S. LLEWELLYN & ASSOCIATES LIMITED
CONSULTING ENGINEERS

May 2, 2024

File: 22057

National Homes
1291 Edgeley Boulevard
Concord, Ontario
L4K 3Z4

Attention: Mr. Darren Huot

RE: Sanitary Discharge, Water Usage and Fire Flow Report
484 Plains Road East – Phase 2
City of Burlington

The proposed Phase 2 development consists of constructing a 9-storey mixed-use building with 166 units and two (2) 3-storey townhouse blocks with an additional 45 units. The site will also include asphalt driveway/parking areas, concrete curb/sidewalk and landscaped areas. Refer to the Site Plan prepared by Kirkor Architects and Planners for details.

1.0 Wastewater Generation

Wastewater generation from the site was estimated in accordance with the Halton Region Water and Wastewater Linear Design Manual. Table 1.1 and 1.2 summarize the sanitary sewer discharge rate for the subject lands.

Table 1.1 – Proposed Phase 2 Population

Occupancy Type	No. of Beds [A]	Gross Floor Area (m^2) [A]	Population Density [B]	Population
Residential (Townhouse)	90	---	2 per/bed	180
Residential (Mixed-Use)	215	---	2 per/bed	430
Commercial	---	509	3.7m^2/per	138
			Total Population [C]:	**748**

[A] Information from site plan prepared by Kirkor Architects and Planners.,
[B] Residential population density per OBC 3.1.17.1.1(b); commercial population density as per OBC Table 3.1.17.1 (5).
[C] Total population = Number of Beds x Population Density

Table 1.2 – Proposed Phase 2 Sanitary Sewer Discharge					
Site Area (ha)	**Population [A]**	**Avg. Demand [B] (l/s)**	**Peak Factor [C]**	**Infiltration [D] (l/s)**	**Peak Flow [E] (l/s)**
0.90	748	2.38	3.9	0.26	**9.48**

[A] From Table 1.1.
[B] Based on a unit sewage flow of 275 lpcd (as per Table 3-1 of the Regional Municipality of Halton Water and Wastewater Linear Design Manual).
[C] Based on the modified Harmon Formula (as per section 3.2.3 of the Regional Municipality of Halton Water and Wastewater Linear Design Manual).
Peak Factor, $M = 1 + [14 / (4+P^{0.5})]$, where P is in thousands
[D] Based on an infiltration rate of 0.286 l/ha/s (as per Section 3.2.4 of the Regional Municipality of Halton Water and Wastewater Linear Design Manual).
[E] Peak Flow = (Avg. Demand x Peak Factor) + Infiltration

Based on the above, the estimated sanitary demand for the Phase 2 development is **9.48 l/s**.

2.0 Water Demand

Water demand for the site was estimated in accordance with the Halton Region Water and Wastewater Linear Design Manual. Table 2.1 summarizes the domestic water demand requirements for the Average Daily, Maximum Daily and Peaking Hourly demand scenarios.

Table 2.1 – Proposed Phase 2 Water Demand Calculation					
Population [A]	Average Daily Demand [B] (l/s)	Max. Daily Peaking Factor [C]	Max. Hourly Peaking Factor [D]	**Max. Daily Demand [E] (l/s)**	**Max. Hourly Demand [F] (l/s)**
748	2.38	2.25	4.00	**5.36**	**9.52**

[A] From Table 1.1
[B] Average Daily Demand = 275 l/cap/day
[C] Max. Daily Peaking Factor = 2.25 (refer to sentence 2.4.1 in Region of Halton Linear Design Manual)
[D] Max. Hourly Peaking Factor = 4.00 (refer to Table 2-2 in Region of Halton Linear Design Manual)
[E] Max. Daily Demand = Average Daily Demand x Max. Daily Peaking Factor
[F] Max. Hourly Demand = Average Daily Demand x Max. Hourly Peaking Factor

Based on the above, the estimated water demand for the Phase 2 development is **9.52 l/s**.

3.0 Fire Flow Demand

Fire flow demands for the proposed development are governed by several guidelines and criteria, such as the Water Supply for Public Fire Protection (Fire Underwriters Survey, 2020), Ontario Building Code (OBC), and various codes and standards published by the National Fire Protection Association (NFPA). Since FUS criteria provides adjustments for sprinklered buildings (OBC does not), the FUS method was used to determine the fire flow demand for Building A which is considered the worst-case scenario for the proposed Phase 2 development.

The residential building is of fire-resistant construction (C=0.6), with limited combustible occupancy (-15% correction) and a sprinkler system (-50% correction). Exposure components are based on the following:

North Face: 0% correction (>30m)
South Face: 15% correction (3.1m to 10.0m)
East Face: 15% correction (10.1m to 20.0m)
South Face: 20% correction (10.1m to 20.0m)

Its is estimated that the required fire flow for the proposed Phase 2 development will be 150 l/s. See the Fire Flow Demand Requirements following this report for details.

A hydrant flow test has been completed by Aquacom Contracting on the two public fire hydrants in the closest proximity to the site. The theoretical flows for the hydrants located at 360 Plains Road East and 457 Plains Road East are **243 l/s** and **303 l/s**, respectfully. Detailed results can be found in section 4.3 of the *Functional Servicing and Stormwater Management Report for 484 Plains Road East Phase 1 & Phase 2 Interim Condition* completed by S. Llewellyn & Associates Limited, dated February 2024.

Therefore, based on the above analysis, the proposed water distribution system will have the capacity and pressure required to adequately service the subject land.

We trust that the information provided addresses the Halton Region requirements.

Prepared by:

S. LLEWELLYN & ASSOCIATES LIMITED





L. Frankovich, BASc. Eng. J. Koch, P.Eng.

FIRE FLOW DEMAND REQUIREMENTS - FIRE UNDERWRITERS SURVEY (FUS GUIDELINES)

Project Number: 22057
Project Name: 484 Plains Road East - Phase 2
Date: May-24

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 2020).

An estimate of the fire flow required is given by the following formula:

$$F = 220\,C\sqrt{A} \qquad (1)$$

where:

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 Type V for wood frame construction .
= 0.8 Type IV-A Mass Timber Construction
= 0.9 Type IV-B Mass Timber Construction
= 1.0 Type IV-C Mass Timber Construction
= 1.5 Type IV-D Mass Timber Construction
= 1.0 Type III Ordinary Construction
= 0.8 Type II Non Combustible Construction
= 0.6 Type I Fire Resistive Construction

A = Total floor area in square metres

Building / Location	# of Storeys	Total GFA (m^2)	Type of Construction	(1) Fire Flow "F" (l/min)	(l/s)	(2) Occupancy %	Adjustment (l/min)	Adjusted Fire Flow (l/min)	(3) Sprinkler %	Adjustment (l/min)	(4) Exposure %	Adjustment (l/min)	Final Adjusted Fire Flow (l/min)	(l/s)
9-Storey Mixed Use Building	9	7538	0.6	11000	183.3	-15	-1650.0	9350.0	-50	-4675.0	50	4675.0	9000	150

Total Area Calculation Building A:

Two largest ajoining floors plus 50% of any floors immediately above them up to eight floors

Floor	Area	Tot. Area	Cumm. Area
1	1633	1633	1633
2	1484	1484	3117
3-6	1484	2968	6085
7-8	1336	1336	7421
9	233	117	7538

(2) Occupancy

Non-Combustible	-25%
Limited Combustible	-15%
Combustible	No Charge
Free Burning	15%
Rapid Burning	25%

(3) Sprinkler

Minimum credit for systems designed to NFPA 13 is 30%.

If the domestic and fire services are supplied by the same municipal water system, then take an additional 10%.

If the sprinkler system is fully supervised (ie. annunciator panel that alerts the Fire Dept., such as a school), then an additional 10% can be taken. Maximum credit = 50%.

(4) Exposure

0 to 3m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
Greater than 30	0%	exceed 75%

BLDG A Side	Exposure (m)	Charge (%)
North =	>30	0
East =	10.1-20	15
South =	3.1-10	20
West =	10.1-20	15
Total Expoure =		***50***