FUNCTIONAL SERVICING BRIEF

7-UNIT APARTMENT DEVELOPMENT
5504 LEWIS AVENUE, NIAGARA FALLS

PREPARED BY:

URBAN &
ENVIRONMENTAL
MANAGEMENT INC.
PROFESSIONAL CONSULTING SERVICES

UEM Project No. 22-215

June 6, 2023

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1.0 INTRODUCTION

The proposal for the property is a 7-unit residential apartment building redevelopment on a 0.13 ha parcel of land. The proposed apartment redevelopment is located at 5504 Lewis Avenue between Centre Street and Kitchener Street in the City of Niagara Falls. The property currently consists of a mixed-use commercial and residential building. The existing building consists of one main floor commercial unit and five second floor residential units. The proposed redevelopment includes converting the main floor commercial unit into two additional residential units. The existing property has an asphalt driveway that runs along the south-west side of the building to the existing rear asphalt parking lot. An existing watermain, sanitary sewer, and storm sewer are available on Lewis Avenue. This Functional Servicing and Stormwater Management (SWM) Brief will evaluate the serviceability of the site with respect to sanitary, water and storm services as well as provide a preliminary SWM strategy to be implemented. This brief will also satisfy the zoning bylaw amendment (ZBA) requirements for the proposed residential redevelopment. The following standards and guidelines were reviewed in preparing this brief:

- The City of Niagara Falls Engineering Design Guidelines Manual
- Ontario Provincial Standards (OPS),
- Ministry of Environment, Conservation and Parks (MECP)
    - Design Guidelines for Sewage Works (2008)
    - Design Guidelines for Drinking-Water Systems (2008)

2.0 WATER DISTRIBUTION SYSTEM

The City of Niagara Falls has an existing 300mm PVC watermain (constructed in 1991) located along the south-east side of Lewis Avenue within the roadway.

The existing water service for the building is a 20mm copper water service connected to the existing 300mm diameter PVC watermain on the south-east side of Lewis Avenue. As per the American Water Works Association (AWWA) M22 Sizing Water Service Lines and Meter Table B1, the calculated peak hour flow of 1.56 L/s for the site, as noted in Table 2-1, is not within the range of flows for a 20mm diameter type k copper water service. Therefore, the existing 20mm diameter type k copper water service does not provide sufficient water flow to support the water demand for the five existing and two proposed apartment units. Therefore, it is proposed to replace the existing 20mm diameter type k copper water service with a 38mm diameter type k copper water service. An existing fire hydrant is located approximately 36m northeast of the subject site and is within the 90m coverage distance of the building's principal entrance.

The proposed water demands were calculated using municipal guidelines and the MECP Design Guidelines for Drinking-Water Systems (2008). The peak hour flow and maximum day flow were calculated based on the number of dwelling units and anticipated population (see Table 2-1). Based on the size of the 300mm diameter PVC watermain along Lewis Avenue and UEM's experience on similar projects, UEM concludes that sufficient flow and pressure will be available to support the proposed residential development. If required, the watermain pressure and capacity can be further reviewed following approval of the zoning by-law (ZBA) application and prior to or during building permit stage (i.e. hydrant pressure testing).

Table 2-1: Total Water Demand

Land Use	Population	Average Daily Demand (450 L/c/day)	Peaking Factors		Peak Hour	Max. Day
			Max. Day	Peak Hour		
Residential	21 (7 units x 3 people/unit)	0.11 L/s, 6.6 L/min	9.5	14.3	1.56 L/s, 93.6 L/min	1.04 L/s, 62.4 L/min

3.0 SANITARY SEWAGE SYSTEM

The City of Niagara Falls has an existing 250mm diameter clay sanitary sewer that runs down the middle of Lewis Avenue within the roadway. As per drawing CC-161 provided by the City of Niagara Falls, the existing sanitary lateral for the property appears to be 225mm diameter in size. The existing sanitary lateral currently services the 5 existing residential units within the building as well as the previous commercial use. The existing 225mm diameter sanitary lateral connects to the existing 250mm diameter clay sanitary sewer on Lewis Avenue. Based on the available information and UEM's site visit, it is believed that there are no additional connections to the existing sanitary lateral. If required, the sanitary lateral can be further investigated following approval of the zoning by-law amendment (ZBA) application and prior to or during building permit stage (i.e. CCTV of the existing sanitary lateral).

It is estimated that the development will generate a total flow of 1.60 L/s to the 250mm diameter sanitary sewer along Lewis Avenue (see Appendix D). The previous commercial unit on the first floor of the building operated as a butcher and deli. Information is not available regarding the fixtures previously used; however, it is anticipated that previous sewage demands for the commercial unit likely included a staff washroom and sink/cleaning area, which would be similar to the sewage demands of one of the proposed additional two residential units. The existing 225mm diameter sanitary lateral is assumed to be installed at a minimum grade of 1.0% as per the City of Niagara Falls Engineering Design Guidelines Manual and has a pipe capacity of 44.90 L/s. Therefore, the existing 225mm diameter sanitary lateral is sufficient in size to support the proposed residential development. As per drawing CC-3023 provided by the City of Niagara Falls, the 250mm diameter clay sanitary sewer fronting the subject site has a pipe slope of 0.49% and a calculated maximum pipe capacity of 41.63 L/s. Based on the proposed development's sanitary sewage generation, it is estimated that the entire 7-unit development will contribute approximately 3.9% to the overall capacity of the sanitary sewer. This is likely very similar to the previous use as a 5-unit residential apartment with the grocery/convenience store use.

4.0 STORMWATER DRAINAGE

There is one catchbasin on the property that is connected to a second catchbasin located within the City of Niagara Falls right-of-way (ROW) (see Appendix A). The two catchbasins are connected via a 150mm diameter storm lead. The existing storm flows from the paved area of the site drain to the existing catchbasin within the parking lot and the existing catchbasin within the ROW. The catchbasin within the City ROW is connected to the existing 675mm diameter storm sewer along Lewis Avenue via a 250mm diameter PVC storm lead.

The existing apartment building has a flat roof. There are no downspouts on the exterior of the building and therefore, it is assumed that precipitation collected on the roof discharges through a downspout within the building. Typical of construction at that time (1960's), the roof drain may be connected to the sanitary lateral. This can only be confirmed through more detailed investigation (CCTV) of the sanitary and storm systems. We understand that it is now City policy that all storm drainage goes to the storm sewer, however, due to the previous building construction, this may not be possible. The proposed conversion of the building to change the commercial space to two dwelling units has no impact on the existing stormwater management system. If required, the existing stormwater discharge from the roof can be further investigated following approval of the ZBA application and prior to or during the building permit stage (i.e. CCTV of the stormwater drainage system).

The site consists of all hard surface (building, asphalt, and concrete). No physical changes to the building or grading changes to the existing site are being proposed. The proposed changes to the parking lot include new line painting and the addition of a green space landscape strip area along the southeast side of the site. The addition of green space area will reduce the amount of storm water draining to the 675mm diameter storm sewer along Lewis Avenue and will promote some onsite infiltration. Therefore, no change to the stormwater management system is required.

5.0 CONCLUSIONS

In conclusion, the proposed 7-unit residential development is serviceable utilizing existing municipal sanitary, storm and watermain infrastructure on Lewis Avenue subject to the following:

1. Replacing the existing 20mm diameter type k copper water service with a 38mm diameter type k copper water service

Respectfully Submitted,
Urban & Environmental Management Inc.

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APPENDIX A

SITE PLAN

LEWIS AVENUE

EDGE OF ASPHALT ROAD

CONCRETE SIDEWALK

APPROXIMATE SANITARY LATERAL LOCATION 225ø (APPROXIMATE SIZE)

EX. CB RIM 188.98 NW INV 187.70 (Ex. 225ø) SE INV 187.75 (EX. 150ø)

CB

WHP

N46°34'40"E 30.824

REG'D PLAN No. 291

MUNICIPAL No. 5514

MUNICIPAL No. 5490

MUNICIPAL No. 5504
TWO STOREY MIXED-USE BUILDING

PORCH

STEPS

CONCRETE PAD

H.C.

H=D

2.75m

6.7m

7.05m

1

2

LOT 8

LOT 7

LOT 6

LOT 9

1.8m HIGH CHAIN LINK FENCE

N47°21'20"W 42.672

PIN 64344-0010(LT)

PIN 64344-0025(LT)

CONCRETE PAD

RASED WALKWAY

AMENITY SPACE

EXISTING ASPHALT SURFACE

9.1m

ASPHALT PARKING LOT

6.9m

EX. CB RIM 189.03 NW INV 188.07 (Ex. 150ø)

2.75m

EXISTING COVERED AREA TO BE REMOVED

COVERED AREA

DESIGNATED GREEN SPACE (GRASSED AREA, ALSO USED FOR SNOW STORAGE)

GARBAGE PICKUP AREA

6.5m

3m

6m

3 4 5 6 7 8 9 10

REG'D PLAN No. 11

SHED

1.8m HIGH CHAIN LINK FENCE

LANE

N46°34'40"E 30.824

PIN 64344-0024(LT)

PROJ. NO. 22-215

No.	DATE	REVISION	BY	No.
No.	DATE	REVISION	BY	0

NOTES
1. The position of pole lines, conduits, watermains, sewers, and other underground and above ground utilities and structures is not necessarily shown on the contract drawings, and, where shown the accuracy of the position of such utilities and structures is not guaranteed. Before starting work, the contractor shall identify the exact location of all such utilities and structures and shall assume liability for damage to them.
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VERIFY SCALE

BAR IS 25mm ON ORIGINAL DRAWING.
0 25mm
IF NOT 25mm ON THIS SHEET, ADJUST SCALES ACCORDINGLY.

DSGN	JS
DR	JS
CHK	0
APVD	0

STAMP

5504 LEWIS AVENUE, NIAGARA FALLS
SITE PLAN

URBAN & ENVIRONMENTAL MANAGEMENT INC.
PROFESSIONAL CONSULTING SERVICES

UEM No.	22-215
SCALE HORZ.	1 : 100
DWG. No.	01
MUN. REF No.	

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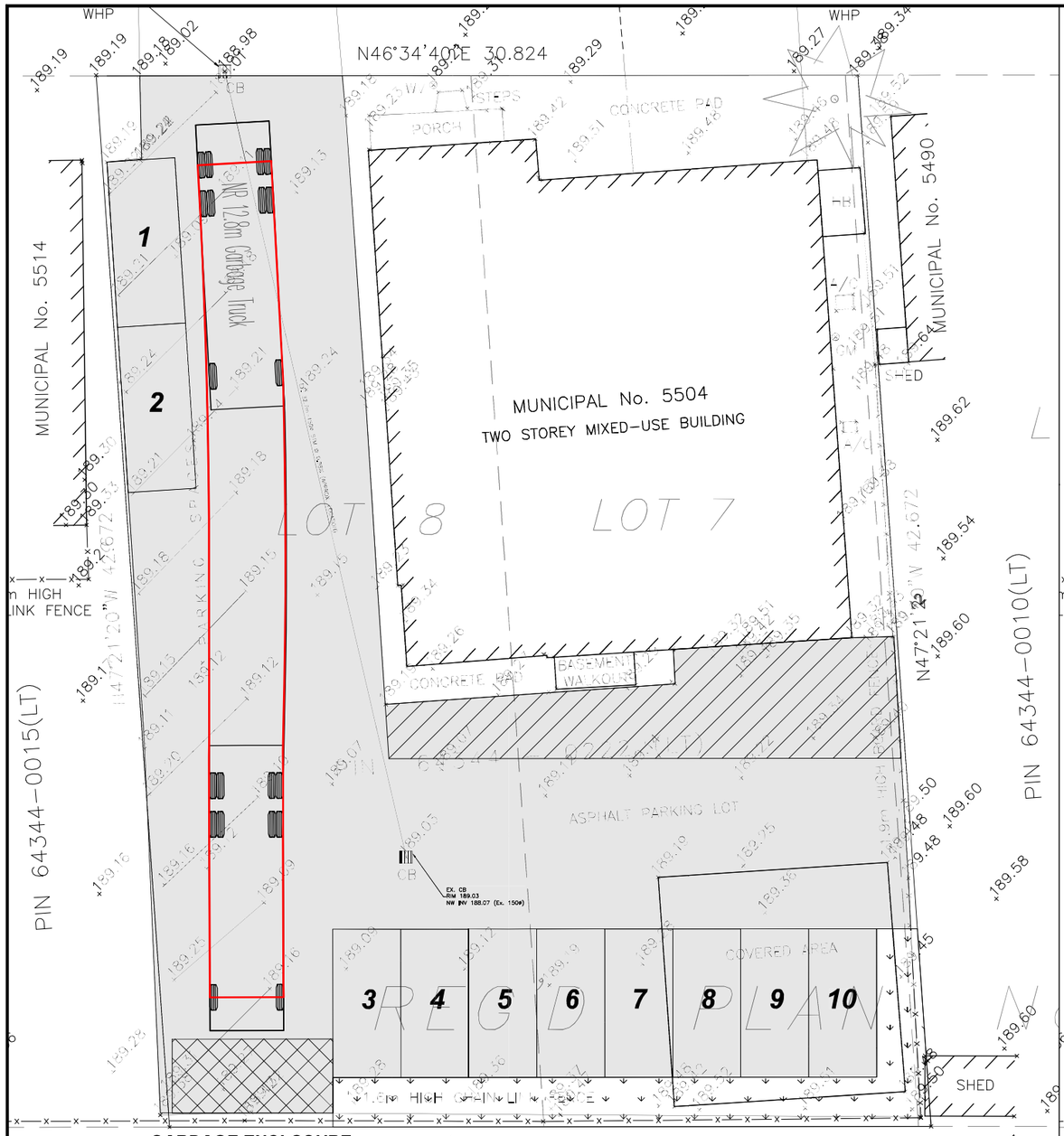
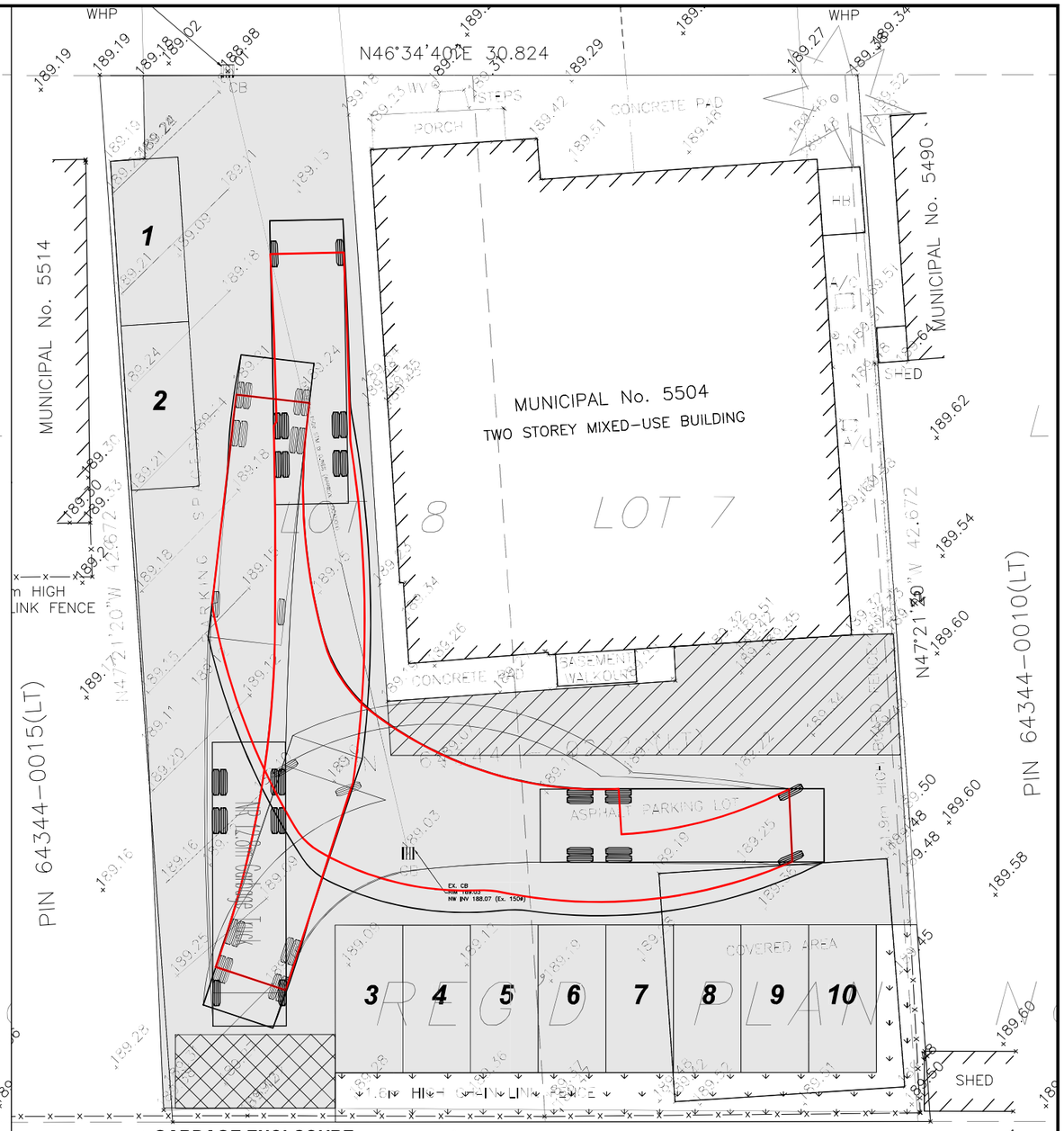
APPENDIX B

NIAGARA REGION COLLECTIONS TRUCK TURNING MOVEMENTS



ENTRANCE MOVEMENT



EXIT MOVEMENT

PROJ. NO. 22-215

No.	DATE	REVISION	BY	No.
No.	DATE	REVISION	BY	0

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DR	JS
CHK	0
APVD	0

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5504 LEWIS AVENUE, NIAGARA FALLS
NIAGARA REGION COLLECTIONS
TRUCK TURNING MOVEMENTS

URBAN & ENVIRONMENTAL MANAGEMENT INC.
PROFESSIONAL CONSULTING SERVICES

UEM No.	22-215
SCALE HORZ.	1 : 100
DWG. No.	02
MUN. REF No.	

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APPENDIX C

WATER DEMAND CALCULATIONS

Water Demand Calculations - 5504 Lewis Avenue, Niagara Falls

The MOECC Design Guidelines for Drinking-Water Systems 2008 was used for the following calculations

Site Information

Apartment Units = 7 units

Using 3 people/dwelling unit

P = 7 x 3 = 21/1000 = 0.021

q = 450 L/per/day

PHF = 14.3 (Table 3-3)

MDF = 9.5 (Table 3-3)

$$Q\,(d) = \frac{P \times q \times M}{86.4}$$

Q (d) = Peak domestic flow (including extraneous flows) in L/s

P = Design population, in thousands

q = Average daily per capita domestic flow in L/cap·d (exclusive of extraneous flow)

I = Unit of peak extraneous flow, in L/(ha·s)

A = Gross tributary area in hectares

$$Q\,(d) = \frac{P \times q \times PHF}{86.4}$$

$$Q\,(d) = \frac{0.021 \times 450 \times 14.3}{86.4}$$

$$Q\,(d) = 1.56\ L/s \quad (peak\ hour\ flow)$$

$$Q\,(d) = \frac{P \times q \times MDF}{86.4}$$

$$Q\,(d) = \frac{0.021 \times 450 \times 9.5}{86.4}$$

$$Q\,(d) = 1.04\ L/s \quad (maximum\ day\ flow)$$

Table 3-3: Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People

DWELLING UNITS SERVICED	EQUIVALENT POPULATION	NIGHT MINIMUM HOUR FACTOR	MAXIMUM DAY FACTOR	PEAK HOUR FACTOR
10	30	0.1	9.5	14.3
50	150	0.1	4.9	7.4
100	300	0.2	3.6	5.4
150	450	0.3	3.0	4.5
167	500	0.4	2.9	4.3

APPENDIX D

SANITARY SEWAGE CALCULATIONS

Sewage Generation Calculations - 5504 Lewis Avenue, Niagara Falls

The MOECC Design Guidelines for Sewage Works 2008 and Design Guidelines for Drinking-Water Systems 2008 were used for the following calculations

Site Information

Apartment Units = 7 units
Using 3 people/dwelling unit

P = 7 x 3 = 21/1000 = 0.021
q = 450 L/per/day
I = 0.286 L/ha·s
A = 0.13 ha
3 per/unit, 7 units, p = 21, q = 450 L/per/day
M = 14.3 (Table 3-3)

$$Q\,(d) = \frac{P \times q \times M}{86.4} + IA$$

$$Q\,(d) = \frac{0.021 \times 450 \times 14.3}{86.4} + (0.286 \times 0.13)$$

$$Q\,(d) = 1.60\ L/s$$

$$Q\,(d) = \frac{P \times q \times M}{86.4} + IA$$

P = Design population, in thousands
q = Average daily per capita domestic flow in L/cap·d (exclusive of extraneous flow)
I = Unit of peak extraneous flow, in L/(ha·s)
A = Gross tributary area in hectares
M = Peaking factor (as determined from Table 3-3 since population is less than 500 people)

Table 3-3: Peaking Factors for Drinking-Water Systems Serving Fewer than 500 People

DWELLING UNITS SERVICED	EQUIVALENT POPULATION	NIGHT MINIMUM HOUR FACTOR	MAXIMUM DAY FACTOR	PEAK HOUR FACTOR
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50	150	0.1	4.9	7.4
100	300	0.2	3.6	5.4
150	450	0.3	3.0	4.5
167	500	0.4	2.9	4.3