Technical Memorandum

Township of King Water-Wastewater Master Plan Modelling

October 2025 | TOK RFP-2024-011 | TYLin Project 100447
Township of King

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EXECUTIVE SUMMARY

1 INTRODUCTION

T.Y.Lin International Canada (TYLin) has been contracted by the Township of King to provide the consultancy services required for the Water and Wastewater Master Plan Update.

As part of this update, TYLin is responsible for updating the City's existing water and wastewater hydraulic models for the three communities of King City, Nobleton, and Schomberg.

This technical memorandum describes the process undertaken to update and build the hydraulic models for the Township of King's communities based on the available information. It also documents all the assumptions made during this process.

2 MODELLING BACKGROUND

2.1 Modelling Platforms

The original water and wastewater hydraulic models were developed using InfoWater Pro and InfoSewer, respectively. InfoWater Pro, developed by Autodesk, is a specialized software for simulating and analyzing water distribution systems, while InfoSewer is designed for the modeling, design, and operational assessment of sanitary and combined sewer networks. TYLin updated both models using the same platforms to maintain consistency with the existing modeling framework and maintain compatibility with the provided datasets.

2.2 Existing Population

The parcel GIS data was provided by the Town for TYLin to develop the Master Plan baseline model. The total existing population for residential parcels, calculated using the Town's design criteria, is 15,819. As there is no established criterion for deriving equivalent population from ICI areas, a population count for the ICI parcels was not conducted. The future population growth will be detailed in Section 4.

3 DESIGN CRITERIA

3.1 Water

The Township of King design criteria will govern the basis of analysis and required levels of service of the existing and future systems in the study area. The applicable watermain design criteria for this project are summarized below in **Table 3-1, Table 3-2** and **Table 3-3**.

Table 3-1: Township of King Watermain System Servicing Design Criteria

Watermain System Servicing Design Criteria	
Fire Flow Requirement	7,000 L/min
System Pressures	
Maximum Sustained Operating Pressure	700 kPa (100 psi)
Normal Operating Pressure	350 to 480 kPa (50 to 70 psi)
Minimum Pressure during Maximum Day Demand	275 kPa (40 psi)
Minimum Pressure during Maximum Day and Fire Flow	140 kPa (20 psi)

Table 3-2: Township of King Friction Factors Criteria

Pipe Diameter	Hazen-Williams C-Factor
150mm	100
200 to 300mm	110
350 to 600mm	120
Over 600mm	130

Table 3-3: Township of King Population Density and Water Demands Criteria

Population Density and Water Demands Criteria	
Residential	
Single Detached Dwellings	3.5 ppu
Semi-Detached Dwellings	3.5 ppu
Townhouses	2.9 ppu
Apartments	2.0 ppu
Domestic Average Day Consumption Rate	370 L/capita/d
Commercial, Industrial and Institutional	
Population Density	86 persons/ha
Commercial Consumption	28 m^3/ha/d
Industrial Consumption	28 m^3/ha/d
Institutional Consumption	18 m^3/ha/d
Peaking Factors	
Maximum Day Demand	2.0
Peak Hour Demand	2.75

3.2 Wastewater

A Manning's Roughness Coefficient of 0.013 was assigned to all sewer pipe elements, based on the Township of King Design Criteria.

Sanitary loads were assigned based on the Township of King Design Criteria as summarized in **Table 3-4** and **Table 3-5**.

Table 3-4: Wastewater Design Criteria

Sanitary Sewer Design Criteria	
Residential Rate	370 Lpcd
Infiltration	0.21 L/s/ha
Residential Peaking Factor	Harmon, $M=1 + 14 / (4 + P^{0.5})$, where P = populations in thousands.
Industrial Peaking Factor	$Mi=6.6604 * Area^{-0.1992}$
Commercial Flows	65 m^3/ha/d, including infiltration and peaking effect
Industrial Sewage Flows	Light industry: 35 m^3/ha/d Heavy industry: 55 m3/ha/d
Schools and Institutions Sewage Flows	65 m^3/ha/d, including infiltration and peaking effect

Table 3-5: Wastewater Population Density Design Criteria

Land Use Type		**Population Density**
Single Family Dwelling		60 persons/ha or 3.5 persons/unit
Semi-detached and Duplex		100 persons/ha or 3.5 persons/unit
Townhouse		125 persons/ha or 2.9 persons/unit
Apartment	Low Density (62 u/ha)	150 persons/ha or 2 persons/unit
	Medium to Low Density (86 u/ha)	210 persons/ha or 2 persons/unit
	Medium Density (124 u/ha)	300 persons/ha or 2 persons/unit
	High Density (274 u/ha)	600 persons/ha or 2 persons/unit

4 PLANNING DATA AND PHASING

Under the Provincial Growth Plans, municipalities are required to update their Official Plans. The Township of King's Official Plan, titled Our King was adopted in 2019 and serves as a guiding document for growth within the Township. In 2023, the Township begun its Official Plan Review to guide growth to the year 2051.

Growth in the Township was classified into three groups:

- Developments being approved/planned for construction
- Intensification of existing built-up areas to increase population density
- New developments on Designated Growth Areas (DGA)

Growth projections are phased over the interim horizon years of 2031, 2036, 2041, 2046, to the final year of study in 2051.

TYLin received GIS data of the Township of King Official Plan Land Use Schedules indicating the land use designations throughout its three primary communities. Projected growth in the township's communities under study phased to the year 2051 is detailed in **Table 4-1**.

Table 4-1: Township of King Population Growth Projections

Community	2031	2036	2041	2046	2051
King City	9742	4723	676	600	635
Nobleton	5511	833	174	526	378
Schomberg	740	12	0	310	0

4.1 Development Applications

As information is received, the Master Plan Models were updated to include water demands and wastewater loads expected from the developments. Developments across all communities within the Township account for a projected population increase of 15,899 people, phased across forecast years indicating the expected dates of service for each development leading to 2051. A summary of all development applications considered in the modelling for this Master Plan can be found in **Appendix A**.

4.2 Intensification Areas

The Township provided GIS data identifying Intensification Opportunities within the three communities of King City, Nobleton, and Schomberg. These areas are classified by density and divided into existing and future opportunities. Refer to **Appendix A**.

Populations for the provided intensification areas were estimated using the information presented in **Table 4-2** and **Table 4-3**.

Table 4-2 Units per Hectare (UPH) for Intensification Densities

Density Category	Gross UPH Range	Average Gross UPH	Net UPH
High	100-180	105	140
Medium-High	60-100	68	90
Medium	40-60	34	45
Medium-Low	20-40	24	33
Low	10-20	15	20

Table 4-3 Persons Per Unit (PPU) for Intensification Densities and Unit Types

Density Category	PPU
High	1.836
Medium-High	2.4675
Medium	2.818
Medium-Low	3.099
Low	3.38

Where intensification areas were found to correspond with development applications received throughout the modelling of the water and wastewater systems, the growth which projected a greater increase in population was retained.

Based on these calculations, intensification within the Township of King is projected to lead to a population growth of 10,465 people. This is allocated between 6,682 in King City, 3,193 in Nobleton, and 590 in Schomberg. The details of all intensification opportunities, including area, estimated population, forecast year, and whether the intensification is an existing or future opportunity are provided in **Appendix A**.

Note: For Nobleton, only the west-end employment expansion, located northeast of 10th Concession and King-Vaughan Road, was considered in the analysis, as confirmed by the Town.

4.3 Designated Growth Areas

A significant portion of growth is expected to occur within Designated Growth Areas (DGA) in the township. A Greenfield Residential Land Summary spreadsheet was provided to TYLin serving as the basis for the assessment of these Designated Growth Areas. Some DGAs overlap with development applications or identified intensification opportunities. In such case, the phasing of the DGA will align with the phasing of the corresponding development application or intensification. For other DGAs that were not assigned a specific phasing by the Town, it was assumed they would be developed as part of the full buildout scenario. A summary of Designated Growth Areas can be found in **Appendix A**.

5 WATER MODELLING METHODOLOGY

TYLin reviewed the provided existing models and updated the models based on the latest GIS data (KingTownship_KingCityWaterNetwork_2025July21.gdb) received from the Township. The water hydraulic model network consists of pipes, junctions, valves, reservoirs, tanks, and pumping stations.

5.1 Existing System and Gap Analysis

TYLin updated the pipe networks to include the constructed new services and approved developments.

5.1.1 Existing Water Facilities

Key infrastructure components within the water distribution system were modeled to reflect their physical characteristics and design parameters. Water treatment plants were represented as reservoir elements with fixed hydraulic grade lines (HGL), simulating the hydraulic head supplied to the network. Pumping stations were modeled using design point curves, incorporating both design head and design flow to reflect their intended performance. Elevated storage tanks were configured based on documented tank geometry, with operating levels sourced from City Operations staff and supplemented by operations and maintenance (O&M) manuals. Groundwater wells were modeled as fixed-head reservoirs to represent their pressure contribution to the system.

It is important to note that this is a steady-state model developed based on the Town's design criteria, and not an operational model. As such, the model reflects idealized conditions for planning and design purposes, rather than dynamic system behavior under real-time operations.

In steady-state modelling, HGL assumptions in elevated tanks and reservoirs should be as follows:

- Average Day Demand (ADD): Bottom of Equalization Storage
- Max Day Demand (MDD): Bottom of Equalization Storage
- Peak Hour Demand (PHD): Bottom of Equalization Storage
- Minimum Hour Demand (MIN): Top of Equalization Storage
- Maximum Day plus Fire Flow (MDD+FF): Bottom of Fire Storage

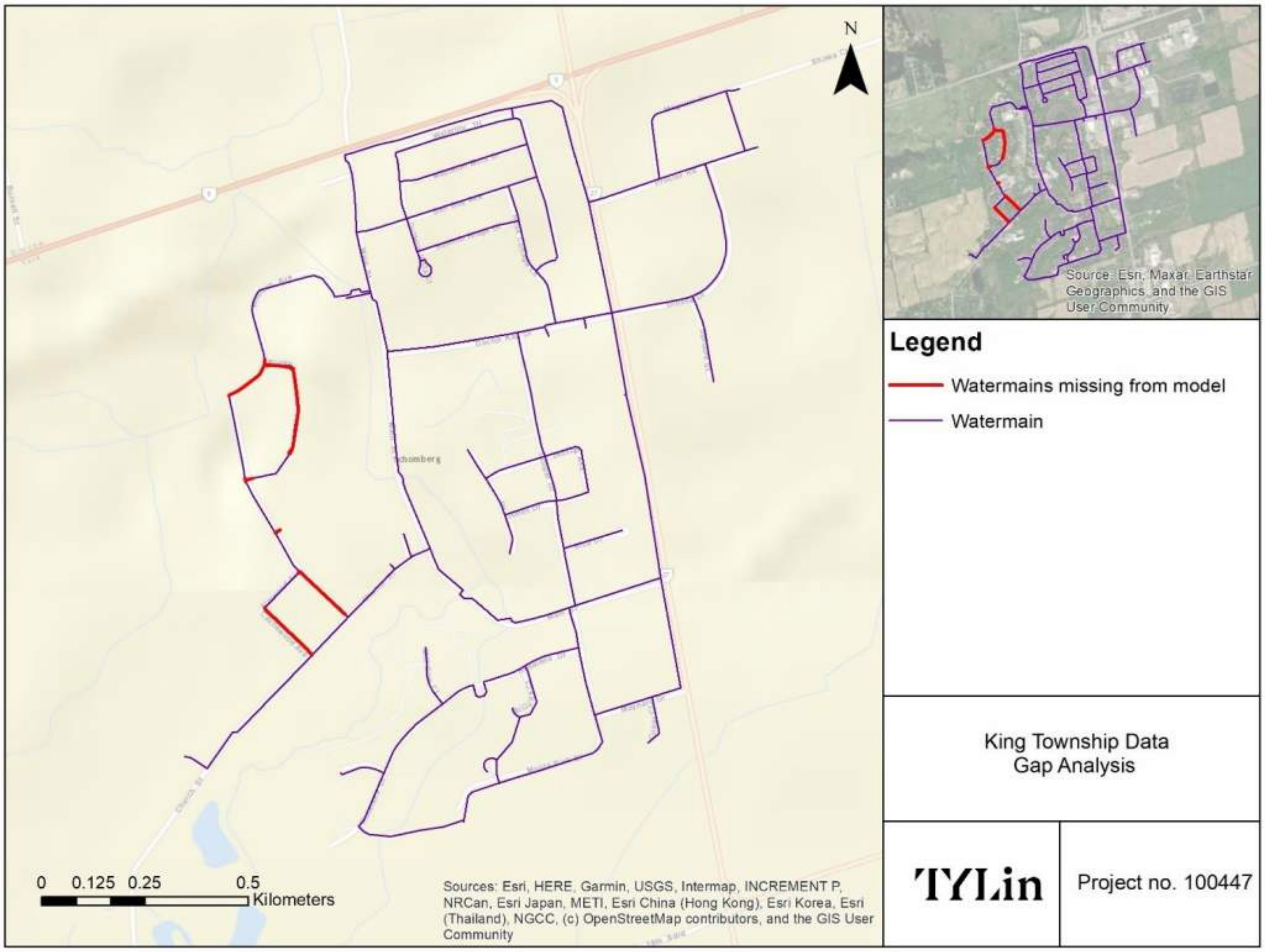
5.1.2 Gap Analysis

As part of the data gap analysis, the hydraulic model was compared against the GIS data provided by the Town. Discrepancies in watermain sizes were identified and are summarized in **Table 5-1**. For King City and Nobleton, these discrepancies were corrected in the model to align with**Error! Reference source not found.**. The missing segments were added, along with their associated attributes from the GIS data. These updates ensure a more complete and representative network for subsequent hydraulic analysis.

Table 5-1: Existing Water Model Gap Analysis

Community	Asset ID	Main Diameter from GIS (mm)	Watermain Diameter from Model (mm)
King City	KWWM_0271	250	150
King City	KWWM_0375	300	400
Nobleton	NWWM_0395	300	200
Nobleton	NWWM_0366	200	150
Nobleton	NWWM_0362	200	150
Nobleton	NWWM_0332	200	100
Nobleton	NWWM_0368	150	600
Nobleton	NWWM_0060	300	200
Nobleton	NWWM_0276	300	200
Nobleton	NWWM_0263	300	200
Nobleton	NWWM_0264	300	200
Nobleton	NWWM_0302	300	200
Nobleton	NWWM_0003	150	300

Figure 5-1 Schomberg Water System Gap analysis



5.2 Model Update

5.2.1 Water Network Update

The water network for King City East has been constructed and was subsequently incorporated into the model as part of the existing scenario to reflect current infrastructure conditions.

Additionally, a discrepancy was identified in the GIS data for a segment of watermain along Highway 27 in Nobleton. While the GIS records indicated a 300 mm diameter, the Town confirmed that this information was incorrect. Accordingly, the model was updated to reflect the correct pipe diameter of 200 mm.

5.2.2 Operational Model to Masterplan Model Conversion

TYLin received the 2024 consumption data and conducted a comparative analysis against the calculated water demands derived from the Town's design criteria. In accordance with the Town's request, the existing model scenarios were updated using demand values calculated based on the Town's design criteria, rather than actual consumption data from billing records. The provided operational models were reverted back to steady state models taking into account the Township's Design Criteria for flows.

5.3 Water Demands

5.3.1 Existing Demands Calculation and Allocation

The nodal demand was distributed based on land use and on a parcel-by-parcel basis.

- Parcels were assigned a number of units based on weighted densities developed for residential housing types, followed by the application of per capita consumption rates to determine water demand.
- ICI parcels were identified based on zoning and area was used for calculating demands
- Parcels were aggregated to the nearest node
- Model nodes were populated

For the water model, existing residential and ICI demands derived from the parcel data were allocated to Demand 1. Demands associated with development applications were assigned to Demand 2, while those related to intensification opportunities and DGAs demands were allocated to Demand 10.

5.3.1 Future Demands Calculation and Allocation

Future development demands were calculated using the same methodology applied to the existing scenario. Population estimates within intensification areas were derived based on the density types outlined in Section 4. For greenfield developments lacking detailed site information, parcel areas were measured using Google Earth, and water demands were estimated using consumption rates based on gross area, as defined in the design criteria.

For future developments located near the existing water network, demands were assigned to the nearest junctions using connection details provided in the FSRs. In areas without existing infrastructure, water demands were allocated to proposed watermains, which were incorporated into the model based on available servicing plans. For intensification areas, demands were similarly assigned to the closest junctions. Where intensification is expected to result in the demolition of existing buildings, the corresponding existing demands were deducted to avoid double-counting.

5.4 Water Hydraulic Analysis

5.4.1 Demand Scenarios

The model simulations are currently running as steady state for all scenarios in InfoWater Pro. There are four demand conditions set up under all time horizon: Average Day Demand (ADD), Maximum Day Demand (MDD), Peak Hour Demand (PHD), and Maximum Day Demand Plus Fire Flow (MDD+FF).

5.4.2 King City Modelling Results

5.4.2.1 Existing Scenario

The existing scenario was modeled using current infrastructure and water demand conditions, incorporating approved development applications. **Figure 5-2** shows that available fire flow in King City under existing conditions ranges from 41 L/s to 704 L/s, with the highest values observed near the elevated tanks. Areas including McClure Drive, King Road and Jane Street, Burton Grove, and Langdon Drive were identified as having low fire flow availability.

Figure 5-3 presents simulated pressure levels across King City under existing conditions, ranging from 49 psi to 85 psi, which fall within the required operational range.

Figure 5-2: King City Simulated Available Fire Flow under Existing MDD+FF Scenario

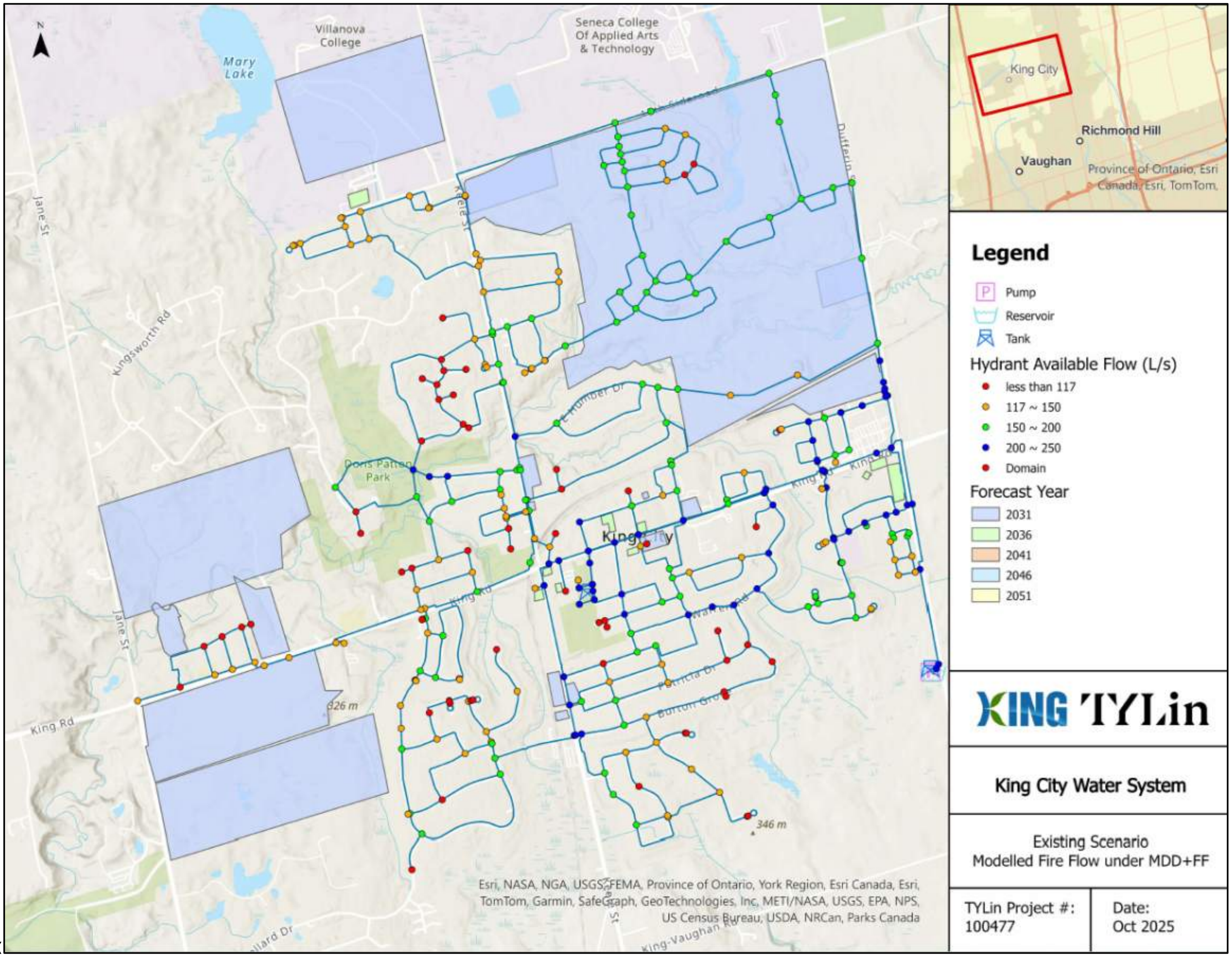


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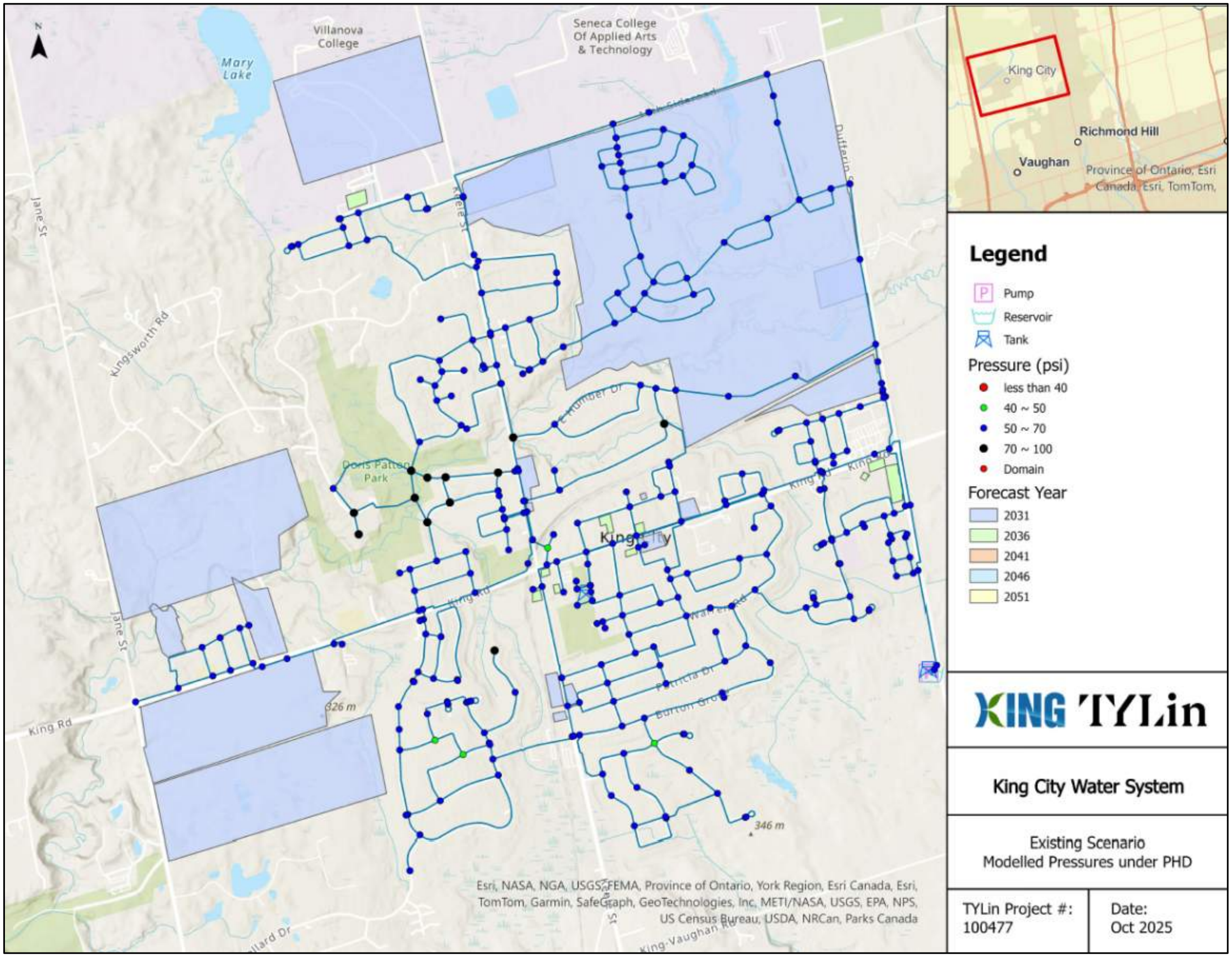
Figure 5-3: King City Simulated Pressures under Existing PHD Scenario



5.4.2.2 Full Buildout: Existing + Developments + Intensification + DGA

Under this scenario, the existing system remains unchanged, with no upgrades implemented, except for network extensions added based on developer-provided information to support servicing in remote areas.

Figure 5-4 shows that fire flow availability in King City under full buildout conditions ranges from 36 L/s to 646 L/s, with the highest values observed near the elevated tanks. While the overall range does not show significant changes compared to the existing scenario, the results map reveals a greater number of junctions marked in red, indicating fire flows below 117 L/s. This suggests that fire flow deficiencies become more widespread and critical under full buildout conditions.

Figure 5-5 presents simulated pressure levels across King City under full buildout conditions, ranging from 33 psi to 68 psi. The lowest pressures fall below the minimum required threshold, highlighting potential serviceability concerns.

Figure 5-4: King City Simulated Available Fire Flow with Full Buildout under MDD+FF Scenario

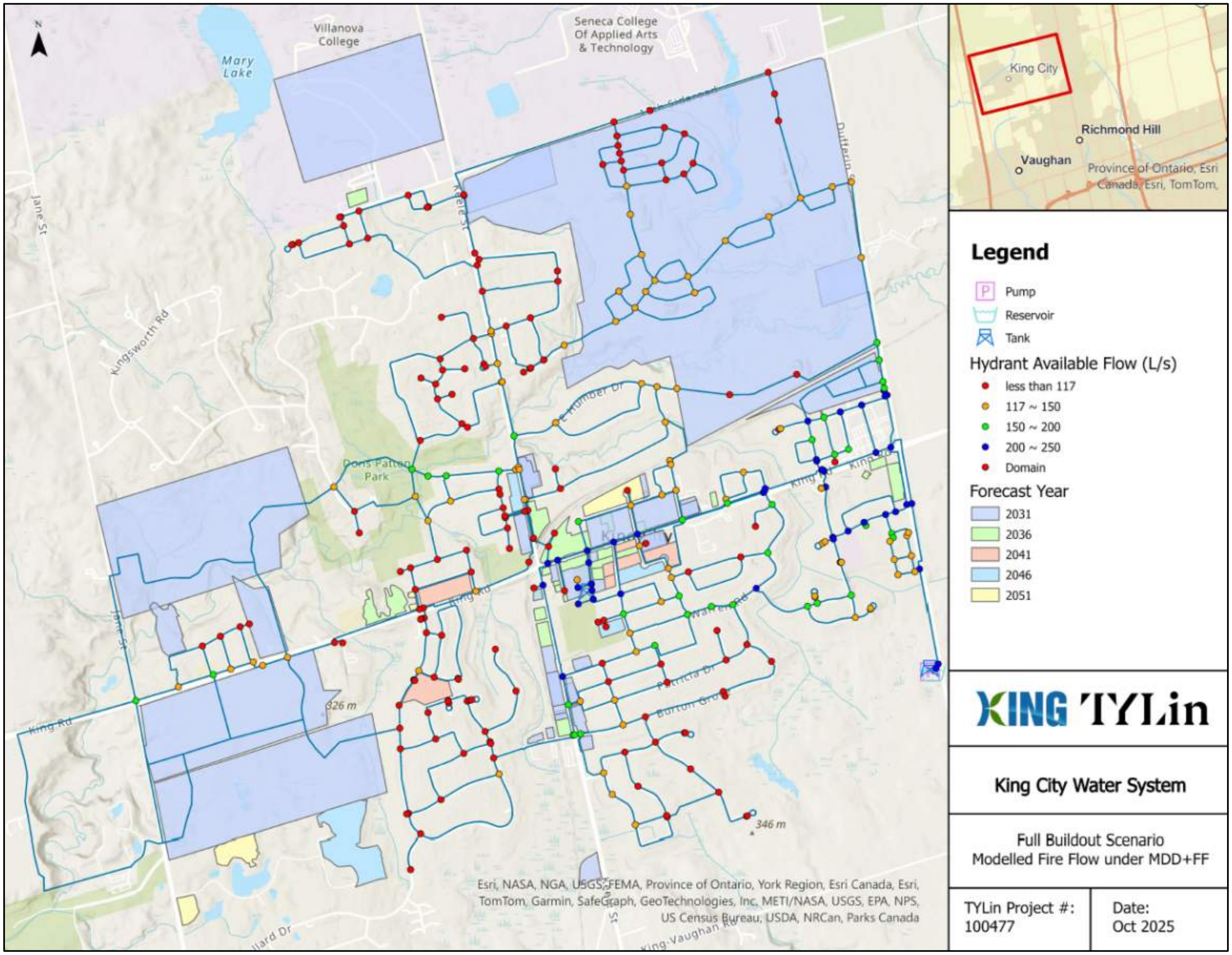
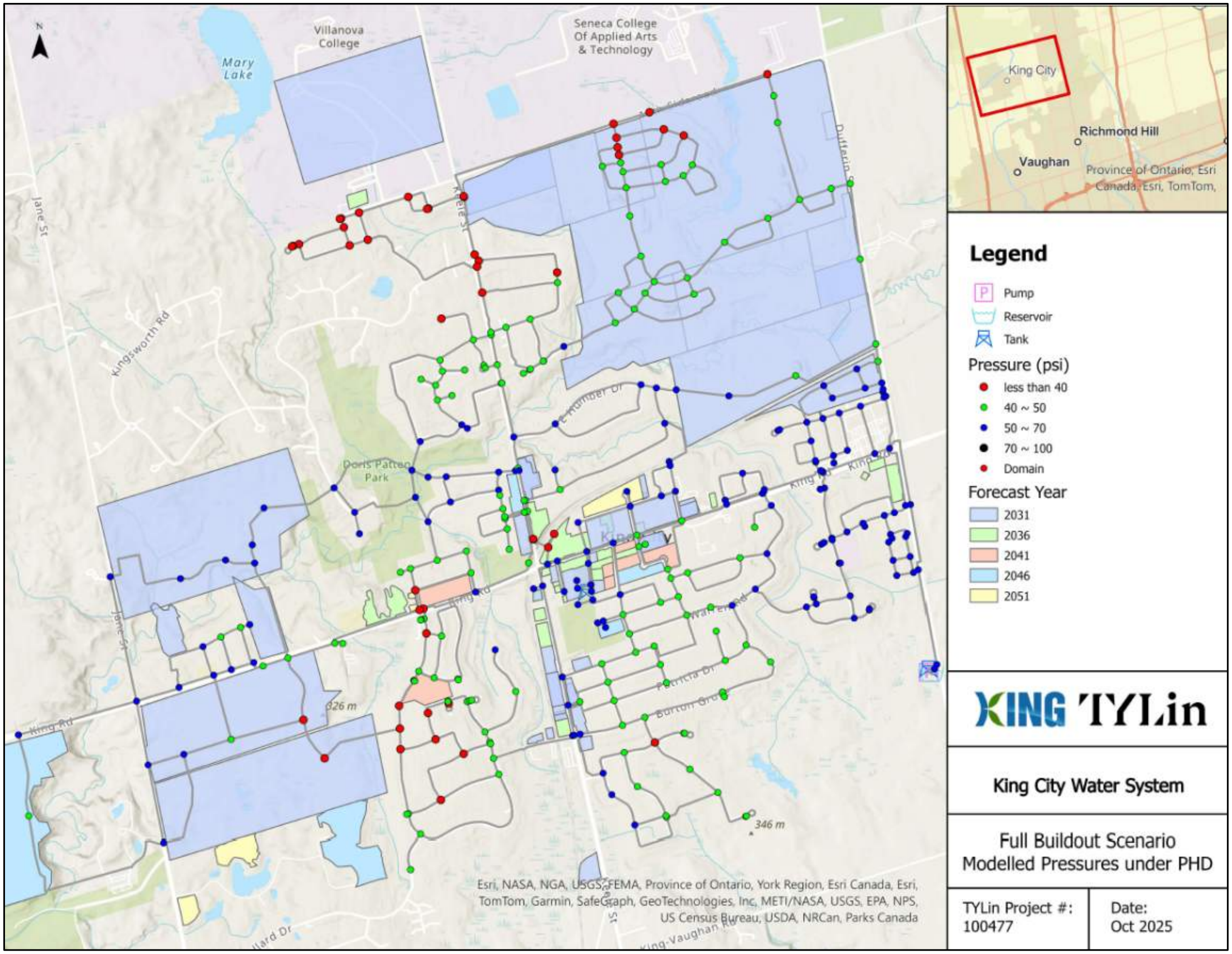


Figure 5-5: King City Simulated Pressures with Full Buildout under PHD Scenario



5.4.2.3 Full Buildout + System Upgrades

This scenario presents the modelled results under full buildout conditions with system upgrades implemented.

Fire flow availability has significantly improved in previously deficient areas:

- Jane Street and King Road: fire flows range from 123 L/s to 195 L/s
- McClure Drive: 119 L/s to 155 L/s
- Burton Grove: 120 L/s to 155 L/s
- Langdon Drive: 112 L/s to 124 L/s

All areas identified with fire flow deficiencies under the existing scenario show marked improvement. Under full buildout conditions, fire flow availability has also improved substantially. As shown in **Figure 5-6**, most junctions coded in red, which indicate flows below 117 L/s, are located at dead-end segments. The majority of junctions located along continuous or looped watermains now demonstrate fire flow availability exceeding 117 L/s.

Figure 5-7 displays modelled pressure levels under full buildout with system upgrades, ranging from 39 psi to 73 psi. Only four junctions fall slightly below 40 psi, but remain close to the acceptable threshold.

Figure 5-6: King City Simulated Available Fire Flow with Full Buildout + System Upgrades under MDD+FF Scenario

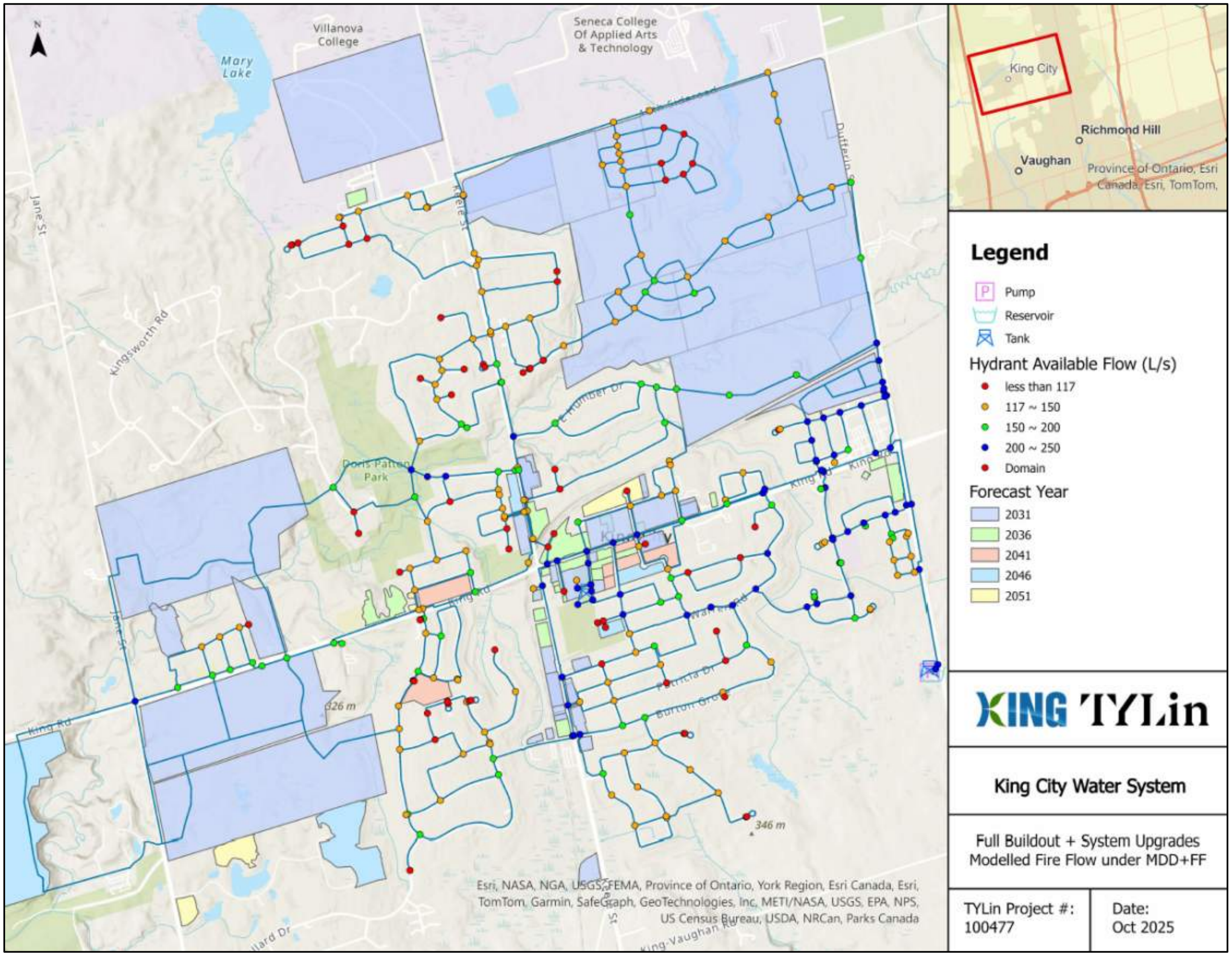
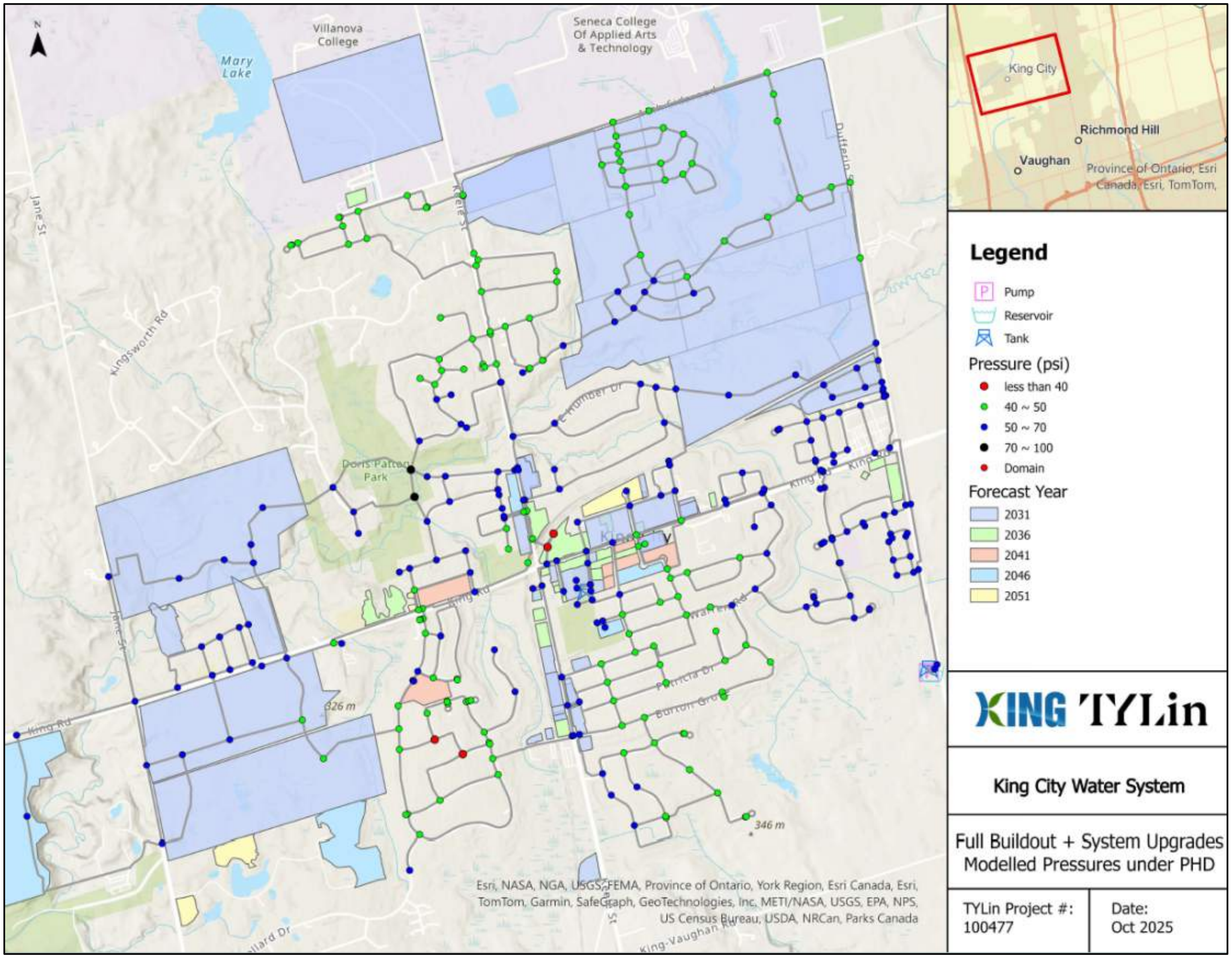


Figure 5-7: King City Simulated Pressures with Full Buildout + System Upgrades under PHD Scenario



5.4.3 Nobleton Modelling Results

5.4.3.1 Existing Scenario

The existing scenario was modeled using current infrastructure and water demand conditions, incorporating approved development applications. As shown in **Figure 5-8**, the available fire flow ranges from 42 L/s to 1752 L/s, with higher values observed near the elevated tanks. **Figure 5-9** illustrates that simulated pressures in Nobleton under existing conditions range from 53 psi to 99 psi, meeting the required criteria. However, fire flow deficiencies are primarily observed near the west end of King Road, along Russel Snider Drive, in the Noblewood Drive neighbourhood, and in the Crestview Road and Janet Avenue area.

Figure 5-8: Nobleton Simulated Available Fire Flow under Existing MDD+FF Scenario

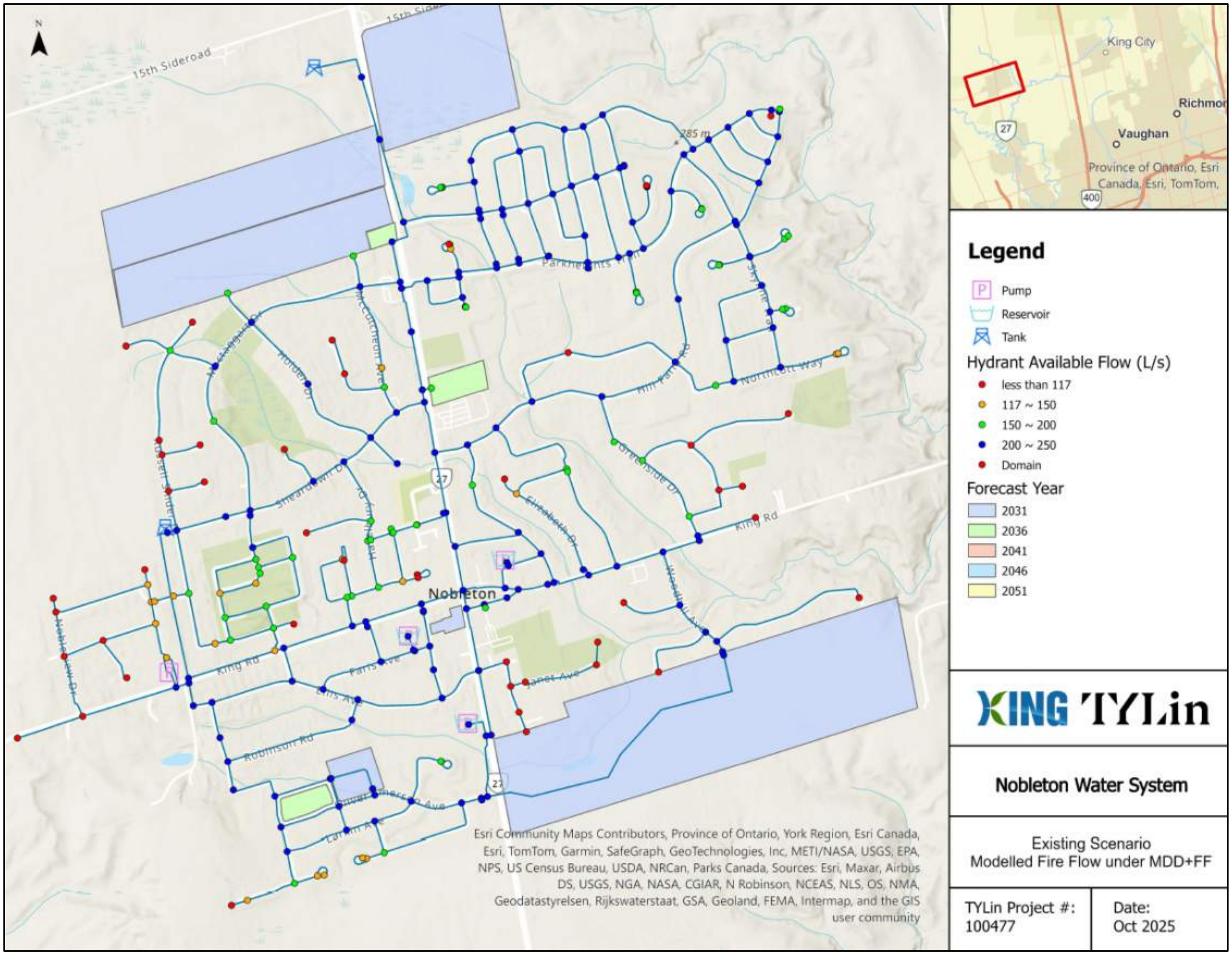
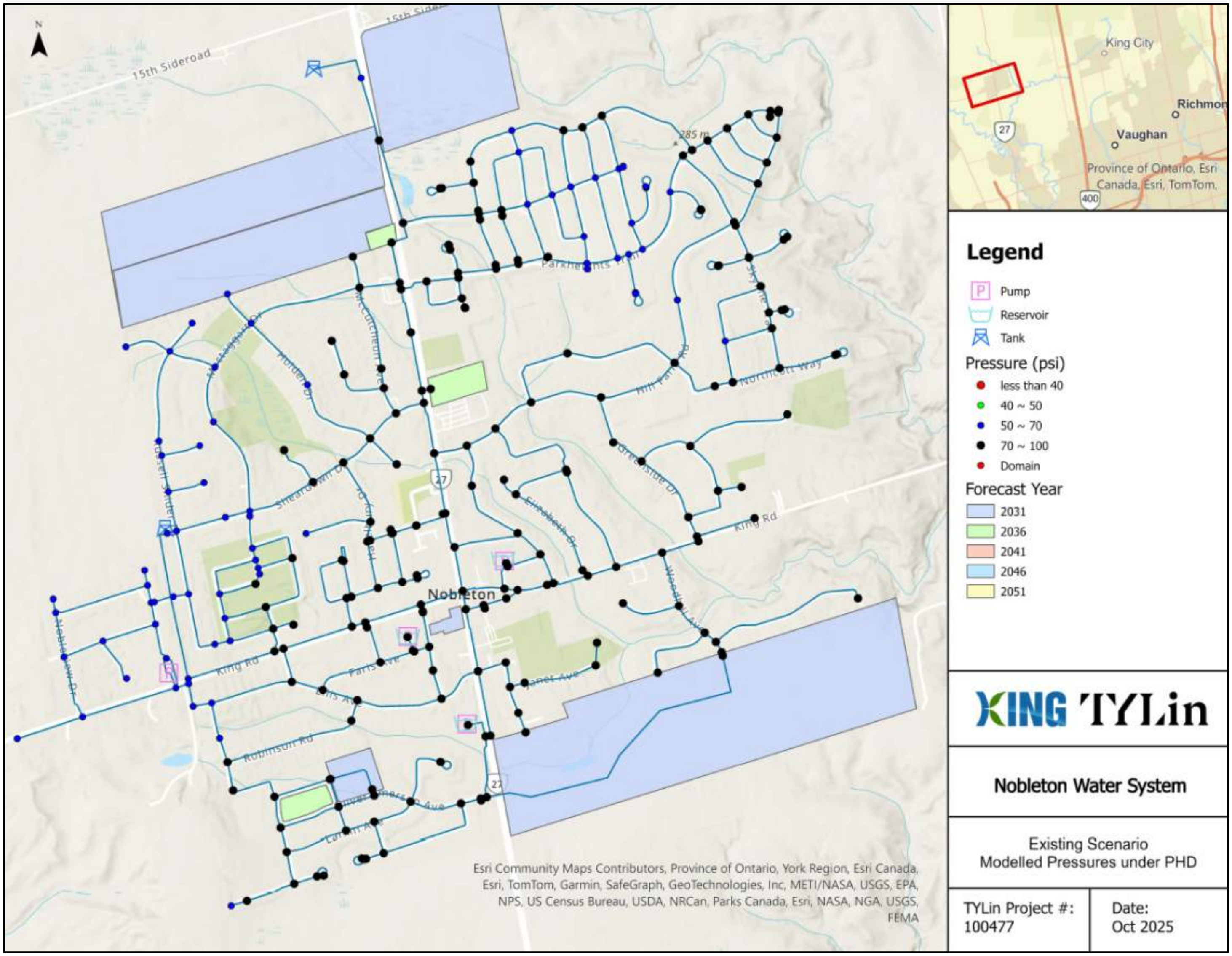


Figure 5-9: Nobleton Simulated Pressures under Existing PHD Scenario



5.4.3.2 Full Buildout: Existing + Developments + Intensification + DGA

Under this scenario, the modelled results reflect the performance of the existing system when subjected to full buildout water demand conditions. **Figure 5-10** shows fire flow availability ranging from 42 L/s to 1713 L/s, with higher values near the elevated tanks. The same areas continue to exhibit fire flow deficiencies when compared to the existing scenario. **Figure 5-11** indicates that modeled pressures range from 52 psi to 97 psi under the additional demands of full buildout.

Figure 5-10: Nobleton Simulated Available Fire Flow with Full Buildout under MDD+FF Scenario

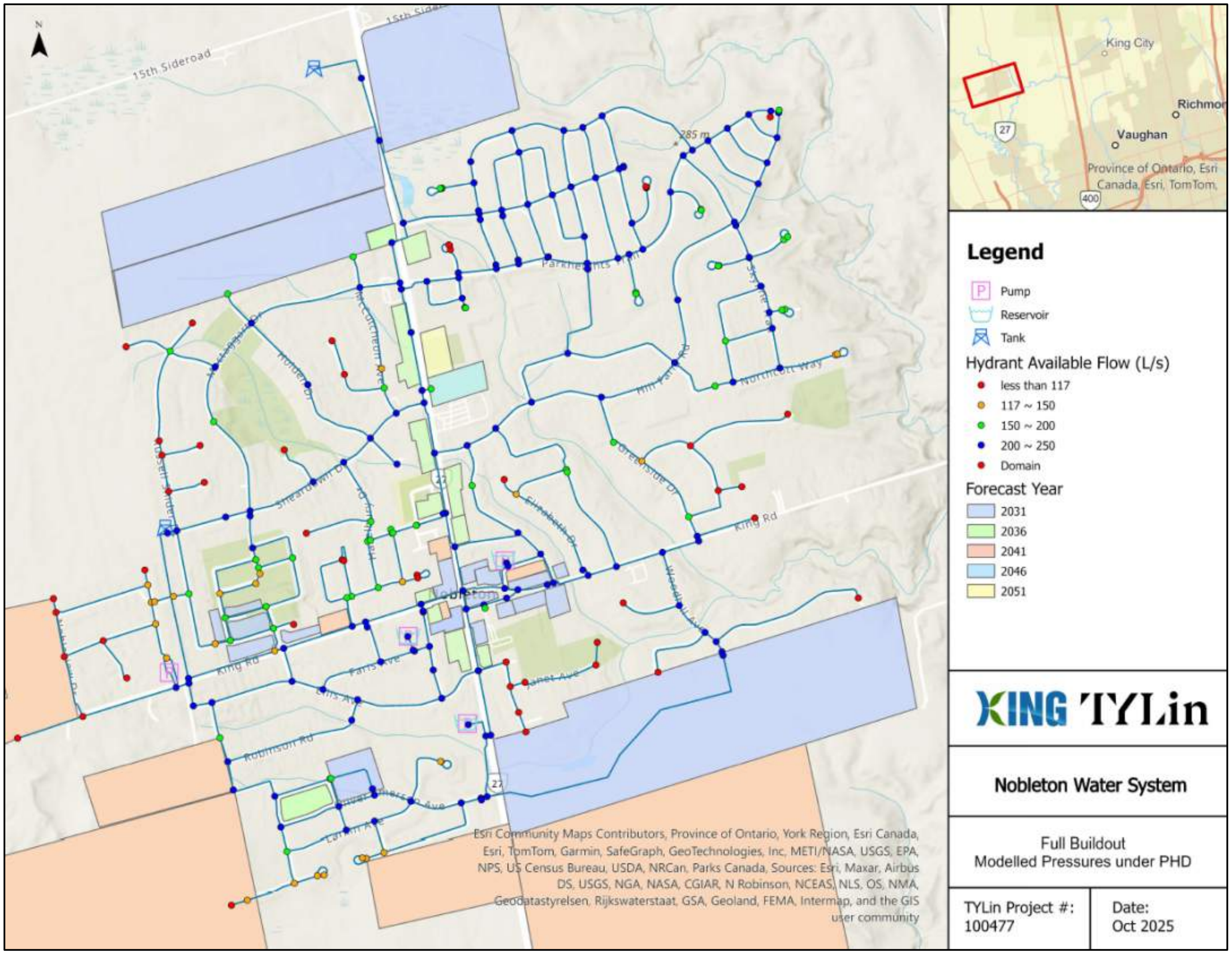
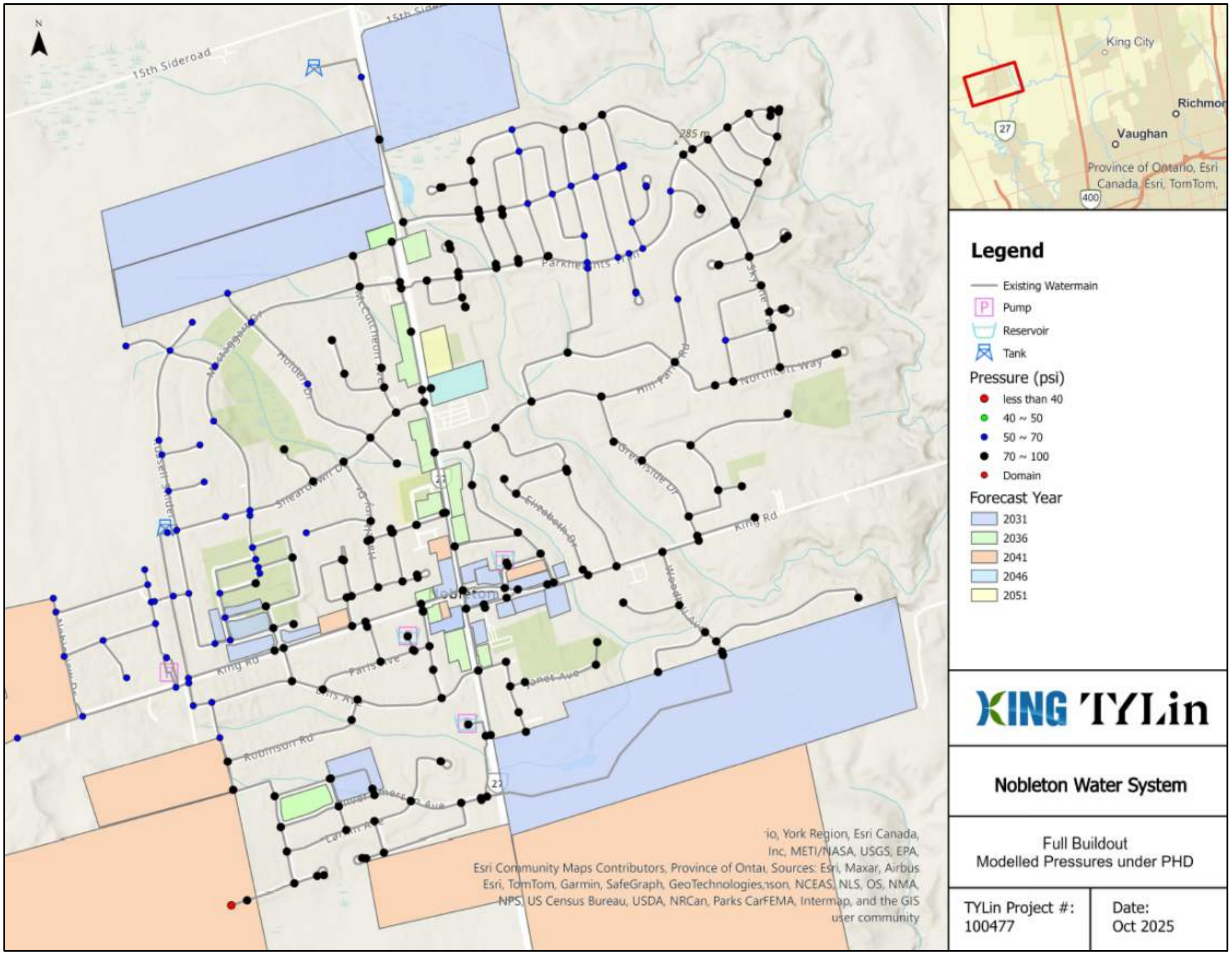


Figure 5-11: Nobleton Simulated Pressures with Full Buildout under PHD Scenario



5.4.3.3 Full Buildout + System Upgrades

This scenario included the water demands for the proposed developments and incorporated all the proposed upgrades to the infrastructure into the model network. Proposed upgrades for 2051 to address the constraints were documented in the depth in the Technical Memo – Alternative Servicing Solutions.

Figure 5-12 shows improved fire flow availability in the areas identified in the previous scenario.

- King Road West: fire flow increased to 131–168 L/s, except at dead-end junctions where values remain lower.
- Russell Snider Drive: fire flow increased to 121–229 L/s.
- Crestview Road and Janet Avenue: fire flow reaches 178 L/s at the intersection.
- Noblewood Drive: fire flow increased to >130 L/s.

Figure 5-13 shows modelled pressures under peak hour demand after the system upgrades; pressures range from 50 psi to 97 psi, which remains within acceptable operating limits.

Figure 5-12: Nobleton Simulated Available Fire Flow with Full Buildout + System Upgrades under MDD+FF Scenario

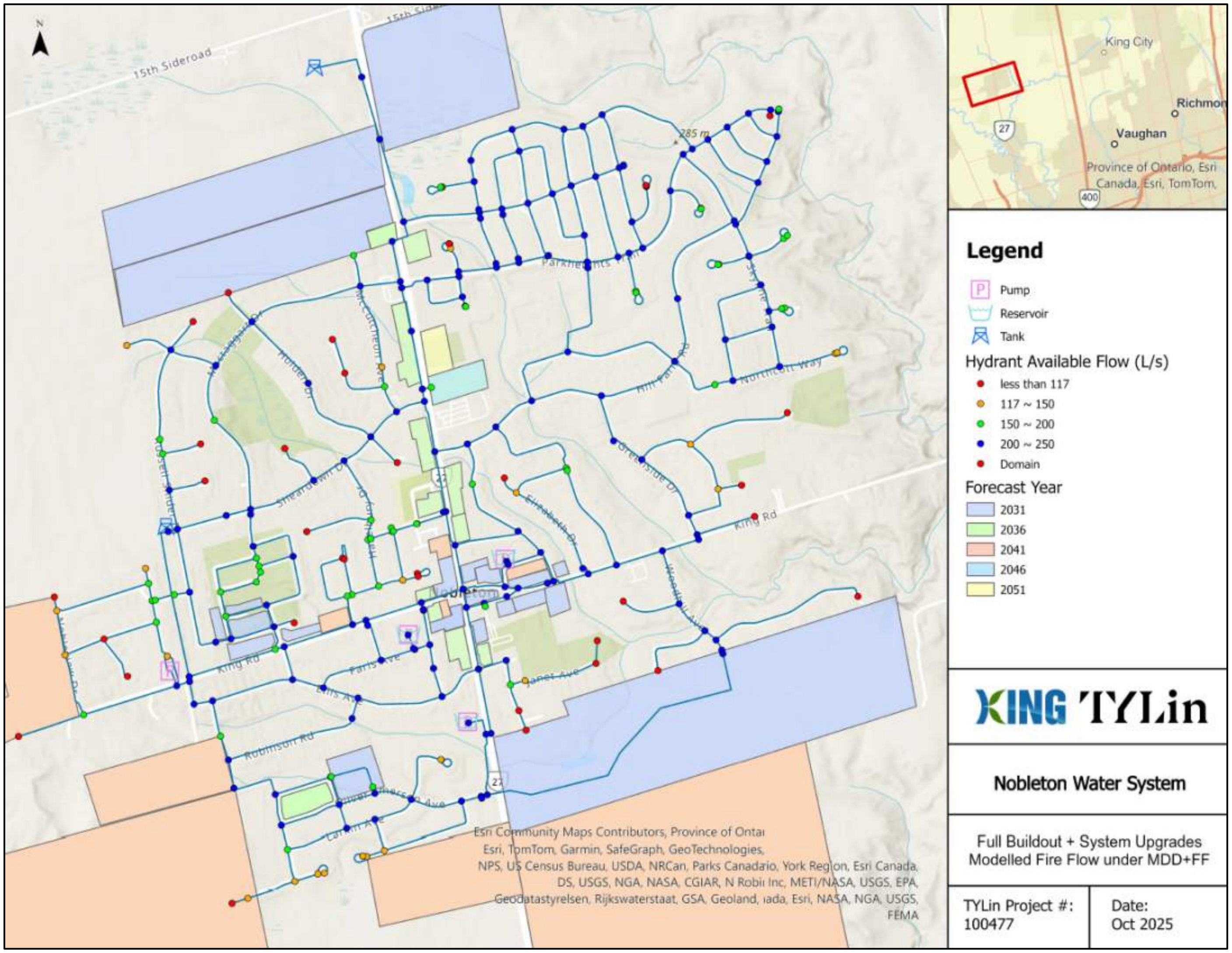
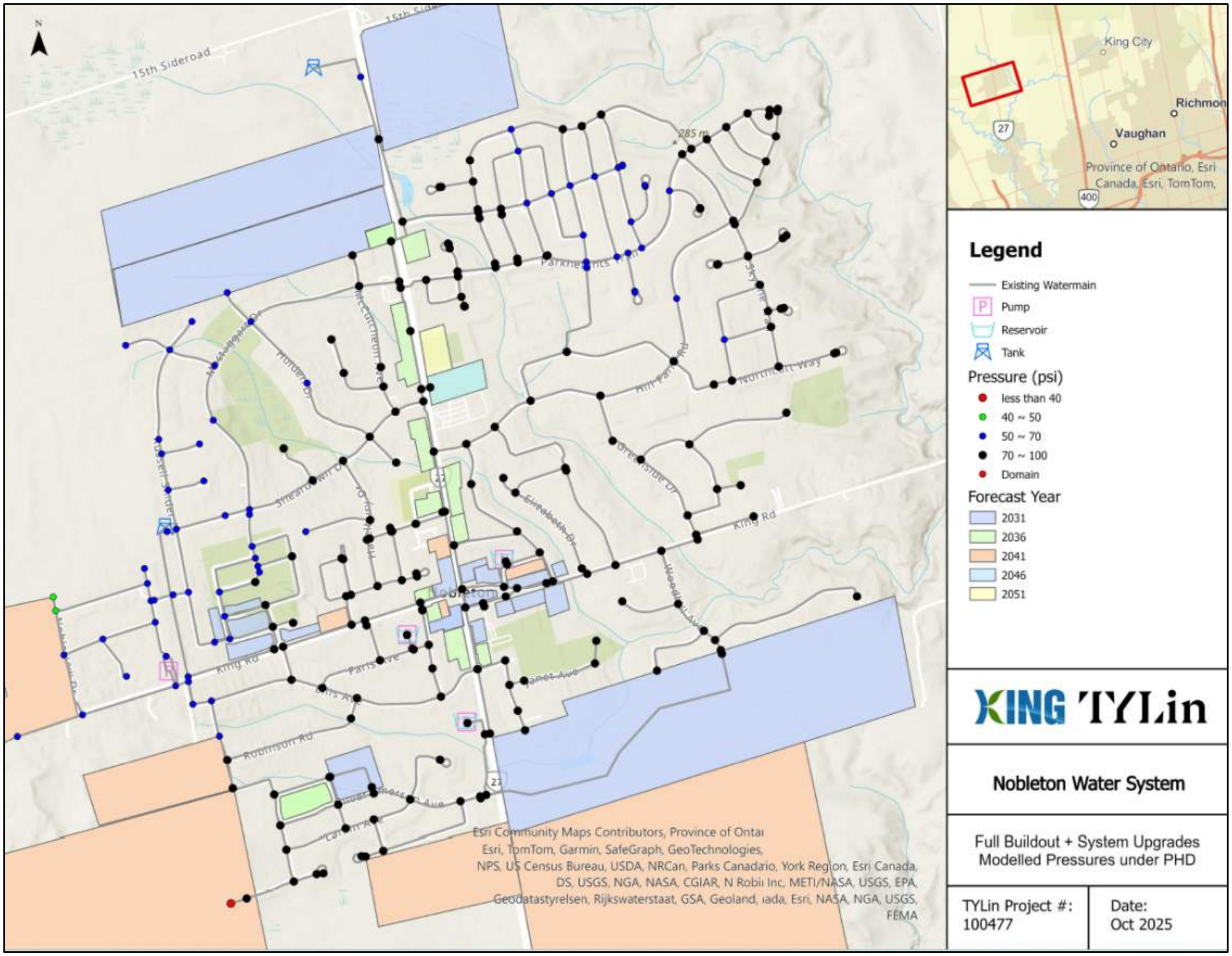


Figure 5-13: Nobleton Simulated Pressures with Full Buildout + System Upgrades under PHD Scenario



5.4.4 Schomberg Modelling Results

5.4.4.1 Existing Scenario

The existing scenario was modelled using current infrastructure and water demand conditions.

Figure 5-14 illustrates that fire flow availability in Schomberg under existing conditions ranges from 45 L/s to 104 L/s south of Main Street, which is identified as the area with the most significant fire flow deficiency. Additionally, low fire flow levels are observed along Copper Drive near Dr. Jones Drive area, ranging from 82 L/s to 112 L/s.

Figure 5-15 shows simulated pressures across Schomberg under existing conditions, ranging from 54 psi to 95 psi, which remains within acceptable operational limits.

Figure 5-14: Schomberg Simulated Available Fire Flow under Existing MDD+FF Scenario

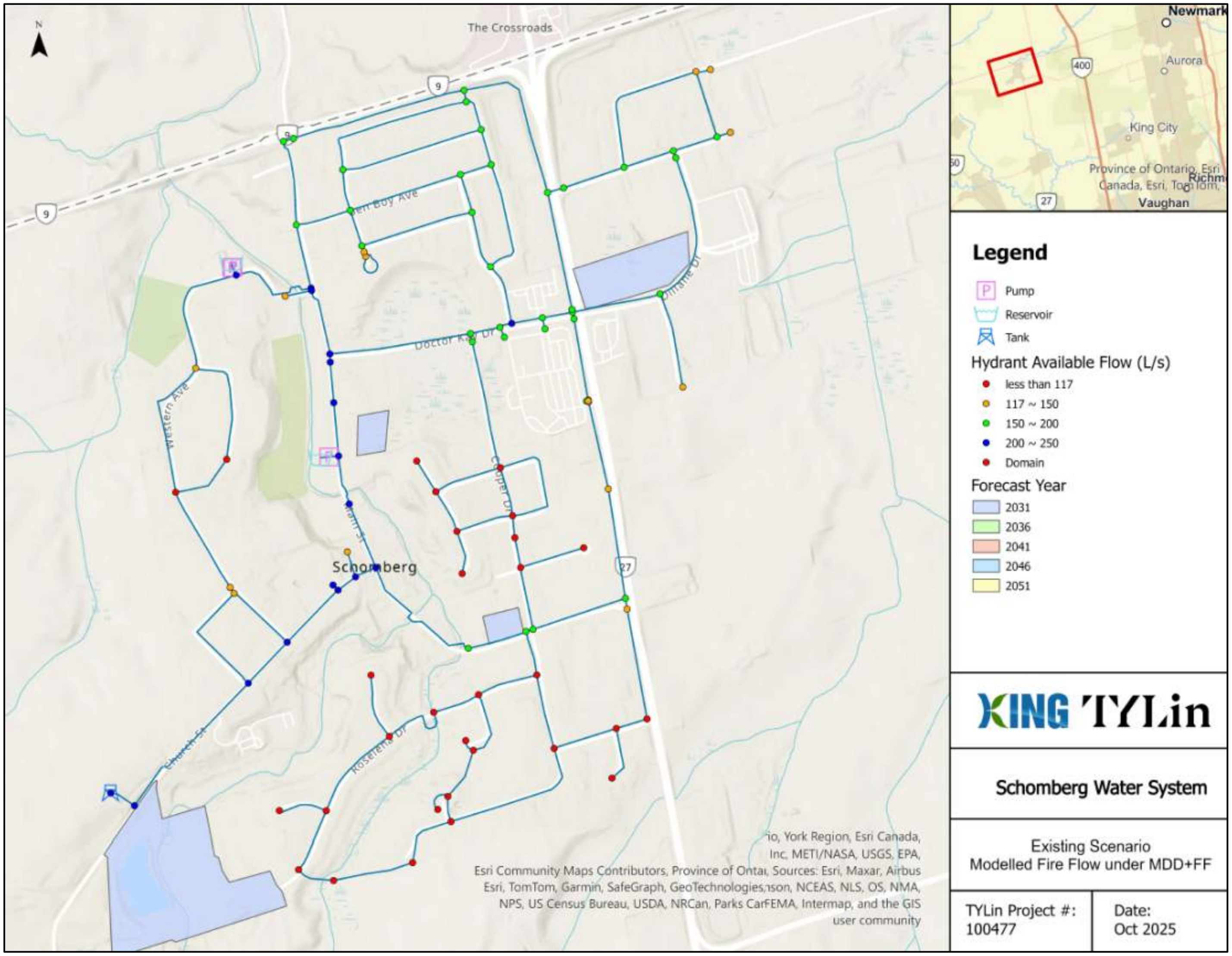
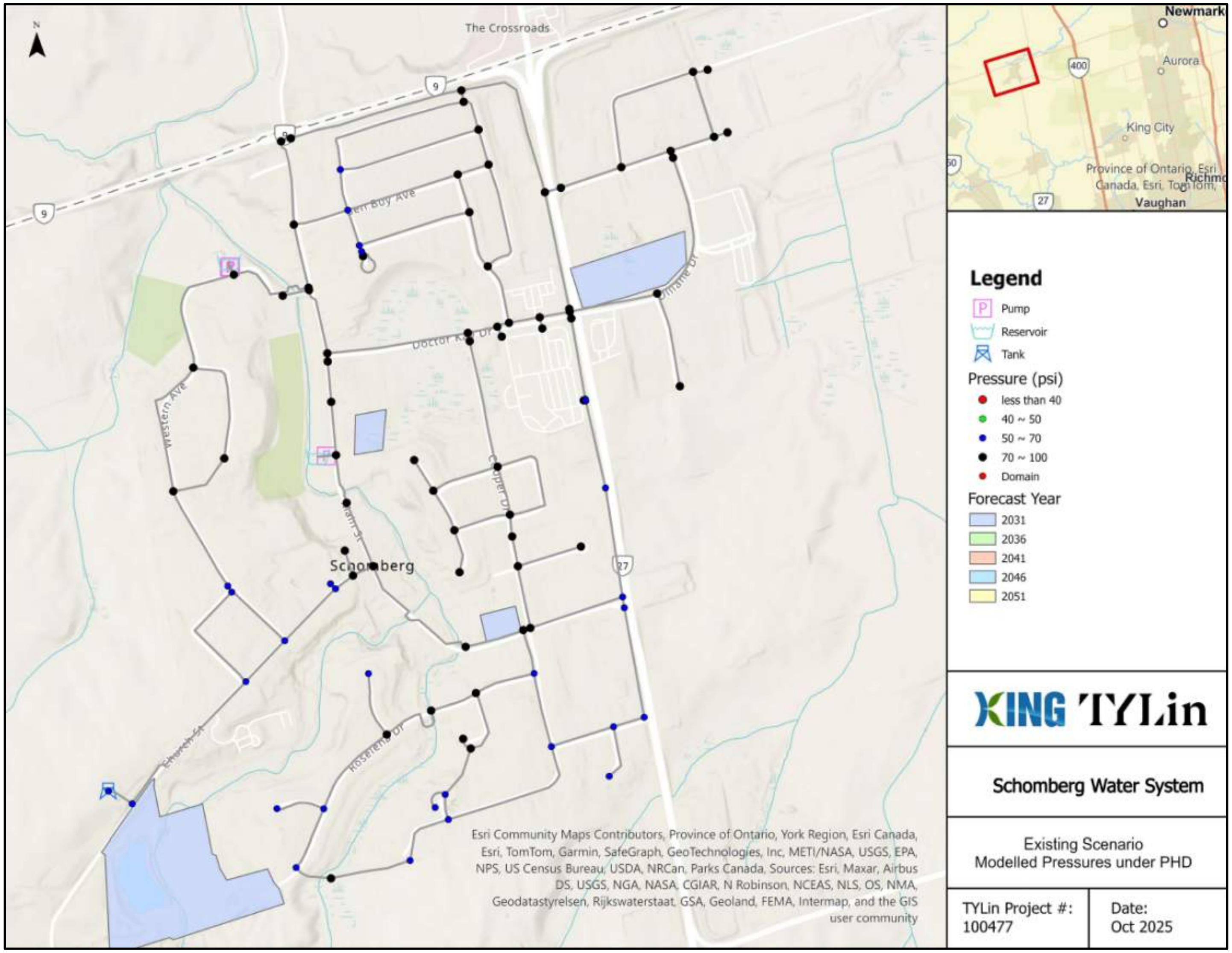


Figure 5-15: Schomberg Simulated Pressures under Existing PHD Scenario



5.4.4.2 Full Buildout: Existing + Developments + Intensification + DGA

Figure 5-16 illustrates fire flow availability in Schomberg under full buildout conditions. South of Main Street, fire flows range from 44 L/s to 98 L/s, while the area along Copper Drive near Dr. Jones Drive shows flows between 77 L/s and 105 L/s. These values are slightly lower than those observed under existing conditions, suggesting that the fire flow limitations stem from the current network infrastructure rather than future development or intensification.

Figure 5-17 presents simulated pressure levels across Schomberg under existing conditions, ranging from 54 psi to 94 psi, which remain within acceptable operational limits.

Figure 5-16: Schomberg Simulated Available Fire Flow with Full Buildout under MDD+FF Scenario

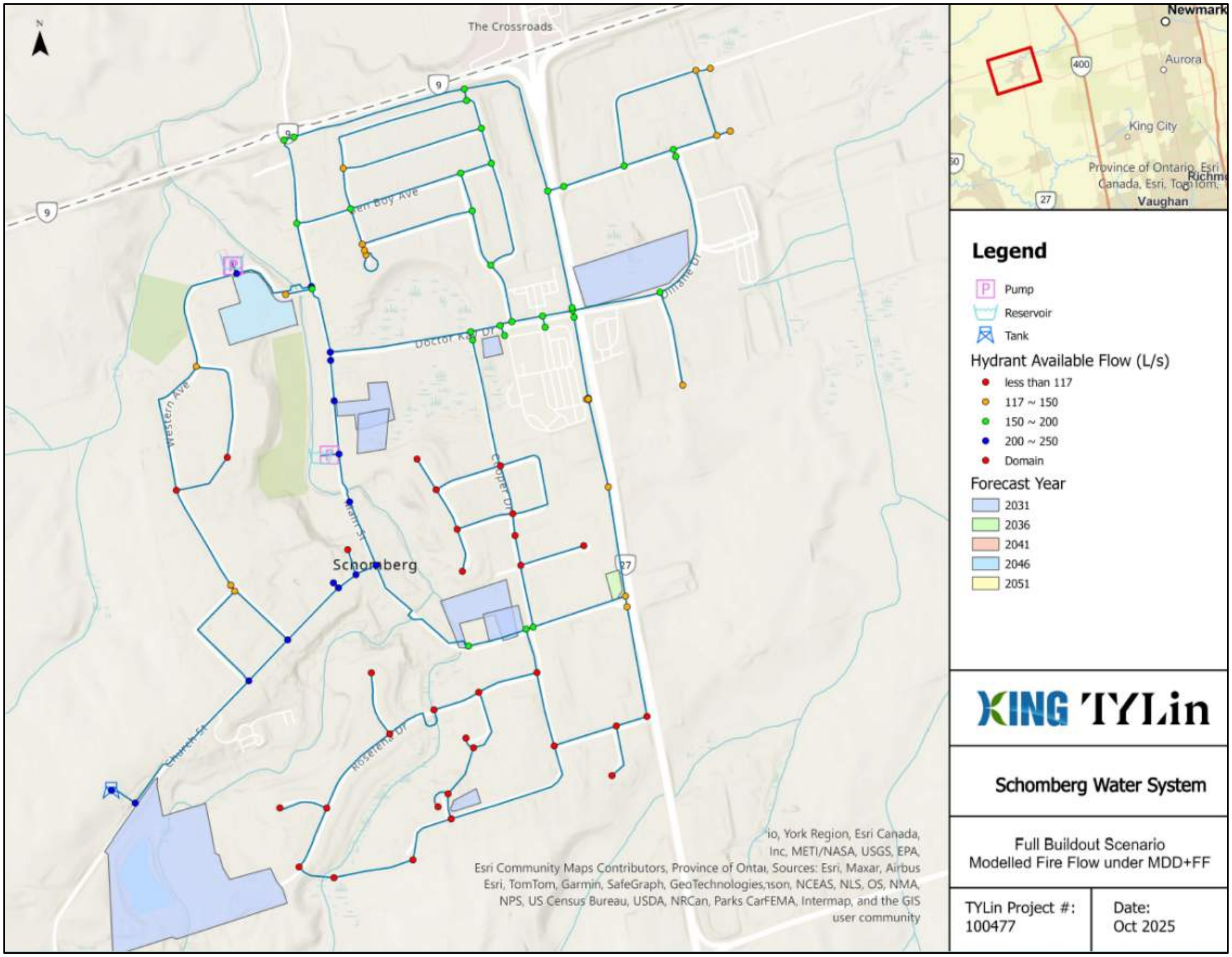
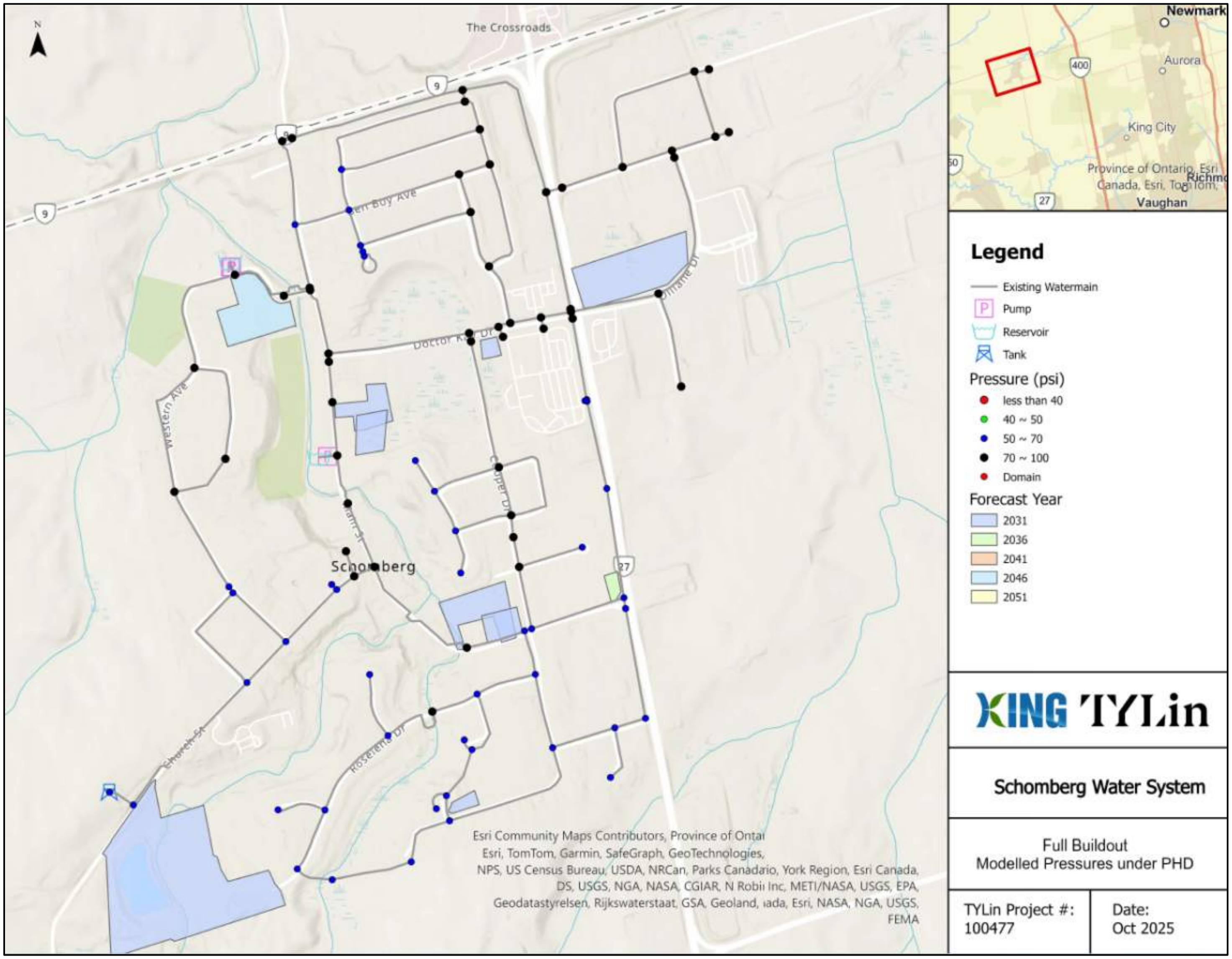


Figure 5-17: Schomberg Simulated Pressures with Full Buildout under PHD Scenario



5.4.4.3 Full Buildout + System Upgrades

Figure 5-18 illustrates fire flow availability in Schomberg under full buildout conditions with system upgrades in place. South of Main Street, fire flows range from 122 L/s to 151 L/s, while the area along Copper Drive near Dr. Jones Drive shows flows between 100 L/s and 155 L/s. These values represent a significant improvement over those observed under both existing and future buildout scenarios without upgrades.

Figure 5-19 presents simulated pressure levels across Schomberg under existing conditions, ranging from 54 psi to 94 psi, which remain within acceptable operational thresholds.

Figure 5-18: Schomberg Simulated Available Fire Flow with Full Buildout + System Upgrades under MDD+FF Scenario

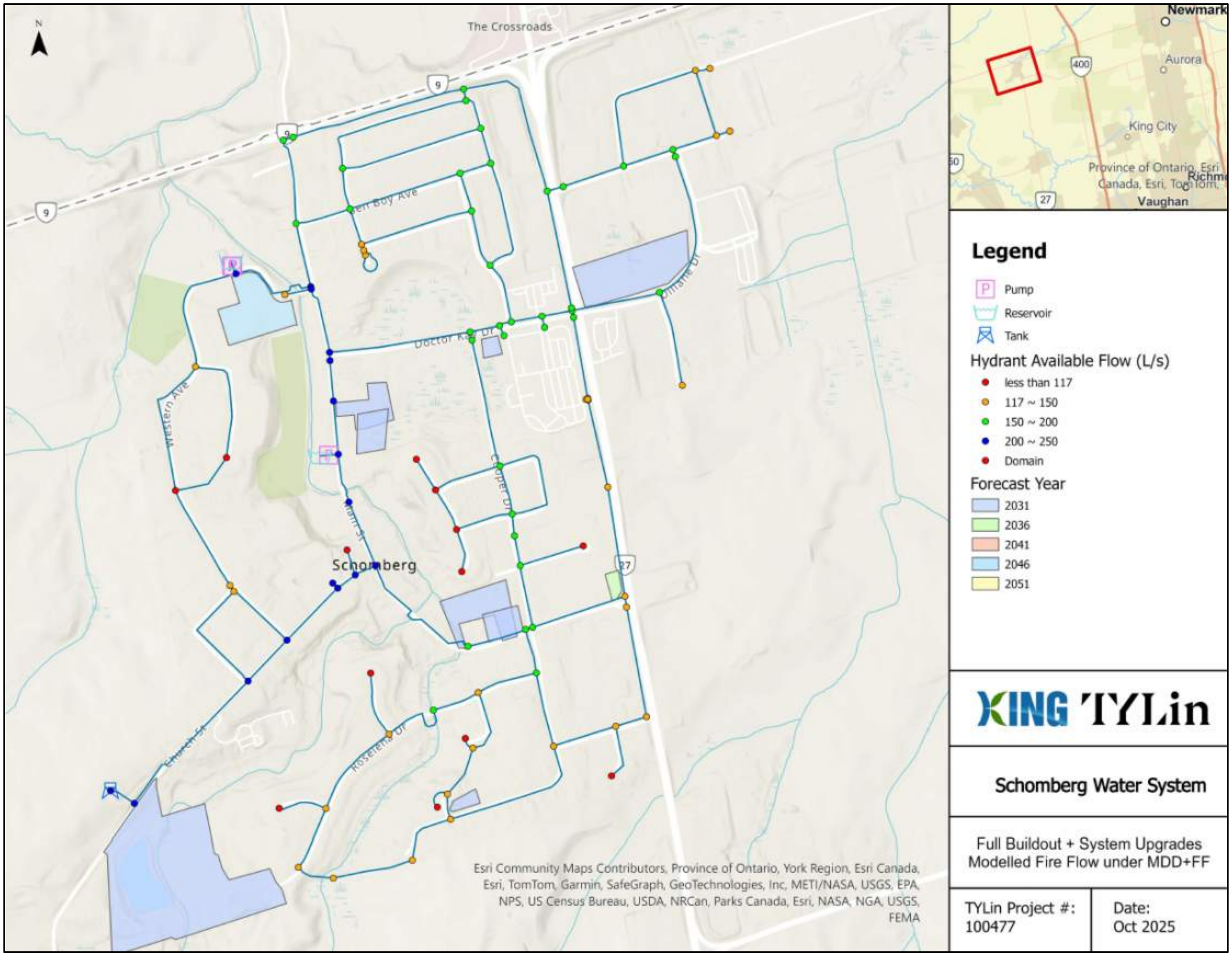
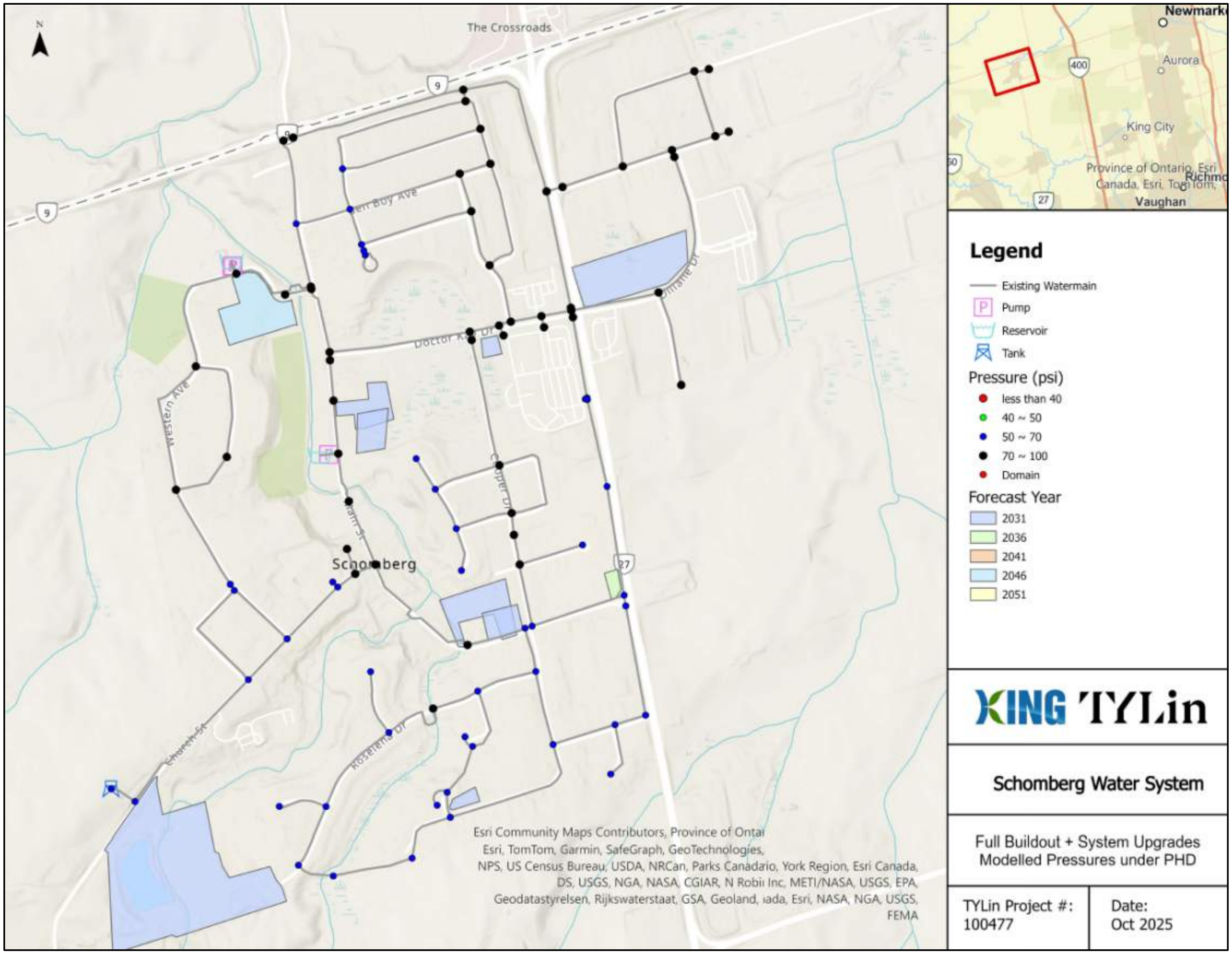


Figure 5-19: Schomberg Simulated Pressures with Full Buildout + System Upgrades under PHD Scenario



6 WASTEWATER MODELLING METHODOLOGY

6.1 Existing System and Gap Analysis

The pipe network consists of interconnected pipes, manholes, wet wells, pumping stations, outfalls, and other components that transport wastewater. TYLin updated the model using the most recent GIS data and record drawings from the Town. During this process, discrepancies were identified, and data gaps were filled, with assumptions made where necessary to resolve missing information.

6.1.1 Existing Wastewater Facilities

The Town's Sewage Pumping Stations were modeled in a simplified form, consisting of pumps, wet wells, and forcemains. The pumps were represented using Design Point Curves that incorporate the design flow and design head parameters. The wet well was configured based on available specifications, including minimum, maximum, and initial water levels, to reflect operational conditions. The Region SPS was modeled as the outlet point in the system, serving as the discharge location for flows conveyed through the Town's SPS infrastructure.

6.1.1.1 King City

Table 6-1 summarizes the sewage pumping stations in King City.

Table 6-1: King City Sewage Pumping Stations (SPS)

Facility	# of Pumps	Total Capacity [L/s]	Source
KSPS_0001 – Martin St. SPS	2	10.78	ECA 121-W601
KSPS_0002 - Keele St. N SPS	2	63.58	ECA 121-W601
KSPS_0003 – Alex Campbell SPS	3	135	ECA 121-W601
KSPS_0004 – Burton Grove SPS	2	19.03	ECA 121-W601
KSPS_0005 – Collard Dr. SPS	2	10.2	ECA 121-W601
KSPS_0007 – Kinghorn Rd. SPS	3	110	ECA 121-W601

Note: King City East pumping Station is currently under construction.

6.1.1.2 Nobleton

Table 6-2 summarizes the sewage pumping stations in Nobleton.

Table 6-2: Nobleton Sewage Pumping Stations

Facility	# of Pumps	Total Capacity [L/s]	Source
NSPS_0001 – Bluff Trail SPS	2	34.2	ECA 121-W601

6.1.1.3 Schomberg

Table 6-3 summarizes the sewage pumping stations in Schomberg.

Table 6-3: Schomberg Sewage Pumping Stations

Facility	# of Pumps	Total Capacity [L/s]	Firm Capacity [L/s]	Source
SSPS_0001 - Proctor Rd PS	2	27		ECA 121-W601

6.1.2 Gap Analysis

A gap analysis conducted on the wastewater modeling system revealed discrepancies between the GIS data and the hydraulic model. Specifically, several invert levels were missing from the model, which compromised its accuracy and completeness. To address this issue, the absent inverts were supplemented using corresponding values extracted from the GIS database, ensuring better alignment between spatial data and model parameters. **Table 6-4** outlines the specific discrepancies identified.

Table 6-4: Wastewater Model and GIS Invert Level Discrepancies

Pipe ID	Model Upstream Invert (m)	Model Downstream Invert (m)	Updated Upstream Invert (m)	Updated Downstream Invert (m)	Length (m)	Diameter (mm)
KSPI_0457	0	0	298.564	298.014	110	200
KSPI_0459	0	0	297.968	295.430	81	200
KSPI_0520	0	294.94	295.370	294.940	38	200
KSPI_0620	0	0	296.984	296.606	57	200
KSPI_0765	282.764	0	282.764	282.762	5	450
NSPI_0502	0	0	257.976	255.140	92	300

NSPI_0504	0	0	247.980	247.818	32	200
NSPI_0636	0	0	269.670	269.150	105	200
NSPI_0685	270.78	0	270.780	268.780	71	200
NSPI_0692	278.6	0	278.600	278.100	48	200
NSPI_0698	0	273.08	273.080	272.530	45	200
NSPI_0700	0	275.18	275.180	274.300	25	200
NSPI_0711	262.68	0	262.680	262.250	41	200

In addition to the discrepancies in invert levels, the gap analysis also identified the pipes exhibiting adverse slopes in the wastewater model. These conditions, where the downstream invert is higher than the upstream invert, can lead to hydraulic inefficiencies and potential operational issues. To rectify this, the invert elevations for the affected pipes were reviewed and updated to ensure proper flow direction and model accuracy. The details of these adverse slope pipes are documented in **Table 6-5**.

Table 6-5: Pipes with Adverse Slopes Identified in Model

Pipe ID	Original Upstream Invert (m)	Original Downstream Invert (m)	Updated Upstream Invert (m)	Updated Downstream Invert (m)
NSPI_0191	255.99	256.56	255.99	255.56
NSPI_0347	256.03	257.68	258.03	257.68
NSPI_0441	253.85	253.9	253.9	253.86
NSPI_0659	277.41	277.53	277.41	277.25
NSPI_0664	277.89	277.92	277.89	277.33
NSPI_0668	272.48	272.53	275.07	272.53
NSPI_0670	272.48	272.53	272.48	270.6
NSPI_0671	267.33	269.11	270.59	269.11
NSPI_0672	265.62	265.66	267.33	265.66
NSPI_0673	265.62	265.66	265.62	264.21
NSPI_0674	264.18	264.21	264.18	263.86
NSPI_0675	263.83	263.86	263.83	263.5
NSPI_0676	261.65	261.71	263.48	263.33
NSPI_0677	261.55	261.57	261.65	261.57
NSPI_0678	261.28	261.3	261.55	261.3
NSPI_0680	267.78	268.5	268.5	267.78
NSPI_0681	264.65	264.67	264.65	264.23

NSPI_0682	265.52	265.6	265.04	264.67
NSPI_0683	265.8	265.9	265.47	265.3
NSPI_0684	265.28	265.3	265.28	265.08
NSPI_0686	268.77	268.78	268.77	266.82
NSPI_0687	265.51	265.82	265.82	265.51
NSPI_0688	275.78	275.8	275.78	275.13
NSPI_0691	277.21	277.56	277.56	276.72
NSPI_0693	278.04	278.1	278.04	277.07
NSPI_0694	276.99	277.07	276.99	275.44
NSPI_0695	275.34	275.44	275.34	273.47
NSPI_0696	273.02	273.03	273.41	273.03
NSPI_0704	269.63	269.66	270.78	269.66
NSPI_0713	271.48	273.05	271.48	269.14
NSPI_0716	267.44	268.71	268.71	267.44
NSPI_0723	261.1	262.09	262.09	261.1
NSPI_0730	261.01	261.03	261.28	261.03
NSPI_0731	261.01	261.03	261.01	260.3

Inconsistencies in pipe diameters between the GIS data and the hydraulic model were identified during the gap analysis. The actual diameters were confirmed by the Town and subsequently updated in the model to reflect accurate field conditions. **Table 6-6** presents a detailed summary of the affected pipes and the diameter adjustments made.

Table 6-6: Pipe Diameter Discrepancies and Verified Updates

Pipe ID	Model Diameter (mm)	GIS Diameter (mm)	Verified Diameter (mm)
NSPI_0021	200	300	300
NSPI_0048	300	200	300
NSPI_0162	300	375	375
NSPI_0281	300	200	300
NSPI_0705	250	<Null>	250
NSPI_0732	250	<Null>	250

6.2 Model Update

6.2.1 Wastewater Model Update

- The backwash discharge location for the Nobleton Water Treatment Plant has been updated. Based on estimated discharge rates, the sanitary system is projected to receive 16 L/s by 2051, with phased flows of 8 L/s by 2031 and 12 L/s by 2041. These discharge rates have been incorporated into the hydraulic model across the relevant planning scenarios.
- The King City East (KCE) Sewage Pumping Station (SPS) has been incorporated into the model, with sanitary flows from 13330 Dufferin Street and King Rocks directed to discharge into the KCE SPS. The location, configuration of the SPS, along with the downstream connection, were modeled based on the KCE SPS design report and associated drawings.

6.2.1 Operational Model to Masterplan Model Conversion

TYLin received the 2024 consumption data and conducted a comparative analysis against the calculated wastewater flows derived from the Town's design criteria. In accordance with the Town's request, the existing model scenarios were updated using flow values calculated based on the Town's design criteria, rather than actual consumption data from billing records. The provided operational models were reverted back to steady state models taking into account the Township's Design Criteria for flows.

6.3 Wastewater Loads

6.3.1 Existing Demands Calculation and Allocation

The nodal demand was distributed based on land use and on a parcel-by-parcel basis.

- Parcels were assigned a number of units based on weighted densities developed for residential housing types
- ICI parcels were identified based on zoning and area was used for calculating sanitary generation loads
- Parcels were aggregated to the nearest node/conduit
- Model nodes were populated

For the existing conditions, the model is built on design criteria according to the Town's request.

6.3.2 Future Demands Calculation and Allocation

For greenfield development and intensification areas, the model relies on theoretical per capita DWF and Inflow/Infiltration (I/I) rates, which are defined according to the Town's design criteria. The Harmon Peaking Factor, a widely accepted method for adjusting flow data based on population size, is used to determine the peak flow values. This factor helps adjust for the increased flow during peak demand periods in areas with higher population densities. The Harmon Peaking Factor is assigned based on the total population in the area, ensuring that the model accounts for expected population growth and corresponding increases in flow demands over time. The I/I rate is calculated by considering the area of each parcel, as this directly impacts the amount of water entering the system due to infiltration or inflow. When considering future sanitary flows, the future development tie-in connections are based on the FSRs.

6.3.3 Levels of Service

In this study, acceptable levels of service are defined to ensure that the sewer system functions efficiently and does not face undue pressure under different flow conditions.

- **Free flow under Dry-Weather Flow (DWF):** This condition refers to the ideal operating scenario during periods of dry weather when there is no significant rainfall. The sewer system is expected to carry wastewater without experiencing any surcharge, which means that the flow within the pipes should not exceed the pipe's capacity. In this case, the maximum flow depth should be below the top of the pipe (the obvert), ensuring that there is no backup of wastewater in the system.
- **Limited Surcharge under Wet-Weather Flow (WWF):** When it rains, the sewer system may experience an increase in flow due to inflow and infiltration (I/I) from stormwater. This can cause the system to surcharge, meaning that the flow exceeds the normal pipe capacity. However, it is acceptable for the pipes to operate under surcharge conditions, provided that the distance between the ground surface and the Hydraulic Grade Line (HGL), which represents the water level in the pipe, is greater than 1.8 meters. This ensures that even under surcharge conditions, there is enough clearance to prevent flooding or significant damage.

The criteria mentioned above are generally applied to maintain system efficiency and prevent overflows. However, exceptions may be made based on factors such as age, condition, or specific location of the pipes. For example, pipes in areas where surcharging is less critical or where mitigation measures are in place may be subject to different operational standards.

6.4 Wastewater Hydraulic Analysis

This section summarizes the modelling results of the following for the communities of King City, Nobleton and Schomberg as follows.

6.4.1 Capacity Analysis Scenarios

Three scenarios were analyzed to evaluate the performance of the sanitary sewer system in the study area under phased planning conditions, as outlined below:

- Scenario 1: Existing

  Represents the current infrastructure, including all approved and under-construction developments. It assesses system performance under the added load from these developments.

- Scenario 2: Full Buildout: Existing + Developments + Intensification + DGA

  Builds on Scenario 1 by incorporating additional sanitary flows from intensification areas and designated growth areas (DGA), reflecting the network's performance under full buildout conditions.

- Scenario 3: Full Buildout + System Upgrades

  Expands on Scenario 2 by integrating system upgrades in areas where deficiencies were identified. This scenario presents the proposed solutions following the evaluation of alternative options. Further details are provided in the Technical Memo – Alternative Servicing Solutions.

6.4.2 King City Modelling Results

6.4.2.1 Existing Scenario

The baseline scenario was modeled using the current infrastructure and wastewater demands while accounting for projected loads from approved development applications.

Figure 6-1 presents pipe capacity and manhole freeboard results in King City under wet weather flow conditions. Sewer flows remain within 85% of pipe capacity across most of the network and surpass this threshold only in sections of sewer along King Road and in the south-west of King City, reaching over 100% capacity in certain pipe segments.

The majority of manhole freeboard levels under the existing scenario are exceed 1.8 meters in the study area, with some surcharge projected from the modelling results. The freeboard in King City ranges from 0 m to 13.18 m under existing conditions.

6.4.2.1 Full Buildout: Existing + Developments + Intensification + DGA

Figure 6-2 presents the modeled results for King City under full system buildout conditions during the WWF scenario. The results are similar to those found under the existing scenario in areas of King City without projected growth. In zones with proposed developments and intensification opportunities, greater pipe capacities and lower freeboard levels are observed. Notably, the sewer west of Keele Street is expected to exceed 100% pipe capacity.

6.4.2.1 Full Buildout + System Upgrades

Figure 6-3 shows the modeled results for King City under full system buildout conditions during the WWF scenario with proposed system upgrades. The results in this condition show significant improvements. Pipes that previously surcharged are found to operate under 85% of their capacities, showing the improved performance in the wastewater system with upgrades.

Figure 6-1 King City Simulated Wet Weather Flow under Existing Scenario

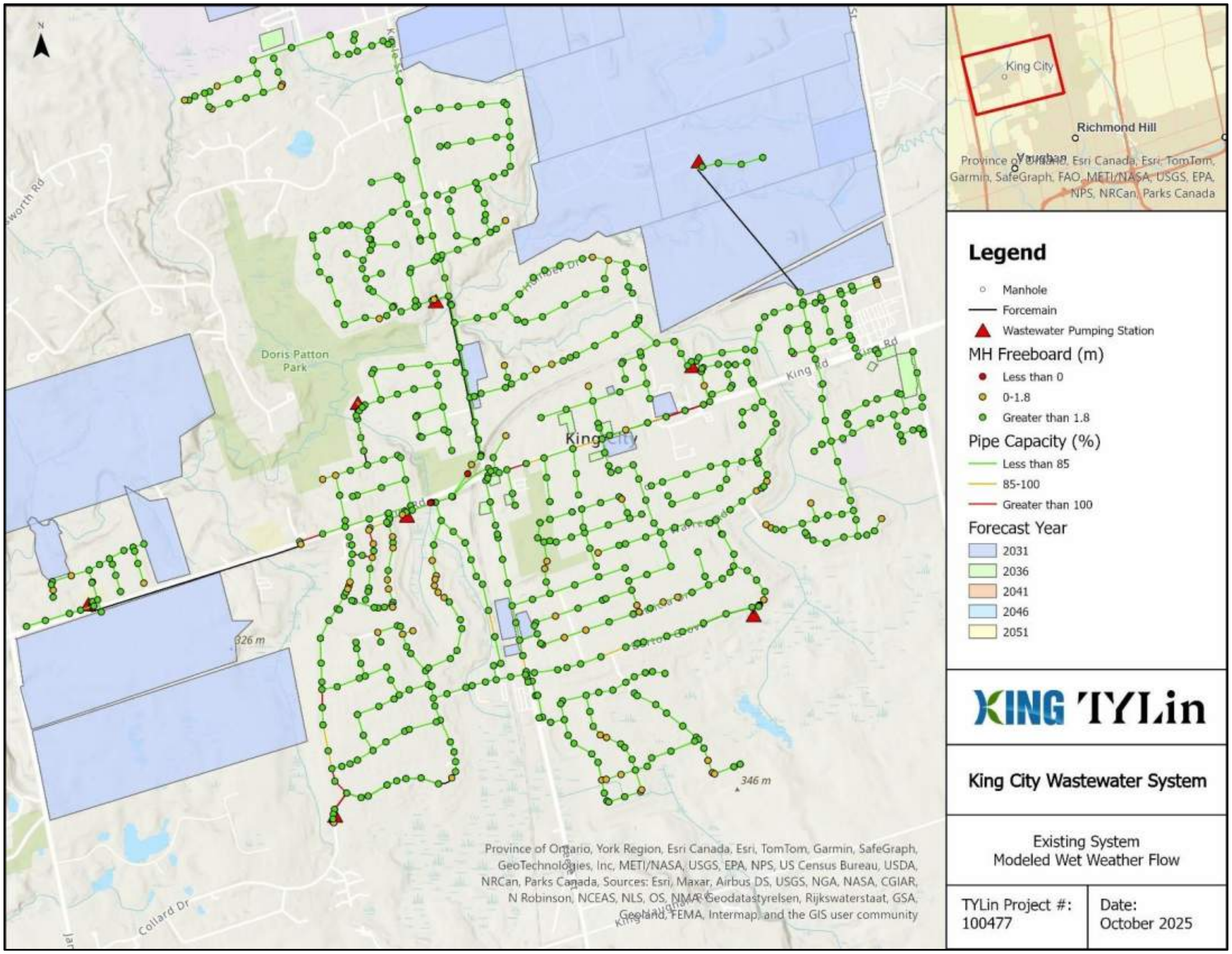


Figure 6-2 King City Simulated Wet Weather Flow under Full Buildout Scenario

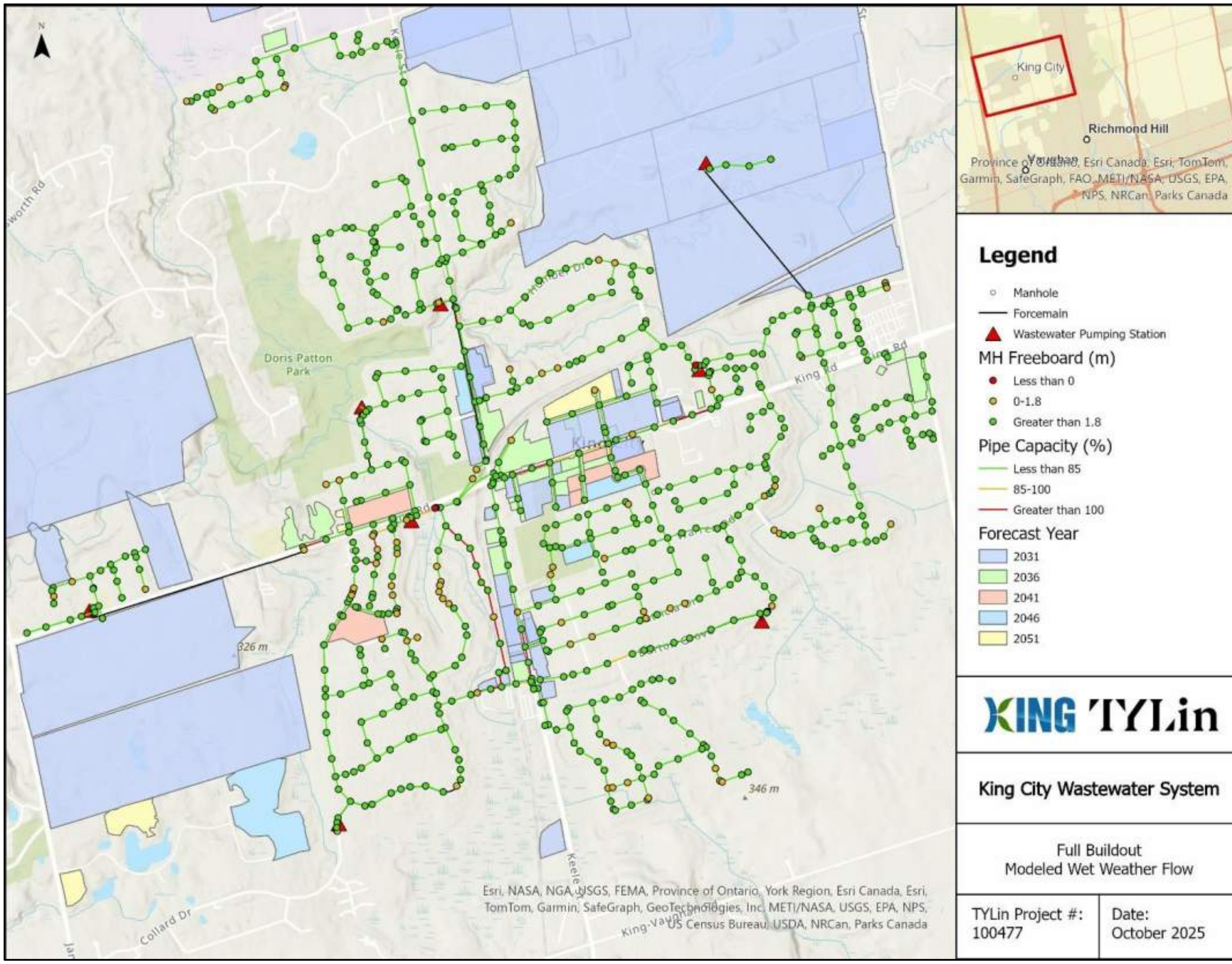
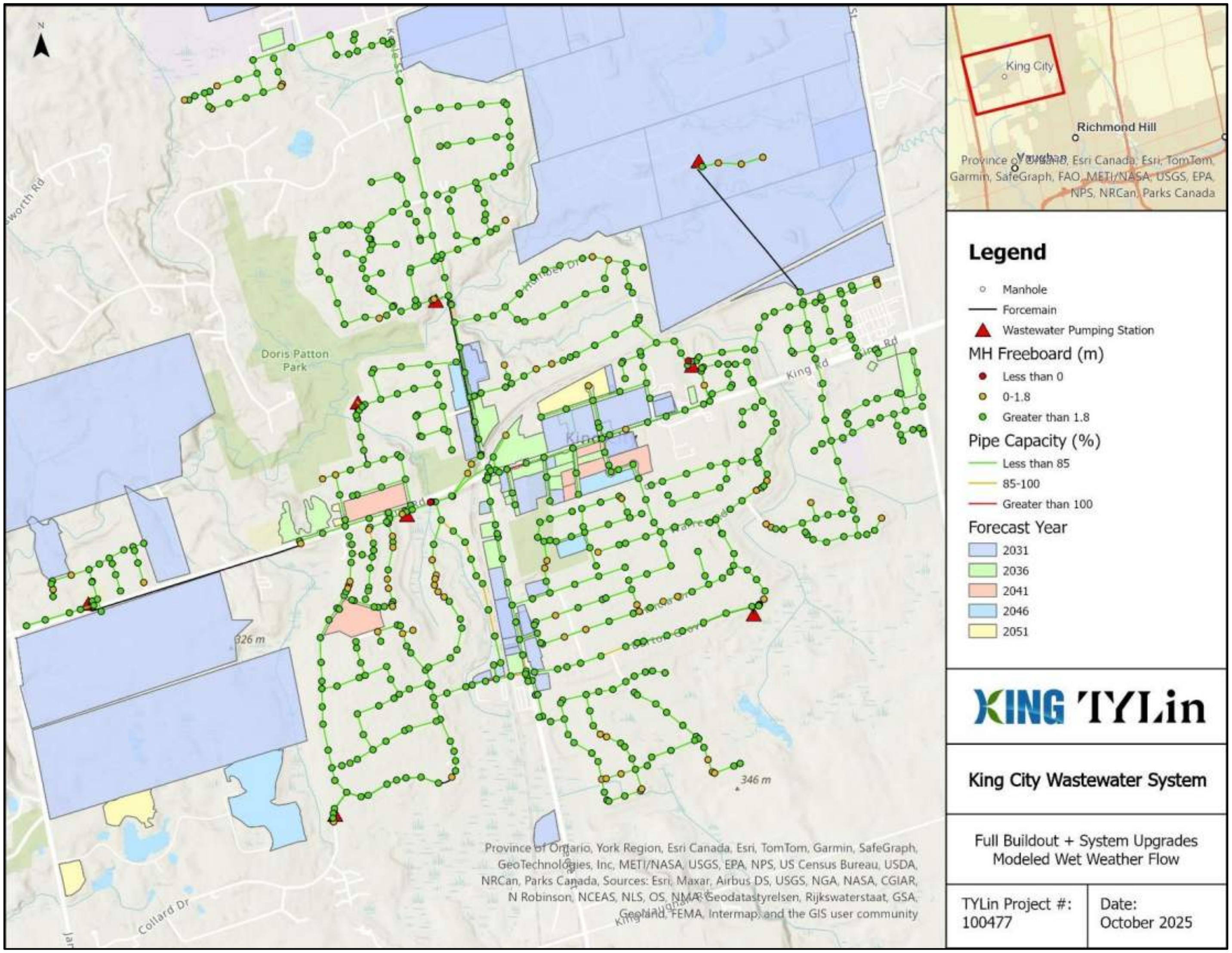


Figure 6-3: King City Simulated Wet Weather Flow under Full Buildout + System Upgrades Scenario



6.4.3 Nobleton Modelling Results

6.4.3.1 Existing Scenario

The existing scenario was modeled using the current infrastructure and wastewater demands and incorporated projected loads from approved development applications.

Figure 6-4 presents pipe capacity and manhole freeboard results in Nobleton under wet weather flow conditions. Within the majority of the network, sewer flows are beneath 85% of the pipe capacity, with the exception of a section of sewer along McCutcheon Avenue.

In addition, the maintenance hole freeboard levels are found to exceed 1.8 m throughout most of the study area, with no signs of surcharge under existing conditions.

6.4.3.1 Full Buildout: Existing + Developments + Intensification + DGA

Figure 6-5 presents the modeled results for Nobleton under full system buildout conditions during the WWF scenario. With the inclusion of loads from several developments and intensification opportunities in the community, multiple sections of sewer are shown to exceed 100% pipe capacity. The freeboard levels of several maintenance holes in these areas have decreased from those found under existing conditions, with several of them being projected to surcharge.

6.4.3.1 Full Buildout + System Upgrades

Figure 6-6 shows the modeled results for Nobleton under full system buildout conditions during the WWF scenario with proposed system upgrades. The results indicate pronounced improvements across the system. All pipe segments which were shown to previously exceed capacity now operate below 85% of their capacities. In addition to an increase in maintenance hole freeboard levels, these results indicate the improved performance of the Nobleton wastewater system with the proposed upgrades.

Figure 6-4: Nobleton Simulated Wet Weather Flow under Existing Scenario

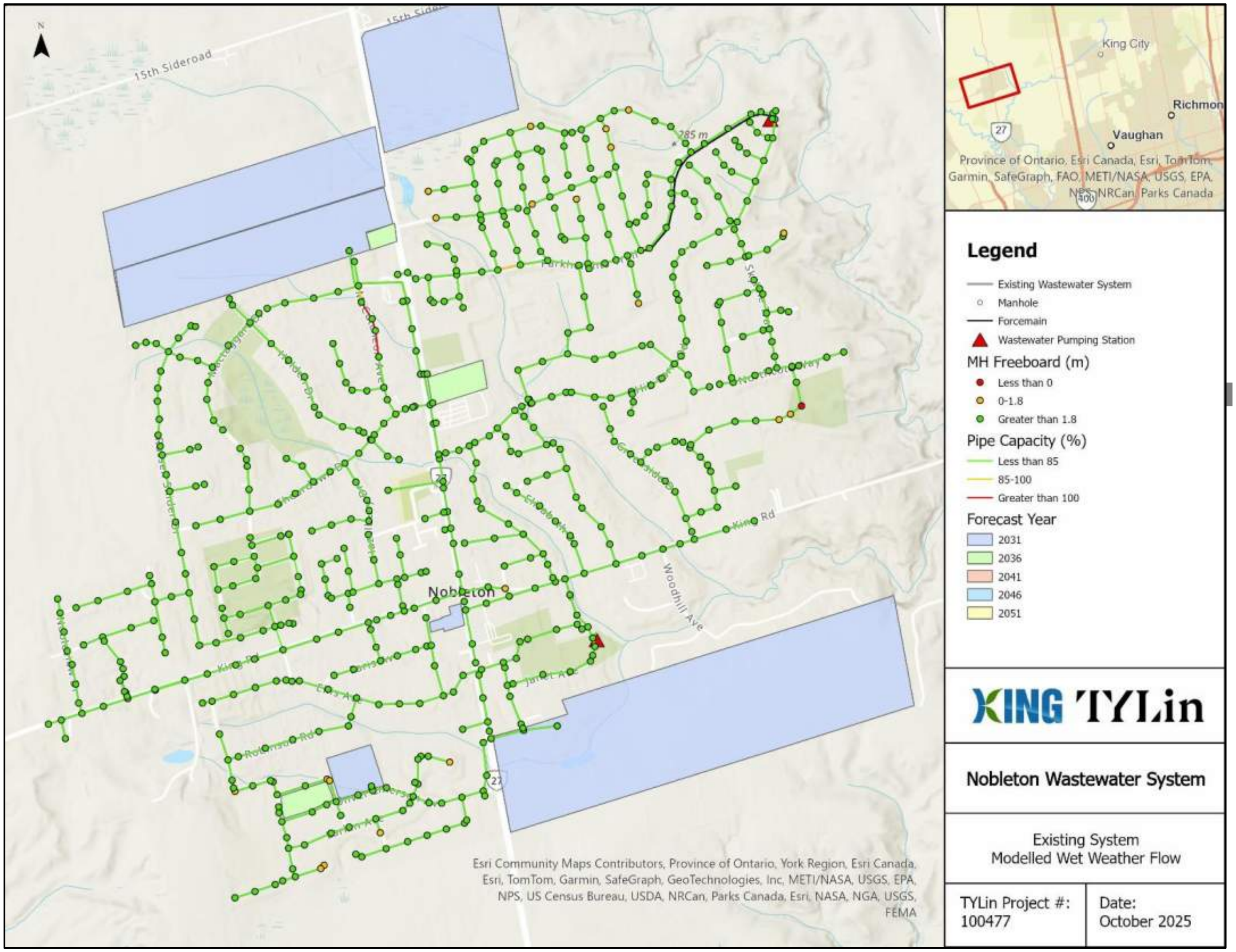


Figure 6-5: Nobleton Simulated Wet Weather Flow under Full Buildout Scenario

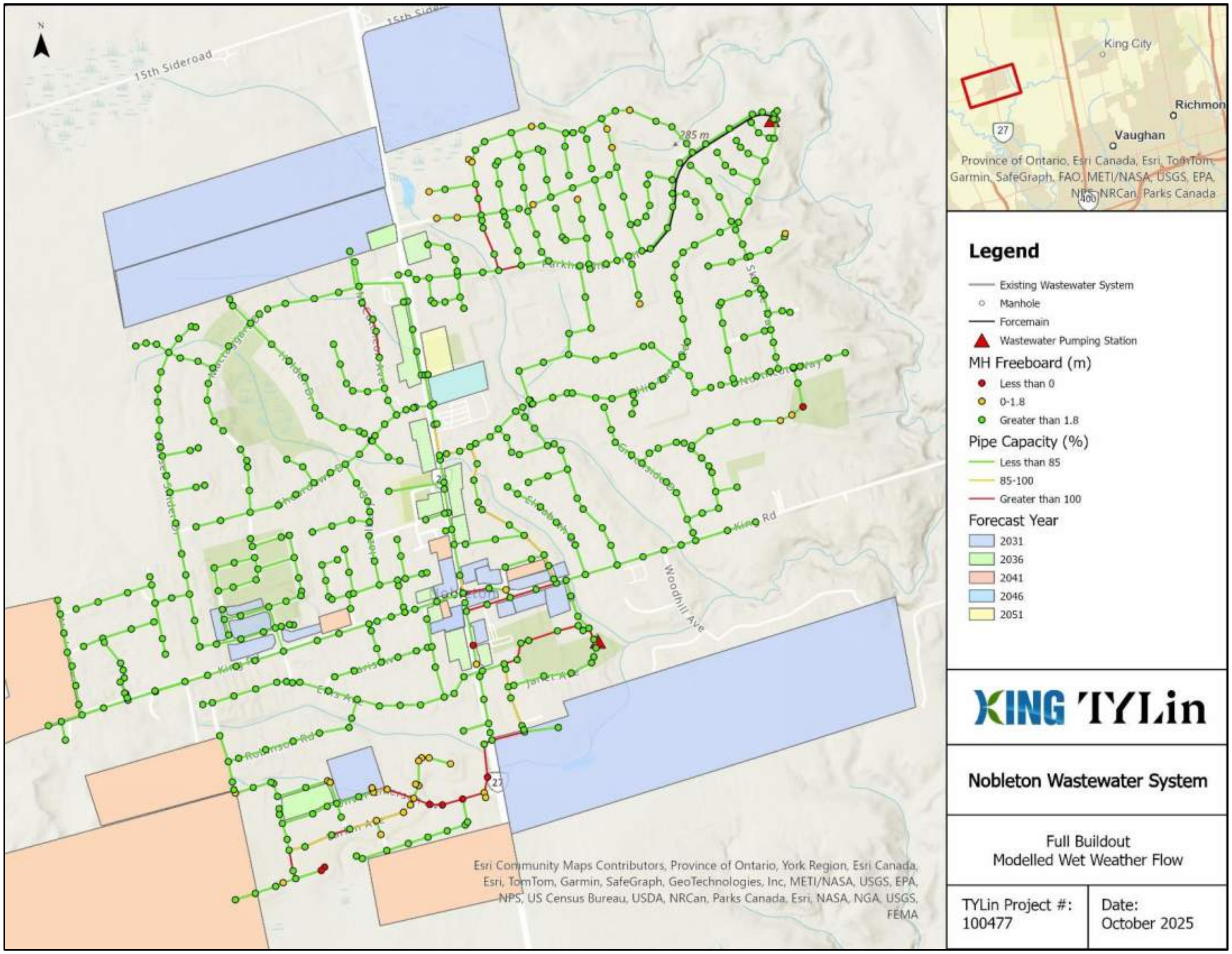
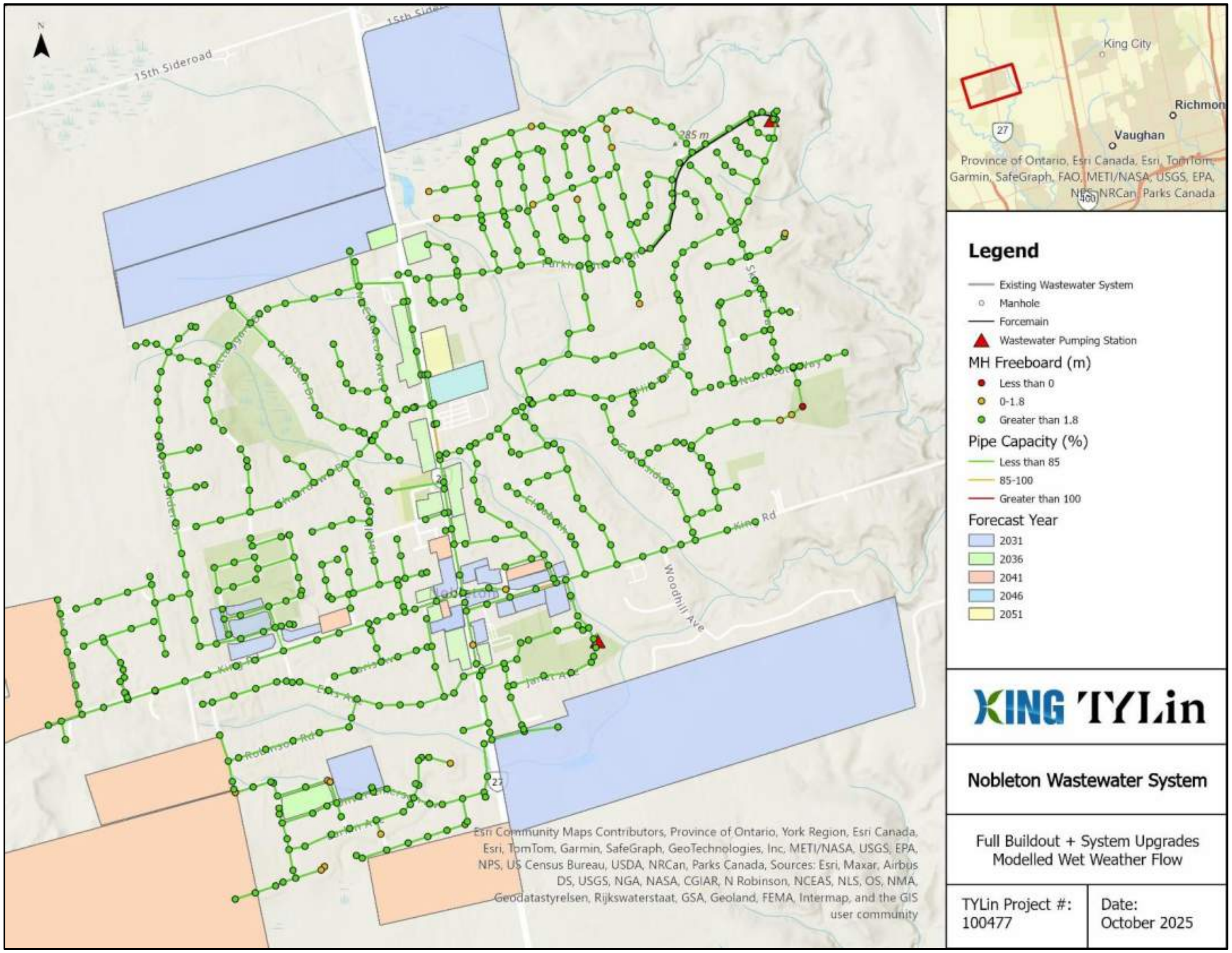


Figure 6-6: Nobleton Simulated Wet Weather Flow under Full Buildout + System Upgrades Scenario



6.4.4 Schomberg Modelling Results

6.4.4.1 Existing Scenario

The existing scenario was modeled using current infrastructure and wastewater demand conditions, incorporating projected loads from approved development applications.

Figure 6-7 presents pipe capacity and manhole freeboard results under wet weather flow conditions. Sewer flows remain within 85% of pipe capacity across most of the network, with the exception of the greenfield area west of Main Street, where flows exceed the 85% capacity threshold.

The manhole freeboard levels exceed 1.8 meters throughout the majority of the study area, and no signs of surcharging or flooding were identified under existing conditions. The freeboard ranges from 0.55 m to 8.27m.

6.4.4.2 Full Buildout: Existing + Developments + Intensification + DGA

Figure 6-8 presents the modeled results for Schomberg under full buildout conditions during the WWF scenario. The results closely resemble those of the existing scenario, primarily due to the limited projected future development and associated wastewater loads in Schomberg. As a result, the system performance remains largely unchanged, with no significant increase in flow or capacity concerns observed.

6.4.4.3 Full Buildout + System Upgrades

Figure 6-9 presents the modeled results for Schomberg under full buildout conditions during the WWF scenario with SPS upgrades. The results show notable improvements. Pipes near Main Street that previously experienced surcharging now operate below 85% of capacity, indicating enhanced system performance and reduced risk of overflow.

Figure 6-7: Schomberg Simulated Wet Weather Flow under Existing Scenarios

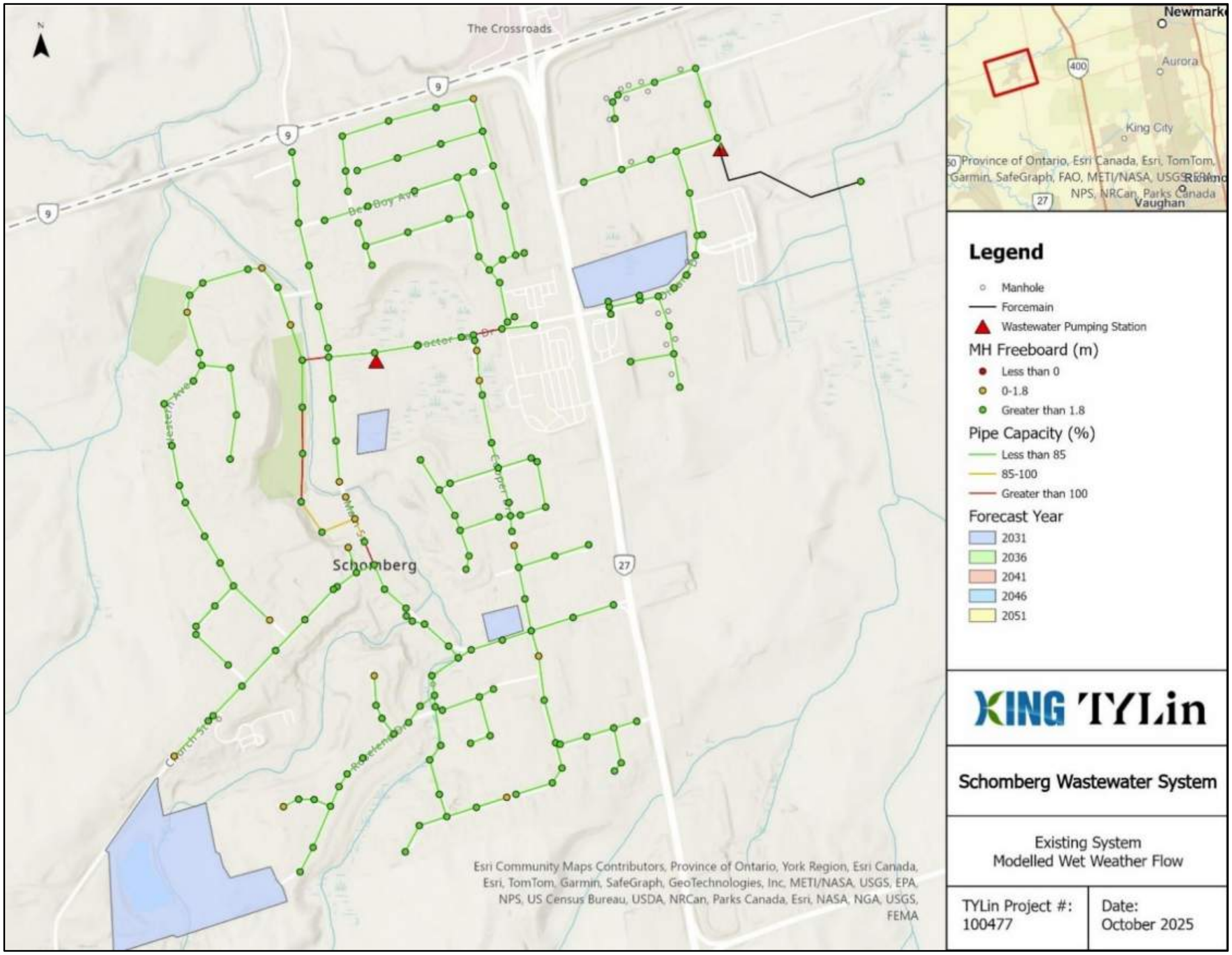


Figure 6-8: Schomberg Simulated Wet Weather Flow under Full Buildout Scenario

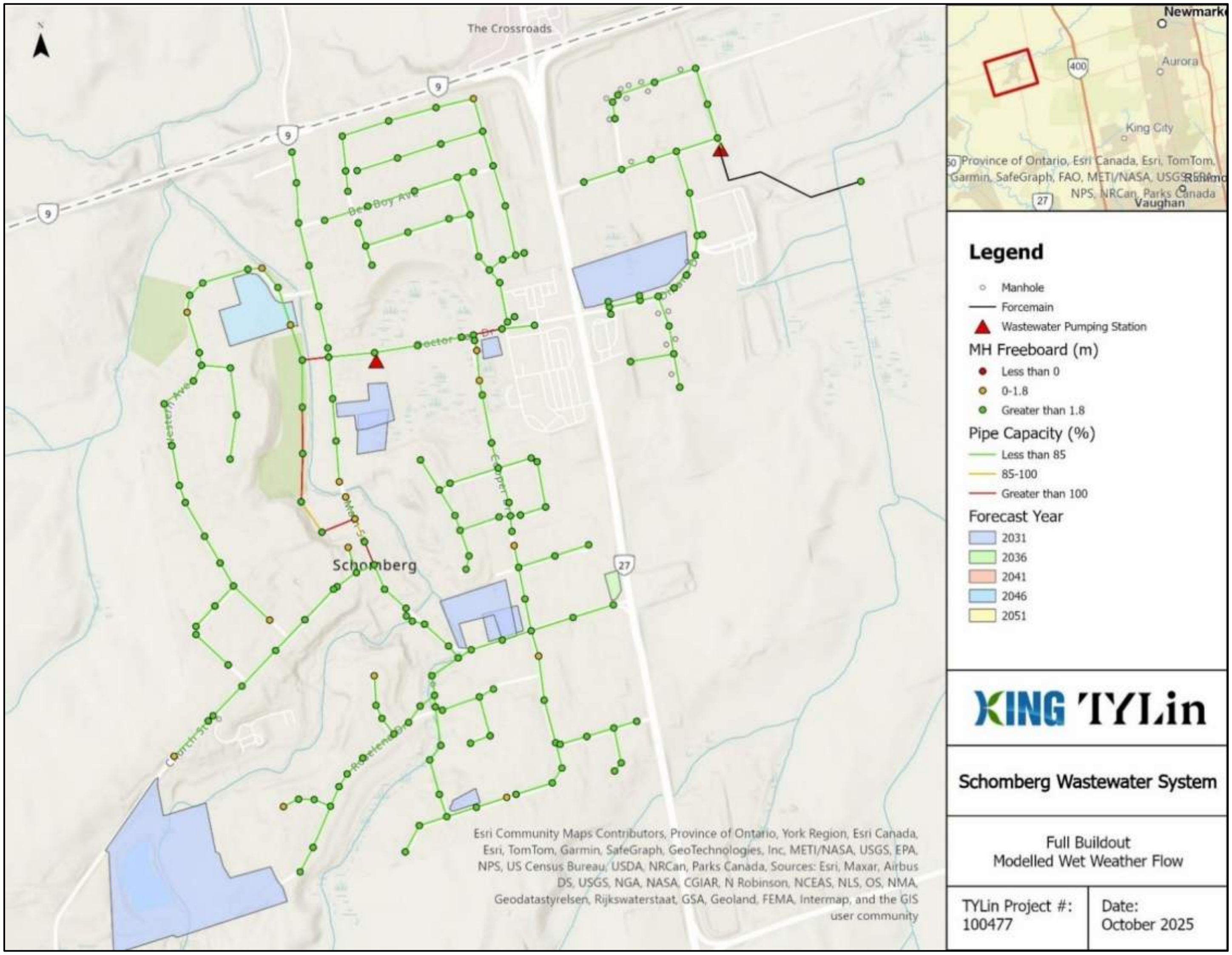
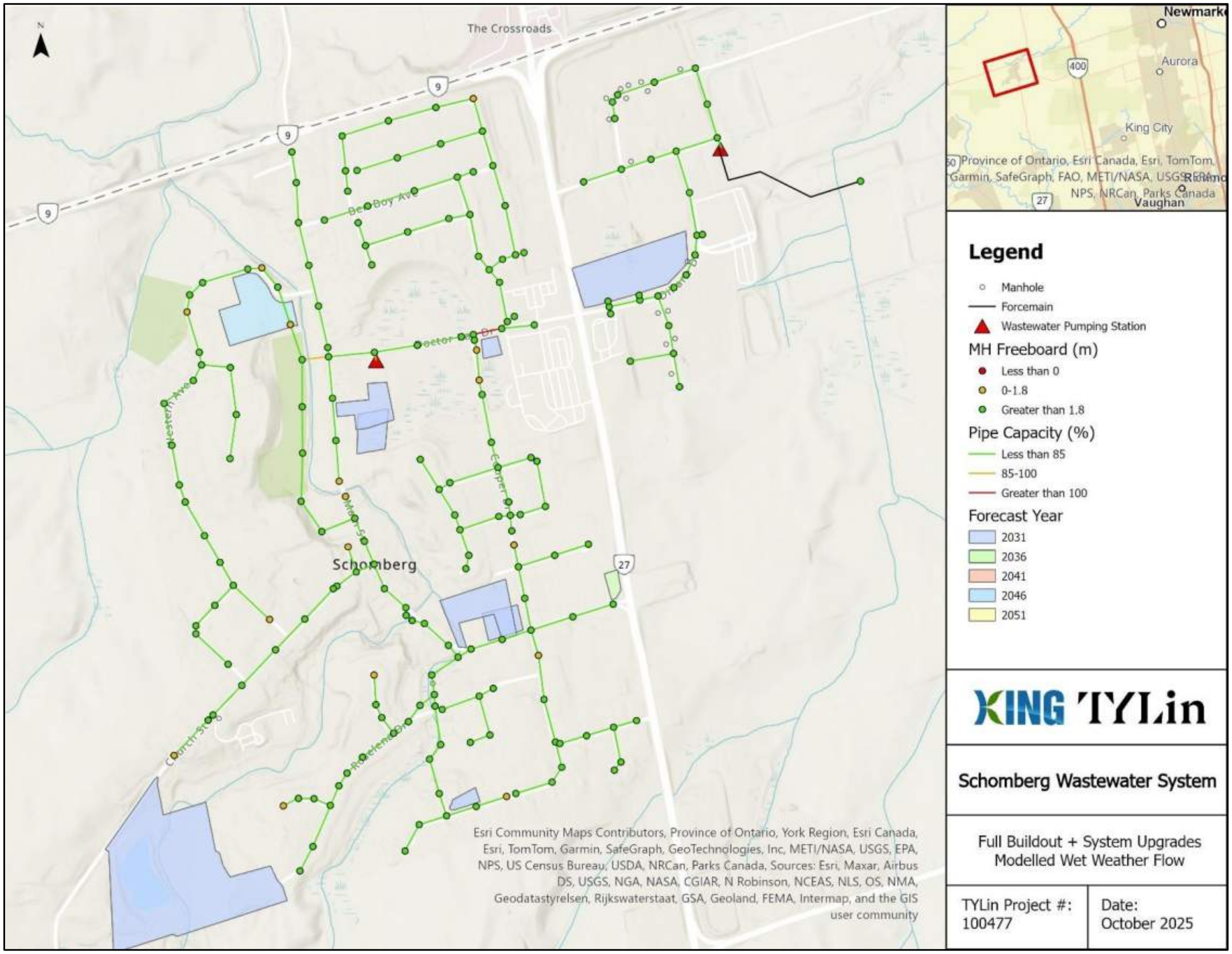


Figure 6-9: Schomberg Simulated Wet Weather Flow under Full Buildout + System Upgrades Scenario



6.4.5 Sewage Pumping Stations

Solutions are recommended to further expand each SPS to accommodate additional future developments in the Township of King. The tables below identify the total capacity of each SPS and the modelled full buildout design flows. The need for SPS upgrades was determined when the modeled flow exceeded the firm capacity of the SPS.

Table 6-7: King City SPS Phased Flows

Facility	Total Capacity (L/s)	Model 2051 Flows (L/s)
Alex Campbell SPS	135	148.27
Burton Grove SPS	19.03	19.59
Kingsview SPS	110 (up to 125)	185.00
Collard Dr SPS	10.20	10.09
Keele St N SPS	63.58	41.79
Martin St SPS	10.78	10.49
King City East SPS	56	53.92

Table 6-8: Nobleton SPS Phased Flows

Facility	Total Capacity (L/s)	Model 2051 Flows (L/s)
Bluff Trail SPS	34.21	10

Table 6-9: Schomberg SPS Phased Flows

Facility	Total Capacity (L/s)	Model 2051 Flows (L/s)
Proctor Rd SPS	**30.3**	**28.9**

APPENDIX A

Planning Data

King Township Development Applications

Address	Residential Population	Non-Residential GFA (ha)	Forecast Year
13151 Keele Street (Stateview)	143	0	2031
12765 Keele Street (Allcon)	332	0	2031
2075 King Road (King Cort) Z-2019-08	568	0	2031
1986, 2000-2008 King Road	76	0	2031
13131 Keele St	15	0	2031
204 Dew Street	28	0	2031
13760 Keele St	640	0	2031
20 Doctors Lane	8	0.07	2036
2480 15th Sideroad	ICI (No residential)	5.15	2036
Mansions of King	361	0	2031
2955 King Road	2453	36.8	2031
12984 keele st	48	0.0812	2031
12764-12800 Keele Street	535	0	2031
12734 & 12750 Keele Street	288	0	2031
2022-2086 King Road	894	2.69	2036
13130 and 13176 Dufferin Street	826	0	2031
125, 137 & 145 Dew Street	93	0	2036
24 Banner Lane	32	0	2036
13711 Keele Street	296	0	2031
2239 King Road and 12991 Keele Street.	0	0.153	2036
13330 Dufferin St	99	0	2031

12805 & 12665 Jane Street	966	0	2031
2720 King Rd (Rimrock)	18	0	2031
52 James Stokes Court	14	0	2031
50 Tatton Court	88	0	2036
12988, 12970, 12950 Dufferin Street	224		2036
1545, 1529 King Road	70		2036
1555 King Road	163		2036
King Square/Block Plan(King Road and William Street)	340	0	2036
Commercial Area East of 400		30	2036
Block 208MaidenstoneSubdivision	87.5	0	2031
13580 Highway 27 (Assumed to be single detached)	791	0	2031
13735 Highway 27	595	0	2031
12805 Highway 27	1505	13.03	2031-2036
2978, 12972, 12966, 12958 Highway 27 and 15 Wellington St (Assumed to be apartments)	320	0	2031
13305 Highway 27	0	1	2036
OLIVER EMERSON AVE (Assumed to be detached)	77	0	2036
13500 Highway 27 (dev type: single detached)	1645	0	2031
13450 and 13500 Highway 27 (assumed to be townhouses)	691	0	2031
13440 Highway 27 (Assumed to be detached)	21	0	2036

66 Main Street (dev type: townhouse)	73.1	0	2031
326 Main Street (dev type: apartment + Commercial)	184	0.017	2031
30 Dillane Drive (dev type: heavy industry)	0	0.1644	2031
199 Church Street (dev type: residential)	215	0	2031

King City Intensification Opportunities

Location	Area (ha)	Est. Net Population	Forecast Year	Existing/Future
Block Plan - Arena Site + LGL	1.81	349	2031	Existing
King Road b/t Banner and Patton	0.42	81	2041	Existing
Dew Street Block - West	3.28	546	2031/2036	Existing
NE corner of Keele and King Road (hoop st)	2.84	547	2036	Existing
Dew Street Block - West	3.18	530	2031/2036	Existing
MTSA - Keele Street North of Keele West Dev.	0.83	160	2031	Existing
MTSA - Keele West Developmnent	1.1	453	2031	Existing
MTSA - NW Corner of Station and Keele	0.57	110	2036	Existing
MTSA - Station Road	0.2	39	2031	Existing
MTSA - Stramota (King Heights) Site	0.54	237	2031	Existing
Core - b/t Banner and Patton	0.35	58	2036	Existing
Core b/t Patton & Fisher	0.4	67	2036	Existing
Core SW corner of King & Patton	0.38	63	2036	Existing
Core - west side of Fisher	0.34	57	2036	Existing
Core - West side of Doctors Lane	0.3	50	2031	Existing
Core - end of Doctors Lane	0.07	12	2036	Existing
Core - Doctors Lane	0.07	12	2036	Existing

Core - King Road - east of Library	0.22	37	2036	Existing
Core west side of Keele Street	0.36	60	2036	Existing
Core - west side of Keele Street	0.75	125	2036	Existing
MTSA - United Church	0.53	88	2031	Existing
MTSA - East Side of Keele b/t Clearview & Burton	0.78	130	2031	Existing
MTSA SE corner of Keele & Burton	0.43	72	2031	Existing
Mided Use - Soth of the MTSA on Keele (Island)	1.27	212	2031	Existing
MTSA - Station Road -5th Ave Site	0.27	45	2031	Existing
King Road - East of cemetary	2.18	363	2036	Existing
King Road b/t Doctors Lane & Fisher	0.68	65	2036	Existing
Core - Fisher Street	0.35	33	2031	Existing
Core - SE corner of King & Fisher	0.19	18	2031	Existing
Core - West side of Keele, nothr of King	1.19	113	2031	Existing
Mixed use - East side of Keele, north of King	1.28	122	2036	Existing
Patton Street -south of Core	0.36	34	2041	Future
Patton Street south	0.34	26	2041	Future
South of Core between Patton and Banner Lane	0.71	54	2041	Future
Banner Lane south of 2075 King Road	1.3	98	2041	Future
King Road & James Street	2.49	188	2041	Future
School Site - King Station	2.58	195	2041	Future
Keele Street- west side, north of Core	1.06	80	2046	Future
Banner Lane to Patton	1.43	73	2046	Future
Patton Lots & Eva L Dennis School Site	0.84	43	2046	Future
East end of South Summit Farm Road	7.99	405	2046	Future
West end of South Summit Farm Road	2.41	122	2051	Future
West end of South Summit Farm Road along Jane	1.21	61	2051	Future

Dew Street North	2.61	435	2051	Future
King Road & Charles St.	0.22	17	2051	Future

Nobleton Intensification Opportunities

Location	Area (ha)	Est. Net Population	Forecast Year	Existing/Future
Block Plan Highway 27 South of Old King Road	0.36	69	2031	Existing
Block Plan - South side of Old King Road	0.3	29	2031	Existing
Block Plan - Southside of King Road	0.6	100	2031	Existing
Block Plan - Mosaic	0.55	163	2031	Existing
Block Plan - NE Corner of Hollywood Cres. and King Road	0.22	21	2031	Existing
Block Plan - Highway 27/King Rd/Old King Rd	0.39	75	2031	Existing
Block Plan- north side of King Road b/t Royal and Hollywood	0.53	50	2031	Existing
Block Plan - North Side of King Road, west of Royal	0.48	80	2031	Existing
Block Plan- Highway 27, north of King Road	0.51	107	2031	Existing
Hambley House -Development Site	0.75	143	2031	Existing
SW Highway 27 & King - Mosaic Condos	0.66	294	2031	Existing
Core Area - Highway 27, south of Mosaic	0.88	147	2036	Existing
NW corner of Hwy 17 and Wilsen Road	0.61	58	2036	Existing
Hwy 27, north of Norman Ave	0.48	46	2036	Existing
Block Plan - Hwy 27 north of Parkview Drive	0.33	55	2036	Existing
West side of Hwy 17, north of Sheardown Dr.	1.43	136	2036	Existing
East side of 27, north of Parkheights Trail	0.8	76	2036	Existing

Fandor	0.41	30	2031	Existing
Fandor	0.9	65	2031	Existing
Fandor	0.88	84	2031	Existing
Fandor	0.41	30	2031	Existing
Fandor	0.45	43	2031	Existing
6029 King Road	0.18889	24	2041	Existing
North side of King Road, west of 27	0.27155	34	2036	Existing
South Side of King Road, west of 27	0.26227	33	2036	Existing
West Side of 27, north of King Road (south of Cal-Wilsen)	0.49	47	2041	Existing
East side of 27, South of Hill Farm Road	0.85	81	2036	Existing
East Side of 27, South of Sheardown	0.94	68	2036	Existing
East side of Hwy 27 - vacant commercial land	1.46	378	2051	Future
East side of Hwy 27 - existing commercial plaza	2.03	526	2046	Future
North side of King Rd, east of Fandor	0.64	61	2041	Future
Royal Ave, north of core area - within block plan area	0.56	42	2041	Future

Schomberg Intensification Opportunities

Location	Area (ha)	Est. Net Population	Forecast Year	Existing/Future
66 Main Street	1.22	116	2031	Exisiting
Old Gas Station on Hwy 27	0.16	12	2036	Exisiting
Cooper Drive & Dillane Drive	0.15	11	2031	Exisiting
326 Main Street	0.79	132	2031	Exisiting
32 Marlynn Crt & Moore Park Drive	0.17	9	2031	Exisiting
Old Schomberg Arena Site	1.61	310	2046	Future

ID	Project Description	Size	Unit	Length	New/ Upsizing?	Unit Cost	Base Cost	Crossings	Crossings Cost	Subtotal	EA Schedule	EA Cost	Engineering	Contingency	Construction Completion Date					GRAND TOTAL (2025 Dollars)	DC Fundable
King City 2051 Upgrades								[count]	$150,000				15%	30%	**2031**	**2036**	**2041**	**2046**	**2051**		
WW-KING-01	Sewer Upgrade from 375 mm to 450mm from south of Kinghorn Rd to Kingsview SPS	450	mm	98	Upsize	4380	$ 428,456		-	$ 428,456	Exempt		$ 64,268	$ 128,537				$ 621,262		$ 620,000	Yes
WW-KING-02	Sewer Upgrade from 375 mm to 450mm along King Rd	450	mm	540	Upsize	4380	$ 2,365,875		-	$ 2,365,875	Exempt		$ 354,881	$ 709,762	$ 3,430,519					$ 3,430,000	Yes
WW-KING-03	Sewer Upgrade from 200 mm to 250mm along Bri Way and Rober Berry Cres	250	mm	300	Upsize	3490	$ 1,046,084		-	$ 1,046,084	Exempt		$ 156,913	$ 313,825			$ 1,516,822			$ 1,520,000	Yes
WW-YR-01	Sewer Upgrade from 600 mm to 675mm along King Rd towards the Region SPS	675	mm	133	Upsize	5400	$ 716,580		-	$ 716,580	Exempt		$ 107,487	$ 214,974		$ 1,039,041				$ 1,040,000	No
WW-KING-05	Sewer Upgrade from 375 mm to 450mm along the sewer between Hogan Ct and Keele St, from Station Rd to King Rd	450	mm	872	Upsize	4380	$ 3,817,723		-	$ 3,817,723	Exempt		$ 572,658	$ 1,145,317	$ 5,535,699					$ 5,540,000	Yes
WW-KING-06	Sewer Upgrade from 250 mm to 350mm along Keele St	350	mm	231	Upsize	3950	$ 911,574		-	$ 911,574	Exempt		$ 136,736	$ 273,472	$ 1,321,783					$ 1,320,000	Yes
WW-KING-07	Sewer Upgrade from 250 mm to 525mm along King Rd from Keele St to William St	525	mm	526	Upsize	4620	$ 2,429,664		-	$ 2,429,664	Exempt		$ 364,450	$ 728,899		$ 3,523,012				$ 3,520,000	Yes
WW-KING-08	Sewer Upgrade from 200 mm to 250mm along King Rd and Alex Campbell Cres	250	mm	434	Upsize	3490	$ 1,515,328		-	$ 1,515,328	Exempt		$ 227,299	$ 454,598	$ 2,197,226					$ 2,200,000	No
WW-KING-09	Sewer Upgrade from 200 mm to 450mm before entering Alex Campbell SPS	450	mm	15	Upsize	4380	$ 64,723		-	$ 64,723	Exempt		$ 9,708	$ 19,417		$ 93,849				$ 90,000	Yes
WW-KING-10	Upgrade of Alex Campbell SPS (130 to 150 L/s) (Forcemain 300mm, L= 700m, No Forcemain Upgrade)	20	L/s		Upsize	25000	$ 500,000			$ 500,000	Schedule B	$ 150,000	$ 75,000	$ 150,000		$ 875,000				$ 880,000	Yes
WW-KING-11	Upgrade of Kinghorn SPS (110 L/s to 152 L/s) (Forcemain 350mm, L= 1000m, No Forcemain Upgrade)	42	L/s		Upsize	25000	$ 1,050,000			$ 1,050,000	Schedule B	$ 150,000	$ 157,500	$ 315,000				$ 1,672,500		$ 1,670,000	Yes
WW-YR-02	Upgrade of King City Region SPS (to 650 L/s) + Forcemain Upgrade/Twinning		L/s								Schedule B				Upgrade to 600 L/s		Upgrade to 700 L/s				No
															$ 12,490,000	**$ 4,500,000**	**$ 1,520,000**	**$ 2,300,000**		**$ 20,790,000**	
				3,015																	
Nobleton 2051 Upgrades																					
WW-NOBL-01	Sewer Upgrade from 200 mm to 250mm along McCutcheon Ave	250	mm	462	Upsize	3490	$ 1,611,109		-	$ 1,611,109	Exempt		$ 241,666	$ 483,333	$ 2,336,108					$ 2,340,000	No
WW-NOBL-02	Sewer Upgrade from 200 mm to 450mm along Hill Farm Rd and Lynwood Cres	450	mm	726	Upsize	4380	$ 3,179,010		-	$ 3,179,010	Exempt		$ 476,851	$ 953,703		$ 4,609,564				$ 4,610,000	Yes
WW-NOBL-03	Sewer Upgrade from 200 mm to 250mm along Hwy 27	250	mm	64	Upsize	3490	$ 222,303		-	$ 222,303	Exempt		$ 33,345	$ 66,691	$ 322,339					$ 320,000	No
WW-NOBL-04	Sewer Upgrade from 200 mm to 300mm along Old King Rd; Sewer Upgrade from 250 mm to 300mm along King Rd	300	mm	514	Upsize	3720	$ 1,910,902		-	$ 1,910,902	Exempt		$ 286,635	$ 573,270	$ 2,770,807					$ 2,770,000	Yes
WW-NOBL-05	Sewer Upgrade from 200 mm to 250mm along Paradise Valley Trail and Kettle Vly Trl	250	mm	315	Upsize	3490	$ 1,099,869		-	$ 1,099,869	Exempt		$ 164,980	$ 329,961	$ 1,594,811					$ 1,590,000	No
WW-NOBL-06	Sewer Upgrade from 200 mm to 300mm along Parkheigths Trail	300	mm	82	Upsize	3720	$ 304,792		-	$ 304,792	Exempt		$ 45,719	$ 91,438	$ 441,949					$ 440,000	Yes
WW-NOBL-07	Sewer Upgrade from 300 mm to 450 mm through Nobleton Park pipe	450	mm	228	Upsize	4380	$ 997,939		-	$ 997,939	Exempt		$ 149,691	$ 299,382			$ 1,447,012			$ 1,450,000	Yes
WW-NOBL-07-A	Sewer Upgrade from 300 mm to 450 mm along Parkview pipe	450	mm	137	Upsize	4380	$ 599,053		-	$ 599,053	Exempt		$ 89,858	$ 179,716			$ 868,626			$ 870,000	Yes
WW-NOBL-07-B	Sewer Upgrade from 300 mm to 400 mm along Crestview Rd	400	mm	250	Upsize	4240	$ 1,061,950		-	$ 1,061,950	Exempt		$ 159,293	$ 318,585			$ 1,539,828			$ 1,540,000	Yes
	Sewer Upgrade from 250 mm to 400 mm from Crestview to Highway 27	400	mm	149	Upsize	4240	$ 633,442		-	$ 633,442	Exempt		$ 95,016	$ 190,033			$ 918,491			$ 920,000	Yes
WW-NOBL-07-C	Sewer Upgrade from 250 mm to 400 mm along Highway 27	400	mm	190	Upsize	4240	$ 804,198		-	$ 804,198	Exempt		$ 120,630	$ 241,259			$ 1,166,087			$ 1,170,000	Yes
WW-NOBL-07-D	Sewer Upgrade from 250 mm to 400 mm along Oliver Emerson Ave	400	mm	258	Upsize	4240	$ 1,093,920		-	$ 1,093,920	Exempt		$ 164,088	$ 328,176			$ 1,586,184			$ 1,590,000	Yes
WW-NOBL-07-E	Sewer Upgrade from 200 mm to 300 mm along Larkie Ave	300	mm	485	Upsize	3720	$ 1,804,200		-	$ 1,804,200	Exempt		$ 270,630	$ 541,260			$ 2,616,090			$ 2,620,000	Yes
WW-NOBL-07-F	Sewer Upgrade from 250 mm to 350 mm along Wilkie Ave	350	mm	103	Upsize	3950	$ 406,850		-	$ 406,850	Exempt		$ 61,028	$ 122,055			$ 589,933			$ 590,000	Yes
WW-NOBL-08-A	Sewer Upgrade from 600 mm to 750mm near Janet Ave to SPS	750	mm	43	Upsize	5760	$ 247,680		-	$ 247,680	Exempt		$ 37,152	$ 74,304		**$ 359,136**				$ 360,000	**Yes**
WW-YR-03	Sewer Upgrade from 600 mm to 750mm near Janet Ave	750	mm	23	Upsize	5760	$ 132,480		-	$ 132,480	Exempt		$ 19,872	$ 39,744		$ 192,096				$ 190,000	No
WW-YR-04	Upgrade of Nobleton Region SPS + Forcemain Upgrade		L/s								Schedule B										No
															$ 7,470,000	**$ 4,610,000**	**$ 10,740,000**			**$ 22,820,000**	
				4,028																	
Schomberg 2051 Upgrades																					
WW-YR-05	Upgrade of Schomberg Region SPS + Forcemain Upgrade		L/s								Schedule B										No

Wastewater Infrastructure Costs – By Community

Water System	2051 Forecasted Growth [Res. Units]	Estimated Capital Costs	Cost/Unit
King City	5,534	$20,790,000	$3,757
Nobleton	2,968	$22,820,000	$7,689
Schomberg	441	$0	$0
TOTAL	**8,943**	**$43,610,000**	**$4,876**

DC (Upgrade to 150 L/s in 2036)Forcemain velocity @150L/s = 2m/s
DC (Upgrade to 152 L/s in 2041)Forcemain velocity @180L/s = 1.87m/s

Trigger Improve existing/future?	New Project ID	Project Description	Size	Unit	Length	New/ Upsizing?	Unit Cost	Cost	Crossings	Crossings Cost	Subtotal	EA Schedule	EA Cost	Engineering	Contingency	Construction Completion Date					GRAND TOTAL (2025 Dollars)	DC Fundable
	King City 2051 Upgrades								[count]	$150,000				0%	30%	2031	2036	2041	2046	2051		
Existing	WAT-KING-01	Upgrade WM from 150mm to 200mm/250mm along McClure Dr	250	mm	1123	Upsize	$ 965	$ 1,083,406	0	$ -	$ 1,083,406	Exempt		$ -	$ 325,022	$ 1,408,428.28					$ 1,410,000	No
Future	WAT-KING-02	Upgrade WM from 150mm to 200mm along Charles St, Melrose Ave, and John St	200	mm	735	Upsize	$ 935	$ 686,885	0	$ -	$ 686,885	Exempt		$ -	$ 206,065	$ 892,950.30					$ 890,000	No
Future	WAT-KING-03	Upgrade WM from 150mm to 200mm along Langdon Dr	200	mm	141	Upsize	$ 935	$ 131,835	0	$ -	$ 131,835	Exempt		$ -	$ 39,551		$ 171,386				$ 170,000	No
Future	WAT-KING-04	Upgrade WM from 150mm to 200mm along Findlay Ave	200	mm	510	Upsize	$ 935	$ 476,850	0	$ -	$ 476,850	Exempt		$ -	$ 143,055		$ 619,905				$ 620,000	No
Future	WAT-KING-05	Upgrade WM from 250mm to 300mm along Burns Blvd and Station Rd	300	mm	2558	Upsize	$ 1,360	$ 3,478,880	0	$ -	$ 3,478,880	Exempt		$ -	$ 1,043,664	$ 4,522,544.00					$ 4,520,000	**Yes**
Future	WAT-KING-06	Upgrade WM from 150mm to 200mm along Chuck Ormsby Cres and Richard Serra Crt	200	mm	585	Upsize	$ 935	$ 546,975	0	$ -	$ 546,975	Exempt		$ -	$ 164,093		$ 711,068				$ 710,000	No
Existing	WAT-KING-07	Upgrade WM from 150mm to 200mm along Burton Grove and Patricia Dr; 150mm to 250mm along Warren Dr	250	mm	1376	Upsize	$ 965	$ 1,327,758	0	$ -	$ 1,327,758	Exempt		$ -	$ 398,327	**$ 1,726,085**					$ 1,730,000	No
Future	WAT-KING-08	Upgrade WM from 200mm to 250mm along Lavender Valley Rd and Spring Hill Dr	200	mm	1215	Upsize	$ 935	$ 1,135,850	0	$ -	$ 1,135,850	Exempt		$ -	$ 340,755	$ 1,476,604.72					$ 1,480,000	**Yes**
	WAT-KING-09	Proposed 300mm watermains east of Hwy 400	300	mm	2173	New	$ 1,360	$ 2,955,933	1	$ 150,000	$ 3,105,933	Exempt		$ -	$ 931,780				$ 4,037,713		$ 4,040,000	**Yes**
	WAT-KING-10	Proposed 300mm watermains along Jane St south of King Rd	300	mm	738	New	$ 1,360	$ 1,004,170	0	$ -	$ 1,004,170	Exempt		$ -	$ 301,251	$ 1,305,420.48					$ 1,310,000	**Yes**
	WAT-KING-11	Proposed 300mm watermains connecting 2955 King Rd and existing 250mm watermain on Burns Blvd	300	mm	1008	New	$ 1,360	$ 1,370,880	1	$ 150,000	$ 1,520,880	Exempt		$ -	$ 456,264	$ 1,977,144.00					$ 1,980,000	**Yes**
	WAT-KING-12	Proposed 300mm watermains along Jane St north of King Rd	300	mm	653	New	$ 1,360	$ 888,080	1	$ 150,000	$ 1,038,080	Exempt		$ -	$ 311,424	$ 1,349,504.00					$ 1,350,000	**Yes**
	WAT-KING-13	Proposed 200mm watermains for Mansions of King	200	mm	1222	New	$ 935	$ 1,142,290	1	$ 150,000	$ 1,292,290	Exempt		$ -	$ 387,687	$ 1,679,976.35					$ 1,680,000	**Yes**
	WAT-LCL-01	Proposed 300mm local watermains for Bushland Heights	300	mm	1001	New	$ 1,360	$ 1,361,360	1	$ 150,000	$ 1,511,360	Exempt		$ -	$ 453,408	$ 1,964,768.00					$ 1,960,000	No
	WAT-LCL-02	Proposed 300mm local watermains for 2955 King Rd	300	mm	1716	New	$ 1,360	$ 2,333,760	2	$ 300,000	$ 2,633,760	Exempt		$ -	$ 790,128	$ 3,423,888.00					$ 3,420,000	No
	WAT-LCL-03	Proposed local watermains for 13130 and 13176 Dufferin Street	150	mm	1026	New	$ 935	$ 959,310	3	$ 450,000	$ 1,409,310	Exempt		$ -	$ 422,793	$ 1,832,103.00					$ 1,830,000	No
	WAT-LCL-04	Proposed local watermains from Tatton Crt to King Rd	150	mm	252	New	$ 935	$ 235,620	4	$ 600,000	$ 835,620	Exempt		$ -	$ 250,686	$ 1,086,306.00					$ 1,090,000	No
	ELT-YR-01	Elevated Tank - New/Capacity Increase		m3		New	$ 1,500	$ -			$ -	Schedule B		$ -	$ -						$ -	No
	STO-YR-01	Operational/Emergency Storage - New/Capacity Increase		m3		New	$ 1,500	$ -			$ -	Schedule B		$ -	$ -						$ -	No
	TRT-YR-01	Treatment Capacity Increase		m3		New	$ 10,000,000	$ -			$ -	Schedule C		$ -	$ -						$ -	No
																$ 16,340,000	**$ 1,510,000**	**$ -**	**$ 4,040,000**		**$21,890,000.00**	
					14037																	
Existing	WAT-NOBL-01	Upgrade WM from 150mm to 200mm along King Rd	200	mm	341	Upsize	$ 935	$ 318,835	0	$ -	$ 318,835	Exempt		$ -	$ 95,651	$ 414,485.50					$ 410,000	No
Existing	WAT-NOBL-02	Upgrade WM from 150mm to 200mm along Nobleview Dr	200	mm	380	Upsize	$ 935	$ 355,300	0	$ -	$ 355,300	Exempt		$ -	$ 106,590	$ 461,890.00					$ 460,000	No
Existing	WAT-NOBL-03	Upgrade WM from 150mm to 200mm along Simon Henry Ave	200	mm	338	Upsize	$ 935	$ 316,030	0	$ -	$ 316,030	Exempt		$ -	$ 94,809	$ 410,839.00					$ 410,000	No
Existing	WAT-NOBL-04	Upgrade WM from 150mm to 200mm along Russell Snider Dr	200	mm	1323	Upsize	$ 935	$ 1,237,005	0	$ -	$ 1,237,005	Exempt		$ -	$ 371,102	$ 1,608,106.50					$ 1,610,000	No
Future	Removed	~~Upgrade WM from 150mm to 200mm along Holden Dr (extended 134m to north along Holden Dr)~~																				
Existing	WAT-NOBL-05	Upgrade WM from 150mm to 200mm along Parkview Dr and Crestview Rd	200	mm	188	Upsize	$ 935	$ 175,780	0	$ -	$ 175,780	Exempt		$ -	$ 52,734	**$ 228,514**					$ 230,000	No
Existing	WAT-NOBL-06	Upgrade WM from 150mm to 200mm along Greenside Dr	200	mm	643	Upsize	$ 935	$ 601,205	0	$ -	$ 601,205	Exempt		$ -	$ 180,362	$ 781,567					$ 780,000	No
	WAT-NOBL-07	Proposed 200mm WM from Ballard Dr to Oliver Emmerson Ave	200	mm	197	New	$ 935	$ 184,195	1	$ 150,000	$ 334,195	Exempt		$ -	$ 100,259	$ 434,454					$ 430,000	No
	ELT-YR-02	Elevated Tank - New/Capacity Increase		m3		New	$ 1,500	$ -			$ -	Schedule B		$ -	$ -						$ -	No
	STO-YR-02	Operational/Emergency Storage - New/Capacity Increase		m3		New	$ 1,500	$ -			$ -	Schedule B		$ -	$ -						$ -	No
	TRT-YR-02	Treatment Capacity Increase		m3		New	$ 10,000,000	$ -			$ -	Schedule C		$ -	$ -						$ -	No
																$ 3,910,000	**$ -**	**$ -**	**$ -**		**$3,900,000.00**	
					3213																	
Existing	WAT-SCHG-01	Upgrade WM from 150mm to 200mm along Cooper Dr	200	mm	677	Upsize	$ 935	$ 632,995	0	$ -	$ 632,995	Exempt		$ -	$ 189,899	$ 822,893.50					$ 820,000	No
Existing	WAT-SCHG-02	Upgrade WM from 150mm to 250mm along Moore Park Dr and Roselena Dr	250	mm	1802	Upsize	$ 965	$ 1,738,930	0	$ -	$ 1,738,930	Exempt		$ -	$ 521,679	$ 2,260,609.00					$ 2,260,000	No
Existing	WAT-SCHG-03	Upgrade WM from 150mm to 200mm from Marlynn Crt to McGuire Crt	200	mm	329	Upsize	$ 935	$ 307,615	0	$ -	$ 307,615	Exempt		$ -	$ 92,285	$ 399,899.50					$ 400,000	No
Existing	WAT-SCHG-04	Upgrade WM from 150mm to 200mm along Maynard Dr and Hwy 27	200	mm	467	Upsize	$ 935	$ 436,645	0	$ -	$ 436,645	Exempt		$ -	$ 130,994	$ 567,638.50					$ 570,000	No
	ELT-YR-03	Elevated Tank - New/Capacity Increase		m3		New	$ 1,500	$ -			$ -	Schedule B		$ -	$ -						$ -	No
	STO-YR-03	Operational/Emergency Storage - New/Capacity Increase		m3		New	$ 1,500	$ -			$ -	Schedule B		$ -	$ -						$ -	No
	TRT-YR-03	Treatment Capacity Increase		m3		New	$ 10,000,000	$ -			$ -	Schedule C		$ -	$ -						$ -	No
																$ 4,060,000	**$ -**	**$ -**	**$ -**		**$4,050,000.00**	
					3275																	

Water Infrastructure Costs – By Community

Water System	2051 Forecasted Growth [Res. Units]	Estimated Capital Costs	Cost/Unit
King City	5,534	$21,890,000	$3,956
Nobleton	2,968	$3,900,000	$1,314
Schomberg	441	$4,050,000	$9,184
TOTAL	**8,943**	**$29,840,000**	**$3,337**

Trigger is current level of service (minimum fire flow requirements)

Developer's Responsibility: New underground services external to the development, required to service the development and if the pipe sizes do not exceed 300mm

Service Internal to the Development