

C. C. TATHAM & ASSOCIATES LTD.

Collingwood

Orillia

Bracebridge

TOWNSHIP OF RAMARA BRECHIN SANITARY SERVICING MASTER SERVICING PLAN UPDATE

File No. 303860
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1 INTRODUCTION

1.1 Background

In 1998, the Township of Ramara commissioned a study to assess the condition of the private sewage systems serving the Village of Brechin and the adjacent Lake Simcoe shoreline communities, and to develop a preliminary sanitary servicing solution.

The October 1998 "Brechin Sanitary Servicing Preliminary Report" by C.C. Tatham & Associates Ltd (CCTA) concluded that health and environmental problems were present due to inadequate sewage disposal systems, and recommended that a communal sewage collection system be constructed to remediate the situation. A preliminary servicing plan was developed, providing for an estimated future equivalent population of 9,934 within the entire developable land in Brechin, Lagoon City, and areas zoned Lakeshore Residential west of Brechin. Sewage would be pumped from Brechin to the Lagoon City Sewage Treatment Plant (STP), which would require staged expansions. The servicing plan provided for a first stage to address the environmental issues in Brechin, then in a second stage provide for residential and industrial growth.

A municipal Class Environmental Assessment (Schedule B) for servicing Brechin was completed in April 2003. All review agencies concerns were addressed and the preliminary servicing plan described in the 1998 report was accepted. Detailed design of the gravity sewer system in Brechin was initiated in 2003.

Recently, proposals for development of properties south of Simcoe Road have been presented. These proposals involve higher density development than originally anticipated in the servicing report, and consequently an increase in sewage flows from these areas. The servicing plan was therefore revisited and revised to ensure that it is viable and cost-effective.

1.2 Purpose

The purpose of this report is to update the servicing plan with up-to-date planning information. This revised plan will form the basis for the detailed engineering design of the collection system, pumping stations and forcemains and will provide for the development of a fair rate structure to assess costs to the benefiting properties.

2 SERVICE AREA

The sanitary sewer service area that will ultimately be serviced by a sewage collection system discharging to the Lagoon City STP is shown in Figure 1. It includes as originally planned:

- Existing developed lands in Brechin, Lagoon City and the lakeshore communities south of Lagoon City to Concession III.
- Lands designated for development in Brechin, Lagoon City, and along Simcoe Road.

The updated projected service area population is summarized in Table 1. Ultimately, if all developable lands were developed, the service area could total an equivalent population of

Table 1
Ultimate Population and System Capacity Requirement of the Potential Sewer Service Area

Component	Existing		Designated Development Areas			Population		Capacity Requirement	
	Lots / Conn.	Equivalent Units	Gross Area (ha)	Density (units/ha)	Number of Units	Persons/lot	Equivalent Population	Unit Rate (m ³ /cap/d)	(m ³ /d)
Lagoon City - Existing (911 units)	911	911				2.0	1822		1332
Hamlet of Brechin - Existing									
Residential	105	105				2.5	263		
Commercial and Municipal	27	48				2.5	120		
Institutional - Churches, etc.	4	9				2.5	23		
Institutional - Schools	2	8				2.5	20		
Industrial Park - Existing	9	9				2.5	23		
Total Brechin - Existing	147	179					448	0.45	201
Hamlet of Brechin - Growth									
Industrial Park - Vacant, Undeveloped			34.6				1033		
Veltri			27.3	12	328	3.0	983		
Perry Ave. Lot 2-20330			4.9	12	58	3.0	175		
Perry Ave. Lot 2-20320			3.9	12	46	3.0	139		
Perry Ave. Lot 2-20310			3.8	12	46	3.0	138		
Perry Ave. Lot 2-20301			3.5	12	42	3.0	125		
Perry Ave. Lot 2-20200			11.4	12	137	3.0	411		
Hwy 12 Lot 9-46600			14.5	12	174	3.0	521		
Total Brechin - Growth			103.8		831		3525	0.45	1586
Lagoon City - Growth									
Lagoon City Infilling					94	2.5	235		
Harrington Subdivision			16.0	24	300	2.5	750		
Concord Woods Phase 1			11.7	24	282	2.5	705		
Concord Woods Phase 2			15.7	24	377	2.5	942		
Blocks 26, 29, 33					138	2.5	345		
Block 24 (Commercial)			2.8	24	67	2.5	168		
Block 27					10	2.5	25		
Block 28			1.52	24	36	2.5	91		
Blocks 31 and 32					83	2.5	208		
Total Lagoon City - Growth					1387		3469	0.45	1561
Concord Point, Brechin Point, Brechin Beach Existing	201					2.0	402	0.18	73
TOTAL							9665		4753

9,665 persons. The basis for these equivalent population projections is described in the following sections.

2.1 Village of Brechin

All existing properties occupied and vacant in Brechin will be serviced. Equivalent populations were estimated for the commercial, institutional and industrial properties, based on their estimated water usage. The total equivalent population assigned to existing lots in Brechin is 448 persons.

All lands currently undeveloped but designated Village Residential, Commercial and Institutional as per the 2002 Official Plan of the Township of Ramara (OP) were considered in estimating the ultimate potential for growth in Brechin. These lands have a total gross area of 69.2 ha. At a residential density of 12 units per gross ha and with a household occupancy of 3.0 persons per unit, the potential for residential growth is estimated at 2,492 persons equivalent.

The Brechin industrial park is currently partially developed. It was assumed that the vacant industrial lots could develop with light industry (little or no wet processes), generating sewage at an average rate of 10 m³/ha. The available 34.6 ha of industrial land is equivalent to a population of 1,033.

2.2 Ramara Road 47

The area immediately west of Brechin along Ramara Road 47 is designated Agriculture, and as such was not included in the potential service area.

2.3 Lagoon City Village

The Lagoon City service area includes lands on Simcoe Road designated Village Residential for which plans of subdivision are currently being developed: the Harrington subdivision, and Concord Woods.

The Harrington property has a gross area of 16 ha. The maximum net density in a serviced area is 24 units per net hectare, which would allow approximately 300 units on this property. Although preliminary plans are for 150 residential units, the maximum density was assumed for planning the servicing requirements, and an equivalent population of 750 persons was allowed for this future subdivision.

A plan of subdivision for the Concord Woods property consisting of 48 single-family residential units was registered in 1990. The most recent application (October 2003) provides for a first stage of development on 11.7 ha for 282 units. It was estimated that further development on the remaining property could add up to 377 units at the maximum density of 24 units per net ha. The total equivalent population in Concord Woods could ultimately total 1,647 persons (Phase 1: 705 persons; subsequent phases: 942 persons).

The existing Lagoon City development totals 1,005 units of which 94 units were vacant in 2004. The existing units have an estimated equivalent population of 1,822 persons. Infilling is projected to add 235 persons.

Growth could occur in Lagoon City on blocks of land located on Paradise Boulevard and Laguna Parkway, as shown in Figure 2 overleaf. A potential growth population of 837 persons equivalent has been estimated, as per the most up-to-date planning documents.

2.4 Lakeshore Communities

The lakeshore area consisting of Concord Point, Brechin Point, and Brechin Beach are included in the sanitary service area due to the environmental and health concerns associated with the on-site sewage disposal systems currently in use. In the Ramara OP, these lands are designated Village Residential and include 201 existing lots. It is planned to service this area using low-pressure sewers due to the soil and groundwater conditions. As such, lower sewage generation rates are applied.

3 SERVICING PLAN AND STAGING

3.1 Overall

As described in the 1998 preliminary servicing plan, it is proposed to install a sanitary sewage collection system in Brechin which will convey the flows via a series of pumping stations to the Lagoon City STP. The sewer system will be constructed in stages, in step with development.

The servicing plan has been modified to accommodate developments in Lagoon City south of Simcoe Road. It is presented on the drawing enclosed at the back of the report.

3.2 Lagoon City STP

3.2.1 Existing Capacity

The Lagoon City Sewage Treatment Plant (STP) is an extended aeration activated sludge facility, with an approved capacity of 2,273 m³/day. The currently available capacity is 1,714 m³/day, because only two of the three required secondary clarifiers have been built. The third clarifier was planned to be constructed as growth necessitated added capacity. In the past 3 years (2001 to 2003), the Lagoon City STP has been utilized on average at 78% of its currently available capacity, treating an average sewage flow rate of 1,332 m³/day.

3.2.2 Upgrades and Expansion Requirements

The Lagoon City STP, with two of 3 clarifiers built, has a residual capacity of 382 m³/day, which is sufficient to service an additional equivalent population of 849 persons or between 283 and 340 single-family homes.

When the third clarifier is constructed, the STP capacity will increase by 559 m³/day, which is sufficient to accommodate an additional equivalent population of 1242 persons or between 414 and 497 single family homes. This assumes that infiltration remains at current levels. Therefore on the basis the third clarifier is built there is sufficient capacity at the approved Lagoon City STP to service the equivalent of 697 new single-family residences in Brechin or 836 units in Lagoon City. This is summarized in Table 2 overleaf.

Table 2
Summary of Treatment Capacity Available and Required

	Equivalent Population	Unit Rate (m ³ /c/d)	Capacity (m ³ /d)		
			Required	Existing	Approved
Lagoon City STP Capacity (Existing)				1714	
Lagoon City STP Capacity (Approved)					2273
Lagoon City Existing	1822		1332		
Residual Capacity					
With STP as currently built (2 clarifiers)	849	0.45		382	
At approved rated capacity (3 clarifiers)	2091	0.45			941
Existing and Future Developments					
Hamlet of Brechin- Existing	448	0.45	201		
Hamlet of Brechin - Growth	3525	0.45	1586		
Harrington	750	0.45	338		
Concord Woods Ph 1 (282 units)	705	0.45	317		
Concord Woods Ph 2 (377 units)	942	0.45	424		
Lagoon City Infilling	235	0.45	106		
Lagoon City - Growth	837	0.45	377		
Lakeshore Communities - Existing	402	0.18	73		
Total Required	7843		3421		-2480
Total	9665		4753		

To service the ultimate population projected for the service area, the Lagoon City STP will require an average day capacity of up to 4,753 m³/day. This will involve an expansion to double the capacity of the STP. In view of the MOE restrictions on phosphorus loadings to Lake Simcoe, the STP expansion will have to incorporate tertiary treatment for phosphorus removal.

In the interim, the Lagoon City STP also necessitates upgrades in response to regulatory changes. These include increasing the capacity to handle and store biosolids produced at the STP, and addition of effluent disinfection using ultraviolet light.

3.3 Servicing Brechin

As delineated in the original servicing plan, a gravity sanitary sewer system will be constructed in Brechin with service connections to every lot within the limits of the Village, and sized to accommodate all future potential developments. Due to the flat topography and the presence of bedrock at relatively shallow depths, three pumping stations will be required in Brechin.

To service the industrial park, a gravity sewer system will discharge to a lift station located near Highway 12 and County Road 47, which will pump up to the Highway 12 gravity sewer. The lift station will be constructed for the design ultimate flows of 12.4 L/s, but originally equipped with pumps sized for existing peak flows. Twin forcemains are recommended, one for existing flows and a second for future flows, to improve the system's efficiency. These can be constructed concurrently.

A second lift station is required at the north end of Perry Avenue, with a twin forcemain to the Concession Road 4 sewer. The lift station will be constructed for the design ultimate flows of 26 L/s but originally equipped with pumps sized for existing peak flows.

A trunk sanitary sewer on Ramara Road 47 will convey the combined sewage from Brechin to a main pumping station proposed to be located at the community park at the west limit of Brechin. This pumping station will be designed to pump the ultimate design flows of 75 L/s from Brechin to the Lagoon City STP, or alternatively to a new trunk sewer and pumping station on Simcoe Road as described in Section 3.4 below. The addition of pumps will accommodate increases in sewage flows due to growth. Twin 200 mm diameter forcemains are required from Brechin to Laguna Parkway in Lagoon City due to the large increase in flows from existing to ultimate conditions.

3.4 Servicing Simcoe Road Developments

In the 1998 servicing plan, it was proposed that in a first phase, the forcemain from the main Brechin sewage pumping station would discharge to the Lagoon City gravity sewer system on Laguna Parkway. This sewer system has some residual capacity that could be utilized to accommodate flows from existing lots in Brechin, if the Lagoon City Pumping Stations Nos. 3 and 5 were upgraded. In a subsequent phase, triggered by growth in Brechin, it was proposed that a twin forcemain would be constructed from Brechin directly to the STP. This approach does not facilitate the servicing of developments on Simcoe Road in either the first phase of the works, as the residual capacity of the Lagoon City sewer system is limited, or in the second phase, due to the complexity of works required to connect into a forcemain.

An alternate approach is proposed as follows:

- Construct a gravity trunk sewer on Simcoe Road discharging to Lagoon City Pumping Station No. 2, to service the proposed developments on the Harrington property and Concord Woods.
- Replace Lagoon City Pumping Station No. 2.
- Construct new twin forcemains directly to the Lagoon City STP along Simcoe Road and Laguna Parkway.

This approach provides a servicing plan that can accommodate developments in this area independently from the sewage works proposed for the Village of Brechin, if required. This is an important feature to provide flexibility in terms of development timeframes.

Nevertheless, the works will eventually be integrated as follows:

- The Simcoe Road gravity trunk sewer and the Lagoon City Pumping Station No. 2 will be sized to convey the ultimate sewage flows from Brechin, Harrington and Concord Woods, so that the twin forcemains from Brechin can discharge to Simcoe Road. A 250 mm diameter sewer from MH 57A to MH 60, a 450 mm diameter sewer from MH 60 to the Lagoon City Pumping Station No. 2, and the expansion of the pumping station to approximately 130 L/s, are required.
- The twin forcemains from Lagoon City Pumping Station No. 2 to the Lagoon City STP will be sized to include the ultimate sewage flows from Brechin. Two 250 mm diameter forcemains are required. The forcemains from Brechin on Laguna Parkway will be oversized to 250 mm diameter. Ultimately, the works will consist of twin 250 mm diameter forcemains along Simcoe Road and Laguna Parkway to the STP, and twin 200 mm diameter forcemains from Brechin to Simcoe Road.

Both the Harrington subdivision and Concord Woods are expected to require a lift station to connect to the proposed Simcoe Road trunk sewer. Estimated peak flows from the Harrington property are 14 L/s. Peak flows from Concord Woods were estimated at 13.3 L/s for the first phase, with a potential to increase to 29.3 L/s with future developments.

3.5 Servicing the Lakeshore Communities

The lakeshore communities of Concord Point, Brechin Point and Brechin Beach are proposed to be serviced via a pressure sewer system which will discharge at Lagoon City Pumping Station No. 2. Each house will be equipped with a grinder pump which will discharge into a small diameter sewer system. The expansion of Lagoon City Pumping Station No. 2 will provide for the estimated peak flow rate from the lakeshore communities of 2 L/s.

3.6 Proposed Staging

The first phase of the sanitary servicing plan will consist of the works required to service the existing properties in Brechin. These consist of:

- Gravity sanitary sewers throughout Brechin
- Industrial Park lift station (Breachin SPS No. 1) and twin forcemains
- Perry Avenue lift station (Breachin SPS No. 2) and twin forcemains
- Ramara Road 47 pumping station (Breachin SPS no. 3) and twin forcemains to Lagoon City STP.
- Lagoon City STP third clarifier and treatment upgrades

To reduce total construction costs and minimize disruption due to construction, it is suggested that forcemains be twinned at the onset, rather than in a subsequent construction project. Similarly, all works, with the exception of pumps, will be sized for ultimate design flows.

The subsequent phases of the servicing plan will be triggered by development proposals. To service Lagoon City developments on Simcoe Road, the following works are required:

- Simcoe Road trunk sewer
- Lagoon City Pumping Station No. 2 replacement and twin forcemains to Laguna Parkway
- Expansion of the Lagoon City STP.

Servicing requirements for growth in Brechin will require:

- Addition or replacement of pumps at Brechin SPS No. 1, No. 2 and No. 3
- Expansion of the Lagoon City STP.

The Lagoon City STP built out to its approved capacity can accommodate growth of between 697 and 836 equivalent residential units. Development plans exceeding this residual capacity, in either Brechin or Lagoon City, will trigger the expansion of the STP.

4 WATER TREATMENT PLANT CAPACITY CONSIDERATIONS

The Villages of Brechin and Lagoon City and the lakeshore communities are connected to the municipal Lagoon City Water Treatment Plant (WTP). The WTP has a maximum day capacity of 4,000 m³/day, and has been utilized in the past three years (2001-2003) to 65% of its capacity at an estimated average water consumption rate of 350 L/p/day.

The WTP has sufficient residual capacity to service the equivalent of approximately 2,000 additional equivalent persons or between 667 and 800 residential units. Expansion of the Lagoon City WTP will be required for growth in Brechin and Lagoon City beyond this amount.

5 NEXT STEPS

The detailed design of the sewers, pumping stations and forcemains servicing Brechin existing will be completed on the basis of this updated servicing plan. Concurrently, the design of the STP treatment upgrades and of the third clarifier will be completed.

When warranted by development proposals, Class environmental assessment requirements will need to be fulfilled for the expansion of the Lagoon City STP (Schedule C). Although expansion of the Lagoon City Pumping Station No. 2 was not considered in the 1998 servicing plan and in the associated Class EA process, it will be assessed and evaluated through the developer-driven planning process.

6 SUMMARY

This revised servicing plan provides for an ultimate serviced population of 9,665. It accommodates recent updates to development proposals, and incorporates additional flexibility for the servicing of developments on Simcoe Road independently from Brechin.

The servicing plan has the following components:

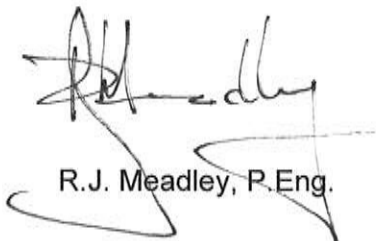
- Gravity sewer system in Brechin, with two lift stations.
- A main sewage pumping station on Ramara Road 47 to convey the sewage to the Lagoon City STP, with twin forcemains to Laguna Parkway.
- In a first stage, extension of one of the forcemain directly to the Lagoon City STP.
- Construction of the STP third clarifier to achieve the STP's rated capacity, as well as various treatment upgrades.
- Gravity trunk sewer on Simcoe Road.
- Replacement of the Lagoon City Pumping Station No. 2, and twin forcemains to Laguna Parkway and the STP.
- Expansion of the Lagoon City STP in response to growth.

All of which is respectfully submitted

C.C.TATHAM & ASSOCIATES LTD.



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R.J. Meadley, P.Eng.

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LAKE SIMCOE

LAGOON CITY

CONCORD POINT

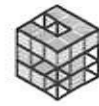
BRECHIN POINT

BRECHIN BEACH

LAGOON CITY STP

LEGEND

— LIMITS OF THE
POTENTIAL SERVICE AREA
TO LAGOON CITY



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**BRECHIN SANITARY SERVICING
POTENTIAL SERVICE AREA**

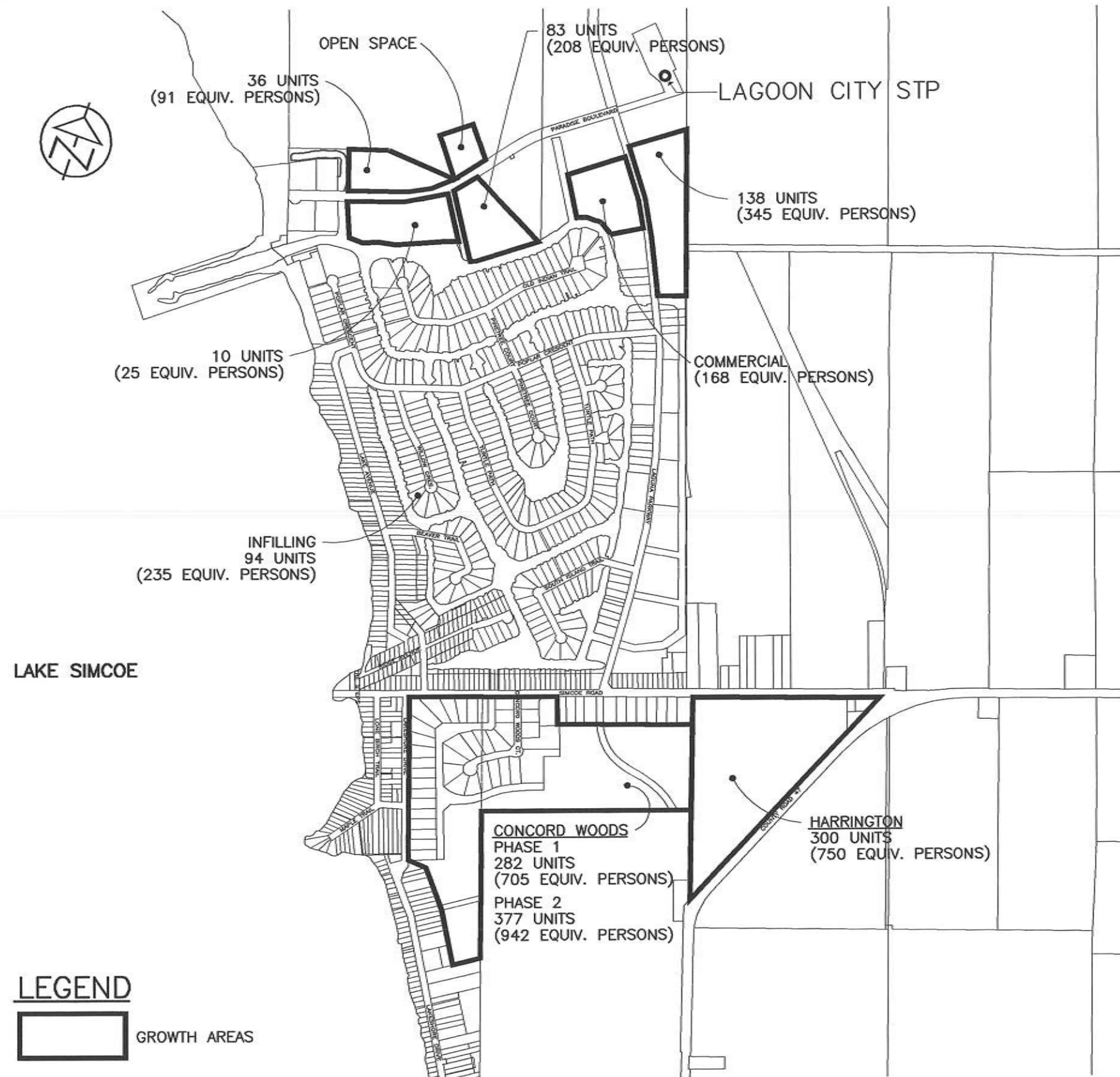
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FIG.1

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BRECHIN SANITARY SERVICING LAGOON CITY - GROWTH POTENTIAL

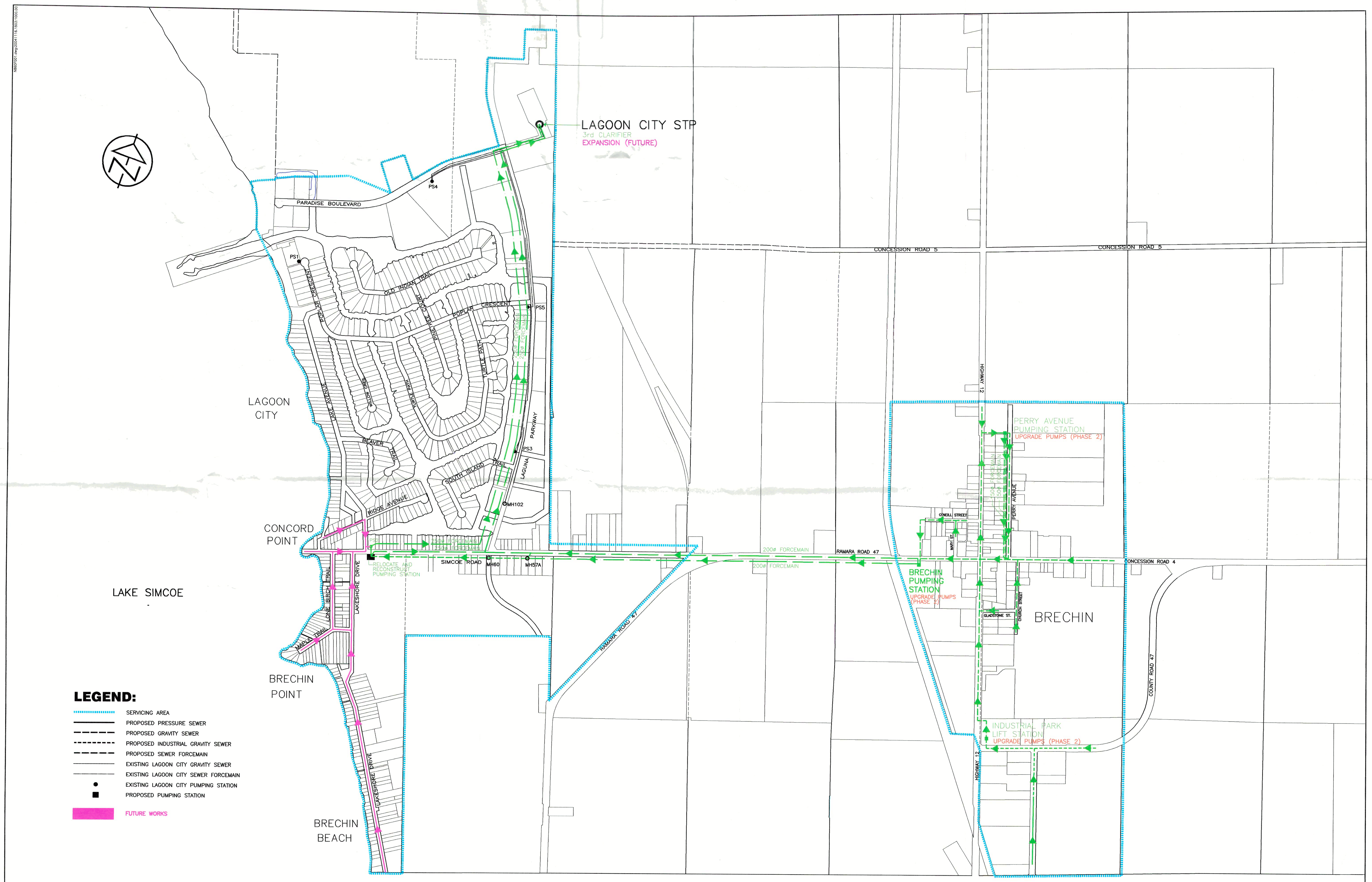
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FIG.2

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BRECHIN SANITARY SERVICING

MASTER SERVICING PLAN

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