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TECHNICAL MEMORANDUM No. 1

Issued Date:	April 23, 2025	File No.:	2279-245
Previous Issue Date:	April 22, 2025	City File No:	3242-13
To:	Mike Squire, AScT	Revision No.	1
From:	Mitchell Brook, P.Eng.		
Client:	City of Nanaimo		
Project Name:	Northeast Nanaimo Water Study Update		
Subject:	Woodgrove Area Baseline Water Review		

1. Objective

The objective of this technical memorandum is to review the available fire flows and peak hour pressures in the existing distribution system in the proposed Woodgrove Redevelopment Area

2. Background

The water supply to the North End of the City water system is supplied from the Labieux Station which receives water by gravity from the South Fork Water Treatment Plant (SFWTP) and reduces the pressure with pressure reducing valves (PRVs) to provide a hydraulic grade line (HGL) of 183m (600 ft) for the pressure zone. This area is known as Pressure Zone 20 North (PZ20N).

Labieux Station distributes water through two main supply mains to PZ20N. One supply main is a 600 mm dia. Ductile Iron watermain on Rock City Road, which supplies the Lost Lake Reservoir (Res No. 2). The second supply main is a 450 mm dia. Steel watermain on Highway 19, which supplies the Rod Glen Reservoir (Res No.4) and distribution system north of Rutherford Road/Metral Road intersection.

The main water distribution system feeding the commercial and multi-family areas in the Metral Drive and Aulds Road area is a 400mm diameter steel watermain on Metral Drive supplied from the 450mm diameter supply main on Rutherford Road / Metral Road intersection.

Pressure Zone 20 North has a redundant supply from Pressure Zone 21 (PZ21), which is supplied by Tanya Reservoir (No. 7), which has a HGL of 214m. There are two pressure reducing valves between PZ20N and PZ21, one of the PRVs are located on Kenwill Drive and the other at the intersection of Turner Road and Uplands Drive. These PRVs allow water to be supplied from PZ21 to PZ20N if the HGL drops below 160m.

It should be noted that PZ21 is suppled from PZ20N via Lost Lake Reservoir (No. 2) and Rod Glen Reservoir (No. 4) utilizing a pump station at each reservoir to lift water to Tanya Reservoir (No.7). Activation of the Kenwill and Turner PRVs provides a good redundant supply to PZ20N, but it does restrict PZ 21 and should only be used for short term events.

The City currently operates the Rod Glen Pump Station and the Lost Lake Pump Station simultaneously to fill the Tanya Reservoir (No. 7) and restricts the fill times for the Rod Glen Reservoir (No. 4) to low flow times during the day to reduce the impact on the PZ20N HGL for the Metral/Aulds Road area.

Pressure Zone 20N provides water to three pressure zones on the City's North Slope which is north of the Metral/Aulds Road area.

Fire flow storage for PZ20N is provided from the SFWTP Clearwell via Labieux Station, Tanya Reservoir (No. 7) via the Kenwill and Turner PRVs, and Rod Glen Reservoir (No.4) and Lost Lake Reservoir (No. 2)

via pump stations which fill Tanya Reservoir. The existing water supply and distribution system is shown on the enclosed figures.

3. Water Demands

3.1 Domestic Demands

Based on information provided by the City the projected population for the Woodgrove Redevelopment is 1,904. An additional 3,909 people are expected at the Bowers Development located on Hammond Bay Road near Uplands Drive. Unit water demand rates used for this analysis were taken from the Manual of Engineering Standards and Specifications (MOESS) and are shown in **Table 1** below:

Table 1: Per Capita Demands

Scenario	Demand Rate
Average Day Demand (ADD)	455 lpcd
Maximum Day Demand (MDD)	1,135 lpcd
Peak Hour Demand (PHD)	1,820 lpcd

Applying the unit rate demands listed above to the project equivalent population for the development the demand rate is calculated as shown in **Table 2** below:

Table 2: Water Demands

Scenario	Demand (lps)	
	Woodgrove	Bowers
ADD	10.0	20.6
MDD	25.0	51.4
PHD	40.1	82.3

The proposed demands were allocated to the nodes adjacent to the proposed development.

3.2 Fire Flow Demand

The required fire flows of the development are based on Table W-1 of the City of Nanaimo MOESS for the current zoning and are summarized below in **Table 3**:

Table 3: Fire Flow Demands

Land Use	Required Fire Flow (lps)
CC4 North Nanaimo Urban Centre	300

4. Hydraulic Capacity Performance and Design Criteria

Based on the MOESS design standards, the criteria outlined below in **Table 5** was used to assess the hydraulic impact of the proposed development on the City water system.

Table 5: Analysis Criteria

Criteria	Analysis Scenario	Parameter Value
Minimum Residual Pressure	PHD	300 kPa (44 psi)
Minimum Residual Pressure (hydrant)	MDD+FF	150 kPa (22 psi)
Minimum Residual Pressure (system)	MDD+FF	35 kPa (5 psi)
Maximum Velocity	MDD+FF	3.5 m/s

5. Hydraulic Capacity Analysis

The City of Nanaimo InfoWater model was evaluated under current baseline conditions and under current conditions with the proposed developments noted in with the proposed development demands noted in **Table 2.** The results of these simulations were compared to assess the impact of the development on the City water distribution system. The enclosed tables shown the available fire flows and peak hour pressures under existing conditions and with the addition of the proposed development demands.

As shown in the enclosed tables the existing distribution system can provide the required 300 lps fire flow in the Woodgrove area. Final pipe diameter requirements and hydrant spacing will need to be confirmed once future road networks and building plans are developed.

The existing Peak Hour conditions indicate that the Hydraulic Grade Line in Pressure Zone 20 drops below the settings of the Turner Road PRV and requires supplemental flow from Pressure Zone 21.

Yours truly,

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Prepared By:

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Project No. 2279-245
Project: Northeast Nanaimo Water Study Update
Title: Woodgrove Area Baseline Results
Date: 16-Apr-25

Hydrant No.	Elevation (m)	Available Fire Flow (lps)		Peak Hour	
		w/ 3.5 m/s Max V	w/o 3.5 m/s Max V	HGL (m)	Pressure (psi)
251	111.7	172	300	158.7	67
252	110.9	300	300	158.6	68
314	103.0	178	300	158.5	79
315	101.6	189	300	158.5	81
316	98.1	300	300	158.4	86
321	94.4	226	300	158.3	91
435	115.6	300	300	159.4	62
918	107.0	300	300	158.9	74
919	106.1	232	300	158.9	75
920	109.0	191	300	158.9	71
1180	114.9	300	300	159.2	63
1329	107.7	300	300	158.8	73
1413	105.6	300	300	158.5	75
1461	115.7	145	300	158.6	61
1662	93.0	300	300	158.3	93
1663	91.6	165	300	158.3	95
1700	107.4	290	300	158.5	73
1702	112.5	110	300	159.1	66
1708	110.0	300	300	158.6	69
1728	113.2	210	300	158.7	65
1729	109.8	149	300	158.7	69
1730	108.7	169	300	158.7	71
1731	110.8	110	258	159.1	69
1809	106.0	233	300	158.9	75
1877	109.2	234	300	158.6	70
1889	108.8	231	300	158.6	71
1916	97.5	110	300	158.4	87
1917	99.8	300	300	158.5	83
1933	115.5	147	300	158.6	61
1945	94.5	62	296	158.3	91
2110	99.6	242	300	159.0	84
2111	101.2	300	300	158.8	82
2112	110.1	279	300	158.7	69
2119	107.2	213	300	158.5	73
2120	106.6	213	300	158.5	74
2122	113.7	172	300	159.1	65
2125	113.0	195	300	159.0	65
2126	110.6	231	300	159.0	69
2127	107.4	278	300	158.9	73
2132	111.0	172	292	158.9	68
2218	105.7	195	300	158.5	75
2336	96.3	172	300	158.4	88
2389	116.6	110	300	159.6	61
2429	108.4	172	300	158.7	72
2559	108.6	190	300	158.5	71
2574	90.2	106	283	158.3	97
2575	88.8	106	217	158.2	99
2576	87.9	106	194	158.2	100
2631	110.6	229	300	158.6	68
2632	109.8	272	300	158.6	69
2634	110.0	300	300	158.6	69
2635	109.6	300	300	158.6	70
2636	112.7	288	300	158.6	65
2642	109.1	212	300	158.5	70
3002	109.9	300	300	158.6	69
3302	108.9	300	300	158.6	71
9041	107.1	286	300	158.5	73
9079	99.8	300	300	158.5	83
9081	102.6	300	300	158.6	80

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		w/ 3.5 m/s Max V	w/o 3.5 m/s Max V	HGL (m)	Pressure (psi)
9082	105.7	300	300	158.7	75
9084	106.0	300	300	158.9	75
9086	107.6	271	300	158.9	73
9087	111.1	172	291	158.9	68
9280	107.7	172	300	158.6	72
9297	101.9	202	300	158.5	80
9326	106.6	209	300	158.5	74
9336	112.6	300	300	159.3	66
9386	112.8	203	300	159.0	66
9403	101.5	110	300	158.8	82
9406	95.4	171	300	158.4	90
9414	95.5	172	300	158.4	90
9416	99.1	300	300	158.4	84
9417	99.9	181	300	158.5	83
9468	94.5	214	300	158.3	91
9471	97.6	222	300	158.5	87
9472	106.0	268	300	158.9	75
9476	102.3	194	300	158.5	80
9477	111.4	247	300	158.7	67
9478	115.4	300	300	159.3	62
9479	115.9	300	300	159.5	62
9493	113.5	223	300	158.7	64
9554	116.7	27	190	159.6	61
P9079	100.0	182	300	158.7	83
P9080	100.0	191	300	158.7	83
P9081	100.0	198	300	158.7	83
P9082	100.0	194	300	158.7	83
P9083	100.0	192	300	158.7	84
P9084	100.0	162	300	158.8	84
P9085	100.0	184	300	158.8	84
P9086	100.0	193	300	158.8	84
P9087	100.0	207	300	158.8	84
P9089	102.5	213	300	158.7	80
P9406	100.0	62	218	158.7	83
P9417	100.0	110	244	158.7	83
P9458	100.0	62	168	158.7	83
P9471	100.0	212	300	158.7	84

Project No. 2279-245
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		w/ 3.5 m/s Max V	w/o 3.5 m/s Max V	HGL (m)	Pressure (psi)
251	111.7	171	300	157.4	65
252	110.9	300	300	157.3	66
314	103.0	176	300	157.0	77
315	101.6	190	300	157.0	79
316	98.1	300	300	156.9	84
321	94.4	227	300	156.8	89
435	115.6	300	300	158.3	61
918	107.0	300	300	157.5	72
919	106.1	215	300	157.4	73
920	109.0	192	300	157.4	69
1180	114.9	300	300	158.0	61
1329	107.7	300	300	157.4	71
1413	105.6	300	300	157.1	73
1461	115.7	143	300	157.3	59
1662	93.0	300	300	156.8	91
1663	91.6	164	300	156.8	93
1700	107.4	287	300	157.2	71
1702	112.5	109	300	157.8	64
1708	110.0	300	300	157.3	67
1728	113.2	208	300	157.4	63
1729	109.8	147	300	157.4	68
1730	108.7	167	300	157.3	69
1731	110.8	109	255	157.8	67
1809	106.0	237	300	157.5	73
1877	109.2	234	300	157.2	68
1889	108.8	229	300	157.2	69
1916	97.5	109	300	156.8	84
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1945	94.5	62	292	156.8	88
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2119	107.2	211	300	157.1	71
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2125	113.0	189	300	157.7	64
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2127	107.4	275	300	157.6	71
2132	111.0	172	286	157.4	66
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2429	108.4	172	300	157.4	70
2559	108.6	190	300	157.1	69
2574	90.2	106	279	156.8	95
2575	88.8	106	215	156.7	97
2576	87.9	106	193	156.7	98
2631	110.6	228	300	157.3	66
2632	109.8	270	300	157.3	68
2634	110.0	300	300	157.2	67
2635	109.6	300	300	157.2	68
2636	112.7	288	300	157.2	63
2642	109.1	211	300	157.2	68
3002	109.9	300	300	157.3	67
3302	108.9	300	300	157.3	69
9041	107.1	288	300	157.1	71
9079	99.8	300	300	156.9	81
9081	102.6	300	300	157.1	78

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P9080	100.0	172	300	156.8	81
P9081	100.0	178	300	156.8	81
P9082	100.0	194	300	156.5	80
P9083	100.0	176	300	156.8	81
P9084	100.0	147	300	157.0	81
P9085	100.0	164	300	157.1	81
P9086	100.0	171	300	157.1	81
P9087	100.0	180	300	157.1	81
P9089	102.5	192	300	157.0	78
P9406	100.0	62	214	157.0	81
P9417	100.0	110	239	157.0	81
P9458	100.0	62	166	157.1	81
P9471	100.0	185	300	158.7	84

N

KENWILL PRV

TURNER PRV

TANYA RES
TWL 214m

LOST LAKE RES
TWL 173 m

ROD GLEN RES
TWL 152m

LABIEUX STATION
SUPPLY FROM SFWTP

300mm

600mm

450mm

450mm

600mm

Legend

- Parcels
- Woodgrove Study Area
- Water Supply
- Water Distribution
- PZ21
- PZ20
- Reservoir and Pump Station
- Reservoir
- Control Valve Station
- PRV

0 0.23 0.45 0.9 Kilometers

N

Legend

- City Hydrant
- Private Hydrant
- Distribution Mains
- Pressure Zones
- Parcels
- Woodgrove Study Area

0 0.1 0.2 0.4 Kilometers

KENWILL PRV

TURNER PRV