Executive Summary

In June 2014 the water and wastewater master plan (The Municipal Infrastructure Group and Fabian Papa and Partners), and the storm drainage and stormwater master plans (Cole Engineering Group) were completed in support of the City of Vaughan Official Plan 2010. Civica Infrastructure Inc. was retained in 2020 to update the water, wastewater, and stormwater services with one assignment being the Vaughan Integrated Urban Water Plan. The servicing needs have been assessed based on phases for the existing condition (2021), 2028, 2036, 2041 growth target horizons, and a 2051 target horizon that includes the population expected for the "white belt" areas.

The study area consists of the entire City of Vaughan and focuses on growth areas within the City as well as currently approved secondary plan areas where intensification is prioritized. This information is presented in the Executive Summary as a City-wide planning area and specific infrastructure needs for the following areas referred to in separate Functional Servicing Strategy Reports as follows:

1. Concord GO and Dufferin Centre
2. Maple GO Station
3. Promenade Centre
4. Steeles West
5. Vaughan Metropolitan Centre
6. Weston and Hwy 7
7. Carrville Centre
8. Rutherford GO Station
9. Vaughan Mills
10. Woodbridge
11. Yonge and Steeles

The study follows the MEA Class Environmental Assessment (EA) process for Municipalities based on the 2023 update and is based on the master planning approach which includes Phase 1 (Problem/ Opportunity Statement), and Phase 2 (Alternative Solutions) of the MEA EA process.

Public consultation is also a requirement of the Class EA process. This is required to ensure that stakeholders and the community are informed of the project and given the opportunity to comment on findings and alternative solutions. This was facilitated through three separate public information sessions, the first two were completed virtually and the third was open to the public through an in-person venue. Comments received through the consultation process have been incorporated in the development of recommendations.

The responsibility for water and wastewater services are jointly provided between the City and the Region of York. Water treatment and bulk distribution as well as wastewater treatment and bulk collection are the responsibility of the Region. Local collection of sewage and distribution of water is the responsibility of the City. For Stormwater this service is fully the responsibility of the City other than on Regional roads and Rights of Way where the Region is responsible. There are generally limited interactions between the Regional and local stormwater management systems.

Problem/ Opportunity Statement

The problem/ Opportunity statement for the study is:

To establish a preferred integrated servicing plan for the City's water, wastewater and stormwater systems that meets current needs and supports growth while emphasizing environmental sustainability and resiliency.

The servicing alternatives considered for the study and the applicability based on the evaluation of the current and future conditions are included as follows:

Alternative 1- Do Nothing

This alternative assesses how doing nothing can meet the objectives set out in the problem statement and is the first alternative for consideration where it may become evident that no action is needed to address the problem or opportunity that has been defined.

Based on the growth pressures and planned future population targets and the key growth areas, there is a need for increased servicing where the Do Nothing alternative will not address the problem. Where current services are adequate to meet the needs of the future population, the Do Nothing alternative is recommended, however, this is only applicable to certain stormwater management areas where future stormwater generation is unchanged due to intensification and increased on-site storage and treatment requirements that benefit the overall system.

Alternative 2- Limit Community Growth/ Demand Management

This alternative considers limiting increased demand on the water, wastewater, and stormwater services. As demand is directly related to population and consumer growth, limiting growth is the approach that would be applied to limit demand in the system. In this alternative, the problem/ opportunity statement could be supported to the extent that there is available servicing capacity within the existing infrastructure systems. Any demands beyond available capacity could not be serviced resulting in limiting growth that exceeds available capacity.

This alternative is applicable where demands can be managed and recommendations for demand management can include a reduction in water consumption as the primary strategy. All feasible demand management strategies are recommended as part of the overall solution and as the lowest cost approach to optimize existing infrastructure.

Demand side management related to climate change include initiatives such as reducing greenhouse gas emissions and promoting sustainable water use practices with consumers and initiatives can include water conservation and efficiency measures, reuse, and outdoor water use awareness that all lead to reducing the carbon footprint associated with water and wastewater services.

Alternative 3- System Optimization/ Supply Management

This alternative considers capacity optimization where there is an opportunity to increase servicing capacity through initiatives that can improve the performance of the system. For the water system they can include pressure management, leak detection and network redundancy. For the wastewater system a reduction in extraneous flows can support system optimization.

This alternative is applicable where supply management can increase asset capacity. All feasible supply management strategies are recommended as part of the overall solution and as the lowest cost approach to optimize existing infrastructure.

Supply-side management related to climate change can include adaptation measures that focus on the resilience and reliability of the water and wastewater infrastructure and the use of green infrastructure solutions to manage stormwater runoff and reduce the effects of land urbanization.

Alternative 4- Build New Infrastructure

Where growth exceeds existing capacity and optimization does not meet future demands, the alternative of building new infrastructure is considered the next best approach. This alternative identifies future constraints and needed replacement or increases in capacity for new areas and where intensification causes constraints in the existing system. The key driver for this alternative is the growth in population for the water and wastewater system. For the stormwater system, the impact is generally related to the expansion of the urban area where additional lands are required to drain into existing drainage areas that may not have necessarily contemplated the increase to the existing infrastructure capacity.

Where optimization of existing infrastructure does not meet future needs, there will be recommendations for expansion of the existing infrastructure in a manner that provides additional capacity as it is needed for the community.

Evaluation of the available options were scored based on criteria that considered technical, environmental, social, and economic conditions. These conditions were assessed to identify potential impacts and suitable mitigation measures where appropriate. The recommended capital projects program has been screened to balance the various criteria considering local conditions, the feasibility of implementation and routing that considered previously defined corridors where minimal environmental impacts will occur.

Alternative 2 and 3 Recommendations- Supply and Demand Side Alternatives

Supply-side optimization solutions for water and wastewater systems focus on improving the availability, reliability, and efficiency of water supply and treatment infrastructure. These solutions aim to enhance the management of water resources, minimize losses, and ensure sustainable water supply for communities. Supply-side optimization solutions considered for this study include:

Infrastructure Rehabilitation and Upgrades:

This alternative includes retrofitting and upgrading aging water and wastewater networks to improve performance, reliability, and efficiency. Where capacity expansion is recommended, these expansions will be considered in conjunction with the condition of the existing infrastructure such that condition improvements will be implemented as part of a capacity increase project. An annual investment is identified in the plan based on the City's existing Asset Management Plan and recommended investment strategy.

Water Loss Management:

This alternative considers implementing any of leak detection programs, pressure management strategies, and water pipe maintenance programs to reduce water losses from leaks and breaks in the water distribution system. Techniques can include using advanced technologies such as acoustic sensors, satellite monitoring, and data analytics to identify and address water loss hotspots. It is recommended that current water loss programs continue with the goal of identifying and reducing water loss.

Water Recycling and Reuse:

This alternative considers Implementing water recycling and reuse programs to treat and reuse wastewater for non-potable applications such as irrigation, industrial processes, and toilet flushing. It can include investing in advanced treatment technologies such as membrane filtration, reverse osmosis, and UV disinfection to ensure water quality and safety for reuse. This alternative may be less beneficial to other alternatives but does remain a consideration should specific opportunities with private partners emerge. At this point, the cost for such an approach from a public infrastructure perspective and based on the two-tiered service delivery responsibility would make this a low-priority initiative.

Inflow and Infiltration Reduction

Inflow and Infiltration (I/I) reduction initiatives offer significant benefits as supply-side management strategies for wastewater systems. By addressing sources of extraneous water entering the collection system, such as through leaks, cracks, or improper connections, the City can optimize the performance and capacity of the infrastructure. This leads to reduced costs, minimized risk of system overflows and backups, and enhanced operational efficiency. Further, I/I reduction efforts contribute to the preservation of water resources by preventing unnecessary water from entering the wastewater system, thus conserving valuable freshwater supplies. Overall, I/I reduction measures serve to improve the reliability, resilience, and sustainability of wastewater systems, ensuring their long-term viability and effectiveness in serving communities.

Developer-led Inflow and Infiltration Reduction initiatives

I/I reduction is generally thought of as the responsibility of the municipality where these activities are identified under system maintenance and part of the ongoing costs of system ownership. However, York Region and many municipalities within the Region have been able to create joint partnerships with the development community on specific developments where sanitary constraints have limited the ability for new development. This approach has been very effective in achieving mutually beneficial goals where the local and Regional municipalities are able to document actual remediation with measures of reduction in I/I flows and where the developer, in exchange for the investment in finding and remediating system defects, is granted servicing allocation that matches the amount of reduction. This has proven to be a very effective approach to achieving optimization of the collection system, remediation of defects, and allocation of servicing capacity for new homes that previously could not be accommodated within the sanitary system due to high I/I flows taking up valuable pipe capacity.

Sanitary Sewer Flow Monitoring

Sanitary sewer flow monitoring plays a crucial role in the supply-side management of wastewater systems by providing valuable insights into system performance and identifying opportunities for optimization. By continuously monitoring flow rates and patterns within the sewer network, the City can detect and quantify sources of inflow and infiltration (I/I), such as leaks, illegal connections, and groundwater infiltration. This enables utilities to prioritize infrastructure repairs and upgrades, target I/I reduction efforts effectively, and minimize the volume of extraneous water entering the system. Additionally, flow monitoring helps utilities optimize hydraulic capacity, anticipate future demand trends, and improve system efficiency, ultimately leading to reduced treatment costs, minimized risk of sewer overflows, and enhanced operational resilience. Overall, sanitary sewer flow monitoring serves as a proactive and data-driven approach to managing wastewater systems, ensuring reliable service delivery and sustainable resource management.

Stormwater Management:

This alternative considers implementing green infrastructure practices such as rain gardens, bioswales, permeable pavements, and retention ponds to capture, treat, and infiltrate stormwater runoff with the benefit of providing best management practices to reduce peak flows, mitigate flooding, and improve water quality being returned to the natural environment. This alternative was extensively evaluated for the Vaughan Metropolitan Centre and across the City. Although there are limited benefits, soil condition is not ideal for effective systems. This alternative remains a valuable component of stormwater management when suitable conditions are in place or can be created to meet performance objectives.

Optimized Pumping and Distribution Systems:

This alternative considers the installing energy-efficient pumps, valves, and controls to optimize the operation of water distribution systems and minimize energy consumption which is currently in place with York Region as the owner of the larger pumping and storage assets. Where feasible, some improvement may be possible at the local level such as implementing pressure management systems and zones to reduce energy costs and minimize pipeline stress.

Asset Management and Predictive Maintenance:

This alternative considers developing comprehensive asset management programs to prioritize maintenance activities, optimize asset life cycles, and minimize downtime and is currently in practice at the City. It is recommended to continue with this program and enhance assessment opportunities where warranted to further increase reliability and cost control strategies.

Integrated Water Resources Management (IWRM):

This alternative is core to the approach of this plan and includes adopting an integrated approach to water resources management that considers the interconnectedness of water supply, wastewater treatment, stormwater management, and environmental sustainability. It is recommended that activities such as collaboration with stakeholders, agencies, industries, and communities continue to optimize water use, minimize conflicts, and enhance resilience to water-related activities.

Demand-side optimization solutions for water and wastewater systems focus on reducing water consumption, improving efficiency, and promoting sustainable water use practices among consumers. These solutions aim to address demand-side pressures on water resources, minimize wastage, and optimize the use of available water supplies. Demand-side optimization solutions considered include:

Water Conservation Programs:

This alternative includes public education and outreach campaigns to raise awareness about the importance of water conservation and encourage behaviour change among consumers. This can include providing incentives for water-saving measures such as installing low-flow fixtures, water-efficient appliances, and landscaping practices that minimize outdoor water use. Much of this effort has been led by York Region and in partnership with the local municipalities. It is recommended that these initiatives continue, and that the City lead local programs where there is benefit to the community.

Smart Metering and Monitoring:

This alternative considers deploying smart metering and monitoring systems to track water consumption in real-time, detect leaks, and identify opportunities for efficiency improvements. This type of program provides consumers with access to water usage data and insights to empower them to make informed decisions about their water consumption habits. The City has an ongoing water meter replacement program which is bringing these benefits to the consumer as more replacements are occurring.

Water Pricing and Tariffs:

This alternative considers a tiered water pricing structures, conservation-based pricing, or seasonal pricing incentives to encourage water conservation and discourage excessive water use. The current pricing model considers a single unit rate and there may be opportunity to consider tiered pricing.

Greywater and Rainwater Harvesting:

This alternative considers the continued promotion of recycling systems and rainwater harvesting systems to capture and reuse water for non-potable applications such as irrigation, toilet flushing, and landscape maintenance. This can include providing guidance and incentives for the installation of rain barrels, cisterns, and greywater treatment systems in residential and commercial buildings. Also, part of the York Region program, finding opportunities to support and communicating these programs can enhance current harvesting activities.

Water Audits and Efficiency Programs:

This alternative considers conducting water audits and efficiency assessments for residential, commercial, and industrial facilities to identify opportunities for water savings and efficiency improvements. This can include offering technical assistance, rebates, and financial incentives for implementing water-saving measures and upgrading water infrastructure. This program is part of the York Region tool kit and there may be opportunities to expand these services where warranted and where available.

Land Use Planning and Zoning:

This alternative considers incorporating water-efficient landscaping requirements, stormwater management practices, and water-sensitive urban design principles into land use planning and zoning regulations. In addition to the current planning approaches, this could include further requirements for native and drought-tolerant plants, permeable surfaces, and green infrastructure to reduce outdoor water demand and minimize runoff. Some of these alternatives are included in the stormwater design criteria to further require onsite treatment, storage, and reuse of stormwater.

Optimization Program Recommendations

Based on the review of these alternatives and current practices in the City, it is recommended that current programs that support these enhancement solutions continue to be funded and delivered and that additional funding be considered to enhance these alternatives into the future. As part of this study, an enhancement program is recommended with identified funding to augment current programs and create an increased focus on the relationship of this plan to other City priorities that are in alignment with efficiency and environmental sustainability priorities. The following programs are categorized as water, wastewater, and stormwater programs with funding needs for the next 10 years. It is also recommended that each program be allocate a full-time staff person that be included in the 2025 new FTE requests and funding be allocated from each of the three program budgets proposed. This is recommended as each area will have its own technical specialization that will benefit from a dedicated person skilled in the required service delivery area.

Table 0-1 Water System Optimization Program Financial Plan

Initiative	Components	Anticipated Outcome	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Water Loss Management	Water audit and leakage assessment Leak detection and repair Pressure management Infrastructure rehabilitation and replacement needs Metering and data management	Reduction in non-revenue water Improvement in revenue recovery Increase in system efficiency Enhanced water resource sustainability	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000	$200,000
Water Demand Management	Water demand assessment and forecasting Water conservation and efficiency measures Emergency response and resilience planning	Reduction in water use and demand Improvement in water infrastructure performance and reliability Enhanced resilience to climate change and extreme events Optimization of resource allocation and investment decisions	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Asset Management and Predictive Maintenance Management	Asset inventory and condition assessment Risk assessment and prioritization Development of maintenance strategies and plans Implementation of predictive maintenance technologies (e.g., condition monitoring, sensor-based analytics) Training and capacity building for staff	Improved asset reliability and performance Reduced maintenance costs and downtime Enhanced safety for workers and the public Optimization of maintenance resources and budget allocation	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Climate Change Adaptation	Climate risk assessment and vulnerability analysis Development of climate adaptation strategies and plans Implementation of adaptation measures and projects Monitoring and evaluation of adaptation effectiveness Stakeholder engagement and capacity building	Improved water system resilience and reliability in the face of climate change impacts Reduced vulnerability to extreme weather events and climate-related risks Enhanced protection of water quality and ecosystems Promotion of social equity and community resilience	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Total			$650,000	$650,000	$650,000	$650,000	$650,000	$650,000	$650,000	$650,000	$650,000	$650,000

Table 0-2 Wastewater System Optimization Program Financial Plan

Initiative	Components	Anticipated Outcome	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Inflow and Infiltration Reduction Program	Increase available capacity for additional sewage flows Minimizing sewer overflows and backups Reducing treatment costs and energy consumption Extending the life of wastewater infrastructure Enhancing public and environmental health Flow monitoring	Increase capacity availability for additional sewage flow Reduction in I/I and associated sewer overflows and backups Lower treatment costs and energy consumption Prolonged lifespan of wastewater infrastructure Improved water quality and environmental health	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000	$2,500,000
Developer Led I/I Reduction and Capacity Gain Program	Agreement between York Region, City and Developer outlining reduction targets and capacity allocation calculations Flow monitoring data sources and modelling approach to confirm wet weather flow reduction I/I source investigation and verification Remediation plan and execution Post Remediation approval and Release of Allocation for Development Warranty Period	Increased efficiency in use of sewer infrastructure capacity Reduction on energy usage related to pumping clean water entering systems Developer supported contribution in exchange for allocation and approvals Efficient use of resources through focused investment, remediation, and measurable reductions	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000	$50,000
Asset Management and Predictive Maintenance Management	Asset inventory and condition assessment Risk assessment and prioritization Development of maintenance strategies and plans Implementation of predictive maintenance technologies (e.g., condition monitoring, sensor-based analytics) Training and capacity building for staff	Improved asset reliability and performance Reduced maintenance costs and downtime Enhanced safety for workers and the public Optimization of maintenance resources and budget allocation	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Climate Change Adaptation	Enhancing resilience and reliability of wastewater infrastructure Protecting public health and the environment Minimizing risks of sewer overflows and system failures Promoting sustainable wastewater management practices	Increased resilience and reliability of wastewater infrastructure Reduced risks of sewer overflows and system failures Improved protection of public health and the environment Promotion of sustainable wastewater management practices	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Total			$2,850,000	$2,850,000	$2,850,000	$2,850,000	$2,850,000	$2,850,000	$2,850,000	$2,850,000	$2,850,000	$2,850,000

Table 0-3 Stormwater System Optimization Program Financial Plan

Initiative	Components	Anticipated Outcome	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Basement Flood and Overland Flood Mitigation	Flood risk assessment and mapping Identification of flood-prone areas and vulnerable properties Implementation of flood protection measures (e.g., stormwater retention ponds, flood barriers) Basement flood mitigation initiatives (e.g., backflow prevention devices, sump pump installations) Emergency preparedness and response planning	Reduction in property damage and economic losses from flooding Decrease in basement flooding incidents and related insurance claims Improved stormwater management infrastructure resilience Enhanced public safety and community resilience to extreme weather events	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000	$250,000
Environmental and Public Protection	Stormwater pollution prevention and control measures Watershed management and restoration projects Implementation of green infrastructure practices (e.g., rain gardens, permeable pavement) Monitoring and assessment of water quality and ecosystem health Public education and outreach campaigns on stormwater pollution and its impacts	Reduced pollutant loads in stormwater runoff Improved water quality in receiving water bodies Enhanced habitat and ecosystem health Reduced risks to public health from waterborne contaminants	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000	$350,000
Asset Management and Predictive Maintenance Management	Asset inventory and condition assessment Risk assessment and prioritization Development of maintenance strategies and plans Implementation of predictive maintenance technologies (e.g., condition monitoring, sensor-based analytics) Training and capacity building for staff	Improved asset reliability and performance Reduced maintenance costs and downtime Enhanced safety for workers and the public Optimization of maintenance resources and budget allocation	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Climate Change Adaptation	Minimizing flood risks and property damage Improving water quality and ecosystem health Enhancing stormwater infrastructure resilience Promoting green infrastructure and sustainable stormwater practices	Reduced flood risks and property damage Improved water quality and ecosystem health Enhanced resilience and reliability of stormwater infrastructure Promotion of sustainable stormwater management practices	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000	$150,000
Total			$900,000	$900,000	$900,000	$900,000	$900,000	$900,000	$900,000	$900,000	$900,000	$900,000

Alternative 4 Recommendations- Build New Infrastructure

As the above supply and demand side management alternatives will not reduce demand or create sufficient optimization of the water and wastewater systems, it is recommended that a strategic infrastructure expansion project be implemented to meet future demands. The assessment of these demands has been completed using hydraulic modelling tools that consider population growth, per-person consumption and projection rates, network performance and infrastructure constraints. The need for future infrastructure is presented in a series of three sections being the water, wastewater, and stormwater infrastructure needs figures. Each figure includes both the area-wide servicing requirements and specific requirements for each of the Functional Servicing Strategy Areas. Cost and timing are detailed in the tables for each of the three services. This information forms the basis for future investment requirements to meet the demands of growth as identified in the Regional and City Official Plans.

Water System Recommendations

The water system for the ultimate servicing requirement is presented in Figure 0-1 to Figure 0-5 and identified both the City-wide servicing needs as well as FSSR specific improvements. The cost and timing for these projects is presented in Table 0-4.

It is noted that growth and intensification does have an impact on the existing infrastructure and on the ongoing City financial contributions for repair and maintenance. Any projects that are within existing serviced areas are noted as impacted by the growth forecast and are therefore considered eligible for Development Charge considerations based on a Growth pays for growth principle.

Add funding for internal resources to support these programs.

Table 0-4: Water Servicing System Projects Preliminary Costs

Area	Project ID	Budget	Estimated Timing	EA Schedule
City-wide	W001-2023	$8,900,000	2051	Exempt
	W004-2023	$106,300,000	2028	Schedule B
		$33,000,000	2051	Schedule B
	W005-2023	$14,000,000	2028	Exempt
	W009-2023	$5,800,000	2028	Exempt
		$3,300,000	2051	Exempt
	W011-2023	TBD on site-by-site basis		
	W013-2023	$51,600,000	2051	Schedule B
	W016-2023	$5,700,000	2028	Exempt
	W017-2023	$4,600,000	2028	Exempt
	W018-2023	$2,300,000	2036	Exempt
	W019-2023	$126,200,000	2051	Schedule B
	W020-2023	$36,500,000	2028	Exempt
	W021-2023	$15,500,000	2051	Schedule B
	W022-2023	$18,000,000	2051	Exempt
	W023-2023	$30,100,000	2051	Schedule B
	W024-2023	$93,600,000	2036	Exempt/B (TBC)
	W025-2023	$9,500,000	2036	Schedule B

Area	Project ID	Budget	Estimated Timing	EA Schedule
		$10,900,000	2041	Exempt
	W026-2023	$56,700,000	2028	Exempt
	W027-2023	$22,900,000	2028	Exempt
		$8,500,000	2036	Exempt
		$19,400,000	2041	Exempt
	W028-2023	$300,000	2028	Exempt
	W029-2023	$35,500,000		Schedule B
		$719,100,000		
Concord Go and Dufferin & Centre	1	$11,900,000	2028	Exempt
	2	$5,900,000	2041	Schedule B
	3	$4,200,000	2041	Schedule B
		$22,000,000		
Maple Go Station	1	$500,000	2041	Exempt
		$500,000		
Promenade	1	$1,500,000	2041	Schedule B
	2	$2,000,000	2041	Schedule B
		$3,500,000		
VMC	1	$58,700,000	2036	2036
	2	$1,300,000	2028	2028
	3	$1,800,000	2028	2028
	4	$3,300,000	2028	2028
	5	$15,600,000	2041	2041
	6	$22,500,000	2041	2041
	7	$11,400,000	2051	At time of road construction
		$114,600,000		
Weston and Highway 7	1	$10,100,000	2028	Schedule B
	2	$7,900,000	2036	Exempt
	3	$1,100,000	2041	Schedule B
	4	$4,600,000	2041	Exempt
	5	$21,600,000	2041	Schedule B
	6	$400,000	2041	Exempt
	7	$8,100,000	2041	Schedule B
		$53,800,000		
Carrville Centre	1	$800,000	2041	Schedule B
	2	$1,700,000	2041	Schedule B
	3	$1,600,000	2041	Exempt
	4	$8,700,000	2041	Schedule B
		$12,800,000		
Vaughan Mills	1	$19,200,000	2028	Schedule B
	2	$5,000,000	2036	Schedule B
	3	$9,100,000	2036	Schedule B

Area	Project ID	Budget	Estimated Timing	EA Schedule
		$33,300,000		
Yonge and Steeles	1	$21,400,000	2028	Exempt
	2	$18,000,000	2041	Exempt
	3	$3,400,000	2036	Exempt
	4	$5,900,000	2036	Exempt
		$48,700,000		
Total		**$1,008,300,000**		

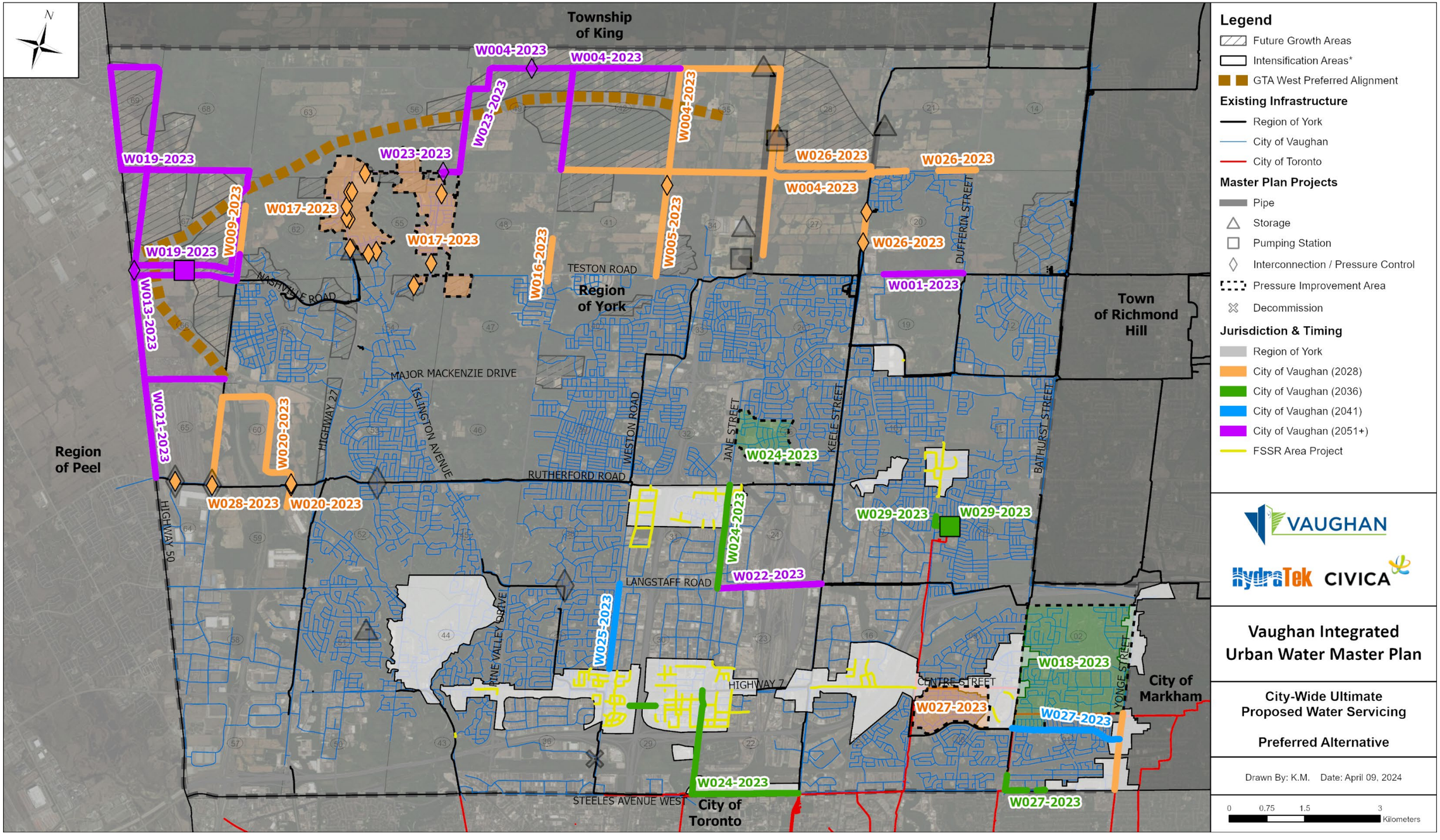


Figure 0-1: Water City-wide and FSSR Proposed Projects

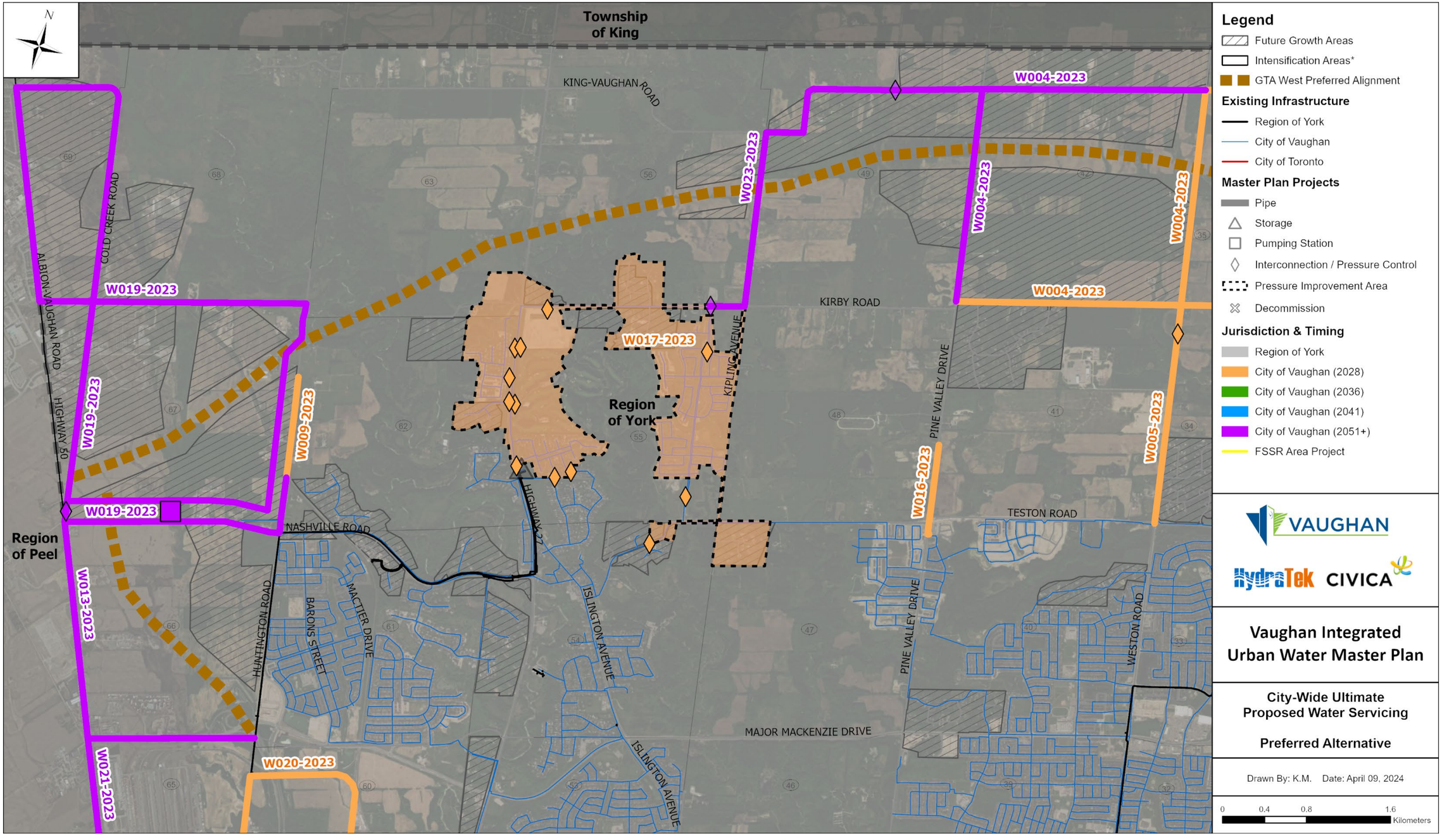


Figure 0-2: Water Servicing System Preferred Alternatives 1

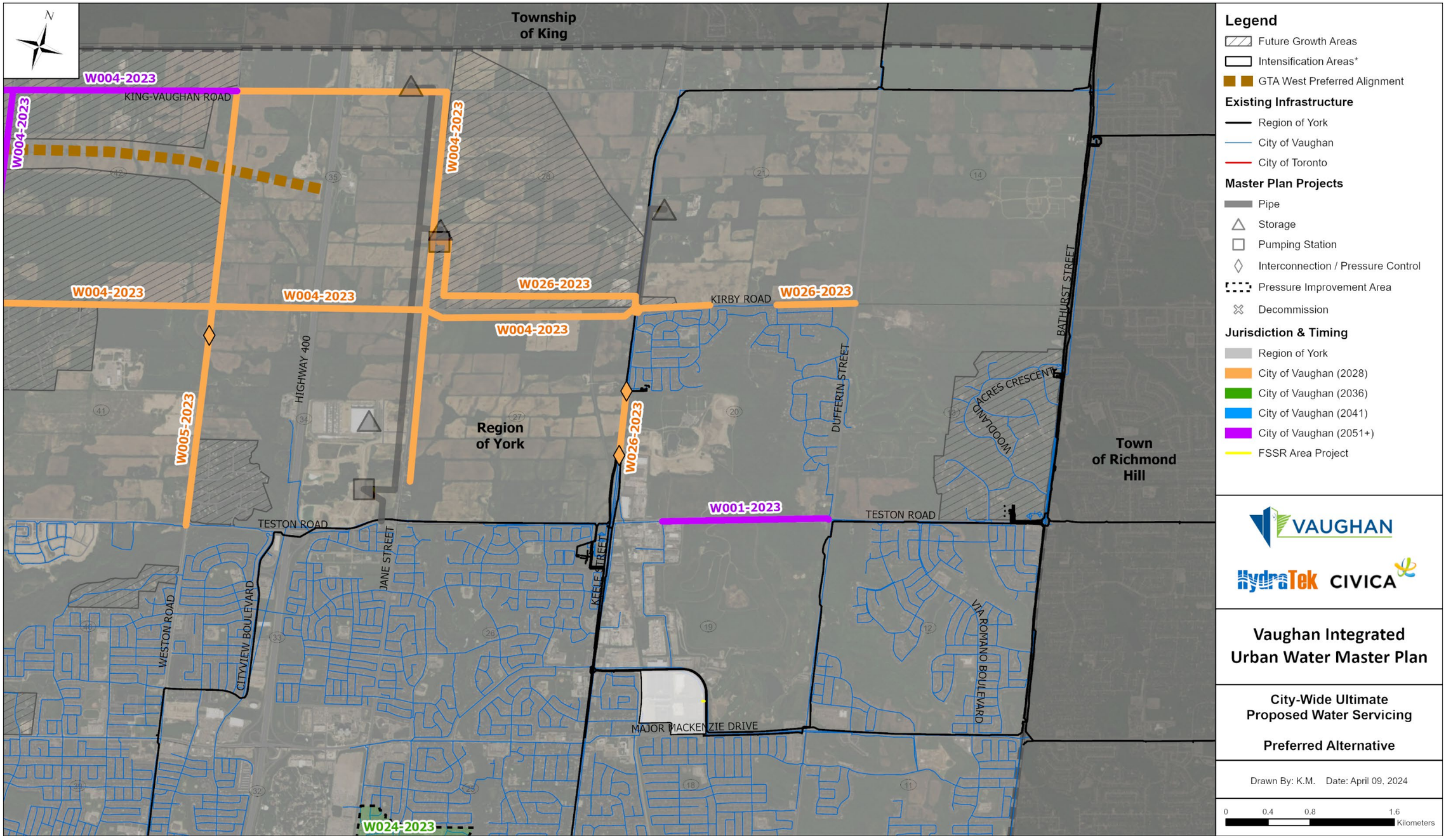


Figure 0-3: Water Servicing System Preferred Alternatives 2

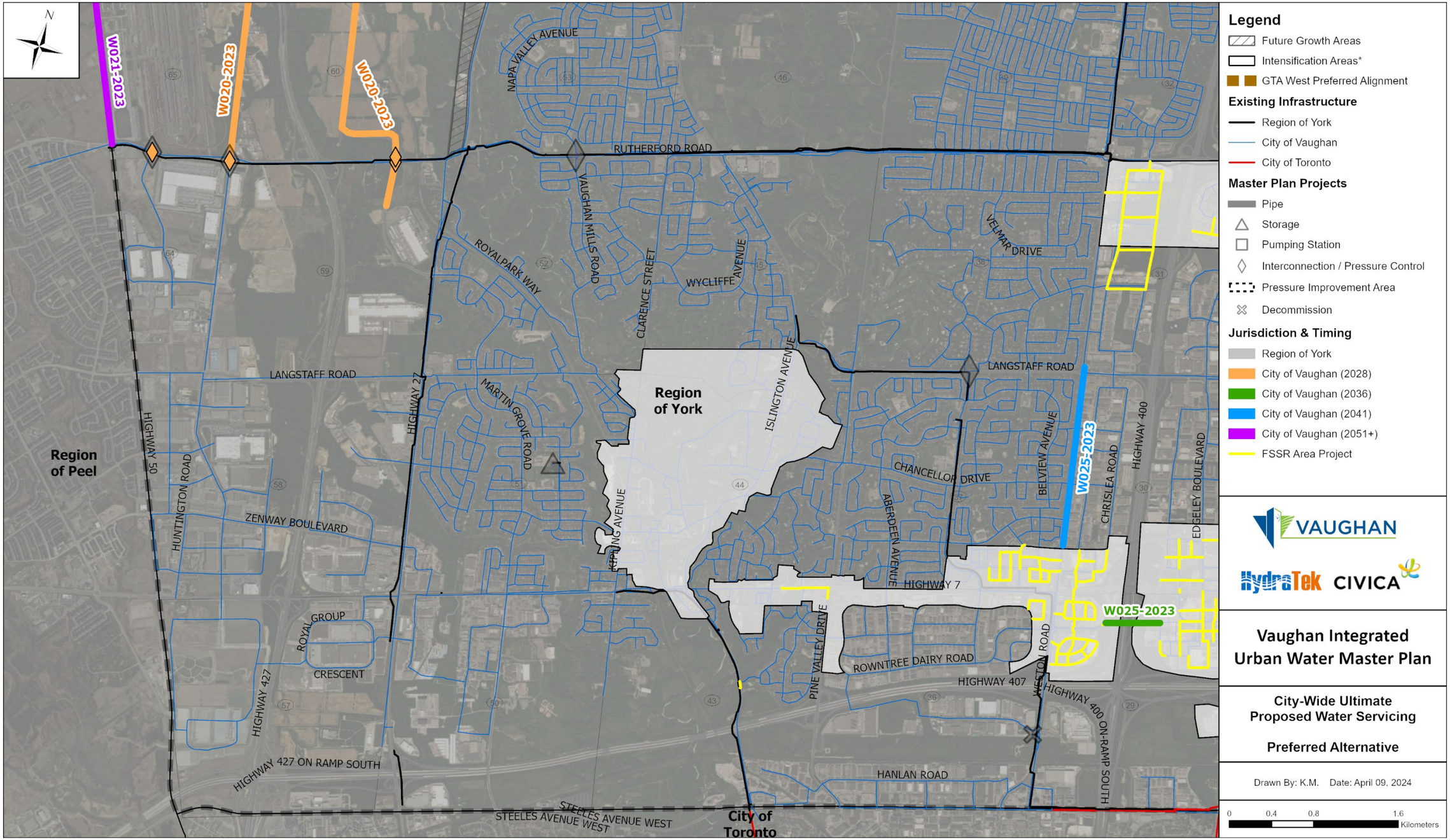


Figure 0-4: Water Servicing System Preferred Alternatives 3

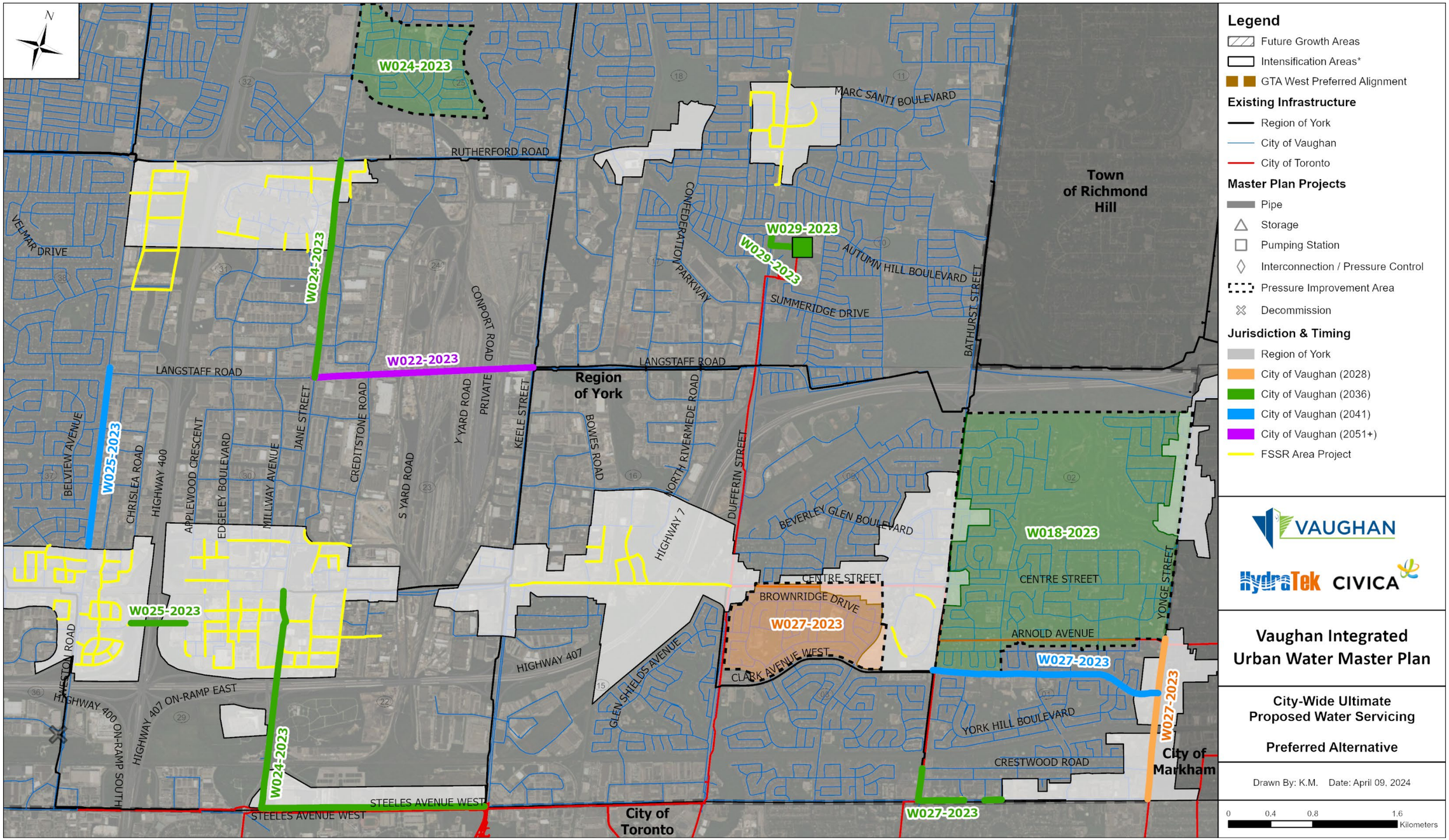


Figure 0-5: Water Servicing System Preferred Alternatives 4

Wastewater System Recommendations

The wastewater system for the ultimate servicing requirement is presented in Figure 0-6 to Figure-0-14 and identified both the City-wide servicing needs as well as FSSR specific improvements. The cost and timing for these projects is presented in Table 0-5.

Impact of intensification on existing infrastructure and the value of the ongoing City contribution. Growth to pay for growth.

Table 0-5: Wastewater Servicing System Projects Preliminary Costs

Area	Project Code	Budget	Estimated Timing	EA Schedule
City Wide	MP 1	$10,700,000	Prior 2028	Exempt
	MP 2A	$29,800,000	Prior 2028	Schedule B
	MP 2B	$31,600,000	2051	Schedule B
	MP 3	$97,900,000	Prior 2028	Schedule B
	MP 4	$25,500,000	Prior 2028	Exempt
	MP 5	$900,000	Prior 2028	Exempt
	MP 6	$6,800,000	Prior 2028	Exempt
	MP 7	$2,300,000	Prior 2028	Exempt
	MP 8A	$91,600,000	Prior 2028	Schedule B
	MP 8B	$38,400,000	2051	Schedule B
	MP 9	$19,200,000	Prior 2028	Exempt
	MP 10	$4,400,000	Prior 2028	Exempt
	MP 11	$4,600,000	Prior 2028	Exempt
	MP 12	$11,400,000	Prior 2028	Exempt
	MP 13	$5,900,000	Prior 2028	Schedule B
	MP B13 SPS	$14,500,000	Prior 2028	Schedule B
	MP 14	$9,900,000	Prior 2028	Exempt
	MP 15	$37,100,000	Prior 2028	Exempt
	MP 16	$4,300,000	2051	Exempt
	Flow Monitoring and Sewer Capacity Analysis Studies	$5,000,000	Prior 2028	
	City-Wide Infiltration/Inflow (I/I) Monitoring and Reduction	$5,000,000	Prior 2028	
		$456,800,000		
Concord Go and Dufferin & Centre	CG 1	$8,200,000	Prior 2028	Exempt
	CG 2	$21,300,000	Prior 2028	Schedule B
	CG 3	$4,800,000	Prior 2028	Exempt
	DC 1	$11,200,000		Exempt
		$45,500,000		
Maple Go Station	M 1	$1,700,000	Prior 2028	Exempt
	M 3	$700,000	Prior 2036	Exempt
	M 4	$2,100,000	Prior 2028	Exempt
		$4,500,000		
Promenade	P 1	$10,400,000	Prior 2028	Exempt

Area	Project Code	Budget	Estimated Timing	EA Schedule
	P 2	$400,000	2036-2041	Exempt
	P 3	$2,800,000	Prior 2028	Exempt
		$13,600,000		
Steeles West	SW3	$5,800,000	Prior 2028	Schedule B
		$5,800,000		
Vaughan Metropolitan Centre	NC 1	$2,700,000	Prior 2028	Exempted
	NW 1	$8,200,000	Prior 2028	Exempted
	NW 2	$1,600,000	Prior 2028	Schedule B
	NW 3	$1,000,000	Prior 2028	Schedule B
	SW 1	$700,000	2036-2041	Exempted
	SW 2	$2,100,000	Prior 2028	Exempted
	SW 3	$900,000	Prior 2028	Exempted
	SW 4	$1,700,000	Prior 2028	Schedule B
	SW 5	$2,200,000	Prior 2028	Exempted
	SW 6	$1,300,000	Prior 2028	Exempted
	SE 1	$2,300,000	Prior 2028	Exempted
	SE 2	$1,100,000	Prior 2028	Exempted
	SE 3	$1,700,000	Prior 2028	Exempted
	SE 4	$2,400,000	Prior 2028	Schedule B
	C 1	$21,500,000	Prior 2028	Schedule B
	M 1	$11,500,000	Prior 2028	Schedule B
	NE 1	$1,400,000	Prior 2028	Exempted
		$64,300,000		
Weston and Highway 7	A2-P 1	$1,800,000	Prior 2028	Schedule B
	A2-P 2	$1,800,000	Prior 2028	Exempt
	A2-P 6	$900,000	Prior 2028	Exempt
	A2-P 7	$1,600,000	Prior 2028	Exempt
	A2-P 9	$10,400,000	Prior 2028	Exempt
	A2-P 10	$5,700,000	Prior 2028	Exempt
	A2-P 11	$2,700,000	Prior 2028	Exempt
	A2-P 12	$16,200,000	Prior 2028	Exempt
	A2-P 13	$24,000,000	Prior 2028	Exempt
		$65,100,000		
Carrville Centre	CV 1	$2,100,000	Prior 2028	Exempt
	CV 2	$1,100,000	2036-2041	Schedule B
	CV 3	$2,400,000	2036-2041	Exempt
	CV 4	$4,100,000	2036-2041	Exempt
		$9,700,000		
Rutherford Go Station	RF1 and RF 2	$700,000	Prior 2028	Exempt
		$700,000		
Vaughan Mills	A2-VM 2	$1,200,000	Prior 2028	Exempt
	A2-VM 3	$1,000,000	Prior 2028	Exempt
	A2-VM 4	$5,100,000	Prior 2028	Exempt
	A2-VM 5	$2,100,000	Prior 2028	Exempt

Area	Project Code	Budget	Estimated Timing	EA Schedule
	A2-VM 6	$800,000	Prior 2028	Exempt
	A2-VM 7	$16,300,000	Prior 2028	Schedule B
		$26,500,000		
Woodbridge	W 1	$4,600,000	Prior 2028	Exempt
	W 2	$1,700,000	Prior 2028	Exempt
	W 3	$4,000,000	Prior 2028	Schedule B
	W 4	$2,100,000	2036-2041	Exempt
		$12,400,000		
Yonge and Steeles	YS-S4	$8,700,000	Prior 2028	Exempt
	YS-S6	$7,600,000	Prior 2028	Exempt/Schedule B
	YS-C1	$12,600,000	2036-2041	Exempt
	YS-N1	$2,900,000	Prior 2028	Exempt
	YS-N2	$2,900,000	2036-2041	Exempt/Schedule B
		$34,700,000		
Total		**$739,600,000**		

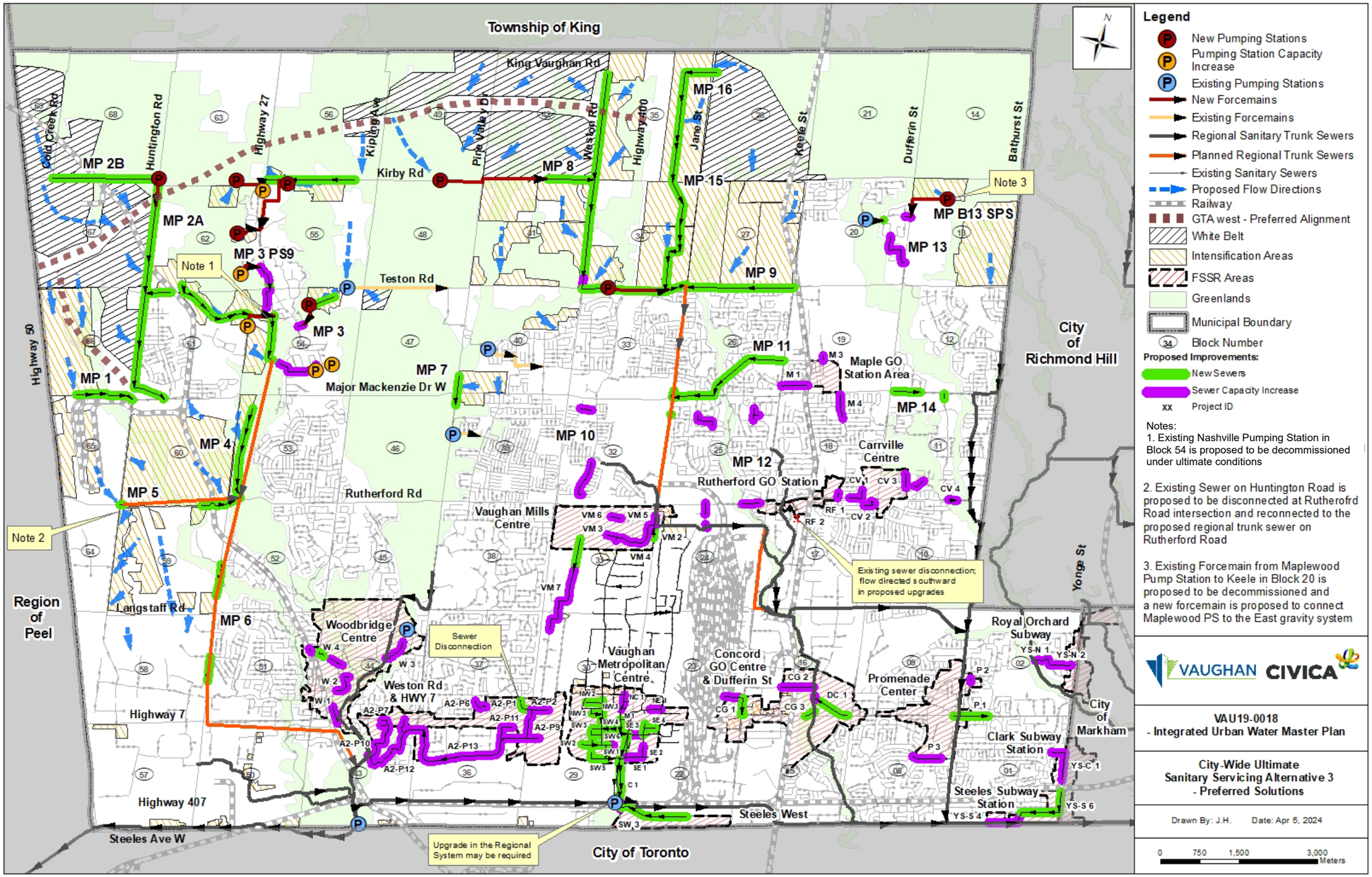
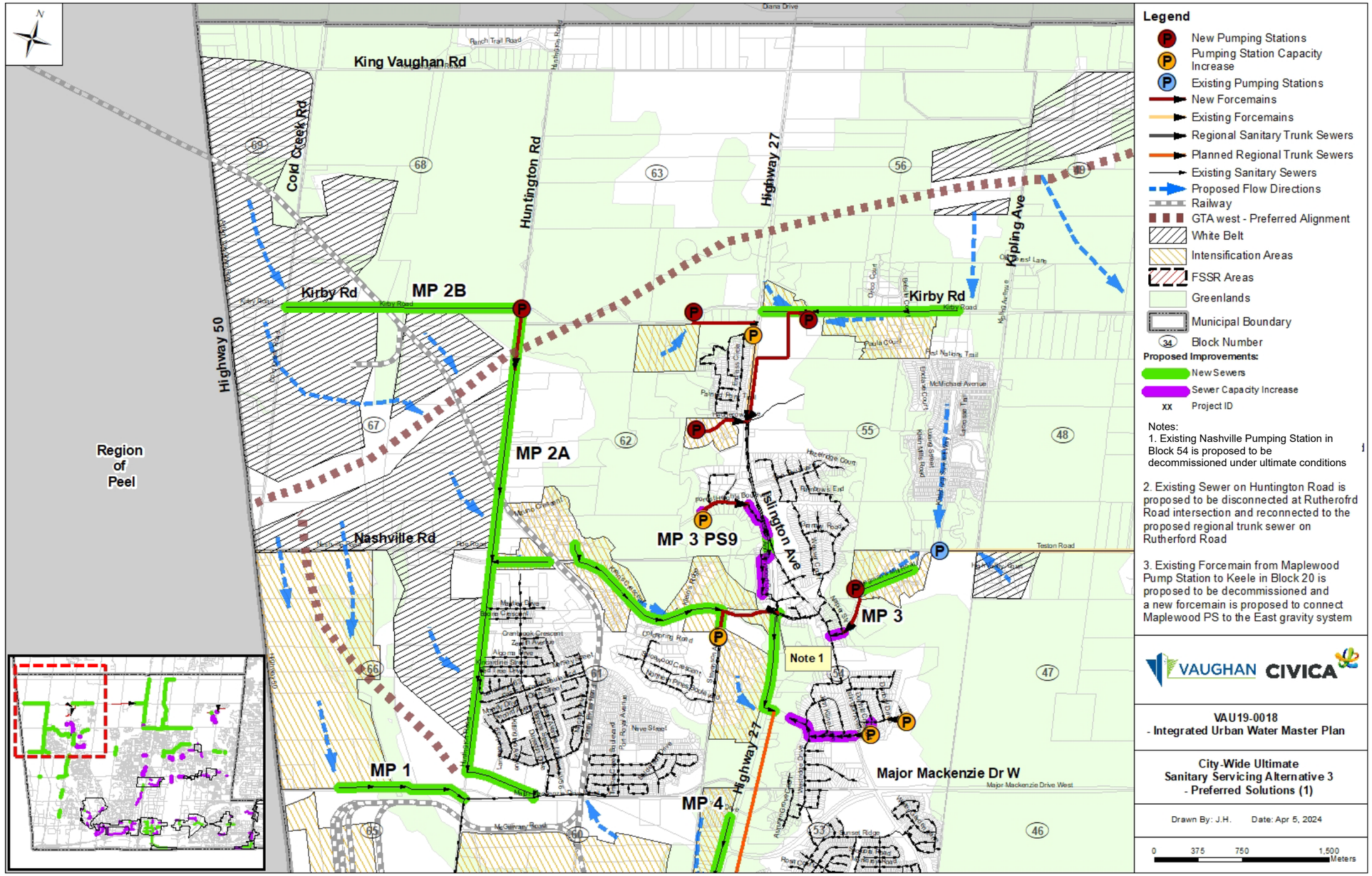


Figure 0-6: Wastewater Citywide and FSSR Preferred Solutions



Notes:
1. Existing Nashville Pumping Station in Block 54 is proposed to be decommissioned under ultimate conditions

Figure 0-7: Wastewater Preferred Solutions 1

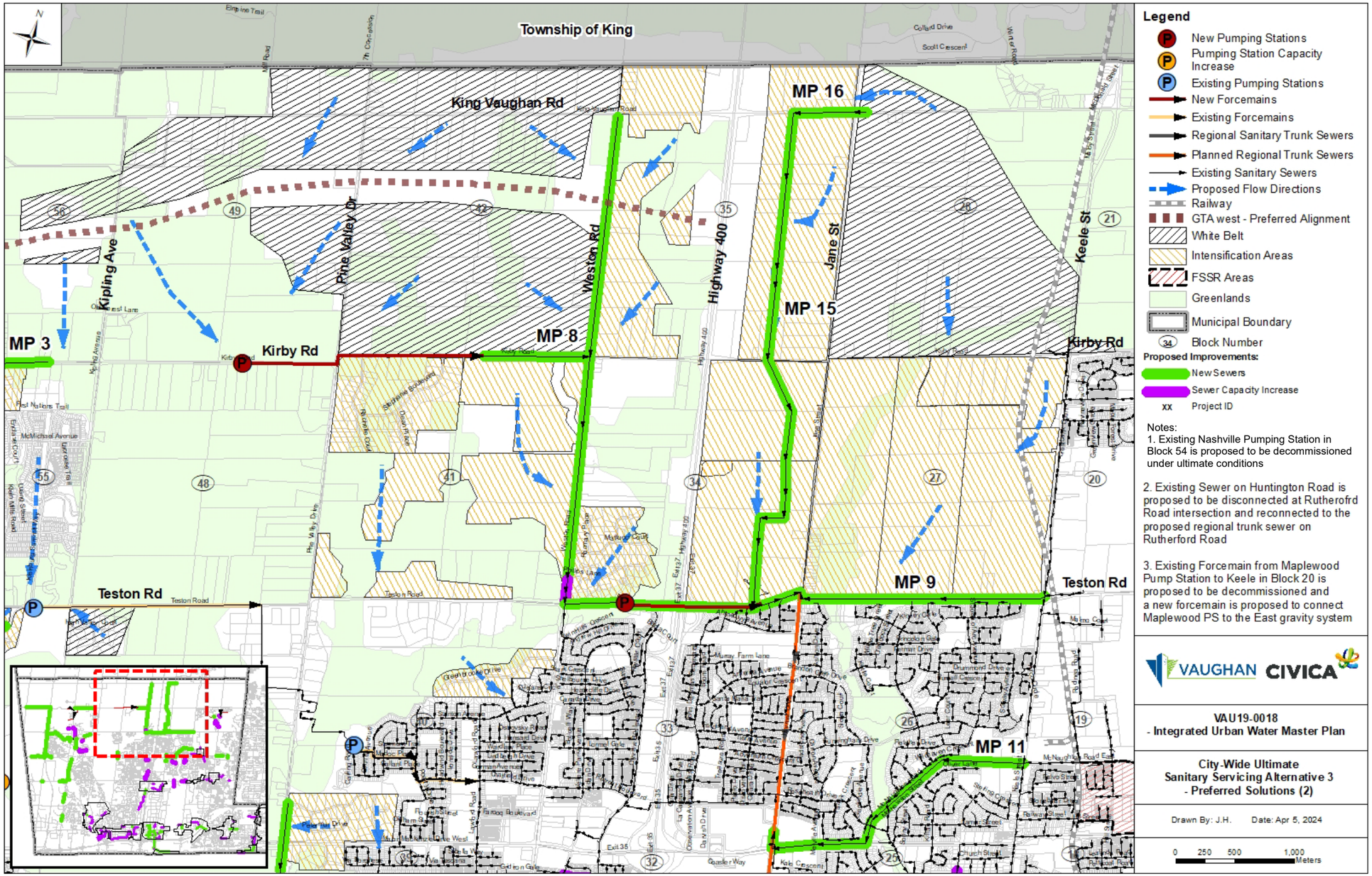


Figure 0-8: Wastewater Preferred Solutions 2

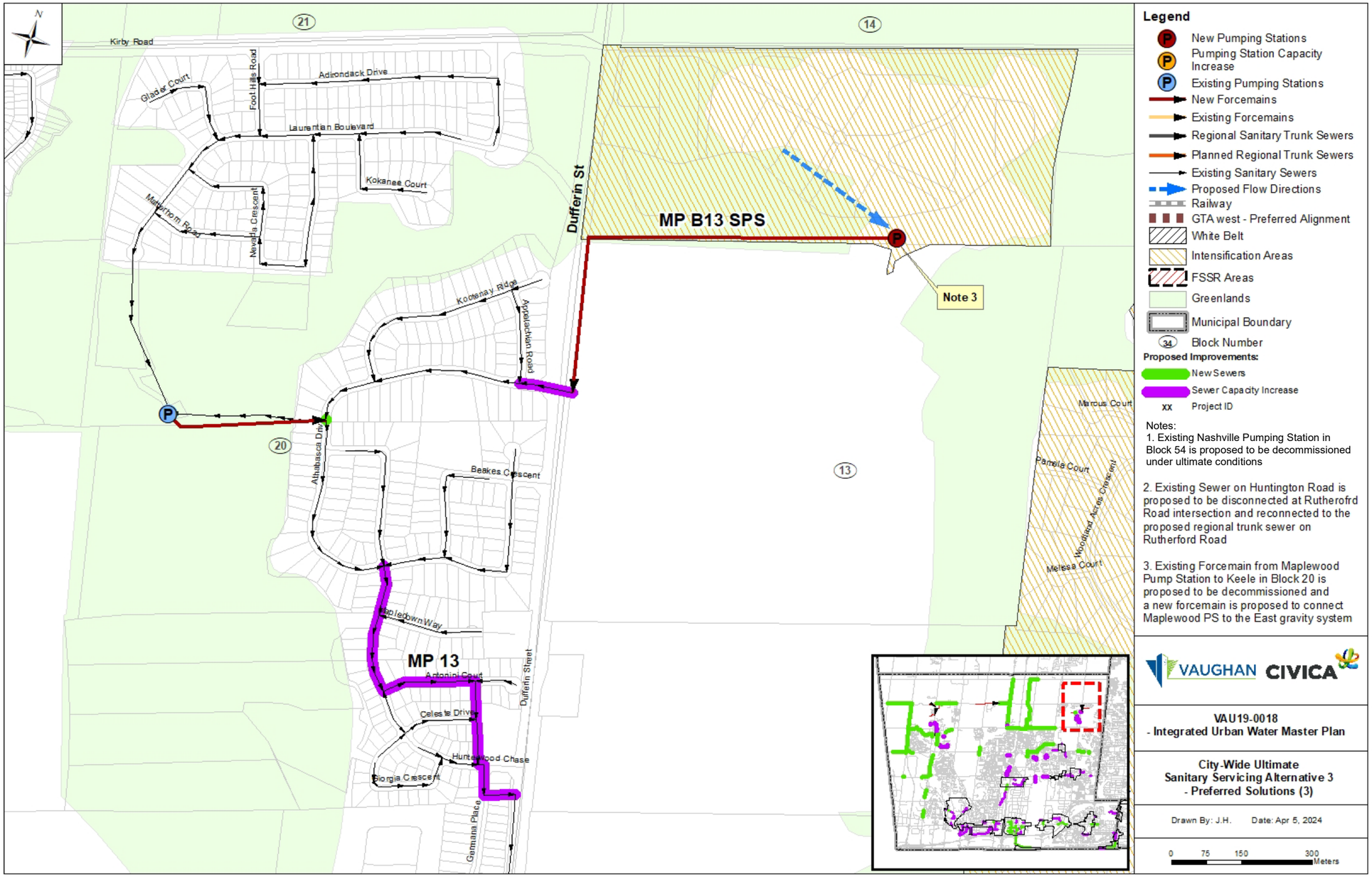


Figure 0-9: Wastewater Preferred Solutions 3

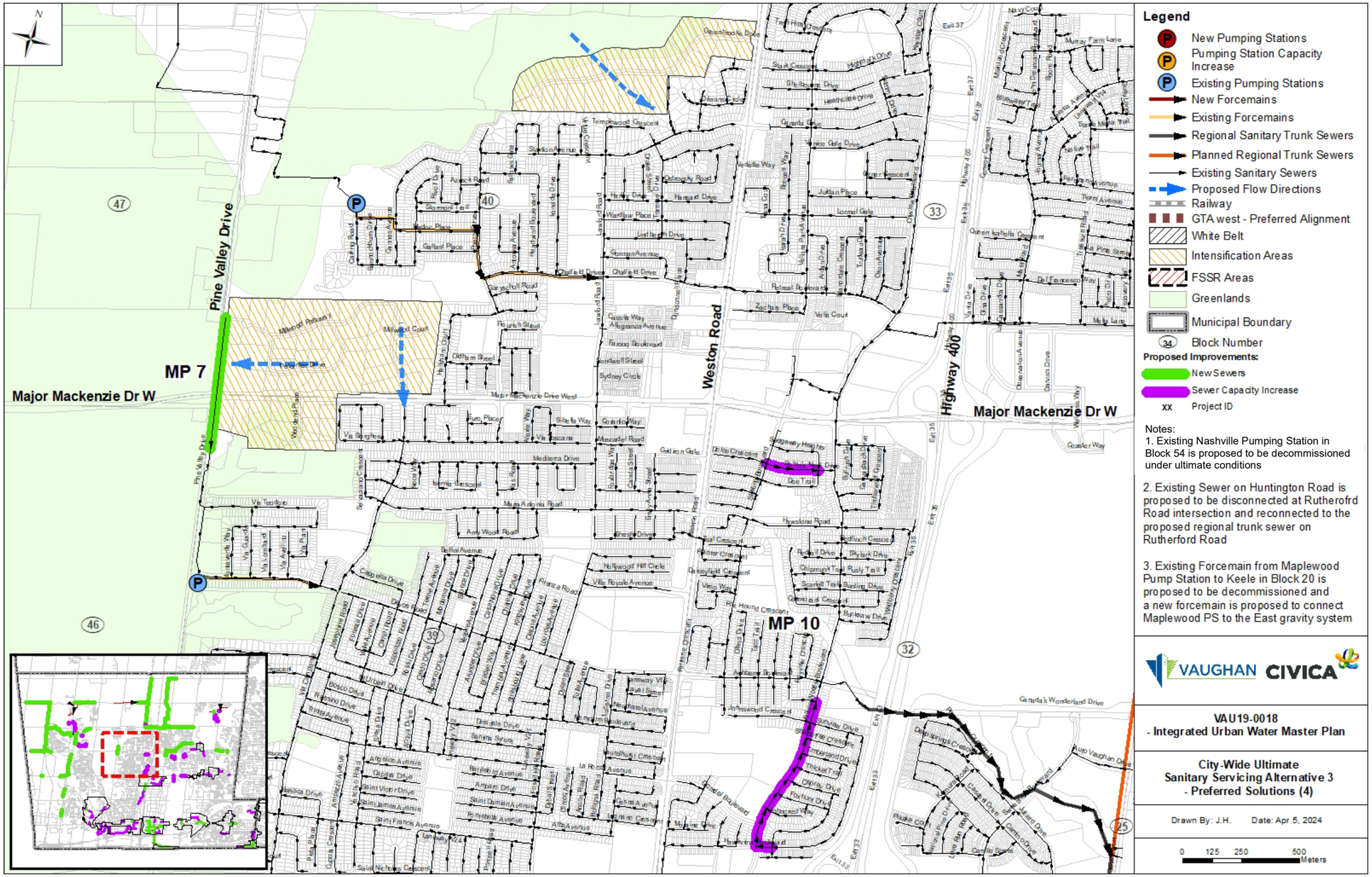


Figure 0-10: Wastewater Preferred Solutions 4

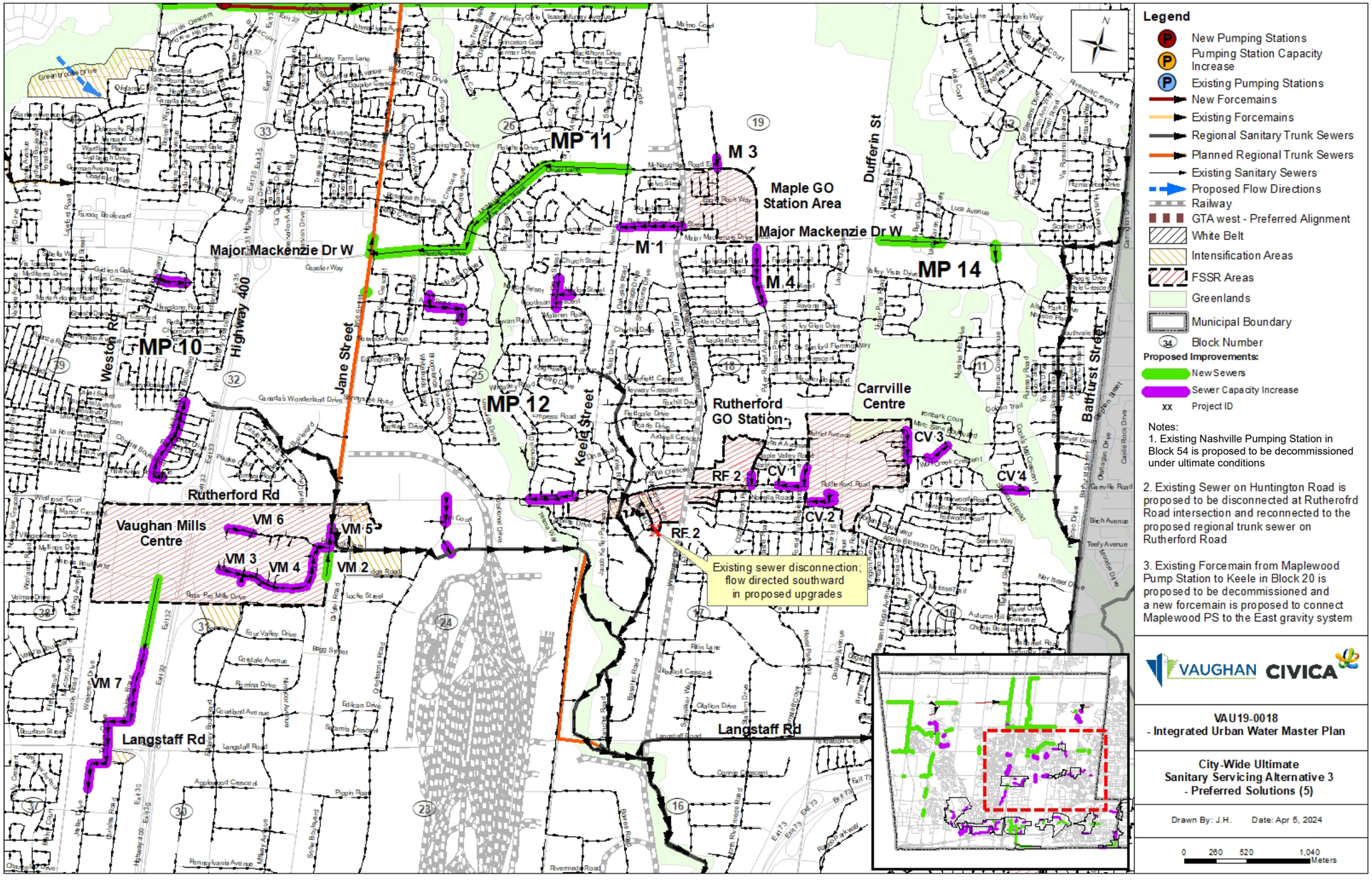


Figure 0-11: Wastewater Preferred Solutions 5

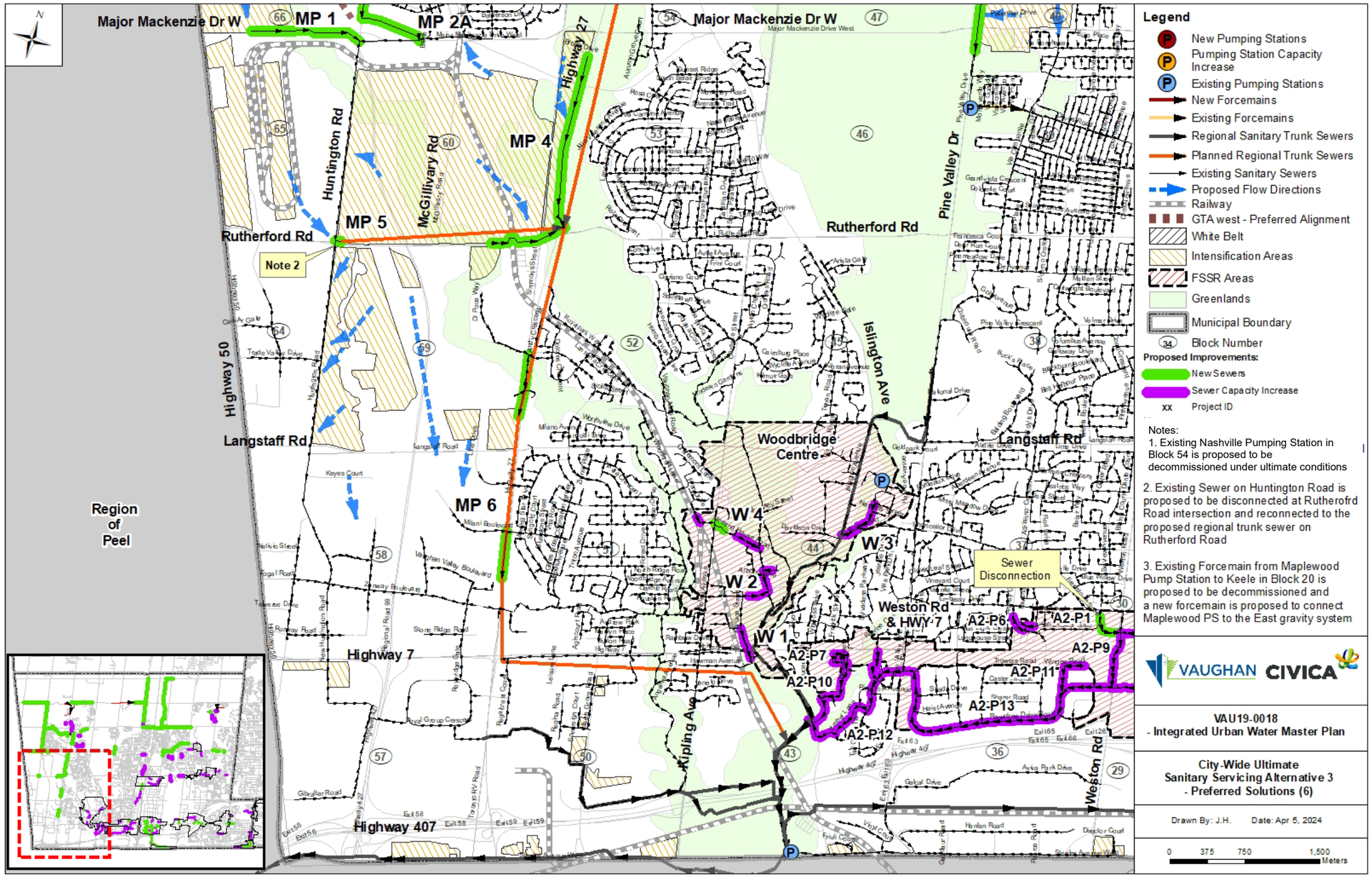


Figure 0-12: Wastewater Preferred Solutions 6

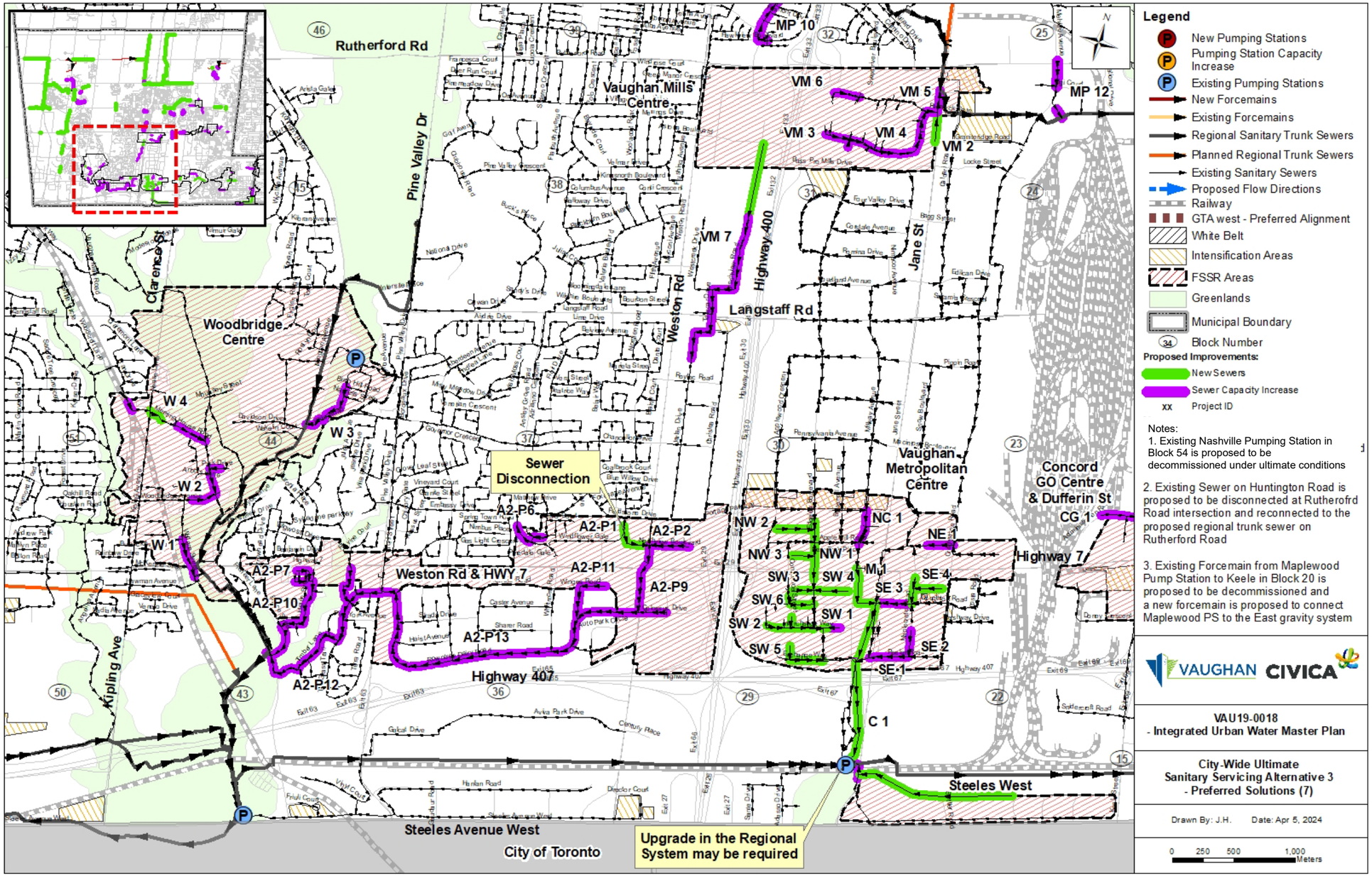


Figure 0-13: Wastewater Preferred Solutions 7

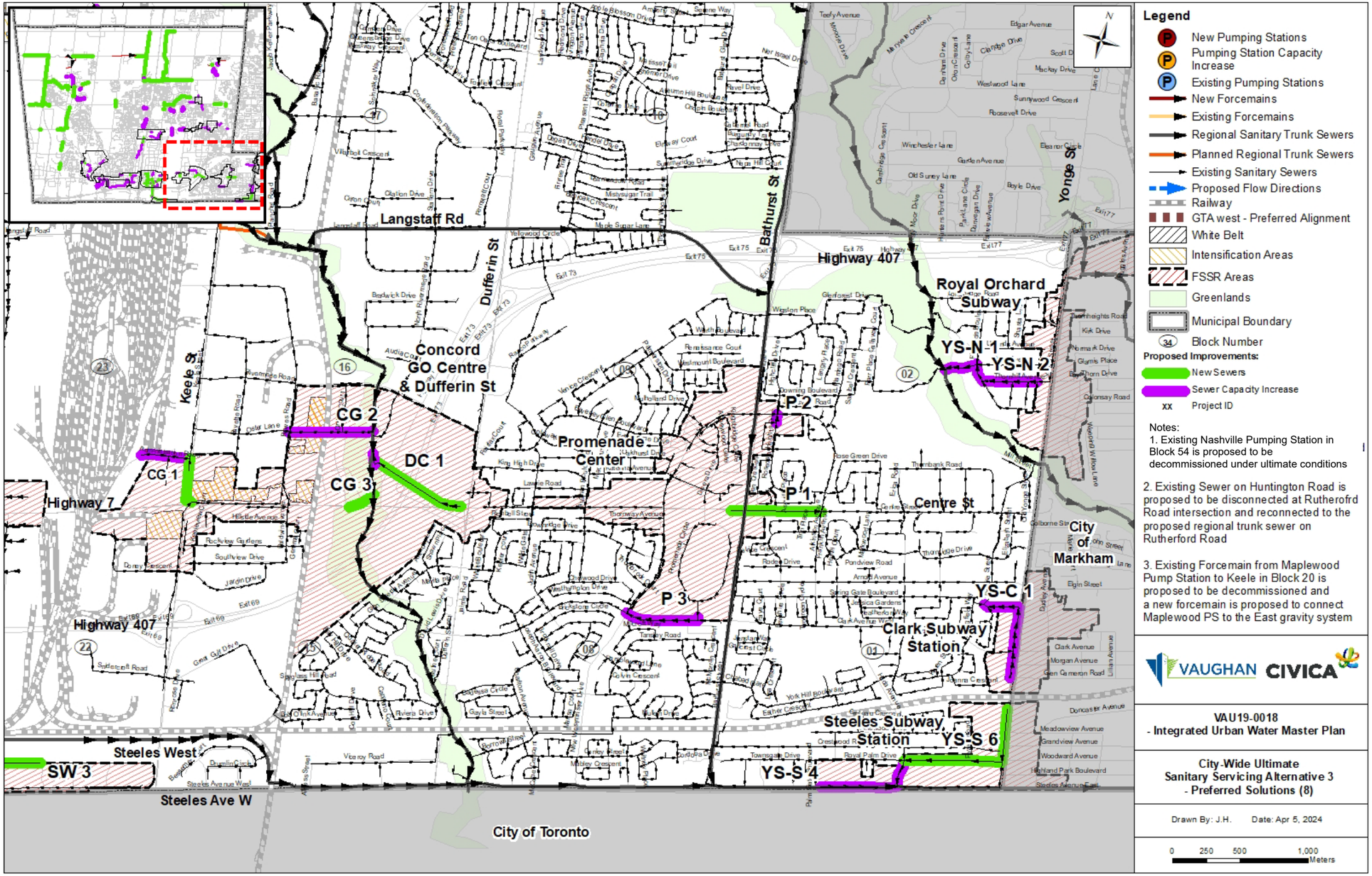


Figure-0-14: Wastewater Preferred Solutions 8

Stormwater System Recommendations

The stormwater system for the ultimate servicing requirement is presented in Figure 0-15 to Figure 0-18 and identified as FSSR-specific improvements. The cost and timing for these projects is presented in Table 0-6.

Impact of intensification on existing infrastructure and the value of the ongoing City contribution. Growth to pay for growth.

Table 0-6: Stormwater Servicing System Projects Costs

Area	Project	Budget	Estimated Timing	EA Schedule
Vaughan Metropolitan Centre	SNE-1	$600,000	2028-2036	Exempt
	SNW-1	$2,500,000	2028-2036	Exempt
	SNW-2	$2,500,000	2028-2036	Exempt
	SNW-3	$5,000,000	2028-2036	Exempt
	SNW-4	$6,600,000	2028-2036	Exempt
	SSE-1	$200,000	2028-2036	Exempt
	SSE-2	$1,500,000	2028-2036	Exempt
	SSE-3	$1,500,000	2028-2036	Exempt
	SSE-4	$2,600,000	2028-2036	Exempt
	NWQ	$7,700,000	2028-2036	Schedule B
	NEQ	$11,100,000	2028-2036	Schedule B
	SEQ	$7,000,000	2028-2036	Schedule B
	SWQ	$15,300,000	2028-2036	Schedule B
		$64,100,000		
Carrville Centre	S1	$1,000,000	2036	Exempt
	S2	$3,600,000	2036	Exempt
		$4,600,000		
Yonge & Steeles	C1	$3,500,000	2028	Exempt
	C2	$2,600,000	2028	Exempt
		$6,100,000		
Total		**$74,800,000**		

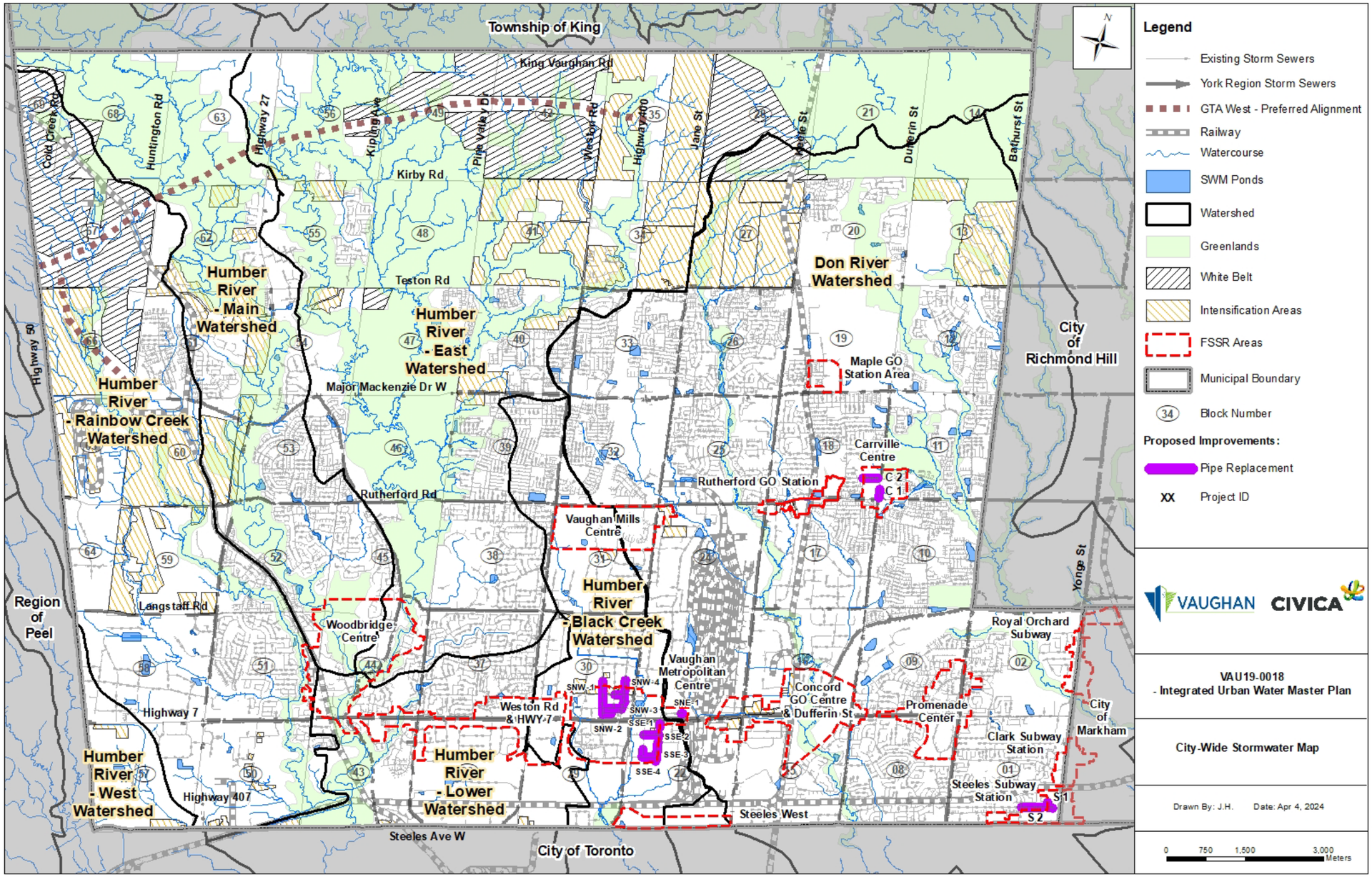


Figure 0-15: Stormwater City-Wide Servicing System

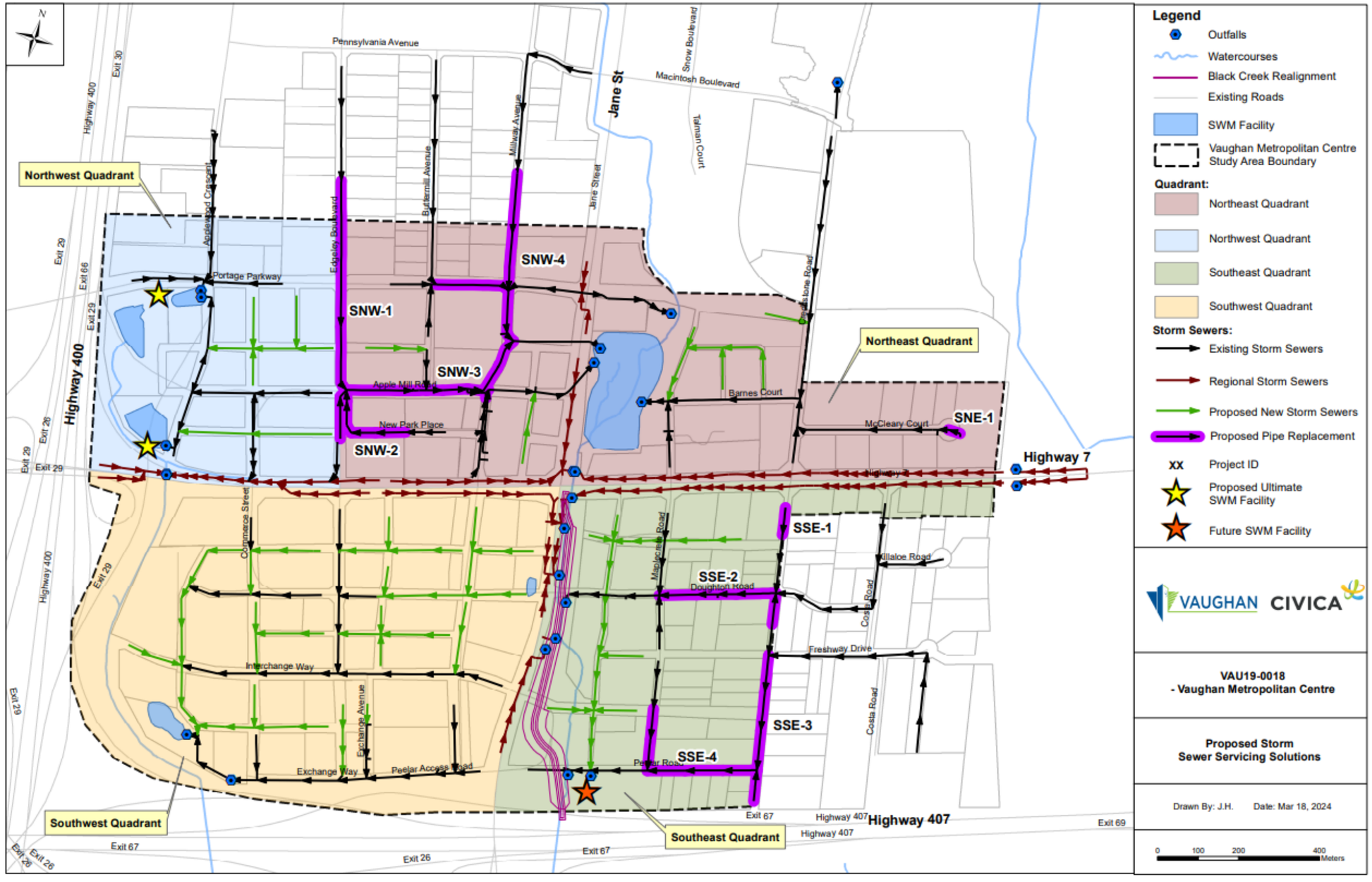


Figure 0-16: Vaughan Metropolitan Centre Proposed Solutions

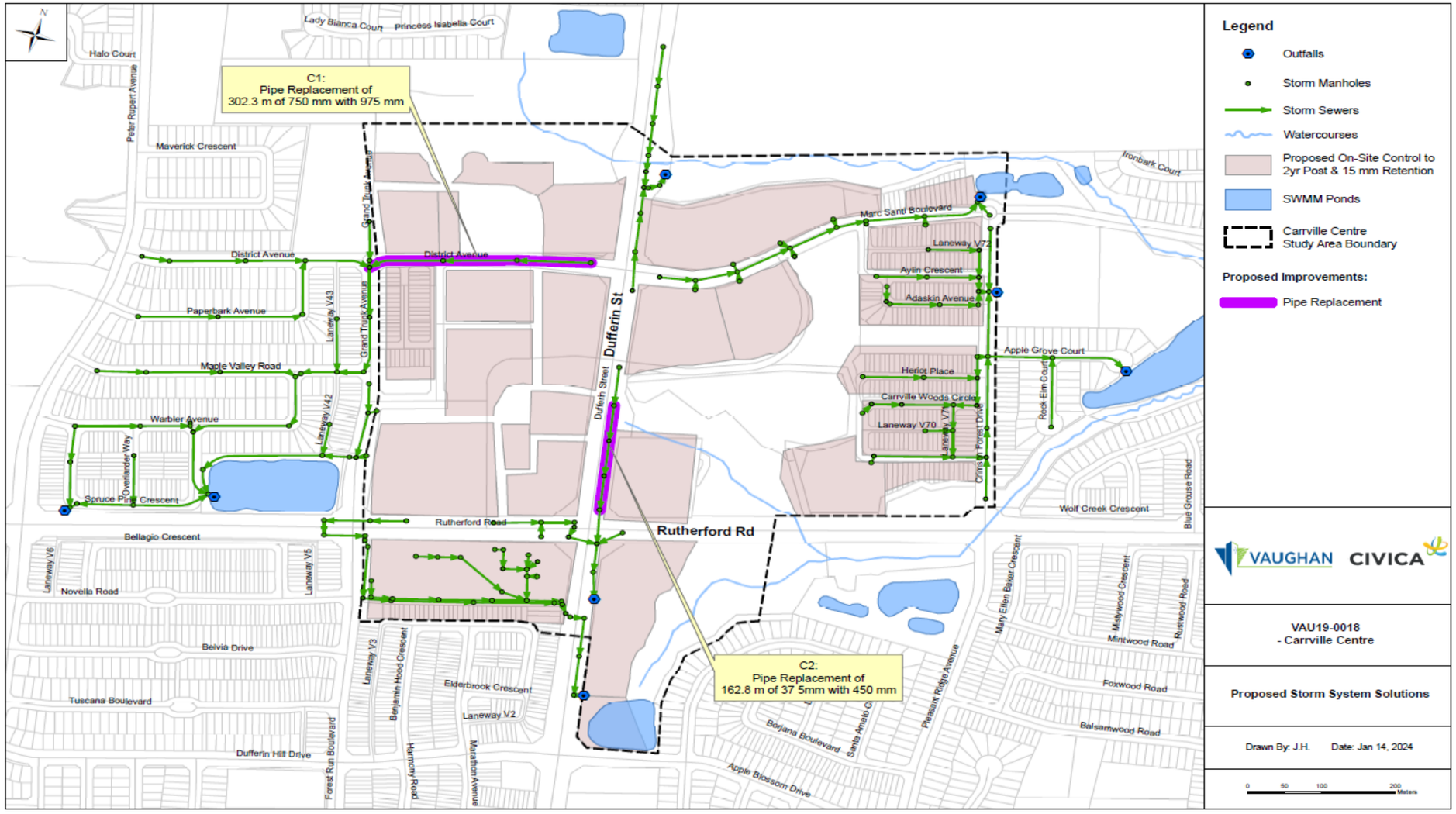


Figure 0-17: Carrville Centre Proposed Solutions

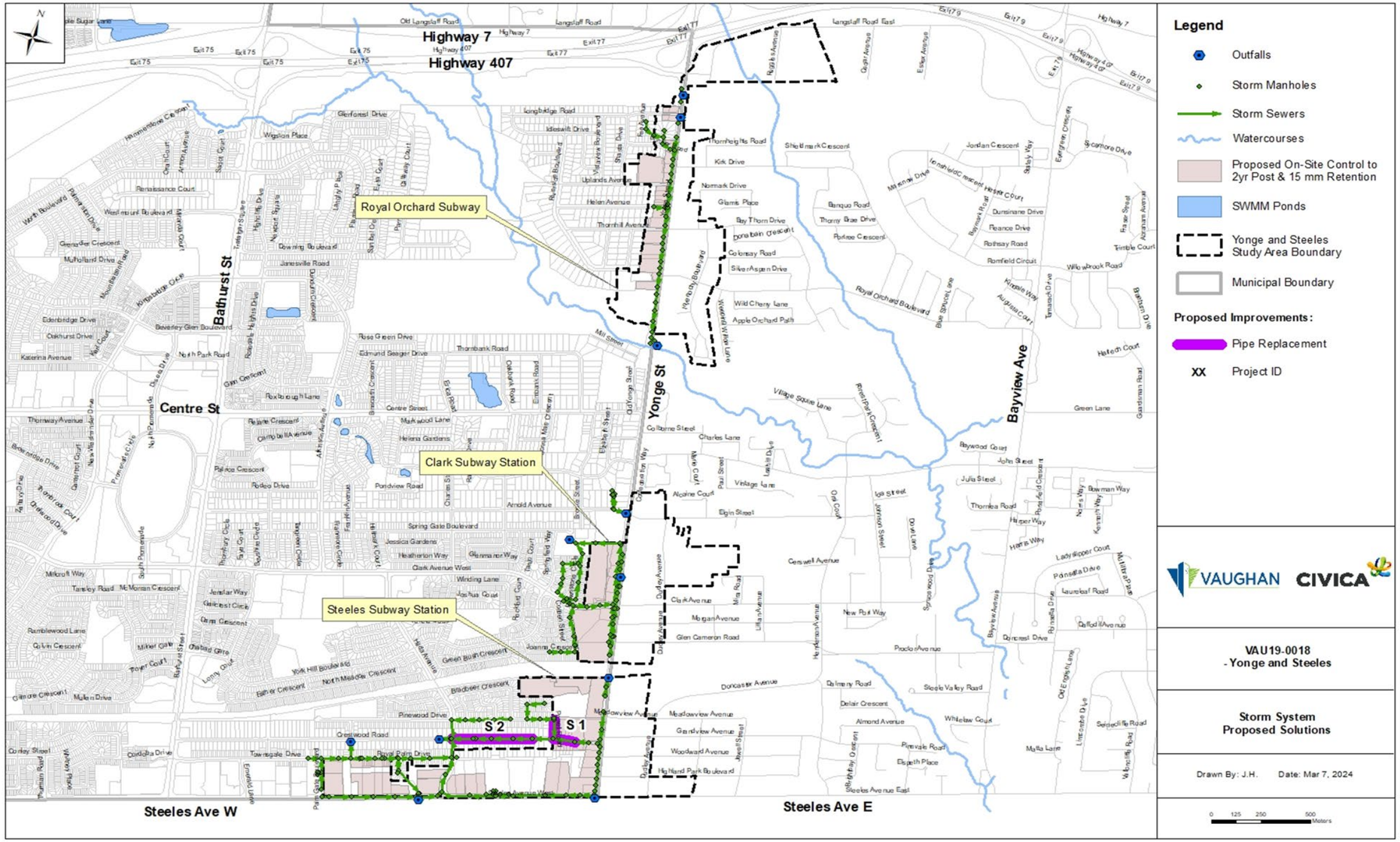


Figure 0-18: Yonge and Steeles Proposed Solutions

Program Implementation Risks and Delivery Considerations

This section provides information on implementation and delivery considerations that may impact aspects of the master plan.

Coordinate with York Region Capital Plan Delivery

The Region is responsible for bulk distribution and collection of water and wastewater as well as treatment. From a City-wide servicing perspective there are critical Regional projects that are required to meet servicing needs primarily in the northeast and northwest area of the City. The following Table provide information on the Regional projects, budget, and timing for completion.

Key considerations with the Region capital plan are timing of critical infrastructure and risk of delay/ risk of escalated development progress. This is noted as a potential risk in timing of completion that may impact development approvals.

Additionally, there may be challenges with planned growth targets when comparing Regional and City forecasts. It is recognized that there is rapid growth expected in the City for the planning horizon and that servicing demands have been estimated based on a more conservative population target. This is to ensure long term servicing capacity is available and timing for implementation is more conservative. Should these forecast rates slow in the planning horizon, this will only impact timing of implementation. The risk of accelerated growth may be more of a challenge for York Region where the planning and implementation of larger scale Regional projects are generally more difficult to advance.

Table 0-7 York Region Capital Projects

Project	Description	Budget	Completion
Northeast Vaughan Water and Wastewater Servicing	Water Phase 1 Pumping Station and tank Jane St and Kirby Rd	$333,400,000	2025
	Water Phase 2 Elevated tank Jane St and King-Vaughan Rd.		2028
	Wastewater Phase 1 1.9km on Keele St Rutherford Rd. to Langstaff Rd.		2025
	Wastewater Phase 2 4.5km on Jane St. from Teston Rd. to Rutherford Rd. and relief sewer for Jane Rutherford Trunk		2028
West Vaughan Sewage Servicing	Route includes Hwy 27, Hwy 7 with termination at the Humber Sewage Pumping Station	$470,000,000	2028 (12 km of sewer) After 2034 (2 km of sewer)

Intensification and Land Use Impacts

Servicing of intensifications areas generally impacts infrastructure capacity in different ways than in greenfield development growth. The rate of growth is generally much more aggressive for the area and the density can be substantially increased while infrastructure needs may not keep pace.

This challenge is being addressed through a rapid implementation recommendation based on the need to be ready to accommodate large high-rise residential projects that can introduce thousands of

residents in a short time frame. These potential impacts have been considered and should be monitored where rapid growth is expected and where service updates are pending to meet these demands.

Cross Boundary Servicing Alternatives Outside York Region

This consideration is identified due to potential servicing alternatives that may be provided through direct negotiation with Peel Region related to water and wastewater servicing along the western limits of Vaughan. This would be considered a last resort approach that, although potentially cost-effective, would be out of conformance with broader servicing agreements and the current sanitary and water servicing agreement between York Region and Peel Region. Should servicing challenges increase in the future, there may be a benefit to open discussions with the Regional tiers where interim or phased servicing alternatives might be feasible to close short-term servicing constraints that may emerge.

Cost for Infrastructure Growth and Benefits to Existing Communities

A consideration under the Development Charges Act is what portion of infrastructure should be considered to be benefitting existing and therefore to be funded by the existing community via taxes. In the idea of growth pays for growth, it should be recognized that, whether green field or intensification in existing serviced areas, when additional population/ servicing demands are added to a service area, and where this added demand creates the need for increases to infrastructure capacity, those costs should be directly attributed to the projects creating the additional demand.

In a similar consideration, and as part of the process for calculating the development charges related to growth, where existing capacity exists to accommodate new growth, that capacity is generally available without consideration of the initial cost to create it in the first place. Development charges collected will be used for the maintenance and operation of the existing pipes. These principles are established in the Development Charges Act and are intended to allocate the cost of future assets appropriately. The general consideration for intensification areas would be any benefit to existing where future costs in a reasonable timeline are considered deferred or eliminated when the replacement of aged infrastructure occurs concurrently with the need for pipe upsizing. However, where upsizing is accelerated earlier than the need for remediation, the consideration should be significantly reduced or eliminated regarding benefit to existing. As a policy, the condition or age of an existing asset has no bearing on the consideration of benefit to the existing community unless the upsizing is part of an existing deficiency and where that benefit to the existing community is identified as part of the DC calculation.