewer system cleaned out as required and prior to assumption of the works.
- Straw bale flow checks will be installed within the ditches/swales.

Traffic Impact

Existing Conditions

As per the Phase 1 *Functional Servicing Report*, the area road system including Highway 10 and the adjacent local roads, was determined to have considerable reserve capacity to accommodate future growth including that of Stonebrook Phase 1.

Phase 2 Traffic

As with the Phase 1 trip estimates, the number of vehicle trips to be generated by the proposed Phase 2 development has been determined based on the low-rise residential condo/townhouse (1-2 floors) land use (ITE code 231). The associated trip rates and trip estimates are provided in Table 1, reflective of the weekday AM and PM peak hours of the adjacent street (Phase 1 volumes are also illustrated for comparative purposes).

Table 1 - Development Trip Generation Rates and Estimates

Land Use rate/ estimate		Weekday AM Peak Hour			Weekday PM Peak Hour		
		In	Out	Total	In	Out	Total
Trip Generation	trips/unit	0.17	0.50	0.67	0.45	0.33	0.78
Phase 1	55 units	9	28	37	25	18	43
Phase 2	24 units	4	12	16	11	8	19
Total	79 units	13	40	53	36	26	62

As indicated, the proposed 24 townhouse units for Phase 2 are expected to generate 16 trips during the weekday AM peak hour and 19 trips during the PM peak hour.

Traffic Operations

Assuming all traffic associated with Stonebrook Phase 1 and Phase 2 development will be oriented to/from Highway 10, traffic volumes on Fairway Heights (which will provide connectivity between Stonebrook and Highway 10) will increase by 13 to 40 vehicles per direction per hour (which equates to 1 vehicle every 1.5 to 4.5 minutes). On Highway 10, recognizing that volumes will be distributed to both the northwest and southeast, increases of 10 to 25 vehicles per direction are expected.

Notwithstanding this increase, the road system will continue to operate well below capacity. As per the FSR, following completion of Phase 1 Highway 10 is expected to operate at 56% of capacity whereas Fairway Heights will operate at 9% of capacity under peak conditions. With Phase 2, these values will only change marginally given the minimal additional volumes.

With the proposed connection to Grayview Drive, motorists will also have ready access to Main Street East via Edith Avenue, thus further distributing traffic through the area road system and further reducing any associated impacts (which are negligible).

As such, no issues with the transportation system are expected.

Road System Improvements

The new road system will create a 3rd leg at the existing Grayview Drive 90 °corner, thus resulting in a 'T' intersection. It is recommended that a stop sign be placed on the southeast leg of Grayview Drive (which is the stem of the 'T') to regulate traffic and allocate right-of-way through the intersection. As this represents a deviation from the existing control (in that there are no restrictions through the curve), additional signage and pavement markings are recommended to alert motorists accordingly (to include a New sign, Stop Ahead sign and painted stop bar).

Utility Network

Existing Utilities

All aboveground existing utility features including hydro poles and pedestals were located during the topographic survey and are identified on Dwg. CSD-1.

Hydro

Hydro One has been contacted and confirmed they have existing infrastructure along Margaret Elizabeth Avenue and Grayview Drive. Their Distribution and Planning Department has not confirmed whether a single phase or three-phase connection is required to service the development; however there is a single-phase connection near the site entrance off of Margaret Elizabeth Avenue and a three-phase connection at the Margaret Elizabeth Avenue and Grayview Drive intersection.

Cable TV

Markdale Cable confirmed they will be servicing this development and have initiated their design accordingly.

Gas

Union Gas confirmed their existing infrastructure along Margaret Elizabeth Avenue has capacity to service the proposed development without a need for upgrades/reinforcement at this time. Union Gas does not reserve load on their system, so capacity is to be re-confirmed prior to construction.

Bell Canada

Bell Canada confirmed they will provide their full suite of fibre to the home services to this development.

Connection Strategies

Detailed connection strategies with all utility companies will be formalized at the appropriate time. However, it would appear that there would be no issue in providing all utility servicing to this development.

Summary

Based on the preceding analyses, the proposed development can be appropriately serviced. Specifically, the proposed strategy for servicing includes:

1. An internal water distribution system can be constructed and connected to the existing watermain on Margaret Elizabeth Avenue to supply the needs of the development. The watermain will be looped to connect to the existing watermain on Grayview Drive.

2. An internal sanitary sewer can be constructed and will convey the sewage via gravity to the existing sewage pumping station on Grayview Drive. We understand there is capacity within the existing wastewater treatment plant and sewage pumping station to service the development.

3. An internal storm sewer system to collect and convey surface water runoff for the development will be constructed. Runoff will be discharged to a stormwater management pond situated off-site on the adjacent agricultural lands to the northwest. The stormwater will be treated for quality and quantity and will not have any adverse impacts downstream.

4. The additional traffic to be generated by Phase 2 is minimal - 16 trips during the AM peak hour and 19 trips during the PM peak hour. In consideration of both Phase 1 and Phase 2 traffic, such can be accommodated on the existing road system without concern. As the new road system will created at 'T' intersection at the Grayview Drive corner, the implementation of minor improvements (signage and stop bar) is required to control passage through the intersection (the minor approach is to operate under stop control).

5. Hydro, telephone, cable and gas service are available.

Additional details with respect to the various servicing components will be provided at the final design stage.

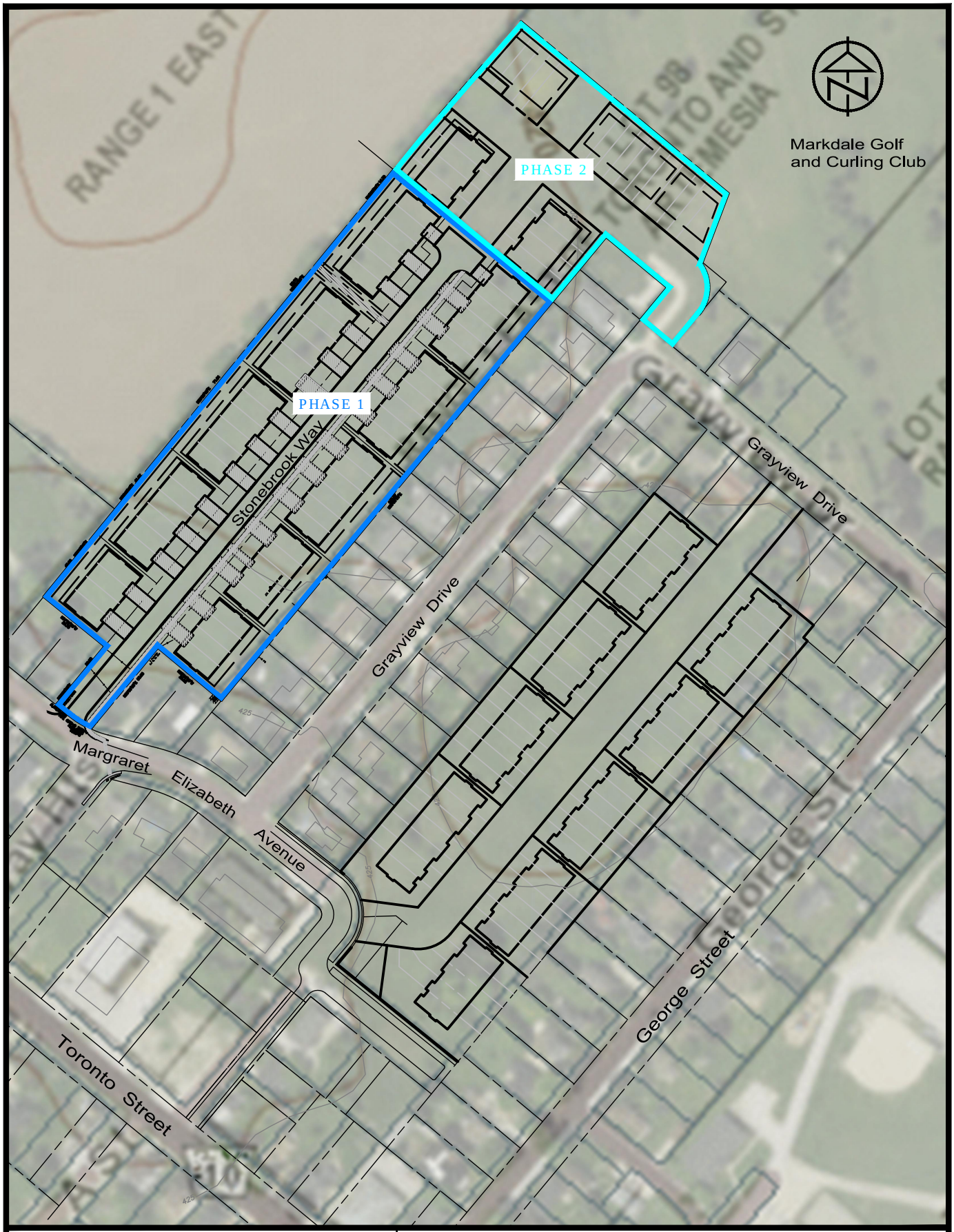
Respectfully submitted,
C.C. Tatham & Associates Ltd.

Cedric Walsh
Intermediate Technician
JRA/CW:rlh

Allan E. Brownridge, B.E.Sc., P.Eng.
Director, Senior Engineer, Project Manager

I:\2017 Projects\117167 - Stonebrook Subdivision - Phase 2\Documents\Reports\Functional Servicing.docx

Attachment A:
Location Plan



C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

STONEBROOK DEVELOPMENTS
MUNICIPALITY OF GREY HIGHLANDS
LOCATION PLAN

SCALE: 1:2500	DATE: DEC/17	FIG NO. 1

Attachment B:
Water Distribution and Wastewater Treatment Calculations

C.C.Tatham & Associates Ltd. Consulting Engineers — Collingwood Bracebridge Orillia Barrie Ottawa	Project:	Stonebrook Phase 2	Date:	15-Dec-17
	File No.:	117167	Designed:	CW
	Subject:	Water Distribution Calculations	Checked	AEB

WATER SUPPLY

1.1 Residential Design Flows

Condominium Block (Units) = 24 (Per Draft Plan submitted by Georgian Planning Solutions)
Population per Unit = 2.2 (Per Markdale Water Supply, O.Rg. 170/03 2015 Annual Summary Report)
Population = 24 x 2.20 = 53

Average daily per capita flow = 450 L/cap/day (Per Municipality of Grey Highlands Development Standards)

Average Daily Flow = 53 x 450 /1000
= 23.85 m³/day
= 0.28 L/s

Design Factors

Residential Population = 53

Residential Max. Day Factor = 2.75 (Per MOECC Design Guidelines - 2008)
Residential Peak Hour Factor = 4.13

Design Flows

Max. Daily Flow = 0.28 x 2.75
= 0.76 L/s (65.59 m³/day)

Peak Hour Flow = 0.28 x 4.13
= 1.14 L/s

Fire Flow = 38.00 L/s (Per MOECC Design Guidelines - 2008)

Max. Day plus Fire = 0.76 + 38.0
= 38.76 L/s (3,349 m³/day)

1.2 Uncommitted Hydraulic Reserve Capacity (Per Markdale Water Supply, O.Rg. 170/03 2015 Annual Summary Report)

System Capacity = 5,990 m³/day
Maximum Day Flow (2014) = 2,781 m³/day
Hydraluic Reserve Capacity = 3,209 m³/day
Total Committed Flows = 330.88 m³/day

Uncommitted Hydraluic Capacity = 2878.12 m³/day
Phase 1 Max. Daily Demand = 149.70 m³/day
Phase 2 Max. Daily Demand = 65.59 m³/day

Ultimate Condition = $\frac{\text{ADF (incl. proposed development)}}{\text{System Capacity}}$

$= \frac{2781 + 330.88 + 65.59 + 149.70}{5990}$

= 56%

Therefore there is sufficient capacity within the existing infrastructure to service the proposed Stonebrook Phase 1 and 2 developments

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WASTEWATER TREATMENT PLANT (Per 2015 Annual Report, Operation and Maintenance, Markdale Wastewater Treatment Plant)

Wastewater Treatment Plan Capacity = 1,122 m³/day
Existing Condition - Average Daily Flow = 744 m³/day
Potentially Committed Developments = 166.32 m³/day

Uncommitted Hydraluic Capacity = 211.68 m³/day

Phase 1 Population = 55 units x 2.2 ppu = 121 cap
Phase 1 Area = 2.61 ha
Phase 1 Average Flow = 121 cap x 450 l/cap/d + 2.61 ha x 0.28 l/s/ha
= 54,450 l/day + 63,141 L/day
= 117.59 m³/day

Phase 1 Peak Flow = 117.59 m³/day x 4 (Harmon Peaking Factor, maximum 4.0)
= 470.36 m³/day

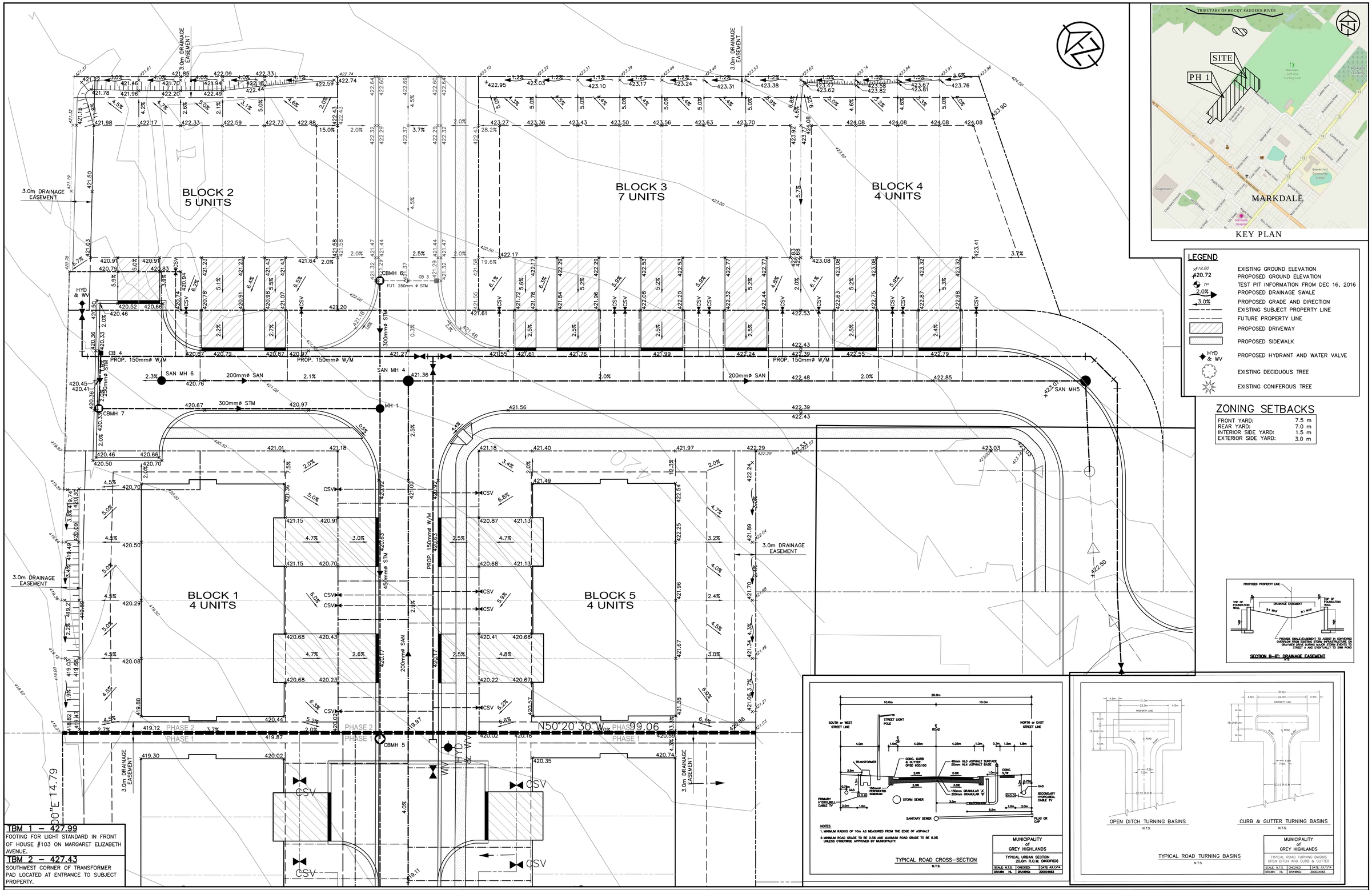
Phase 2 Population = 24 units x 2.2 ppu = 53 cap
Phase 2 Area = 1.20 ha
Phase 2 Average Flow = 53 cap x 450 l/cap/d + 1.20 ha x 0.28 l/s/ha
= 23,850 l/day + 29,030 L/day
= 52.88 m³/day

Phase 1 Peak Flow = 52.88 m³/day x 4 (Harmon Peaking Factor, maximum 4.0)
= 211.52 m³/day

Phase 1 - Average Daily Flow = 117.59 m³/day
Phase 2 - Average Daily Flow = 52.88 m³/day
Total Proposed Increased Daily Flow = 170.47 m³/day , which is less than 211.69 m³/day

Therefore there is sufficient capacity within the existing infrastructure to service both phases of the development

Attachment C:
Conceptual Site Development Plan



LEGEND

- EXISTING GROUND ELEVATION
- PROPOSED GROUND ELEVATION
- TEST PIT INFORMATION FROM DEC 16, 2016
- PROPOSED DRAINAGE SWALE
- PROPOSED GRADE AND DIRECTION
- EXISTING SUBJECT PROPERTY LINE
- FUTURE PROPERTY LINE
- PROPOSED DRIVEWAY
- PROPOSED SIDEWALK
- PROPOSED HYDRANT AND WATER VALVE
- EXISTING DECIDUOUS TREE
- EXISTING CONIFEROUS TREE

ZONING SETBACKS

FRONT YARD:	7.5 m
REAR YARD:	7.0 m
INTERIOR SIDE YARD:	1.5 m
EXTERIOR SIDE YARD:	3.0 m

SECTION B–B': DRAINAGE EASEMENT
N.T.S.

TYPICAL ROAD CROSS–SECTION
N.T.S.

MUNICIPALITY of GREY HIGHLANDS		
TYPICAL URBAN SECTION 20.0m R.O.W. (MODIFIED)		
SCALE: N.T.S.	CHECKED:	DATE: JULY/14
DRAWN: HL	DRAWING:	3000034683

TYPICAL ROAD TURNING BASINS
N.T.S.

MUNICIPALITY of GREY HIGHLANDS		
TYPICAL ROAD TURNING BASINS OPEN DITCH and CURB & GUTTER		
SCALE: N.T.S.	CHECKED:	DATE: JULY/14
DRAWN: HL	DRAWING:	3000034683

CONTRACT DRAWINGS

CONTRACTOR MUST VERIFY ALL DIMENSIONS AND BE RESPONSIBLE FOR SAME. ANY DISCREPANCIES MUST BE REPORTED TO THE ENGINEER BEFORE COMMENCING WORK. DRAWINGS ARE NOT TO BE SCALED.

DRAWING REFERENCES:

1. DRAFT PLAN PER DRAWING NUMBER 16142–19 PREPARED BY DESIGN PLAN SERVICES INC., TITLED "DRAFT PLAN OF PROPOSED SUBDIVISION PART OF LOT 98, CON.1 MUNICIPALITY OF GREY HIGHLANDS, COUNTY OF GREY", DATED OCTOBER 25, 2017.
2. LEGAL BOUNDARY SHOWN ON THIS PLAN WAS TAKEN FROM A PLAN TITLED "PLAN OF SURVEY OF PART OF LOT 98 CONCESSION 1 NORTHEAST OF THE TORONTO AND SYDENHAM ROAD", MARTIN KNISLEY, PROVIDED TO CCTA ON JUNE 1, 2017
3. LOCATION OF EXISTING WATER INFRASTRUCTURE TAKEN FROM A PLAN PREPARED BY GENIVAR, TITLED 'EXISTING MARKDALE WATER SYSTEM' DATED MARCH 2012, INCLUDED IN THE 2015 MARKDALE WATER SUPPLY REPORT.
4. INFORMATION RELATED TO EXISTING SEWAGE PUMPING STATION WAS TAKEN FROM A SET OF PLANS TITLED 'GRAYVIEW AND COUNTY ROAD 12 SEWAGE PUMPING STATION' PREPARED BY GENIVAR, DATED FEB, 9, 2012.
5. BOREHOLE INFORMATION FROM GEOTECHNICAL REPORT PREPARED BY PETO MACCALLUM LTD. DATED DECEMBER 2017.

NO.	REVISIONS	DATE	INITIAL

APPROVED

NOT FOR CONSTRUCTION

STONEBROOK DEVELOPMENTS
STONEBROOK PHASE 2 DEVELOPMENT
MUNICIPALITY OF GREY HIGHLANDS

CONCEPTUAL SITE DEVELOPMENT PLAN

C.C. Tatham & Associates Ltd.
Consulting Engineers
Collingwood Bracebridge Orillia Barrie Ottawa

SCALE: 1:250		JOB NO. 117167	
DESIGN: CW	CHECKED: JRA	DWG. CSD-1	
DRAWN: CW	DATE: JULY/17		