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TECHNICAL MEMORANDUM No. 2

Issued Date:	May 8, 2025	File No.:	2279-245
Previous Issue Date:	None	City File No:	3242-13
To:	Mike Squire, AScT	Revision No.	-
From:	Mitchell Brook, P.Eng.		
Client:	City of Nanaimo		
Project Name:	Northeast Nanaimo Water Study Update		
Subject:	Woodgrove Area Water Review – Development Scenarios		

1. Objective

The objective of this technical memorandum is to review the available fire flows and peak hour pressures in the distribution system in the proposed Woodgrove Redevelopment Area under the identified development scenarios provided by the City of Nanaimo

2. Background

The City has identified three development population scenarios that are to be reviewed to determine the impact on the distribution system and to identify necessary upgrades to provide the required fire flows and peak hour pressures. The three scenarios are:

1) +2500 Population
    a. For this scenario it has been assumed that a new watermain will be constructed along the proposed connector road from Enterprise Way to Hammond Bay Road through 6261 Hammond Bay Road (Bowers Property)
2) +5000 Population
    a. For this scenario it has been assumed that a new watermain loop will be constructed from Calinda St. to Aulds Rd through future development at 6700 Island Highway and 6631 Island Highway. As part of this works, the existing watermain looping at 6631 Island Highway and 6700 Island Highway will be modified to suit the new looped main
    b. For this scenario watermain looping through future development will be limited to two connection locations to the existing distribution system. This will impact the existing watermains at the following locations:
        i. 6580 Island Highway
        ii. 6550 Island Highway
        iii. 6700 Island Highway
3) +7500 Population
    a. For this scenario the proposed works identified under the +5000 scenario have been included as part of the review.

A summary of the population breakdown in the study area is shown on the enclosed figures for reference.

3. Water Demands

3.1 Domestic Demands

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)		
	+2500 Population	+5000 Population	+7500 Population
MDD	37.6	65.7	98.5
PHD	60.4	105.3	157.9

The proposed demands were allocated to the nodes adjacent to the proposed development areas. The population increases were added to the base 2023 demand scenario in the water model

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)
6985 Island Highway	192(1)
CC4 North Nanaimo Urban Centre	300

Notes: (1) Based on the FUS calculation provided during the development review.

4. Hydraulic Capacity Performance and Design Criteria

Based on the MOESS design standards, the criteria outlined below in **Table 4** was used to assess the hydraulic impact of the proposed development on the City water system.

Table 4: 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 2023 Demand Scenario with each of the three development population scenario demands noted in **Table 2**.

The required improvements to provide the design fire flows and residual peak hour pressures are shown in the enclosed figures and are summarized below:

Scenario – +2500 Population

1) Proposed 300 mm dia. watermain through the proposed development at 6261 Hammond Bay Road.

Scenario – +5000 Population

1) Proposed 300 mm dia. watermain through the proposed development at 6261 Hammond Bay Road.
2) Install a new 250 mm dia. watermain loop to Marlin Way from 6261 Hammond Bay Road.
3) Upgrade 200 mm dia. watermain at 6469 Metral Drive to 300 mm dia.
4) Upgrade 200 mm dia. watermain on Metral Drive to 250 mm dia.
5) Install new 250 mm dia. watermain loop at 6580 Island Highway.
6) Install new 300 mm dia. watermain loop to Calinda Road.
7) Upgrade 200 mm dia. watermain on Portsmouth to 300 mm dia.
8) Upgrade 200 mm dia. watermain on Woodgrove Site to 250 mm dia.
9) Install 300 mm dia. watermain loop to Dover Road.
10) Upgrade 200 mm dia. watermain on Dover Road to 300 mm dia.

Scenario – +7500 Population

1) Scenario +5000 Population Improvements
2) Install new 250 mm dia. loop main from 6700 Island Highway to Portsmouth 300 m.

The above noted pipe diameters are based on a design fire flow of 300 lps. Final pipe size can be confirmed as the development in the area proceeds and the required fire flows are determined.

6. Cost Estimates

The cost estimates shown in **Table 5** are Class 'D' (feasibility study) made without preliminary design input and include a 30% contingency and 30% allowance for engineering, legal, financial, and administration. They are derived from our in-house construction cost data from similar watermain projects constructed in the mid Vancouver Island Area. They are in 2025 dollars and are exclusive of GST and do not include any allowances for inflation.

Table 5: Cost Estimates (2025 Dollars exc GST)

Project	Diameter (mm)	Length (m)	Unit Price	Extension
Scenario - +2500 Population				
Watermain loop at 6261 Hammond Bay Road	300	600	$2,500	$1,500,000
			Subtotal	**$1,500,000**
Scenario - +5000 Population				
Watermain loop at 6261 Hammond Bay Rd	300	600	$2,500	$1,500,000
Watermain loop to Marlin Way	250	150	$2,000	$300,000
Watermain upgrade at 6469 Metral Dr	300	90	$2,500	$225,000
Watermain upgrade on Metral Dr	250	30	$2,000	$60,000
Watermain loop at 6580 Island Highway	250	85	$2,000	$170,000
Watermain loop to Calinda St	300	615	$2,500	$1,537,500
Watermain upgrade on Portsmouth Rd	300	500	$2,500	$1,250,000
Watermain upgrade at Woodgrove Site	250	170	$2,000	$340,000
Watermain loop to Dover Rd	300	125	$2,500	$312,500
Watermain upgrade on Dover Rd	300	330	$2,500	$825,000
			Subtotal	**$6,520,000**
Scenario - +7500 Population				
Watermain loop at 6261 Hammond Bay Rd	300	600	$2,500	$1,500,000
Watermain loop to Marlin Way	250	150	$2,000	$300,000
Watermain upgrade at 6469 Metral Dr	300	90	$2,500	$225,000
Watermain upgrade on Metral Dr	250	30	$2,000	$60,000
Watermain loop at 6580 Island Highway	250	85	$2,000	$170,000
Watermain loop to Calinda St	300	615	$2,500	$1,537,500
Watermain upgrade on Portsmouth Rd	300	500	$2,500	$1,250,000
Watermain upgrade at Woodgrove Site	250	170	$2,000	$340,000
Watermain loop to Dover Rd	300	125	$2,500	$312,500
Watermain upgrade on Dover Rd	300	330	$2,500	$825,000
Watermain loop to Portsmouth Rd	250	300	$2,000	$600,000
			Subtotal	**$7,120,000**

Allowances for inflation for the future improvements should be included as part of the cost estimates. Further discussion with the City is needed to confirm the applicable inflationary allowance that is to be included in the cost estimates.

Yours truly,

KOERS & ASSOCIATES ENGINEERING LTD.

Prepared By:	Reviewed By:
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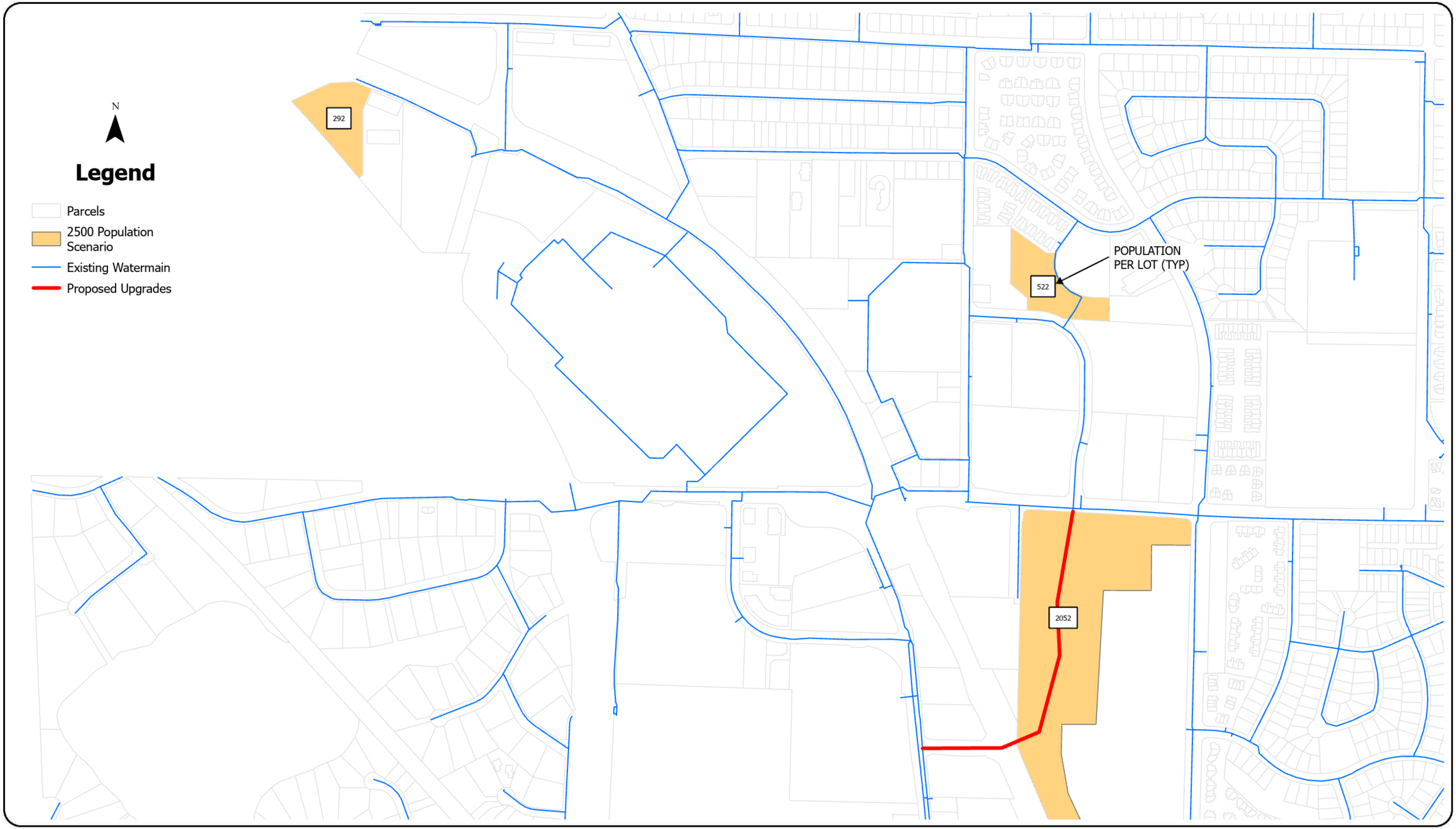

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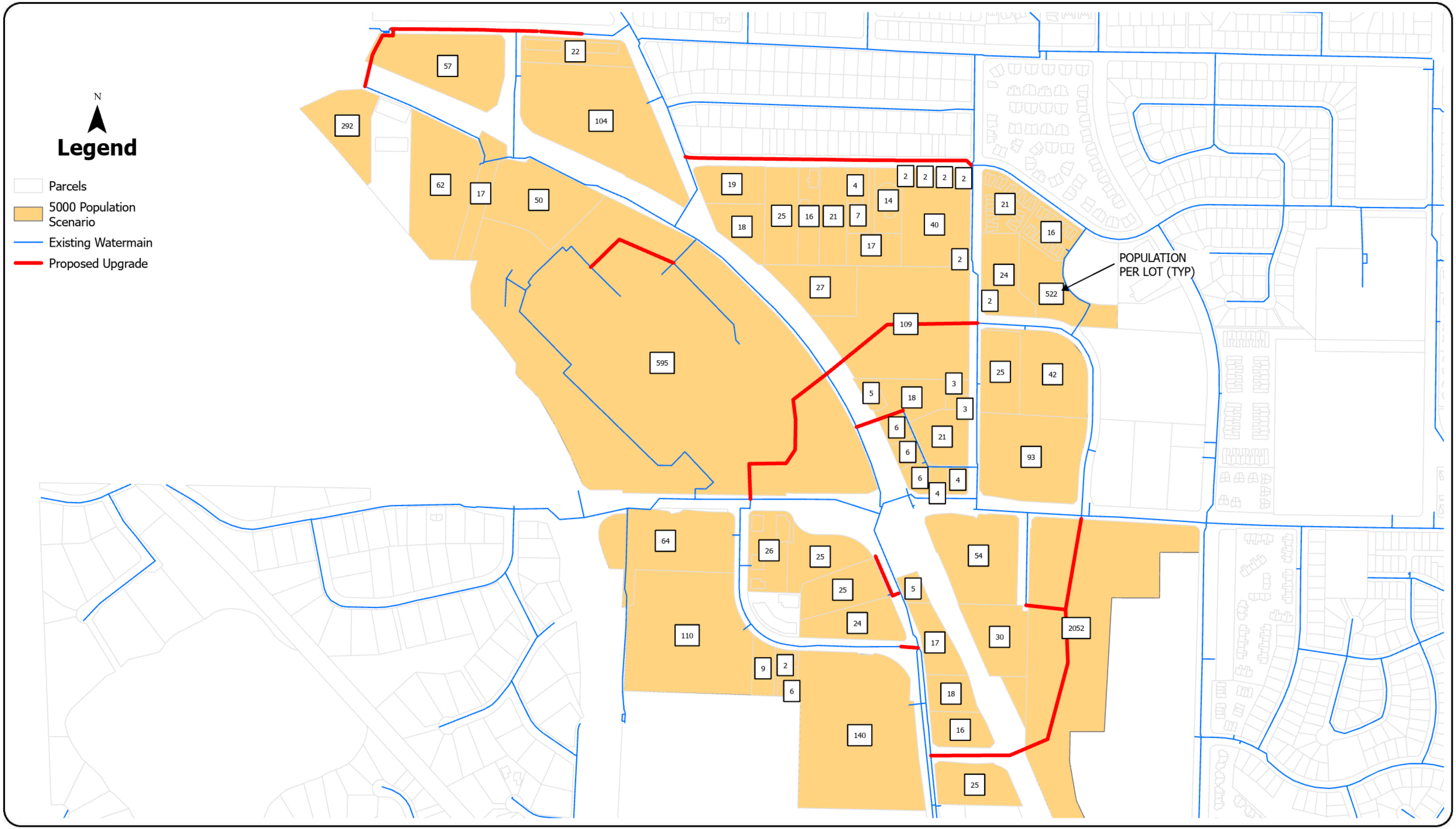
PROJECT
WOODGROVE AREA PLAN WATER REVIEW

TITLE
2500 POPULATION SCENARIO – UPGRADES

APPROVED CD
DATE MAY 2025
PROJECT No. 2279–245
SCALE 1:6,000
DWG No. 2279–245–01



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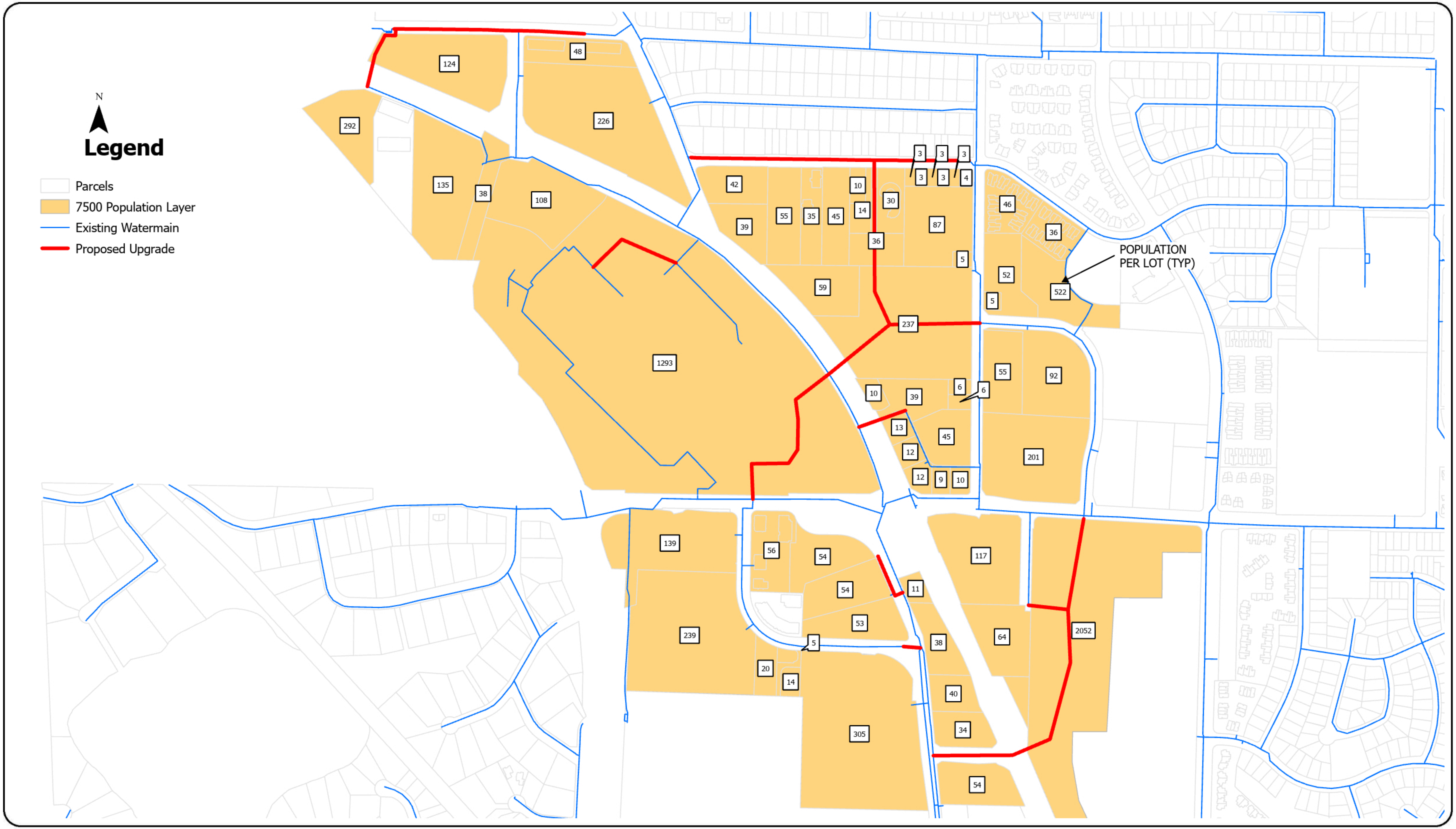
PROJECT
WOODGROVE AREA PLAN WATER REVIEW

TITLE
5000 POPULATION SCENARIO – UPGRADES

APPROVED CD
DATE MAY 2025
PROJECT No. 2279–245
SCALE 1:6,000
DWG No. 2279–245–02



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PROJECT
WOODGROVE AREA PLAN WATER REVIEW

TITLE
7500 POPULATION SCENARIO – UPGRADES

APPROVED CD
DATE MAY 2025
PROJECT No. 2279–245
SCALE 1:6,000
DWG No. 2279–245–03