

Prepared By:



Servicing Feasibility Study

1043-1057 3rd Ave East - Owen Sound, ON
Lutheran Social Services
Commercial / Residential Development

GMBP File: 221130-3

April 2023

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SERVICING FEASIBILITY STUDY

1043-1057 3RD AVE EAST - OWEN SOUND, ON
LUTHERAN SOCIAL SERVICES

APRIL 2023

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1. INTRODUCTION

Lutheran Social Services proposes a residential development consisting of 40 residential units consisting of thirty-five (35) one-bedroom units and five (5) two-bedroom units. The ground floor of the development consists of approximately 40m² commercial space, residential common rooms, mechanical and garbage rooms along with associated driving and parking areas on an approximately 0.160 ha property located at the north side of 3rd Ave East in Owen Sound, as shown in Figure 1

The City of Owen Sound has requested a Servicing Feasibility Study to confirm whether the proposed sanitary and water service connections are adequate.

2. SITE DESCRIPTION

2.1 Location and Topography

The 0.160 ha site consists of the historical parcels of 1043 and 1057 3rd Avenue East within the eastern limits of the City of Owen Sound. The parcels are in the process of being merged into one parcel. For the purposes of this report, they are considered one parcel. The subject property is bound by 3rd Ave East to the west, Commercial lands to the north and south, and residential lands to the east.

2.2 Site Conditions

Under current conditions, the 0.160ha subject property is developed with a two-story commercial duplex and associated parking areas. The subject property generally slopes downward from east to west. Runoff from the subject property drains overland to an internal stormwater system in the existing parking lot ultimately draining to the 3rd Ave E storm sewer system.

3. SANITARY SERVICING

3.1 Background/Existing Infrastructure

An existing 300mm sanitary main is located along 3rd Avenue East on the west side of the site. An existing wastewater service (size to be confirmed) is located in the middle of the west side of the site and is currently used by the existing commercial development.

3.2 Sewage Demands

To estimate the peak flow, we have assumed and calculated the following in accordance with The City of Owen Sound:

Table 1 – Sanitary Peak Flow Calculations

Residential Equivalent Population (REP)	= 2.3 persons per unit ⁽¹⁾ = 2.3x 40 units = 92 persons
Site Area	= 0.160 ha
Average Flow (Q)	= 400L/capita/day
Peak Extraneous Flows (I)	= 0.20L/ha/s
Harmon Peaking Factor (M)	= $1+(14/(4+(REP/1000)^{0.5}))^{(1)}$ = $1+(14/(4+(92/1000)^{0.5}))^{(1)}$ = 4.25
Peak Flow	= $(MxQxREP/1000)/86.4+IA$ = $(4.25x400x(92/1000))/86.4+0.2x0.160$ = 1.84L/s
Commercial Equivalent Population (CEP)	= 100 persons per Ha ⁽¹⁾ = 100x 0.160 ha = 16 persons
Site Area	= 0.160 ha
Peak Extraneous Flows (I)	= 0.20L/ha/s
Harmon Peaking Factor (M)	= $1+(14/(4+(CEP/1000)^{0.5}))^{(1)}$ = $1+(14/(4+(16/1000)^{0.5}))^{(1)}$ = 4.39
Peak Flow	= $(MxQxREP/1000)/86.4+IA$ = $(4.39x400x(16/1000))/86.4+0.2x0.160$ = 0.36L/s
Total Peak Flow	= 1.84L/s + 0.36L/s = 2.2L/s

¹ Taken from The City of Owen Sound Subdivision Policies and Engineering Design Standards, revised June 2021.
 As per Table 1 above, the total peak sanitary flow is calculated to be 2.2L/s.

3.3 Proposed Sanitary Service

It is proposed to install a new 150mm sanitary lateral to connect to the existing 300mm diameter mainline sanitary sewer. The proposed sanitary service connection is shown as Figure 2 of this report.

As noted in Section 3.2, the required combined peak sanitary flow for residential and commercial is 2.2 L/s. The proposed 150mm diameter sanitary service at 1% provides a capacity of 15 L/s which is more than sufficient to service the proposed development.

The Owen Sound Wastewater Treatment Plant located on the eastern shore of Georgian Bay on 3rd Avenue East has a capacity of 24,545 m³/day and has been confirmed to be operating at approximately 50% capacity, based on correspondence with City Staff. Based on the operational capacity of the plant and the existing infrastructure available adjacent to the site, there is adequate capacity to service the proposed development.

4. WATER SUPPLY AND DISTRIBUTION

4.1 Existing Water Infrastructure

There is an existing 150mm diameter watermain located on 3rd Ave East. The static pressure noted on the City of Owen Sound Water Plat 11 for hydrant 1-b-153 (located 42m West of subject property) is 68psi. An exiting water service stub is available off the 3rd Ave East watermain, but the size and type is unknown.

4.2 Water Demands Assessment

Calculations of the water demand for the proposed development have been determined using the guidelines outlined within Owen Sound's Subdivision Policies and Engineering Design Standards (June 2021), and the Ministry of the Environment, Conservation and Parks (MECP) Design Guidelines for Drinking-Water Systems (May 2019).

The Owen Sound Design Standards do not specify an average flow/capita/day or the persons per unit for design purpose, and for consistency, the average sanitary demands of 400L/cap/day and 2.3 persons per unit were used for the water demand.

In order to convert the average daily demands into maximum daily and peak hourly flows, a peaking factor was applied. The peaking factor was in accordance with Table 3-3 of the MECP design guidelines, resulting in a maximum day factor 3.0 and a peak hour factor of 4.5

Table 2 – Watermain Maximum Day Demand and Fire Flow Calculations

Residential equivalent Population (REP)	= 2.3 persons per unit ⁽¹⁾ = 2.3x 40 = 92 persons
Commercial equivalent Population (CEP)	= 86 persons/ha ⁽¹⁾ = 86x 0.160 = 13.8 persons
Average Daily Demand (ADD)	= (REP+CEP) x Average Daily Demand Per Person = (92+13.8) x 400L/day = 42,320L/day = 42.32m ³ /day = 0.489L/s
Peak Hour	= ADD x Peak hour factor = 42.32m ³ /day x 4.5 = 190.44m ³ /day = 2.20L/s
Maximum Day Demand (MDD)	= ADD x Maximum daily factor = 42.32m ³ /day x 3.0 = 126.96m ³ /day = 1.47L/s
Fire Flow (FF)	= 85L/s
MDD + FF	= 1.47L/s + 85L/s = 86.47L/s

Fire flow calculation completed per Fire Underwriter Survey (1999) Water Supply for public Fire protection. A detailed calculation is included in Appendix B of this report.

4.3 Proposed Infrastructure

The commercial/residential development will be serviced with municipally treated water. The proposed building is proposed to be sprinklered. A single new 150mm diameter connection is proposed to be made to the existing 150mm diameter watermain along 3rd Ave East as shown on SP1 appended to report.

4.4 Water Capacity

The water service to the building is proposed to be a 150 mm diameter watermain to provide sufficient flow/pressure for the sprinkler system. As per the appended Water Service Friction Headloss calculations, there would be a minimal friction headloss through the water service length during the fire flow conditions. Based on the static water pressure of 68 psi, there would still be more than 50 psi of pressure in the system.

Fire flow supply to each building is to be confirmed by the building mechanical engineer at the time of detailed design and sprinkler design (if necessary). In addition, a hydrant flow test adjacent to the site is to be completed to ensure the fire flow is available from the City's watermain system, since it is from one source through the adjacent property and is only 68 psi at static pressure.

The proposed development will have an Average Day Demand (ADD) of 42.32m³/day and Maximum Day Demand (MDD) of 126.96m³/day based on the combined residential and commercial equivalent population of 105.8 persons.

The City's existing water treatment plant has a capacity of 27,300m³/day and is operating at approximately 50% capacity as per correspondence from the City. Based on the operational capacity of the plant and the existing infrastructure available adjacent to the site, sufficient water supply to provide potable water to the proposed commercial/residential development is available.

The preceding calculations are intended to justify the sizes of the development's proposed water services only for the purposes of supporting a zoning application. Interior Plumbing design is expected to be completed by a licensed plumber at the time of a Building Permit application.

5. SUMMARY

Based on the preceding calculations and provided information:

- Proposed sanitary servicing works are expected to be sufficiently sized including:
 - The proposed 150 mm Ø sanitary service proposed to connect to the existing 300mm diameter sanitary sewer located on 3rd avenue east
 - The required peak sanitary flow for residential and commercial is 2.2 L/s. The city staff to confirm based on the current conditions if this is considered acceptable.
- Proposed water servicing works are expected to be sufficiently sized including:
 - The proposed 150 mm Ø main water service connecting to the existing 150 mm Ø watermain on 3rd avenue east, in order to service the development.
 - The required peak water demands for residential and commercial is 1.47 L/s. The city staff to confirm based on the current conditions if this is considered acceptable.

All of which is respectfully submitted,

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FIGURES:

221130-2

City of Owen Sound



N.T.S.
APR 2023

SITE LOCATION PLAN

COMMERCIAL DEVELOPMENT

Figure No. 1



**APPENDIX A:
FRICTION HEADLOSS CALCULATIONS**

Servicing Feasibility Study
1043-1057 3RD AVE EAST
City of Owen Sound
Our File: 221130-3
March 2023

Water Service Friction Headloss Calculations

Location	Peak Flow Rate (L/min)	Peak Flow Rate (USgpm)	Pipeline Diameter (mm)	Flow Rate (L/s)	Flow Velocity (m/s)	Pipeline Length (m)	Friction Headloss (m/m)	Friction Headloss (m)	Friction Headloss (kPa)	Friction Headloss (psi)
Proposed On-Site Watermain	88.2	23.3	150	1.47	0.08	42	0.00	0.0	0.1	0.0

Notes for Water Flow Calculations

1. Peak Flow Rate to be determined by Hydraulic Loads for Fixtures as outlined in Ontario Building Code

2. Hazen-Williams Roughness Coefficient

150 mm	=	100
200-250 mm	=	110
300 - 600 mm	=	120
Over 600 mm	=	130

3. Hazen Williams Formula

$$h_L = \frac{10.67 * L * Q^{1.85}}{C^{1.85} * d^{4.8655}}$$

where: h_L = head loss (m)
L = Length of pipe (m)
C = Hazen Williams coefficient (-)
Q = Peak flow (m³/s)
D = Diameter of pipe (m)