# Asset Management Plan

Town of Aurora

2021

This Asset Management Program was prepared by:


Empowering your organization through advanced asset management, budgeting & GIS solutions

# Key Statistics

Replacement cost of asset portfolio
$1.5 billion

Replacement cost of infrastructure per household
$77,114

Percentage of assets in fair or better condition
79%

Percentage of assets with assessed condition data
39%

Annual capital infrastructure deficit
$36 million

Recommended timeframe for eliminating annual infrastructure deficit
20 Years – Tax-Funded Assets
10-15 Years – Rate-Funded

Target reinvestment rate
3.2%

Actual reinvestment rate
0.8%

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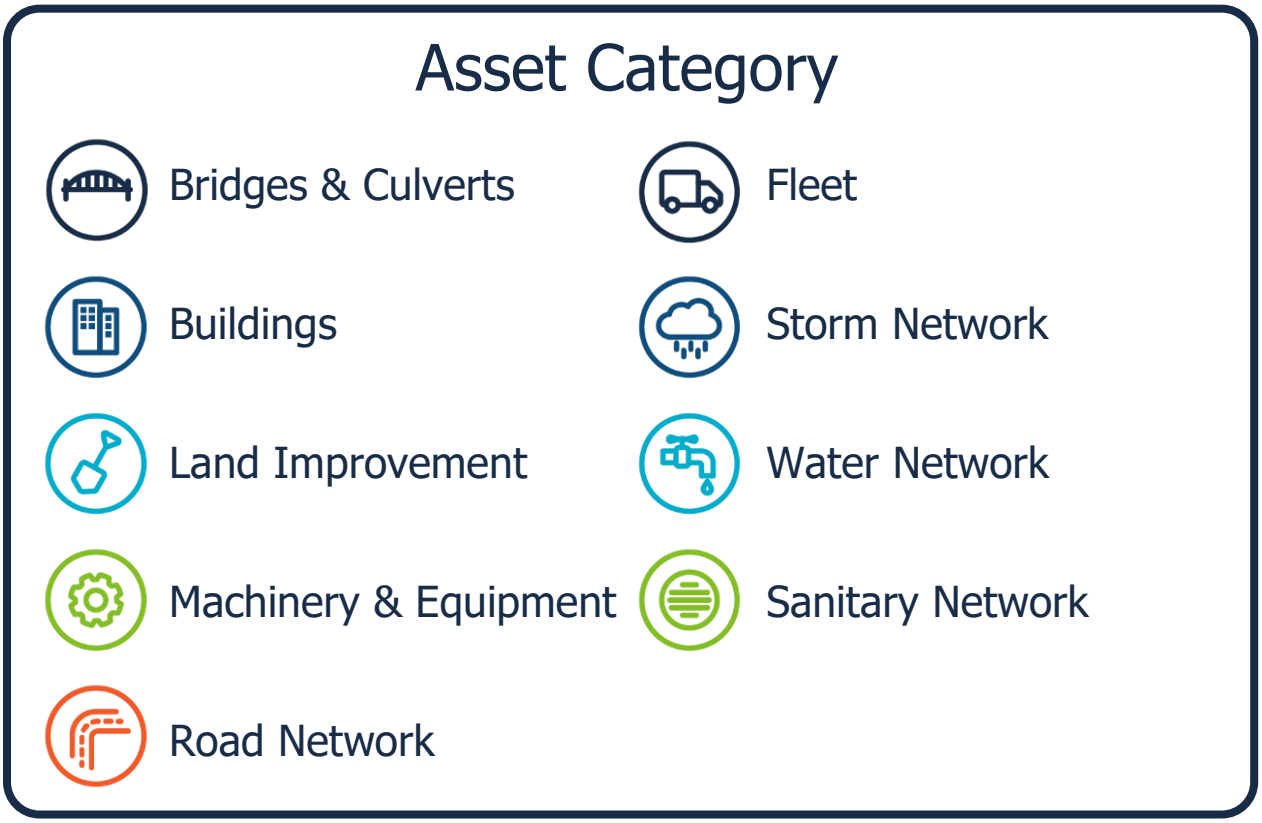
# Executive Summary

Municipal infrastructure provides the foundation for the economic, social, and environmental health and growth of a community through the delivery of critical services. The goal of asset management is to deliver an adequate level of service in the most cost-effective manner. This involves the development and implementation of asset management strategies and long-term financial planning.

## Scope

This AMP identifies the current practices and strategies that are in place to manage public infrastructure and makes recommendations where they can be further refined. Through the implementation of sound asset management strategies, the Municipality can ensure that public infrastructure is managed to support the sustainable delivery of municipal services.

This AMP include the following asset categories:



With the development of this AMP the Municipality has achieved compliance with O. Reg. 588/17 to the extent of the requirements that must be completed by July 1, 2022. There are additional requirements concerning proposed levels of service and growth that must be met by July 1, 2024 and 2025.

# Findings

The overall replacement cost of the asset categories included in this AMP totals $1.5 billion. 79% of all assets analysed in this AMP are in fair or better condition and assessed condition data was available for 39% of assets. For the remaining assets, assessed condition data was unavailable, and asset age was used to approximate condition – a data gap that persists in most municipalities. Generally, age misstates the true condition of assets, making assessments essential to accurate asset management planning, and a recurring recommendation in this AMP.
The development of a long-term, sustainable financial plan requires an analysis of whole lifecycle costs. This AMP uses a combination of proactive lifecycle strategies (paved roads, bridges & structural culverts) and replacement only strategies (all other assets) to determine the lowest cost option to maintain the current level of service.

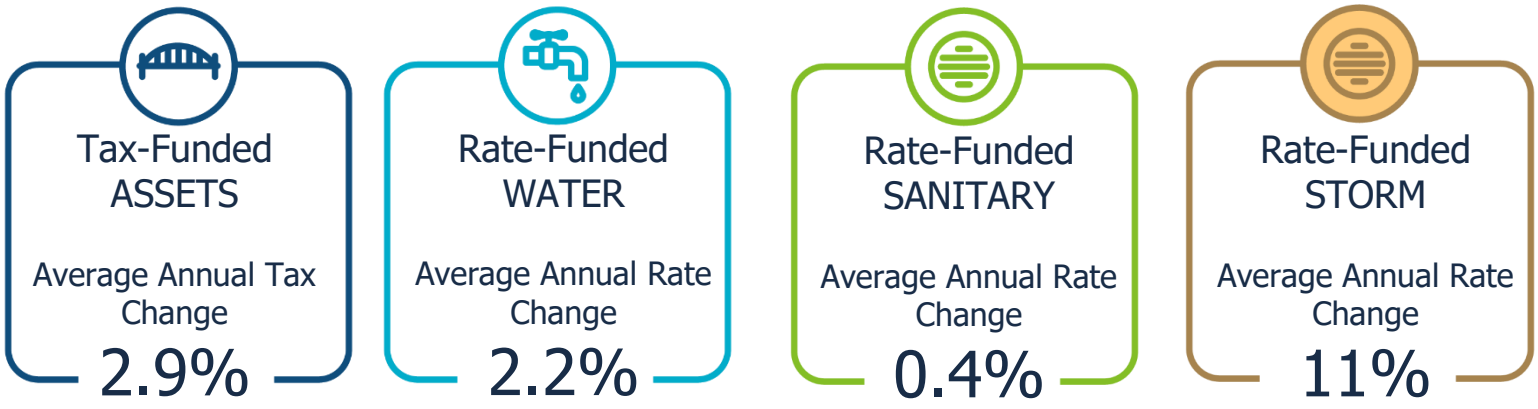
To meet capital replacement and rehabilitation needs for existing infrastructure, prevent infrastructure backlogs, and achieve long-term sustainability, the Municipality's average annual capital requirement totals $48 million. Based on a historical analysis of sustainable capital funding sources, the Municipality is committing approximately $12 million towards capital projects or reserves per year. As a result, there is currently an annual funding gap of $36 million.

It is important to note that this AMP represents a snapshot in time and is based on the best available processes, data, and information at the Municipality. Strategic asset management planning is an ongoing and dynamic process that requires continuous improvement and dedicated resources.

Annual Increase
Per Household


# Recommendations

A financial strategy was developed to address the annual capital funding gap. The following graphics shows annual tax and rate change required to eliminate the Municipality's infrastructure deficit based on a 20-year plan for tax-funded assets, a 10-year plan for water and sanitary assets, and a 15-year plan for storm assets:




Recommendations to guide continuous refinement of the Municipality's asset management program. These include:

- Review data to update and maintain a complete and accurate dataset
- Develop a condition assessment strategy with a regular schedule
- Review and update lifecycle management strategies
- Development and regularly review short- and long-term plans to meet capital requirements
- Measure current levels of service and identify sustainable proposed levels of service

# 1 Introduction & Context

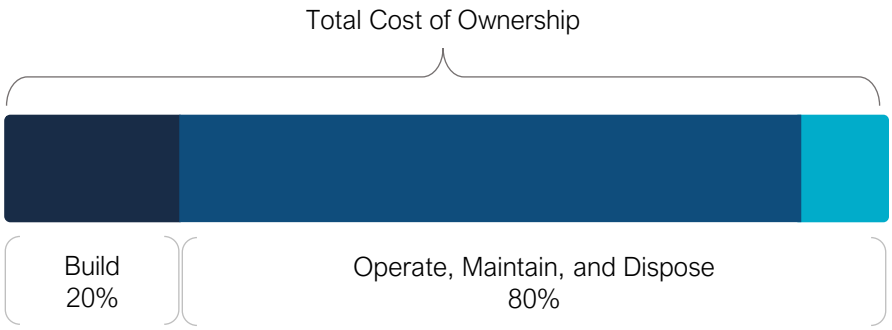
## Key Insights

- The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio
- The Town's asset management policy provides clear direction to staff on their roles and responsibilities regarding asset management
- An asset management plan is a living document that should be updated regularly to inform long-term planning
- Ontario Regulation 588/17 outlines several key milestone and requirements for asset management plans in Ontario between July 1, 2022 and 2025

# An Overview of Asset Management

Municipalities are responsible for managing and maintaining a broad portfolio of infrastructure assets to deliver services to the community. The goal of asset management is to minimize the lifecycle costs of delivering infrastructure services, manage the associated risks, while maximizing the value ratepayers receive from the asset portfolio.

The acquisition of capital assets accounts for only 10-20% of their total cost of ownership. The remaining 80-90% derives from operations and maintenance. This AMP focuses its analysis on the capital costs to maintain, rehabilitate and replace existing municipal infrastructure assets.




These costs can span decades, requiring planning and foresight to ensure financial responsibility is spread equitably across generations. An asset management plan is critical to this planning, and an essential element of broader asset management program. The industry-standard approach and sequence to developing a practical asset management program begins with a Strategic Plan, followed by an Asset Management Policy and an Asset Management Strategy, concluding with an Asset Management Plan.

This industry standard, defined by the Institute of Asset Management (IAM), emphasizes the alignment between the corporate strategic plan and various asset management documents. The strategic plan has a direct, and cascading impact on asset management planning and reporting.

### 1.1.1 Asset Management Policy

An asset management policy represents a statement of the principles guiding the municipality's approach to asset management activities. It aligns with the organizational strategic plan and provides clear direction to municipal staff on their roles and responsibilities as part of the asset management program.

The Town adopted Policy No. FS-07 Strategic Asset Management Policy on March 26th, 2019 in accordance with Ontario Regulation 588/17.

The asset management plan satisfies the policy statement 1.0 section 5:

> *The Town will develop an asset management plan (AMP) that incorporates all infrastructure categories and municipal infrastructure assets that are necessary to the provision of services…The AMP will be reviewed annually to address the Town's progress in implementing its asset management plan and updated at least every five years in accordance with O. Reg. 588/17 requirements, to promote, document and communicate continuous improvement of the asset management program.*

The Town's strategic asset management policy includes multiple commitments such as commitments to the utilization of levels of service information, lifecycle management, mitigation approaches to climate change, and the coordination with upper and neighbouring municipalities in its asset maintenance, rehabilitation and replacement decision points wherever possible.

### 1.1.2 Asset Management Strategy

An asset management strategy outlines the translation of organizational objectives into asset management objectives and provides a strategic overview of the activities required to meet these objectives. It provides greater detail than the policy on how the municipality plans to achieve asset management objectives through planned activities and decision-making criteria.

The Town's Asset Management Policy contains many of the key components of an asset management strategy and may be expanded on in future revisions or as part of a separate strategic document.

### 1.1.3 Asset Management Plan

The asset management plan (AMP) presents the outcomes of the municipality's asset management program and identifies the resource requirements needed to achieve a defined level of service. The AMP typically includes the following content:

- State of Infrastructure
- Asset Management Strategies
- Levels of Service
- Financial Strategies

The AMP is a living document that should be updated regularly as additional asset and financial data becomes available. This will allow the municipality to re-evaluate the state of infrastructure and identify how the organization's asset management and financial strategies are progressing.

# Key Concepts in Asset Management

Effective asset management integrates several key components, including lifecycle management, risk management, and levels of service. These concepts are applied throughout this asset management plan and are described below in greater detail.

## 1.1.4 Lifecycle Management Strategies

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. Asset deterioration has a negative effect on the ability of an asset to fulfill its intended function, and may be characterized by increased cost, risk and even service disruption.

To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

There are several field intervention activities that are available to extend the life of an asset. These activities can be generally placed into one of three categories: maintenance, rehabilitation and replacement. The following table provides a description of each type of activity and the general difference in cost.

| Lifecycle Activity | Description | Example (Roads) | Cost |
|---|---|---|---|
| Maintenance | Activities that prevent defects or deteriorations from occurring | Crack Seal | $ |
| Rehabilitation/ Renewal | Activities that rectify defects or deficiencies that are already present and may be affecting asset performance | Mill & Re-surface | $$ |
| Replacement/ Reconstruction | Asset end-of-life activities that often involve the complete replacement of assets | Full Reconstruction | $$$ |

Depending on initial lifecycle management strategies, asset performance can be sustained through a combination of maintenance and rehabilitation, but at some point, replacement is required. Understanding what effect these activities will have on the lifecycle of an asset, and their cost, will enable staff to make better recommendations.

The Town's approach to lifecycle management is described within each asset category outlined in this AMP. Developing and implementing a proactive lifecycle strategy will help staff to determine which activities to perform on an asset and when they should be performed to maximize useful life at the lowest total cost of ownership.

### 1.1.5 Risk Management Strategies

Municipalities historically take a 'worst-first' approach to infrastructure spending. Rather than prioritizing assets based on their importance to service delivery, assets in the worst condition are fixed first, regardless of their criticality. However, not all assets are created equal. Some are more important than others, and their failure or disrepair poses more risk to the community than that of others. For example, a road with a high volume of traffic that provides access to critical services poses a higher risk than a low volume rural road. These high-value assets should receive funding before others.

By identifying the various impacts of asset failure and the likelihood that it will fail, risk management strategies can identify critical assets, and determine where maintenance efforts, and spending, should be focused.

This AMP includes a high-level evaluation of asset risk and criticality. Each asset has been assigned a probability of failure score and consequence of failure score based on available asset data. These risk scores can be used to prioritize maintenance, rehabilitation and replacement strategies for critical assets.

### 1.1.6 Levels of Service

A level of service (LOS) is a measure of what the Town is providing to the community and the nature and quality of that service. Within each asset category in this AMP, technical metrics and qualitative descriptions that measure both technical and community levels of service have been established and measured as data is available.

These measures include a combination of those that have been outlined in O. Reg. 588/17 in addition to performance measures identified by the Town as worth measuring and evaluating. The Town measures the level of service provided at two levels: Community Levels of Service, and Technical Levels of Service.

#### Community Levels of Service

Community levels of service are a simple, plain language description or measure of the service that the community receives. For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Stormwater) the Province, through O. Reg. 588/17, has provided qualitative descriptions that are required to be included in this AMP. For non-core asset categories, the Town has determined the qualitative descriptions that will be used to determine the community level of service provided. These descriptions can be found in the Levels of Service subsection within each asset category.

## Technical Levels of Service

Technical levels of service are a measure of key technical attributes of the service being provided to the community. These include mostly quantitative measures and tend to reflect the impact of the municipality's asset management strategies on the physical condition of assets or the quality/capacity of the services they provide.

For core asset categories (Roads, Bridges & Culverts, Water, Wastewater, Stormwater) the Province, through O. Reg. 588/17, has provided technical metrics that are required to be included in this AMP. For non-core asset categories, the Town will determine the technical level of service provided by the July 2024 deadline.

## Current and Proposed Levels of Service

This AMP focuses on measuring the current level of service provided to the community. Once current levels of service have been measured, the Town plans to establish proposed levels of service over a 10-year period, in accordance with O. Reg. 588/17.

Proposed levels of service should be realistic and achievable within the timeframe outlined by the Town. They should also be determined with consideration of a variety of community expectations, fiscal capacity, regulatory requirements, corporate goals and long-term sustainability. Once proposed levels of service have been established, and prior to July 2024, the Town must identify a lifecycle management and financial strategy which allows these targets to be achieved.

# Ontario Regulation 588/17

As part of the *Infrastructure for Jobs and Prosperity Act, 2015*, the Ontario government introduced Regulation 588/17 - Asset Management Planning for Municipal Infrastructure (O. Reg 588/17). Along with creating better performing organizations, more liveable and sustainable communities, the regulation is a key, mandated driver of asset management planning and reporting. It places substantial emphasis on current and proposed levels of service and the lifecycle costs incurred in delivering them.

The diagram below outlines key reporting requirements under O. Reg 588/17 and the associated timelines.

**2019**

Strategic Asset Management Policy

**2022**

Asset Management Plan for Core Assets with the following components:

1. Current levels of service
2. Inventory analysis
3. Lifecycle activities to sustain LOS
4. Cost of lifecycle activities
5. Population and employment forecasts
6. Discussion of growth impacts

**2024**

Asset Management Plan for Core and Non-Core Assets

**2025**

Asset Management Policy Update and an Asset Management Plan for All Assets with the following additional components:

1. Proposed levels of service for next 10 years
2. Updated inventory analysis
3. Lifecycle management strategy
4. Financial strategy and addressing shortfalls
5. Discussion of how growth assumptions impacted lifecycle and financial

## 1.1.7 O. Reg. 588/17 Compliance Review

The following table identifies the requirements outlined in Ontario Regulation 588/17 for municipalities to meet by July 1, 2022. Next to each requirement a page or section reference is included in addition to any necessary commentary.

| Requirement | O. Reg. Section | AMP Section Reference | Status |
|---|---|---|---|
| Summary of assets in each category | S.5(2), 3(i) | 4.1.1 - 5.2.1 | Complete |
| Replacement cost of assets in each category | S.5(2), 3(ii) | 4.1.1 - 5.2.1 | Complete |
| Average age of assets in each category | S.5(2), 3(iii) | 4.1.3 - 5.2.3 | Complete |
| Condition of core assets in each category | S.5(2), 3(iv) | 4.1.2 – 5.2.2 | Complete |
| Description of municipality's approach to assessing the condition of assets in each category | S.5(2), 3(v) | 4.1.2 – 5.2.2 | Complete |
| Current levels of service in each category | S.5(2), 1(i-ii) | 4.1.6 - 5.2.6 | Complete for Core Assets Only |
| Current performance measures in each category | S.5(2), 2 | 4.1.6 - 5.2.6 | Complete for Core Assets Only |
| Lifecycle activities needed to maintain current levels of service for 10 years | S.5(2), 4 | 4.1.4 - 5.2.4 | Complete |
| Costs of providing lifecycle activities for 10 years | S.5(2), 4 | Appendix B | Complete |
| Growth assumptions | S.5(2), 5(i-ii)<br>S.5(2), 6(i-vi) | 6.1-6.2 | Complete |

# 2 Scope and Methodology

## Key Insights

- This asset management plan includes 9 asset categories and is divided between tax-funded and rate-funded categories
- The source and recency of replacement costs impacts the accuracy and reliability of asset portfolio valuation
- Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life

# Asset categories included in this AMP

This asset management plan for the Town of Aurora is produced in compliance with Ontario Regulation 588/17. The July 2022 deadline under the regulation—the first of three AMPs—requires analysis of only core assets (roads, bridges & culverts, water, wastewater, and stormwater). The data and attribute information included in this plan have been exported from the CityWide Asset Manager inventory database.

The AMP summarizes the state of the infrastructure for the Town's asset portfolio, establishes current levels of service and the associated technical and customer oriented key performance indicators (KPIs), outlines lifecycle strategies for optimal asset management and performance, and provides financial strategies to reach sustainability for the asset categories listed below.

| Asset Category | Source of Funding |
|---|---|
| Road Network | Tax Levy |
| Bridges & Culverts | |
| Buildings | |
| Machinery & Equipment | |
| Fleet | |
| Land Improvement | |
| Water Network | User Rates |
| Sanitary Network | |
| Storm Network | |

# Deriving Replacement Costs

There are a range of methods to determine the replacement cost of an asset, and some are more accurate and reliable than others. This AMP relies on two methodologies:

- **User-Defined Cost and Cost/Unit**: Based on costs provided by municipal staff which could include average costs from recent contracts; data from engineering reports and assessments; staff estimates based on knowledge and experience
- **Cost Inflation/CPI Tables**: Historical cost of the asset is inflated based on Consumer Price Index or Non-Residential Building Construction Price Index

User-defined costs based on reliable sources are a reasonably accurate and reliable way to determine asset replacement costs. Cost inflation is typically used in the absence of reliable replacement cost data. It is a reliable method for recently purchased and/or constructed assets where the total cost is reflective of the actual costs that the Town incurred. As assets age, and new products and technologies become available, cost inflation becomes a less reliable method.

# Estimated Useful Life

The estimated useful life (EUL) of an asset is the period over which the Town expects the asset to be available for use and remain in service before requiring replacement or disposal. The EUL for each asset in this AMP was assigned according to the knowledge and expertise of municipal staff and supplemented by existing industry standards when necessary.

# Reinvestment Rate

As assets age and deteriorate they require additional investment to maintain a state of good repair. The reinvestment of capital funds, through asset renewal or replacement, is necessary to sustain an adequate level of service. The reinvestment rate is a measurement of available or required funding relative to the total replacement cost.

By comparing the actual vs. target reinvestment rate the Town can determine the extent of any existing funding gap. The reinvestment rate is calculated as follows:

$$Target\ Reinvestment\ Rate = \frac{Annual\ Capital\ Requirement}{Total\ Replacement\ Cost}$$

$$Actual\ Reinvestment\ Rate = \frac{Annual\ Capital\ Funding}{Total\ Replacement\ Cost}$$

# Deriving Asset Condition

An incomplete or limited understanding of asset condition can mislead long-term planning and decision-making. Accurate and reliable condition data helps to prevent premature and costly rehabilitation or replacement and ensures that lifecycle activities occur at the right time to maximize asset value and useful life.

A condition assessment rating system provides a standardized descriptive framework that allows comparative benchmarking across the Town's asset portfolio. The table below outlines the condition rating system used in this AMP to determine asset condition. This rating system is aligned with the Canadian Core Public Infrastructure Survey which is used to develop the Canadian Infrastructure Report Card. When assessed condition data is not available, age-based condition is used as a proxy.

| Condition | Description | Criteria | Service Life Remaining (%) |
|---|---|---|---|
| Very Good | Fit for the future | Well maintained, good condition, new or recently rehabilitated | 80-100 |
| Good | Adequate for now | Acceptable, generally approaching mid-stage of expected service life | 60-80 |
| Fair | Requires attention | Signs of deterioration, some elements exhibit significant deficiencies | 40-60 |
| Poor | Increasing potential of affecting service | Approaching end of service life, condition below standard, large portion of system exhibits significant deterioration | 20-40 |
| Very Poor | Unfit for sustained service | Near or beyond expected service life, widespread signs of advanced deterioration, some assets may be unusable | 0-20 |

The analysis in this AMP is based on assessed condition data only as available. In the absence of assessed condition data, asset age is used as a proxy to determine asset condition. Appendix F includes additional information on the role of asset condition data and provides basic guidelines for the development of a condition assessment program.

# 3 Portfolio Overview

## Key Insights

- The total replacement cost of the Town's asset portfolio is $1.5 billion
- The Town's target re-investment rate is 3.2%, and the actual re-investment rate is 0.8%, contributing to an expanding infrastructure deficit
- 79% of all assets are in fair or better condition
- Average annual capital requirements total $48.3 million per year across all assets

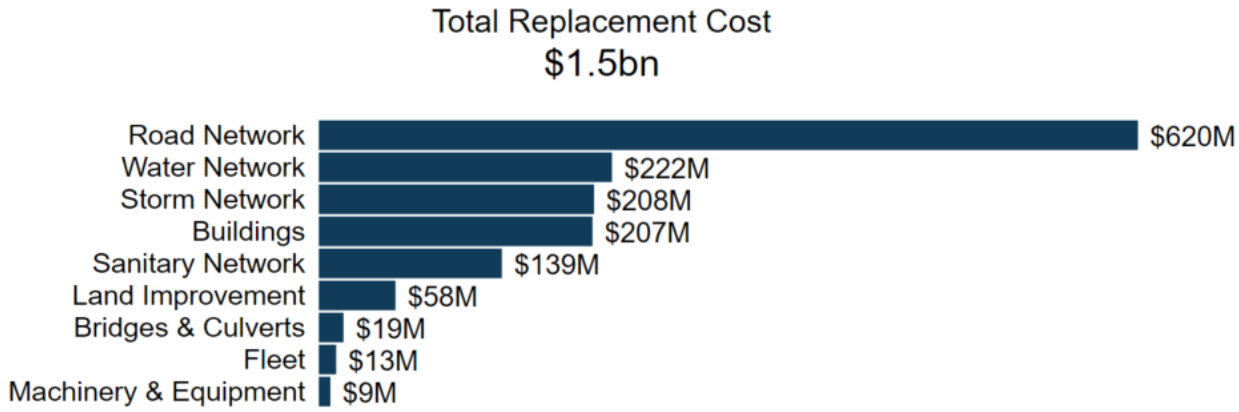
# Asset Management Report Card

| Asset Category | Replacement Cost (millions) | Asset Condition | Financial Capacity[1] | |
|---|---|---|---|---|
| Road Network | $619.8 | Good (68%) | Annual Requirement: | $21,480,000 |
| | | | Funding Available: | $4,683,000 |
| | | | **Annual Deficit:** | **$16,794,00** |
| Bridges & Culverts | $18.7 | Good (69%) | Annual Requirement: | $545,000 |
| | | | Funding Available: | $0 |
| | | | **Annual Deficit:** | **$545,000** |
| Storm Network | $208.3 | Fair (48%) | Annual Requirement: | $5,153,000 |
| | | | Funding Available: | $1,600,000 |
| | | | **Annual Deficit:** | **$3,553,000** |
| Buildings | $207.1 | Fair (46%) | Annual Requirement: | $9,510,000 |
| | | | Funding Available: | $1,465,000 |
| | | | **Annual Deficit:** | **$8,045,000** |
| Machinery & Equipment | $8.8 | Poor (36%) | Annual Requirement: | $1,648,000 |
| | | | Funding Available: | $568,000 |
| | | | **Annual Deficit:** | **$1,079,000** |
| Fleet | $13.2 | Fair (40%) | Annual Requirement: | $1,258,000 |
| | | | Funding Available: | $347,000 |
| | | | **Annual Deficit:** | **$912,000** |
| Land Improvement | $58.1 | Fair (48%) | Annual Requirement: | $2,217,000 |
| | | | Funding Available: | $311,000 |
| | | | **Annual Deficit:** | **$1,905,000** |
| Water Network | $221.9 | Fair (54%) | Annual Requirement: | $4,347,000 |
| | | | Funding Available: | $1,787,000 |
| | | | **Annual Deficit:** | **$2,560,000** |
| Sanitary Network | $138.6 | Fair (57%) | Annual Requirement: | $2,104,000 |
| | | | Funding Available: | $1,459,000 |
| | | | **Annual Deficit:** | **$645,000** |
| **Overall** | $1,494.6 | Fair (58%) | Annual Requirement: | $48,258,000 |
| | | | Funding Available: | $12,220,000 |
| | | | **Annual Deficit:** | **$36,038,000** |

[1] Section 7.0 provides an in-depth analysis on the financial implications of the Town's annual deficit.

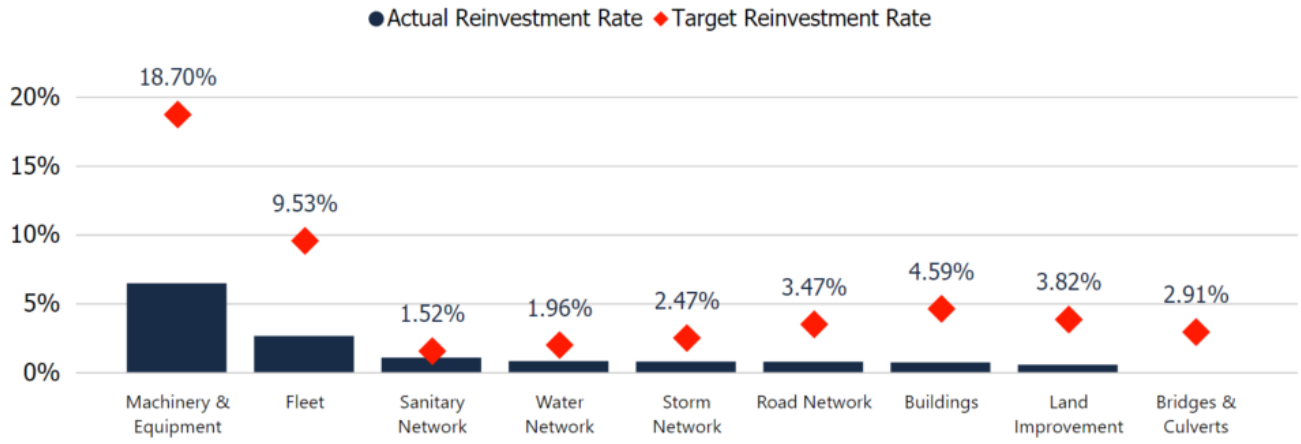
# Total Replacement Cost of Asset Portfolio

The asset categories analyzed in this AMP have a total replacement cost of $1.5 billion based on inventory data from 2020. This total was determined based on a combination of user-defined costs and historical cost inflation. This estimate reflects replacement of historical assets with similar, not necessarily identical, assets available for procurement today.



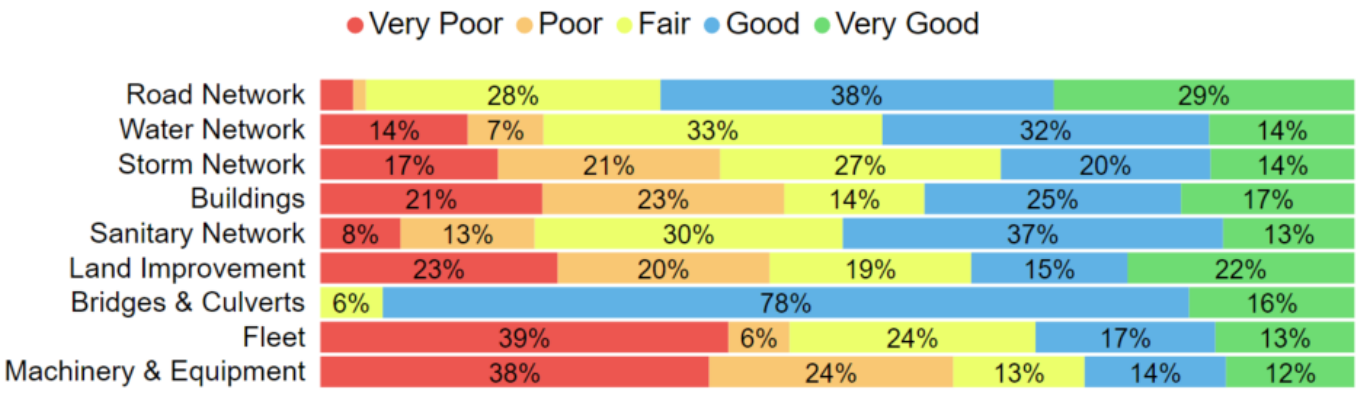

# Target vs. Actual Reinvestment Rate

The graph below depicts funding gaps or surpluses by comparing target vs actual reinvestment rate. To meet the long-term replacement needs, the Town should be allocating approximately $48 million annually, for a target reinvestment rate of 3.2%. Actual annual spending on infrastructure totals approximately $12 million, for an actual reinvestment rate of 0.8%.



# Condition of Asset Portfolio

The current condition of the assets is central to all asset management planning. Collectively, 79% of assets in Aurora are in fair or better condition. This estimate relies on both age-based and field condition data.

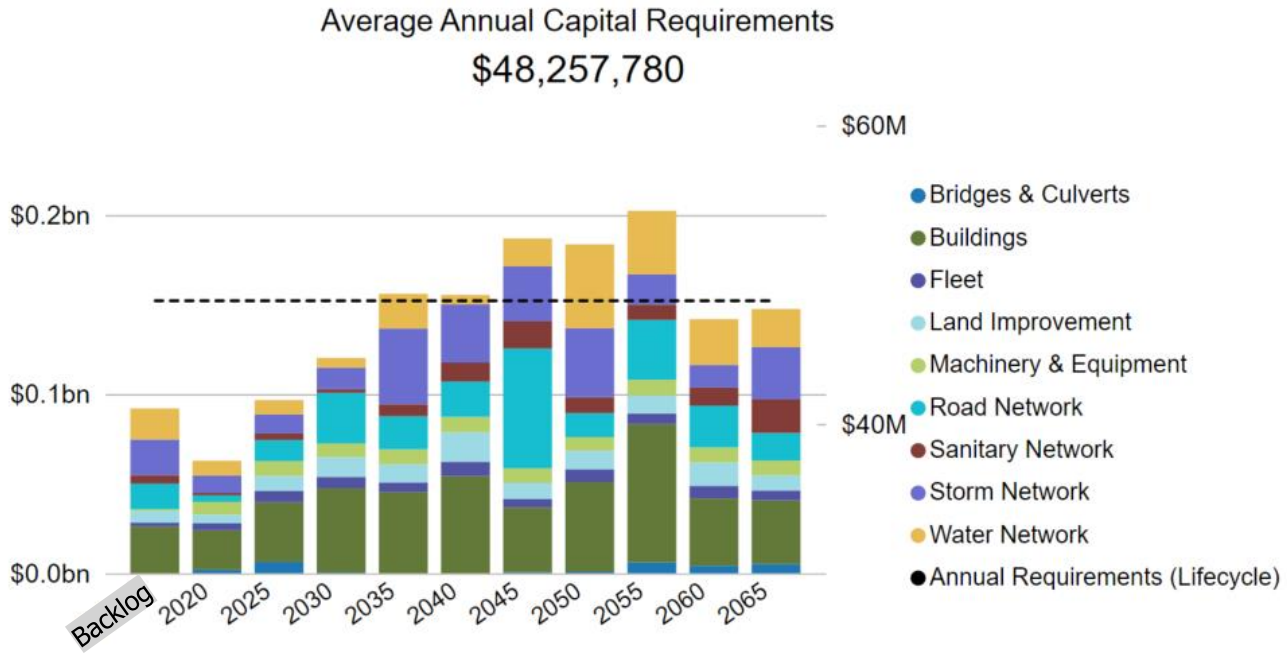



This AMP relies on assessed condition data for 39% of assets; for the remaining portfolio, age is used as an approximation of condition. Assessed condition data is invaluable in asset management planning as it reflects the true condition of the asset and its ability to perform its functions. The table below identifies the source of condition data used throughout this AMP.

| Asset Category | Asset Segment | % of Assets with Assessed Condition | Source of Condition Data |
|---|---|---|---|
| Road Network | Paved Roads | 100% | 2020 Road Appraisals |
| Bridges & Culverts | Bridges | 100% | 2020 OSIM Report |
| | Structural Culverts | 100% | 2020 OSIM Report |
| Storm Network | All | 0% | N/A |
| Buildings | All | 18% | Building Needs Assessment Report / Staff Assessments |
| Machinery & Equipment | All | 40% | Staff Assessments |
| Fleet | All | 41% | Staff Assessments |
| Land Improvement | All | 43% | Staff Assessments |
| Water Network | All | 8% | Staff Assessments |
| Sanitary Network | All | 19% | Staff Assessments |

# Forecasted Capital Requirements

The development of a long-term capital forecast should include both asset rehabilitation and replacement requirements. With the development of asset-specific lifecycle strategies that include the timing and cost of future capital events, the Town can produce an accurate long-term capital forecast. The following graph identifies capital requirements over the next 50 years.



# 4 Analysis of Tax-funded Assets

## Key Insights

- Tax-funded assets are valued at $925.8 million
- 83% of tax-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for tax-funded assets is approximately $36.7 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

# Road Network

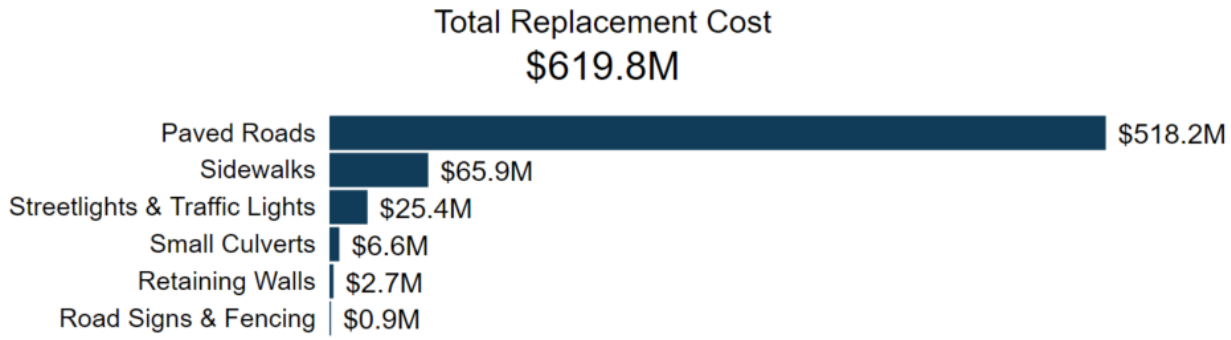
The Road Network is a critical component of the provision of safe and efficient transportation services and represents one of the highest value asset categories in the Town's asset portfolio. It includes all municipally owned and maintained roadways in addition to supporting roadside infrastructure including pavement and curbs, sidewalks, paths, multiuse trails, streetlights, signage, retaining walls, and traffic signals.

Decisions on road maintenance and repairs are primarily managed through RoadMatrix – a data-driven pavement modelling and management tool. The tool factors in the condition of the road and other linear right-of-way assets and the road classification in order to recommend the most cost-effective treatments within a finite funding envelope. In addition to the recommendations from the pavement management system, input from the Operations road division annual inspections is incorporated to create a more comprehensive workplan. The Town has not yet optimized CityWide's project prioritization applications, therefore, Staff should continue to use their pavement management system to develop a work plan for their linear assets.

## 4.1.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Road Network inventory. It is exported from the CityWide Asset Manager database.

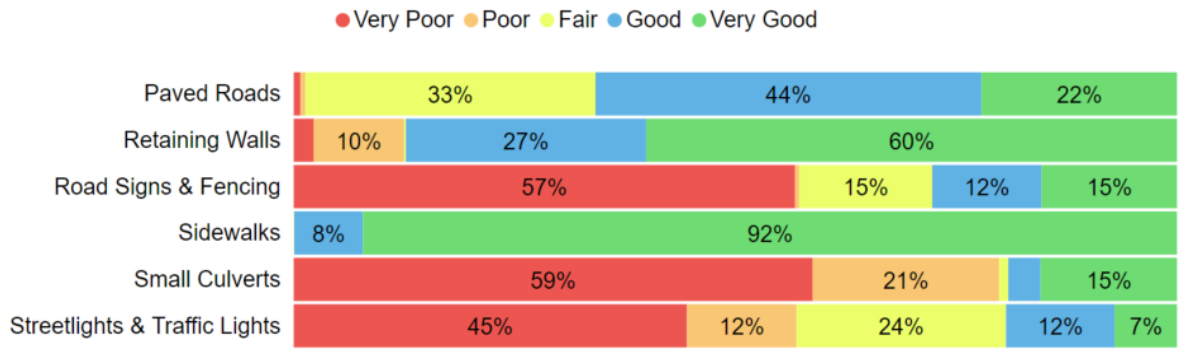
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| Paved Roads | 189,804 Length (m), 134,272 Area (m2) | Cost/Unit | $518,211,388.92 |
| Retaining Walls | 68 | CPI Tables | $2,713,721.00 |
| Road Signs & Fencing | 7,419 Quantity, 240,087 Length (m) | CPI Tables | $899,998.00 |
| Sidewalks | 217 Length (km) | Cost/Unit | $65,933,440.91 |
| Small Culverts | 778 | CPI Tables | $6,624,346.00 |
| Streetlights & Traffic Lights | 5,297 Quantity, 16,988 Length (m) | CPI Tables | $25,423,233.00 |
| | | | **$619,806,128** |




## 4.1.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| Paved Roads | 67% | Good | 92% Assessed |
| Retaining Walls | 75% | Good | Age-based |
| Road Signs & Fencing | 31% | Poor | Age-based |
| Sidewalks | 90% | Very Good | 91% Assessed |
| Small Culverts | 24% | Poor | Age-based |
| Streetlights & Traffic Lights | 32% | Poor | Age-based |
| | **68%** | **Good** | **87% Assessed** |



## Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- A Road Needs Study is performed every 4-5 years and entered into a pavement management system
- Parking lots are assessed cyclically every 4 years
- Annual inspections for sidewalks that include deficiency testing
- Regulatory and Warning road signs are assessed for post condition and reflectivity on an annual basis as per MMS standards
- Traffic signals are inspected twice per year, along with conflict monitoring
- Streetlights are inspected as per MMS standards, with extra inspections during winter months for public safety
- Regular internal inspections are completed for various other road assets

# 4.1.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Road Network assets has been assigned according to a combination of established provincial standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| Paved Roads | 20-40 | 24.0 |
| Retaining Walls | 15-30 | 16.0 |
| Road Signs & Fencing | 5-15 | 22.6 |
| Sidewalks | 30 | 23.0 |
| Small Culverts | 30-40 | 37.5 |
| Streetlights & Traffic Lights | 20-40 | 24.6 |
| | | **24.2** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 4.1.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. This process is affected by a range of factors including an asset's characteristics, location, utilization, maintenance history and environment. A Transportation Master Plan is updated on a 5 year cycle and identifies capacity constraints and infrastructure gaps. A Winter Maintenance Management plan is also updated on a 5 year cycle that provides direction in snow management, asset impacts, and maintenance requirements.

The following lifecycle strategy has been developed as a proactive approach to managing the lifecycle of the Town's roads. Instead of allowing the roads to deteriorate until replacement is required, strategic rehabilitation is expected to extend the service life of roads at a lower total cost. Depending on the road class and the general environmental conditions, the Estimated Useful Life and frequencies of events performed will vary. The strategies developed within CityWide align with the strategies within the pavement management system software. An illustration is provided below as an example. Appendix A contains a detailed summary of the various lifecycle strategies based on the road class of the road segment.

| Paved Roads | | |
|---|---|---|
| **Event Name** | **Event Class** | **Event Trigger** |
| Crack Sealing | Preventative Maintenance | 70 to 85 Condition |
| Mill & Pave | Rehabilitation | 45 to 69 Condition |
| Pulverize and Pave | Rehabilitation | 45 to 69 Condition |
| Full Reconstruction | Replacement | 0 to 44 Condition |

The following table outlines the Town's current lifecycle management strategy.

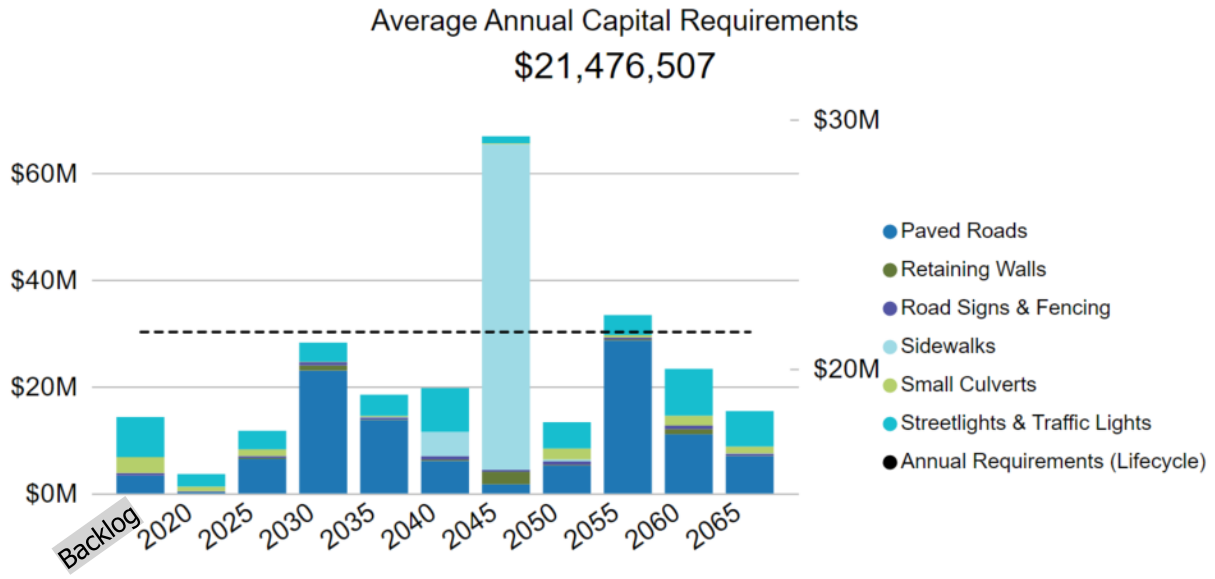
| Activity Type | Description of Current Strategy |
|---|---|
| Maintenance | A crack sealing program has been implemented for asphalt surfaces; $60,000 is spent annually as a proactive maintenace measure |
| | Streetlight maintenance work is handled by a 3rd party, but overseen by Operations |
| Rehabilitation | Full depth asphalt replacement and mill & pave are lifecycle activities commonly applied to Urbanized roads (with curbs) |
| | Pulverize and pave measures are applied to Rural roads (with ditches) |
| Replacement | Ditch culverts continue to be removed as Town roads are urbanized with modern storm systems |
| | Many road related assets are considered for replacement during coordinated lifecycle activities with other work on localized assets, such as the underground infrastructure |

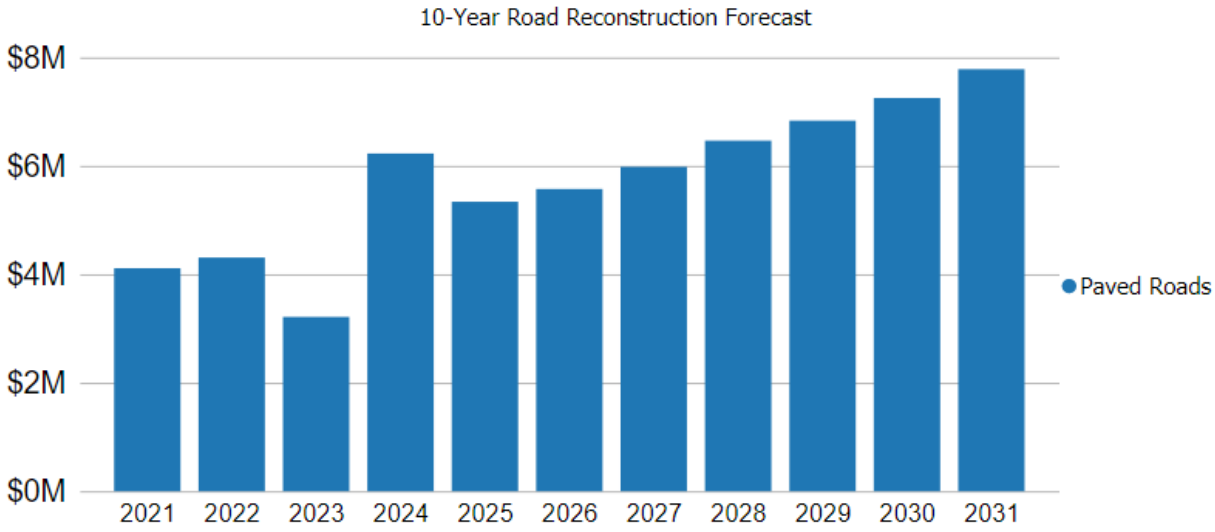
## Forecasted Capital Requirements

Based on the lifecycle strategies identified previously for Paved Roads, and assuming the end-of-life replacement of all other assets in this category, the following graph forecasts capital requirements for the Road Network.

The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs to meet future capital needs. The graph labelled "Average Annual Capital Requirements" is developed using information from the CityWide software which relies on the capital needs within an asset category; The graph labelled, "10-Year Road Reconstruction Forecast", considers the capital needs of the roads resulting from coordination opportunities with other asset categories and a pre-defined funding envelope.

The capital costs will typically differ between these two graphs since a capital plan resulting from individual asset needs will be different than the capital plan resulting from a project-based approach. The goal of this asset management plan is to assess the required long-term funding for these assets to maintain the desired levels of service. As Staff work towards refining the data and structure within CityWide, they will be able to run various risk and lifecycle strategies that will help them prioritize assets for rehabilitation and/or replacement effectively. In the meantime, the road reconstruction program from the pavement management system will provide a more accurate project-based forecast.



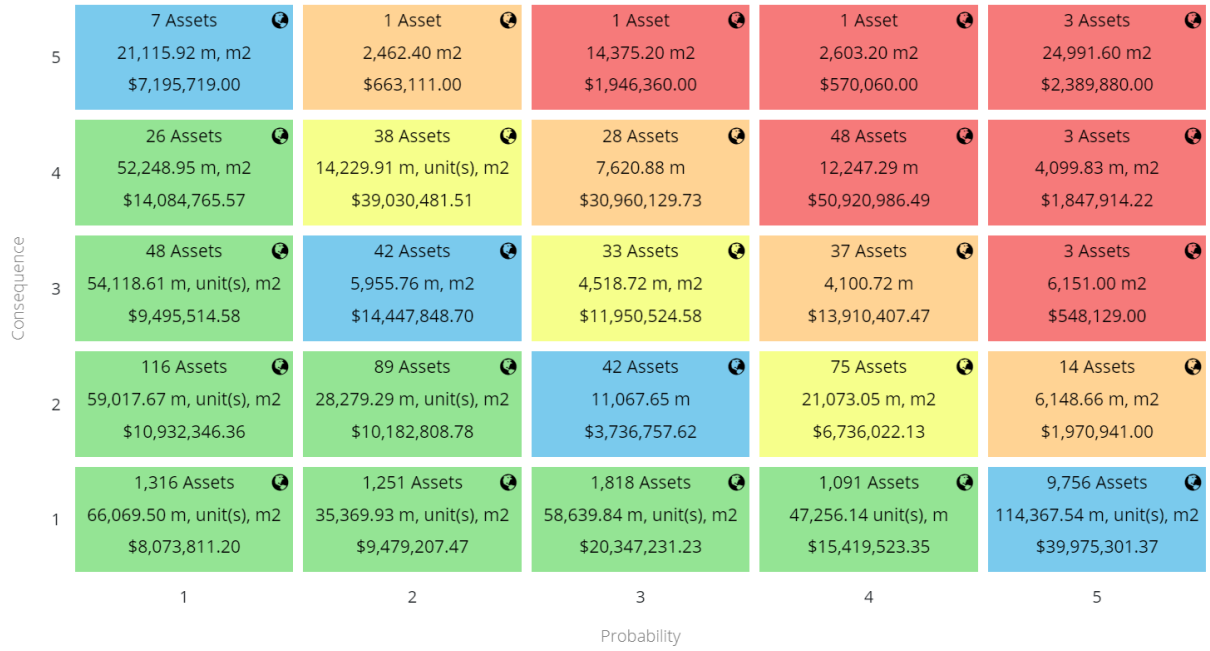




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

# 4.1.5 Risk & Criticality

## Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.




This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets will allow the Town to determine appropriate risk mitigation strategies and treatment options. This may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Staff should continue to refine their risk and criticality modelling in order to supplement the outcomes from the pavement management system.

## Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

### Climate Change & Extreme Weather Events

An increase in freeze/thaw cycles causes road pavement to heave and settle. This can cause the accelerated deterioration of road surface pavement which leads to an increased need for maintenance and rehabilitation. The uncertainty surrounding the impact of extreme weather events can make changing conditions difficult to plan for.

### Organizational Knowledge & Capacity

Both short and long-term planning requires the regular collection of infrastructure data to support asset management decision-making. Staff find it a continuous challenge to dedicate resource time towards data collection to ensure that road condition and asset attribute data is regularly reviewed and updated. Consequently, the Town often utilizes third party contractors to meet their needs (i.e., sidewalk condition assessments).

## 4.1.6 Levels of Service

The following tables identify the Town's current level of service for the Road Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

### Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by the Road Network.

| Service Attribute | Qualitative Description | Current LOS (2020) |
|---|---|---|
| Accessible | Description, which may include maps, of the road network in the municipality and its level of connectivity | See Appendix C |
| Quality | Description or images that illustrate the different levels of road class pavement condition | Every road section receives a pavement quality index (PQI) rating (0-100). The rating incorporates pavement roughness measurements and surface distresses (type, quantity, severity). Ratings are categorized into 5 general qualitative descriptors as detailed below.<br><br>0-29 – Failed<br>30-49 – Poor<br>50-69 – Fair<br>70-89 – Good<br>90-100 – Excellent |

## Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Road Network.

| Service Attribute | Technical Metric | Current LOS (2020) |
|---|---|---|
| Accessible[2] | Lane-km of arterial roads (MMS classes 1 and 2) per land area (km/km$^2$) | 0.27[3] |
| | Lane-km of collector roads (MMS classes 3 and 4) per land area (km/km$^2$) | 2.38[3] |
| | Lane-km of local roads (MMS classes 5 and 6) per land area (km/km$^2$) | 5.89[3] |
| Quality | Average pavement condition index for paved roads in the municipality | 67% |
| | Average surface condition for unpaved roads in the municipality (e.g. excellent, good, fair, poor) | N/A |
| | % of sidewalks in poor or very poor condition | 0% |
| | % of pathways in poor or very poor condition | 42% |
| | % of street lighting in poor or very poor condition | 57% |
| Cost Efficient | Total O&M Cost to provide roads / Population Served | $208 |
| | Five Year Average annual capital expenditure for roads | $4,909,857 |
| Environmental Stewardship | % of streetlights with LED or low energy fixtures | 99% |

[2] Please see Appendix E for a summary of the Minimum Maintenance Standards for the classification and patrolling frequency of roads

[3] Any road segments without a defined number of lanes will be assumed to have 2 lanes.

### 4.1.7 Recommendations

## Asset Inventory

- Update the replacement cost of road assets, every 2-4 years, based on latest tender or project unit prices.
- Continue to refine the road and sidewalk asset inventory to ensure new assets and betterments are reflected and attributes are detailed.

## Condition Assessment Strategies

- Upload updated condition information into CityWide and the Town's corporate GIS every 4-5 years, when possible, in order to maintain consistency with their pavement management system.
- Road appurtenances such as signs, streetlights, and small culverts can be updated on a less frequent basis through internal staff assessments.

## Lifecycle Management Strategies

- Implement the identified lifecycle management strategies for paved roads to realize potential cost avoidance and maintain a high quality of road pavement condition.
- Evaluate the efficacy of the Town's lifecycle management strategies at regular intervals to determine the impact cost, performance, and risk.

## Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

## Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the Town believes to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

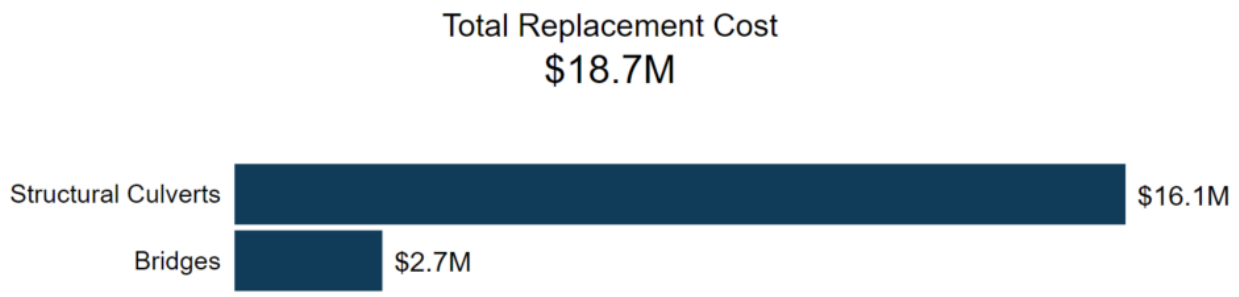
# Bridges & Culverts

Bridges & Culverts represent a critical portion of the transportation services provided to the community. Operations Services is responsible for the maintenance of all bridges and culverts located across municipal roads with the goal of keeping structures in an adequate state of repair and minimizing service disruptions.

## 4.1.8 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Bridges & Culverts inventory. It is exported from the CityWide Asset Manager database.

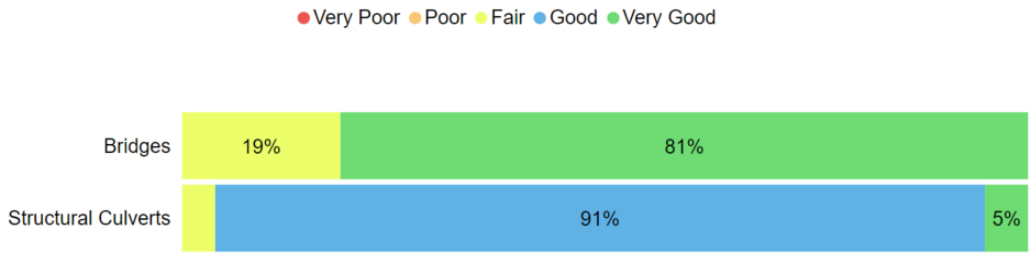
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| Bridges | 2 | 81% CPI Tables, 19% User-Defined Cost | $2,669,062.00 |
| Structural Culverts | 26 | 38% CPI Tables, 62% User-Defined Cost | $16,074,031.00 |
| | | | **$18,743,093** |



## 4.1.9 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| Bridges | 75% | Good | 74% Assessed |
| Structural Culverts | 68% | Good | 100% Assessed |
| | **69%** | **Good** | **87% Assessed** |




To ensure that the Town's Bridges & Culverts continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation, and replacement activities is required to increase the overall condition of the Bridges & Culverts.

### Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Condition assessments of all bridges and culverts with a span greater than or equal to 3 meters are completed every 2 years in accordance with the Ontario Structure Inspection Manual (OSIMs)
- Operations Staff perform regular visual inspections in between OSIM inspections

## 4.1.10 Estimated Useful Life & Average Age

The Estimated Useful Life for Bridges & Culverts assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| Bridges | 40 | 29.6 |
| Structural Culverts | 30-50 | 32.4 |
| | | **32.0** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 4.1.11 Lifecycle Management Strategy

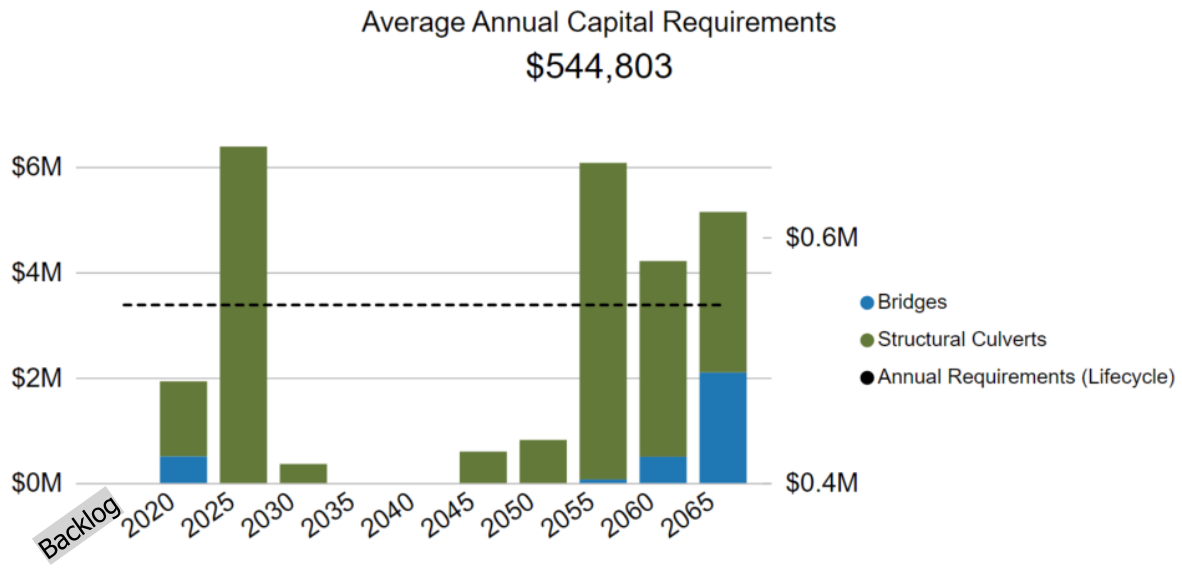
The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

| Activity Type | Description of Current Strategy |
|---|---|
| Maintenance, Rehabilitation and Replacement | All lifecycle activities are driven by the results of mandated structural inspections competed according to the Ontario Structure Inspection Manual (OSIM). Staff perform lifecycle activities (ex: deck replacements, concrete patch repairs, guard rail repairs, etc.) depending on recommendations through OSIM and/or staff inspections. |
| | Maintainence activities, such as cleaning or brushing, are completed by Operations staff as capacity allows |

## Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs.




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

# 4.1.12 Risk & Criticality

## Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.


This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets will allow the Town to determine appropriate risk mitigation strategies and treatment options. This may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data.

## Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

### Capital Funding Strategies

Major capital rehabilitation projects for bridges and culverts are entirely dependant on the availability of grant funding opportunities. When grants are not available, bridge rehabilitation projects may be deferred. An annual capital funding strategy reduce dependency on grant funding and help prevent deferral or capital works.

### Organizational Knowledge & Capacity

Aurora staff noted that there are staffing capacity issues as scheduled general maintenance and cleaning can be challenging to complete when required. To further compound the capacity issue, the Town is in the process of inventorying all undersized culverts which requires considerable time and resources.

## 4.1.13 Levels of Service

The following tables identify the Town's current level of service for Bridges & Culverts. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

### Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Bridges & Culverts.

| Service Attribute | Qualitative Description | Current LOS (2020) |
|---|---|---|
| Accessible | Description of the traffic that is supported by municipal bridges (e.g. heavy transport vehicles, motor vehicles, emergency vehicles, pedestrians, cyclists) | None of the Town's structures have loading or dimensional restrictions meaning that most types of vehicles, including heavy transport, motor vehicles, emergency vehicles and cyclists can cross them without restriction. |
| Quality | Description or images of the condition of bridges & culverts and how this would affect use of the bridges & culverts | See Appendix C |

### Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by Bridges & Culverts.

| Service Attribute | Technical Metric | Current LOS (2020) |
|---|---|---|
| Accessible | % of bridges in the Town with loading or dimensional restrictions | 0% |
| Quality | Average bridge condition index value for bridges in the Town | 78 |
| | Average bridge condition index value for structural culverts in the Town | 45 |
| Cost Efficient | Total O&M Cost to provide structural (>3m span) culverts and bridges / Population Served | - |
| | Five Year Average annual capital expenditure for bridges and culverts | $100,057 |

### 4.1.14 Recommendations

## Data Review/Validation

- Continue to review and validate inventory data, assessed condition data and replacement costs for all bridges and structural culverts upon the completion of OSIM inspections every 2 years.

## Condition

- Ensure that bridge condition indices (BCIs) from OSIMs are updated regularly in the inventory to support planning for lifecycle modeling.

## Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

## Lifecycle Management Strategies

- This AMP includes capital costs associated with the reconstruction of bridges and culverts as well as projected capital rehabilitation and renewal costs. These activities and their associated costs should be incorporated into CityWide and the corporate GIS system, every 2 years, to allow for more accurate capital forecasting.

## Levels of Service

- Continue to measure current levels of service in accordance with the metrics identified in O. Reg. 588/17 and those metrics that the Town believe to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

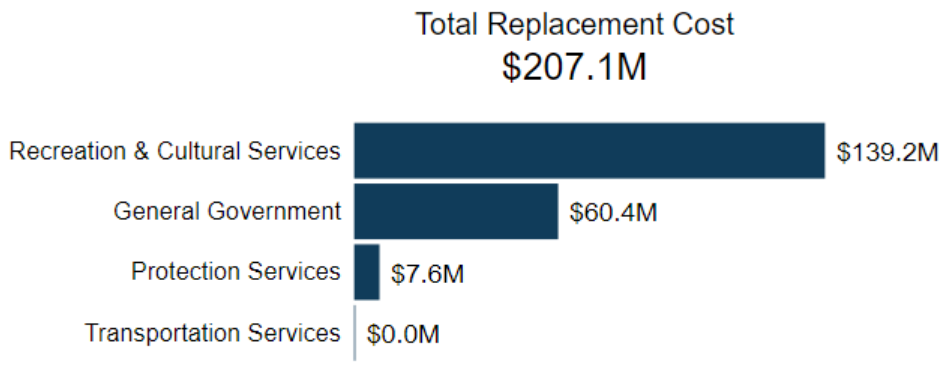
# Buildings

The Buildings portfolio includes property, facilities, and related property with respect to administration services, community centres, library, fire services, and other miscellaneous buildings that are available for public use or lease to third party tenants.

## 4.1.15 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Buildings inventory. It is exported from the CityWide Asset Manager database.

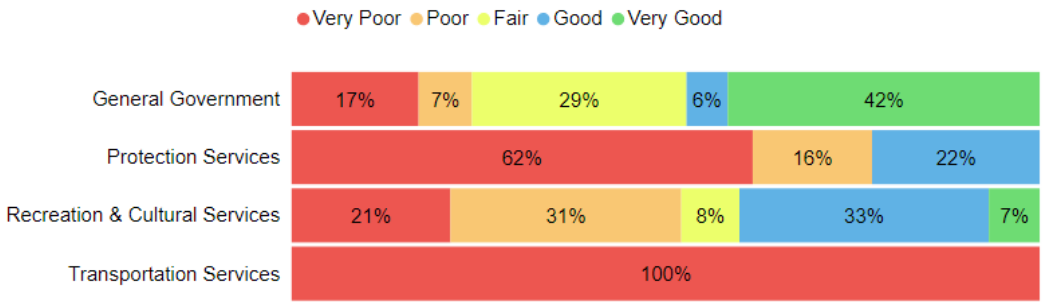
| Asset Segment | Name | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|---|
| General Government | Town Hall | 116 | 14% CPI Tables, 86% User-Defined Cost | $60,369,165 |
| | Hydro Building | | | |
| | Joint Operations Centre | | | |
| | Library Canada | | | |
| Protection Services | New & Old Fire Hall | 9 | User-Defined Cost | $7,589,801 |
| Recreation & Cultural Services | Senior Center | 79 | 18% CPI Tables, 82% User-Defined Cost | $139,182,569 |
| | Petch House | | | |
| | Aurora Recreation Center | | | |
| | Aurora Family Leisure Complex | | | |
| | Aurora Community Centre | | | |
| | Factory Theatre | | | |
| | Lawn Bowling Tennis Clubhouse | | | |
| | Victoria Hall | | | |
| | School Museum | | | |
| | Soccer Clubhouse | | | |
| | New & Old Library | | | |
| | Sports Hall of Fame | | | |
| Transportation Services | Quonset Storage | 1 | CPI Tables | $8,279 |
| | | | | **$207,149,814** |




## 4.1.16 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| General Government | 56% | Fair | Age-based |
| Protection Services | 26% | Poor | Age-based |
| Recreation & Cultural Services | 43% | Fair | Age-based |
| Transportation Services | 0% | Very Poor | Age-based |
| General Government | 56% | Fair | Age-based |
| | 46% | Fair | **Age-based** |




To ensure that the Town's Buildings continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Buildings.

## Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete regular visual inspections of buildings to ensure they are in a state of adequate repair.
- Staff will be working with a third-party contractor to develop building condition assessments on their critical buildings, in order to develop a detailed componentized building inventory, complete with rehabilitation and replacement recommendations.

# 4.1.17 Estimated Useful Life & Average Age

The Estimated Useful Life for Buildings assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

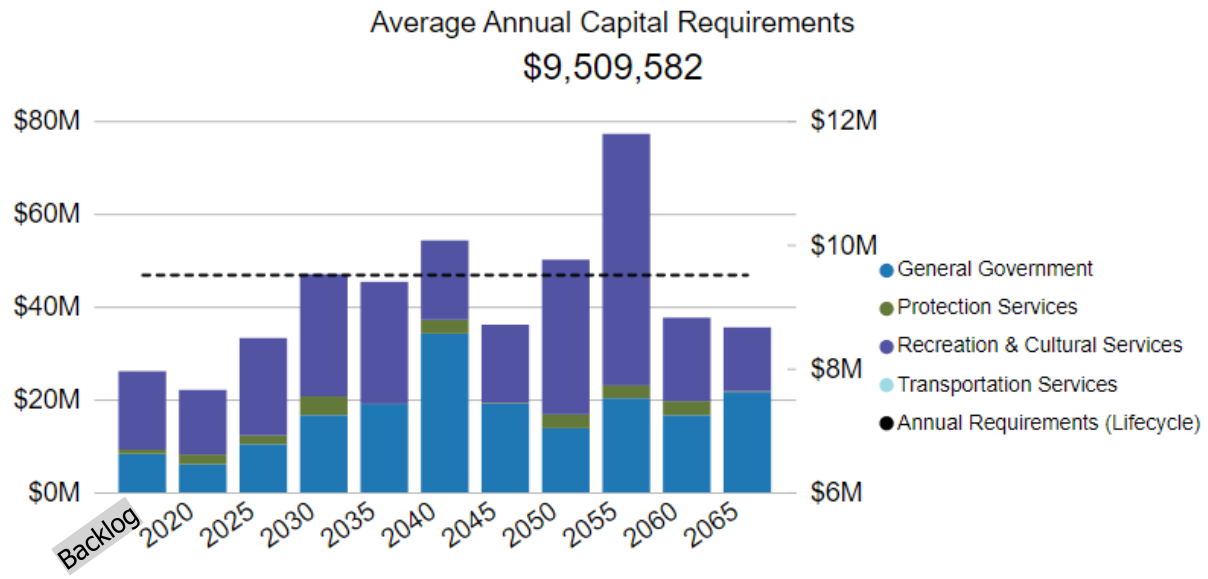
| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| General Government | 5-50 | 3.9 |
| Protection Services | 10-50 | 21.4 |
| Recreation & Cultural Services | 5-50 | 14.8 |
| Transportation Services | 10 | 18.5 |
| General Government | 5-50 | 3.9 |
| | | **9.1** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 4.1.18 Lifecycle Management Strategy

### Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs.




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

## 4.1.19 Risk & Criticality

Buildings are considered a non-core asset category. As such, the Town has until July 1, 2024 to identify asset risk and determine asset criticality.

## 4.1.20 Levels of Service

Buildings is considered a non-core asset category. As such, the Town has until July 1, 2024 to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

### 4.1.21 Recommendations

## Asset Inventory

- The Town's asset inventory contains a mix of componentized buildings. Buildings consist of several separate capital components that have unique estimated useful lives and require asset-specific lifecycle strategies. Staff should work towards a more consistent and component-based inventory for all facilities to allow for more accurate lifecycle planning.

## Condition Assessment Strategies

- The Town should implement regular condition assessments for all facilities to better inform short- and long-term capital requirements.

## Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

## Levels of Service

- Begin brainstorming current levels of service to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

# Machinery & Equipment

All Town owned machinery and small equipment, including information technology & telecommunication equipment is included in this portfolio.

In order to maintain the high quality of public infrastructure and support the delivery of core services, Town staff own and employ various types of machinery and equipment. This includes:

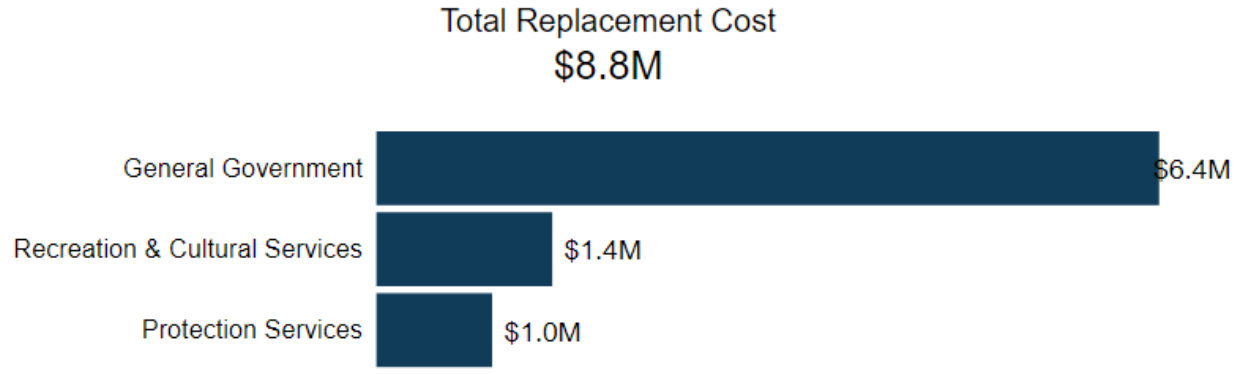
- Landscaping equipment to maintain public parks
- Fire equipment to support the delivery of emergency services
- Plows and sand hoppers to provide winter control activities
- Library books for public loan

Keeping machinery & equipment in an adequate state of repair is important to maintain a high level of service.

## 4.1.22 Asset Inventory & Replacement Cost

The following table includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Machinery & Equipment inventory. It is exported from the CityWide Asset Manager database.

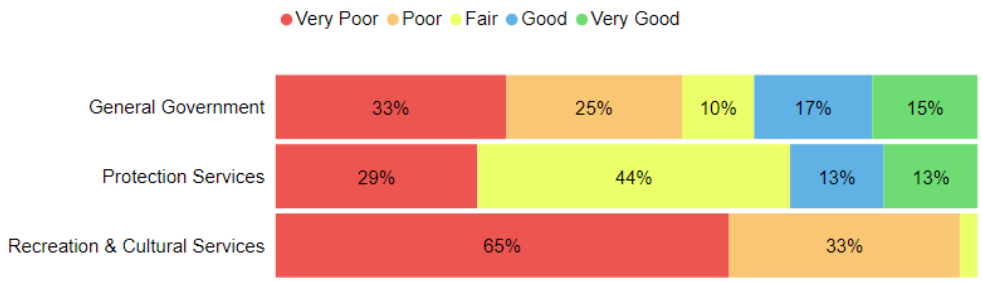
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| General Government | 1,545 | CPI Tables | $6,417,707.00 |
| Protection Services | 53 | CPI Tables | $951,186.00 |
| Recreation & Cultural Services | 14 | CPI Tables | $1,443,988.00 |
| | | | **$8,812,881** |



## 4.1.23 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| General Government | 40% | Fair | Age-based |
| Protection Services | 48% | Fair | Age-based |
| Recreation & Cultural Services | 10% | Very poor | Age-based |
| | **36%** | **Poor** | **Age-based** |




To ensure that the Town's Machinery & Equipment continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Machinery & Equipment.

### Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete regular visual inspections of their machinery & equipment to ensure they are structurally and functionally sound. Assets typically stay true to their estimated useful life, and are replaced at end of life.

## 4.1.24 Estimated Useful Life & Average Age

The Estimated Useful Life for Machinery & Equipment assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

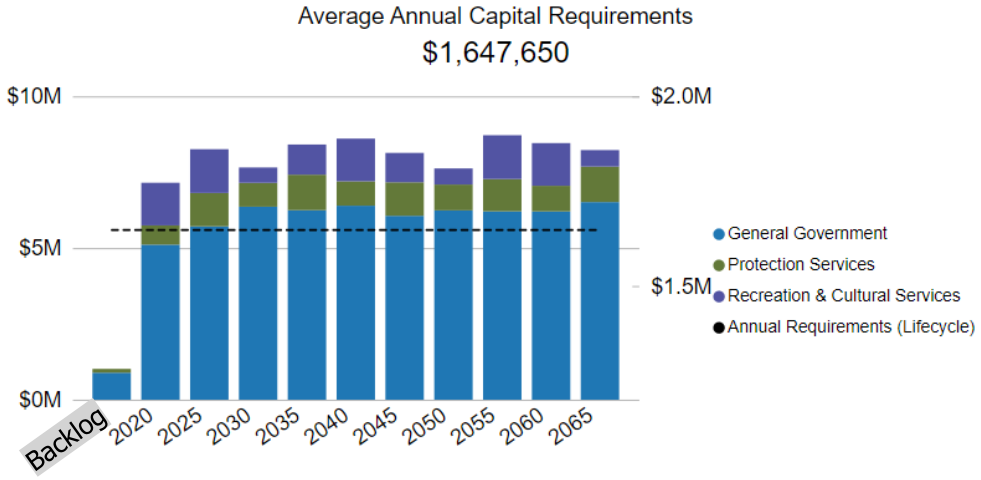
| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| General Government | 5-10 | 3.0 |
| Protection Services | 5-10 | 5.5 |
| Recreation & Cultural Services | 5-10 | 5.7 |
| | | **3.1** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 4.1.25 Lifecycle Management Strategy

### Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs.




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

## 4.1.26 Risk & Criticality

Machinery & Equipment are considered a non-core asset category. As such, the Town has until July 1, 2024 to identify asset risk and determine asset criticality.

## 4.1.27 Levels of Service

Machinery & Equipment is considered a non-core asset category. As such, the Town has until July 1, 2024 to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

## 4.1.28 Recommendations

### Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

### Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk equipment.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

### Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

### Levels of Service

- Begin measuring current levels of service to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

# Fleet

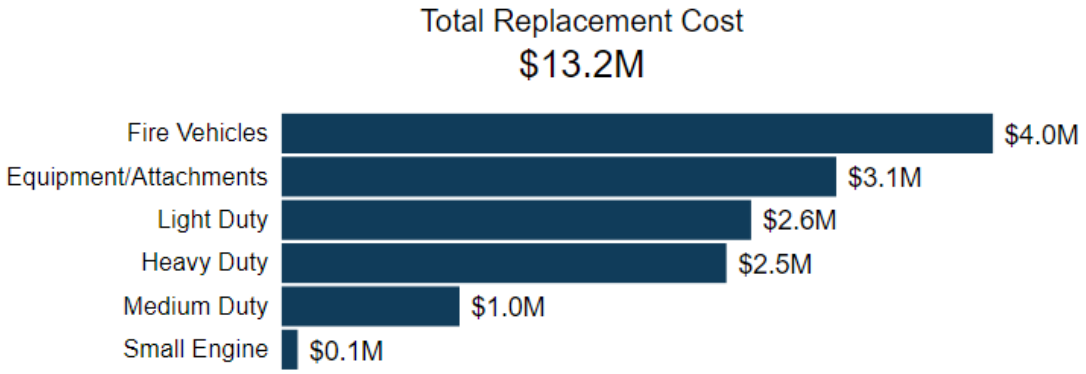
Vehicles allow staff to efficiently deliver municipal services and personnel. Municipal vehicles are used to support several service areas, including:

- tandem axle trucks for winter control activities
- fire rescue vehicles to provide emergency services
- pick-up trucks to support the maintenance of the transportation network and address service requests

## 4.1.29 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Fleet. It is exported from the CityWide Asset Manager database.

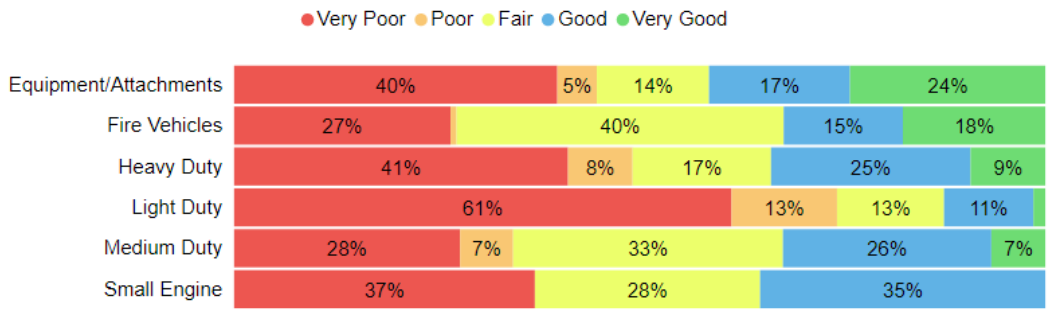
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| Equipment/Attachments | 78 | CPI Tables | $3,084,570.00 |
| Fire Vehicles | 23 | CPI Tables | $3,955,779.00 |
| Heavy Duty | 11 | CPI Tables | $2,474,040.00 |
| Light Duty | 53 | CPI Tables | $2,611,191.00 |
| Medium Duty | 17 | CPI Tables | $990,474.00 |
| Small Engine | 4 | CPI Tables | $90,441.00 |
| | | | **$13,206,495** |



## 4.1.30 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| Equipment/Attachments | 44% | Fair | Age-based |
| Fire Vehicles | 47% | Fair | Age-based |
| Heavy Duty | 40% | Fair | Age-based |
| Light Duty | 25% | Poor | Age-based |
| Medium Duty | 47% | Fair | Age-based |
| Small Engine | 34% | Poor | Age-based |
| | **40%** | **Fair** | **Age-based** |




To ensure that the Town's Fleet continue to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Fleet.

### Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete regular visual inspections of vehicles to ensure they are in state of adequate repair prior to operation

- Condition assessments are conducted on vehicles in accordance with regulations for health and safety regulations including National Fire Protection Association (NFPA) codes and standards for fire service-related vehicles.

## 4.1.31 Estimated Useful Life & Average Age

The Estimated Useful Life for Fleet assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

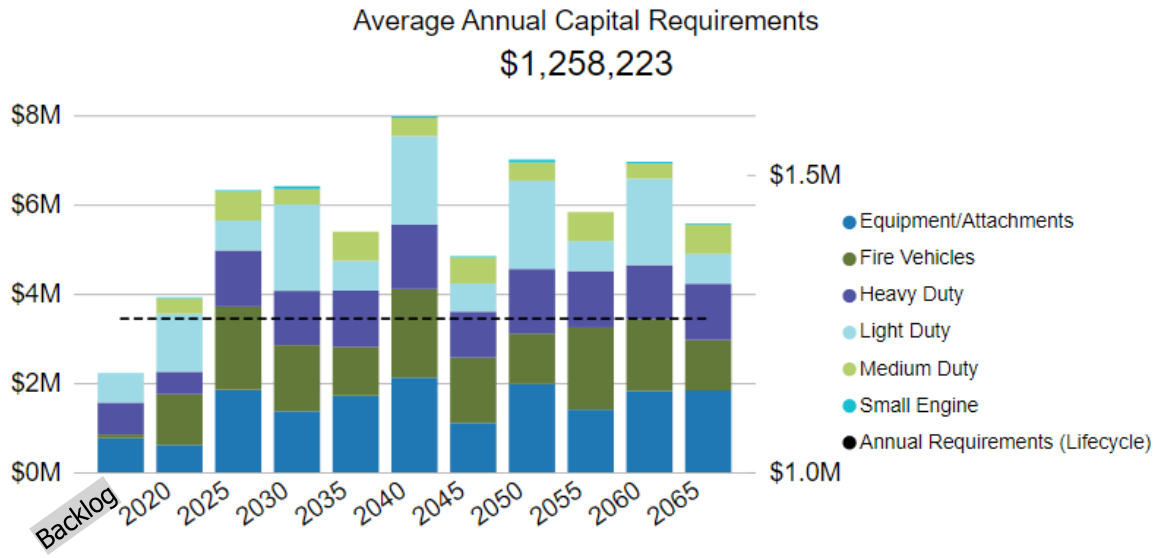
| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| Equipment/Attachments | 7-10 | 9.6 |
| Fire Vehicles | 5-15 | 4.6 |
| Heavy Duty | 8-10 | 6.9 |
| Light Duty | 10 | 8.5 |
| Medium Duty | 10 | 4.8 |
| Small Engine | 15 | 13.7 |
| | | **8.2** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 4.1.32 Lifecycle Management Strategy

### Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs.




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

## 4.1.33 Risk & Criticality

Fleet are considered a non-core asset category. As such, the Town has until July 1, 2024 to identify asset risk and determine asset criticality.

## 4.1.34 Levels of Service

Fleet are considered a non-core asset category. As such, the Town has until July 1, 2024 to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

### 4.1.35 Recommendations

## Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk equipment.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

## Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.
- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

## Levels of Service

- Begin measuring current levels of service in accordance with the metrics that the Town has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

# Land Improvement

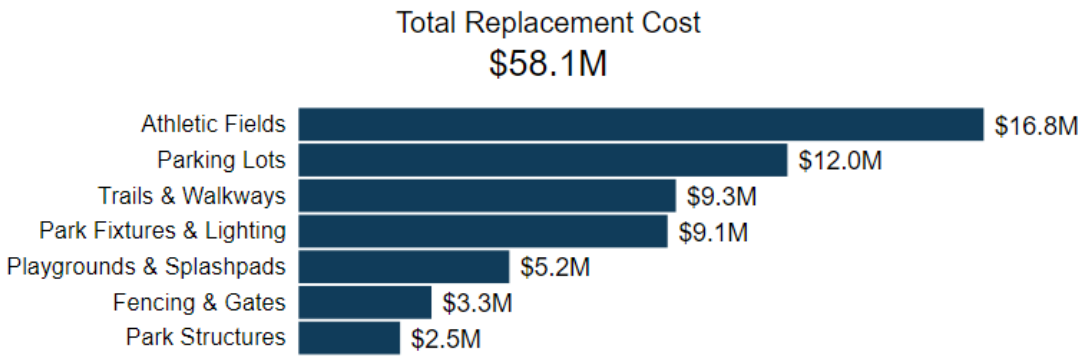
The Town of Aurora owns a small number of assets that are considered Land Improvements. This category includes:

- Parking lots for municipal facilities
- Athletic fields and playgrounds
- Multi-use trails and pathways
- Fencing and gates
- Miscellaneous landscaping and other assets

## 4.1.36 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Land Improvement inventory. It is exported from the CityWide Asset Manager database.

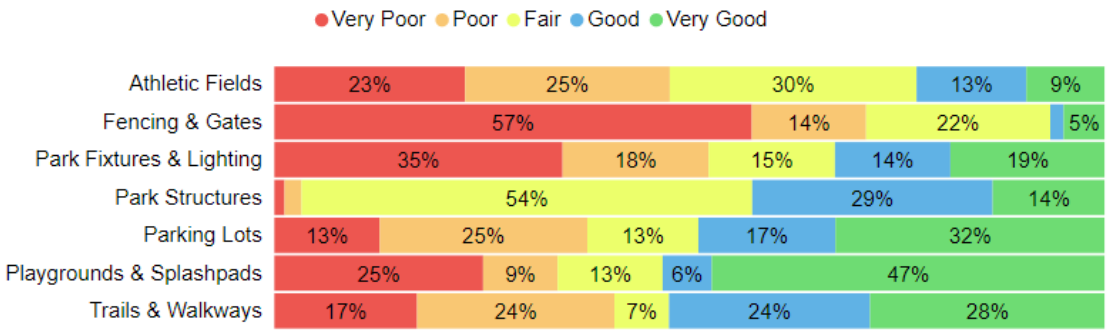
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| Athletic Fields | 75 | CPI Tables | $16,819,883 |
| Fencing & Gates | 57 Quantity, 830,061 Length (m) | CPI Tables | $3,265,325 |
| Park Fixtures & Lighting | 702 Quantity, 325 Length (m) | CPI Tables | $9,059,930 |
| Park Structures | 472 | CPI Tables | $2,494,409 |
| Parking Lots | 9 Quantity, 108,307 Area (m2), 5,480 Length (m) | 6% CPI Tables, 94% Cost/Unit | $12,002,081 |
| Playgrounds & Splashpads | 64 | CPI Tables | $5,176,358 |
| Trails & Walkways | 90 Quantity, 6,186 Length (m) | CPI Tables | $9,264,170 |
| | | | **$58,082,156** |



## 4.1.37 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| Athletic Fields | 42% | Fair | 5% Assessed |
| Fencing & Gates | 23% | Poor | Age-based |
| Park Fixtures & Lighting | 42% | Fair | Age-based |
| Park Structures | 63% | Good | Age-based |
| Parking Lots | 56% | Fair | 26% Assessed |
| Playgrounds & Splashpads | 57% | Fair | Age-based |
| Trails & Walkways | 54% | Fair | Age-based |
| | **48%** | **Fair** | **7% Assessed** |




To ensure that the Town's Land Improvements continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Land Improvements.

### Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Staff complete regular visual inspections on land improvements assets to ensure they are in state of adequate repair. Playgrounds are inspected according to CSA standards.

## 4.1.38 Estimated Useful Life & Average Age

The Estimated Useful Life for Land Improvement assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

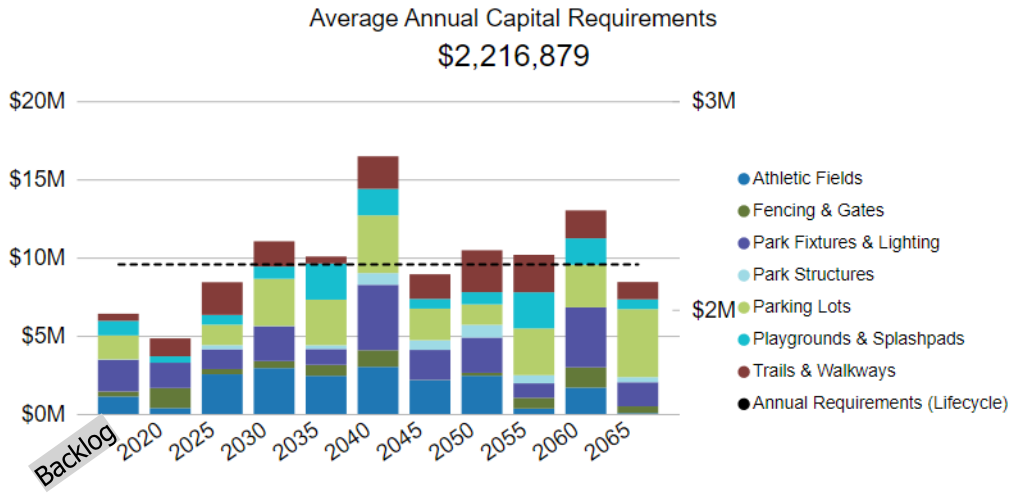
| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| Athletic Fields | 10-25 | 26.9 |
| Fencing & Gates | 20-35 | 20.1 |
| Park Fixtures & Lighting | 10-20 | 25.0 |
| Park Structures | 10-50 | 13.0 |
| Parking Lots | 25-30 | 15.0 |
| Playgrounds & Splashpads | 10-20 | 13.6 |
| Trails & Walkways | 30-60 | 15.6 |
| | | **22.0** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 4.1.39 Lifecycle Management Strategy

### Forecasted Capital Requirements

The following graph forecasts long-term capital requirements. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs.



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

## 4.1.40 Risk & Criticality

Land Improvement are considered a non-core asset category. As such, the Town has until July 1, 2024 to identify asset risk and determine asset criticality.

## 4.1.41 Levels of Service

Land Improvement are considered a non-core asset category. As such, the Town has until July 1, 2024 to determine the qualitative descriptions and technical metrics that measure the current level of service provided.

## 4.1.42 Recommendations

### Replacement Costs

- All replacement costs used in this AMP were based on the inflation of historical costs. These costs should be evaluated to determine their accuracy and reliability. Replacement costs should be updated according to the best available information on the cost to replace the asset in today's value.

### Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk assets.
- Review assets that have surpassed their estimated useful life to determine if immediate replacement is required or whether these assets are expected to remain in-service. Adjust the service life and/or condition ratings for these assets accordingly.

### Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies.

### Levels of Service

- Work towards identifying current and proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

# 5 Analysis of Rate-funded Assets

## Key Insights

- Rate-funded assets are valued at $568.8 million
- 72% of rate-funded assets are in fair or better condition
- The average annual capital requirement to sustain the current level of service for rate-funded assets is approximately $11.6 million
- Critical assets should be evaluated to determine appropriate risk mitigation activities and treatment options

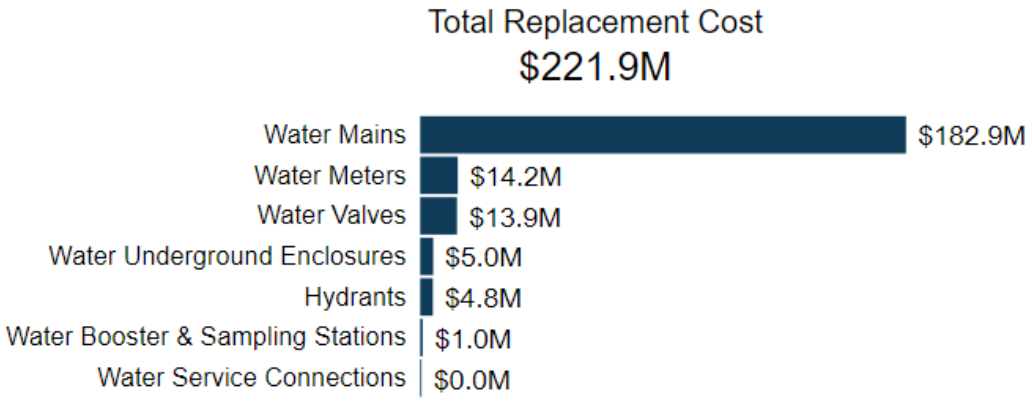
# Water Network

The Town is responsible for water distribution to the end users, consumer metering, and billing. York Region is responsible for water production and bulk distribution. Water in Aurora is 20 percent ground water source and 80 percent lake-based source. Water Services are coordinated between York Region and the Town's Operational Services department.

## 5.1.1 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Water Network inventory. It is exported from the CityWide Asset Manager database.

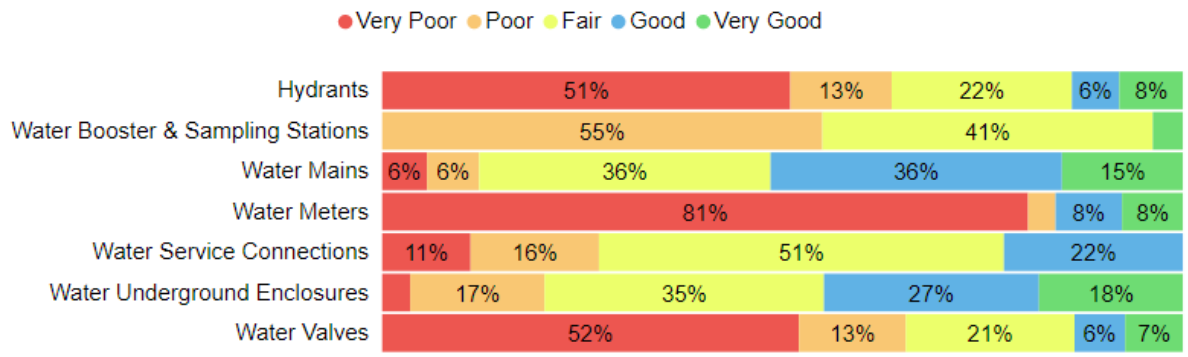
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| Hydrants | 1,518 | CPI Tables | $4,830,518.00 |
| Water Booster & Sampling Stations | 11 | 20% CPI Tables, 80% User-Defined Cost | $1,018,550.00 |
| Water Mains | 378 km | Cost/Unit | $182,877,542.24 |
| Water Meters | 17,700 | CPI Tables | $14,222,255.00 |
| Water Service Connections | 360,900 m | CPI Tables | $29,696.00 |
| Water Underground Enclosures | 688 | CPI Tables | $4,979,098.00 |
| Water Valves | 19,476 | CPI Tables | $13,919,293.00 |
| | | | **$221,876,952** |



## 5.1.2 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| Hydrants | 28% | Poor | Age-based |
| Water Booster & Sampling Stations | 42% | Fair | Age-based |
| Water Mains | 60% | Good | 3% Assessed |
| Water Meters | 15% | Very Poor | Age-based |
| Water Service Connections | 47% | Fair | Age-based |
| Water Underground Enclosures | 58% | Fair | Age-based |
| Water Valves | 27% | Poor | Age-based |
| | **54%** | **Fair** | **<1% Assessed** |




To ensure that the Town's Water Network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Water Network.

## Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Water sampling stations are inspected weekly
- Generators are inspected weekly, pumps are inspected monthly, and the structures housing those assets are inspected semi-annually
- Booster stations are inspected regularly for deficiencies
- Hydrants are inspected annually
- 25% of the main line water valves are inspected annually and are tracked using a collector app
- Bulk water stations are inspected on a weekly basis or as needed

# 5.1.3 Estimated Useful Life & Average Age

The Estimated Useful Life for Water Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| Hydrants | 30 | 24.8 |
| Water Booster & Sampling Stations | 30-50 | 12.8 |
| Water Mains | 50-80 | 28.7 |
| Water Meters | 10-20 | 24.9 |
| Water Service Connections | 58 | 31.3 |
| Water Underground Enclosures | 55 | 24.8 |
| Water Valves | 30 | 28.0 |
| | | **28.2** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 5.1.4 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

The following table outlines the Town's current lifecycle management strategy.

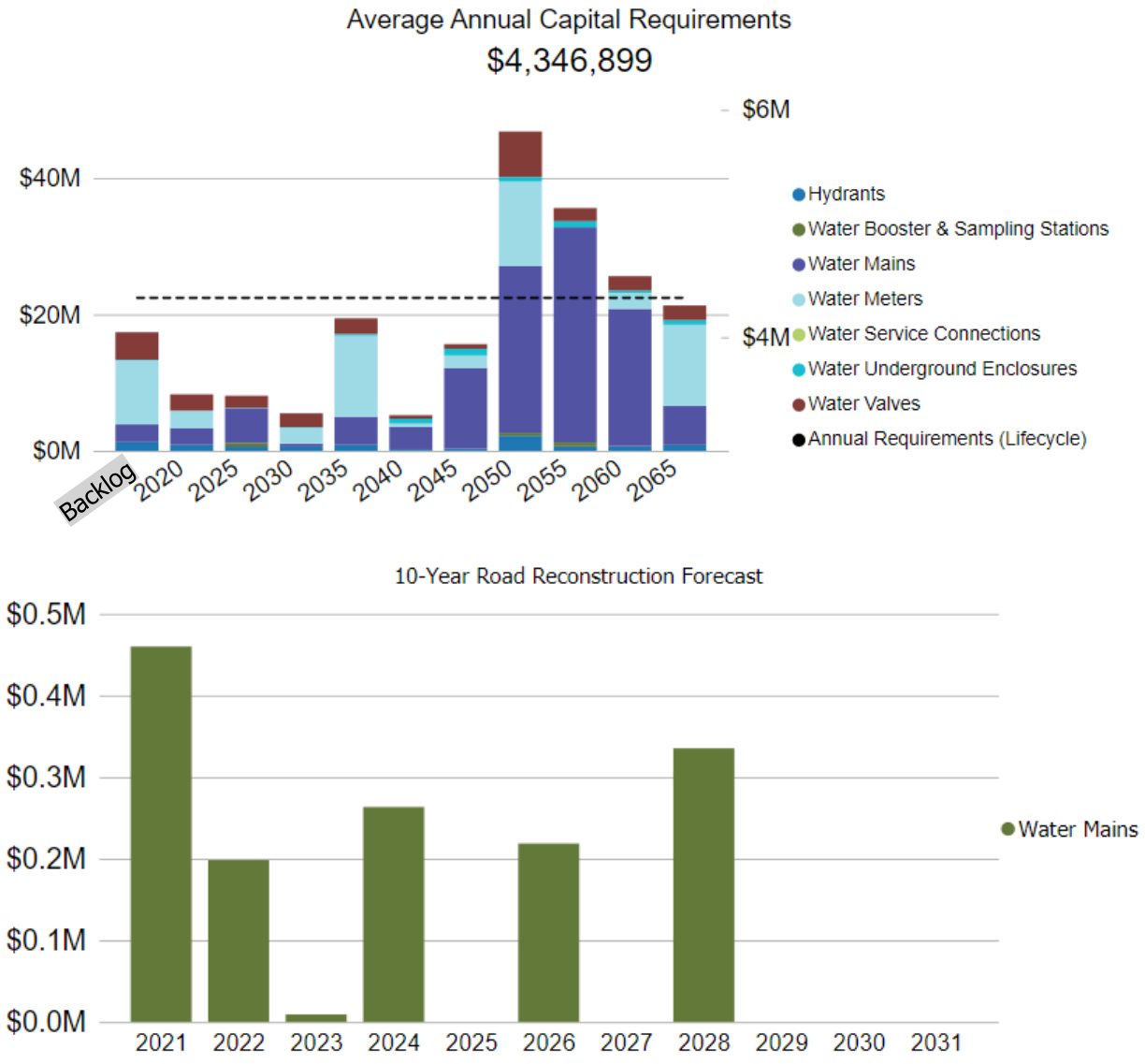
| Activity Type | Description of Current Strategy |
|---|---|
| Maintenance | Hydraulic modelling is completed on an as-needed basis with the most recent study completed approximately 2.5 years ago |
| | Leak detection is completed for service lines when an issue arises, but no formal program is currently in place |
| | Pressure and fireflow testing are regularly done by developers and insurance companies for new subdivisions |
| | Hydrants are flushed regularly, problematic areas have been noted to be flushed more frequently |
| | Main line valves are exercised during inspection, which covers 25% of the network on annual basis |
| Rehabilitation | A residential water meter repalcement program is in place; approximately half of the town's water meters have been replaced |
| Replacement | Booster stations are maintained weekly with different components inspected at varying frequencies; while condition ratings are not assigned, deficiencies are identified and noted |
| | Watermain lining is now typically considered during road repairs; an intensive lining program was in place between 2007-2011 |

### Forecasted Capital Requirements

The following graphs forecast long-term capital requirements for the Water network. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs.

The graph labelled "Average Annual Capital Requirements" is developed using information from the CityWide software which relies on the capital needs within an asset category; The graph labelled, "10-Year Road Reconstruction Forecast", considers the capital needs of the water mains resulting from coordination opportunities with roads reconstruction projects.

The capital costs will typically differ between these two graphs since a capital plan resulting from individual asset needs will be different than the capital plan resulting from a project-based approach. As Staff work towards refining the data and structure within CityWide, they will be able to run various risk and lifecycle strategies that will help them prioritize assets for rehabilitation and/or replacement effectively. In the meantime, the road reconstruction program from the pavement management system will provide a more accurate project-based forecast.

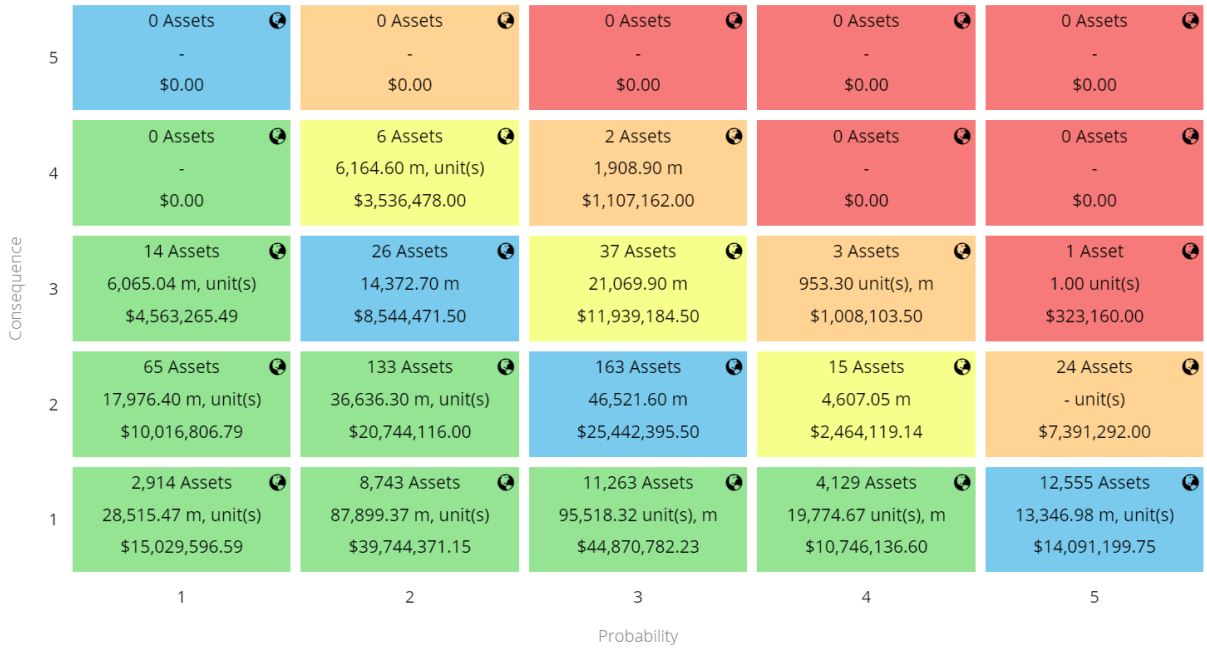



The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

# 5.1.5 Risk & Criticality

## Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.




## Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

### Assessed Condition Data

Water network assets such as mains are difficult to directly visually inspect. In contrast to storm and sanitary mains that can be directly inspected using CCTV camera, watermain condition assessments rely on a proxy of age, pipe material, diameter size, number of main breaks, and soil type to approximate when they need to be replaced. Staff should continue to refine their available attribute information for watermains in order to develop reliable forecasts.

## 5.1.6 Levels of Service

The following tables identify the Town's current level of service for Water Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

### Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Water Network.

| Service Attribute | Qualitative Description | Current LOS (2020) |
|---|---|---|
| Scope | Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal water system | See Appendix C |
| | Description, which may include maps, of the user groups or areas of the municipality that have fire flow | See Appendix C |
| Reliability | Description of boil water advisories and service interruptions | The Town experienced no boil water advisories in 2020. However, water service interruptions may occur due to main breaks, maintenance activities or reconstruction projects. Staff attend to these interruptions in a timely manner, when possible. |

## Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Water Network.

| Service Attribute | Technical Metric | Current LOS (2020) |
|---|---|---|
| Scope | % of properties connected to the municipal water system | 97.1% |
| | % of properties where fire flow is available | 98.6% |
| Reliability | # of connection-days per year where a boil water advisory notice is in place compared to the total number of properties connected to the municipal water system | 0 |
| | # of connection-days per year where water is not available due to water main breaks compared to the total number of properties connected to the municipal water system | 32:17,700 |
| | Total # of FTEs / 100 km Length | TBD |
| Cost Efficient | Total O&M Cost to Provide water/ Population Served | $740 |
| | Five Year Average annual capital expenditure for Water | $1,562,719 |
| | Cost of Water Quality/Compliance Monitoring / Population Served | TBD |

### 5.1.7 Recommendations

## Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk water network assets and update on a regular basis.

## Risk Management Strategies

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

## Lifecycle Strategies

- Determine the efficacy of the trenchless lining strategy to rehabilitate pipes that are approaching their end-of-life and continue to replace old cast iron and ductile iron pipes with PVC to address the potential for water main breaks.

## Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the Town has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

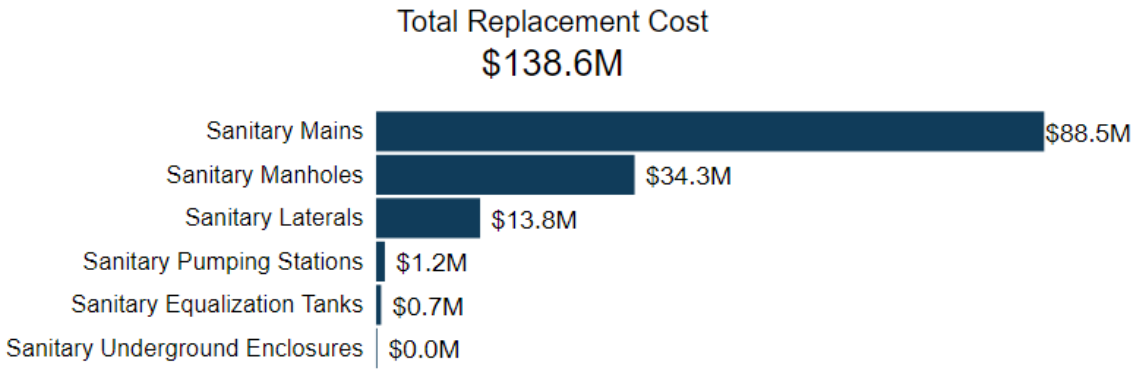
# Sanitary Network

The Town is responsible for wastewater collection and delivery to Regional trunk infrastructure. Sewer services provided by the Town are overseen by the Water and Wastewater Management division.

## 5.1.8 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Sanitary Sewer Network inventory. It is exported from the CityWide Asset Manager database.

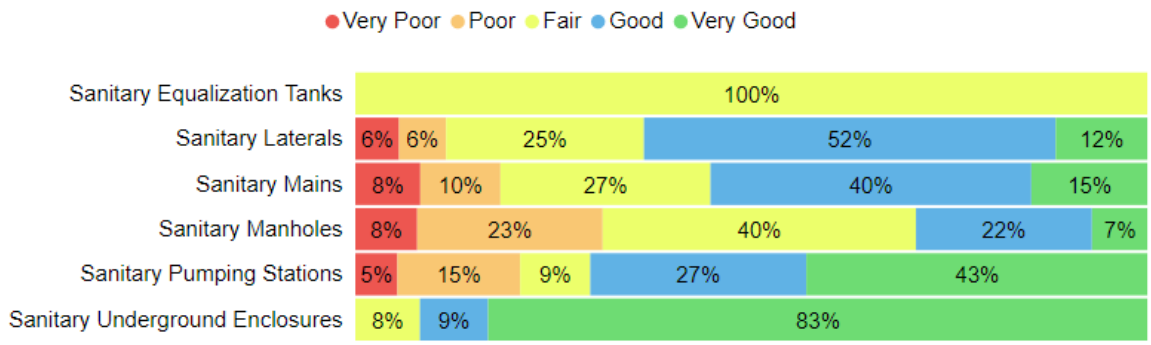
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| Sanitary Equalization Tanks | 2 | CPI Tables | $698,535.00 |
| Sanitary Laterals | 139 km | CPI Tables | $13,814,061.00 |
| Sanitary Mains | 204 km | Cost/Unit | $88,544,355.87 |
| Sanitary Manholes | 2,860 | CPI Tables | $34,280,651.00 |
| Sanitary Pumping Stations | 6 (67components) | 84% CPI Tables, 16% User-Defined Cost | $1,195,618.00 |
| Sanitary Underground Enclosures | 6 | CPI Tables | $32,178.00 |
| | | | **$138,565,399** |



## 5.1.9 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| Asset Segment | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| Sanitary Equalization Tanks | 49% | Fair | Age-based |
| Sanitary Laterals | 61% | Good | Age-based |
| Sanitary Mains | 59% | Fair | 7% Assessed |
| Sanitary Manholes | 50% | Fair | Age-based |
| Sanitary Pumping Stations | 68% | Good | Age-based |
| Sanitary Underground Enclosures | 85% | Very Good | Age-based |
| | 57% | Fair | 5% Assessed |




To ensure that the Town's Sanitary Network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Sanitary Network.

## Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- CCTV inspections are done for approximately 10% of the entire sewer network every year
- Manholes are inspected for deficiencies and captured in a checklist type format on an annual basis through a collector app
- Sanitary pumping stations are inspected alongside water booster stations
- Sanitary laterals are inspected on a regular basis

# 5.1.10 Estimated Useful Life & Average Age

The Estimated Useful Life for Sanitary Sewer Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| Sanitary Equalization Tanks | 55 | 26.0 |
| Sanitary Laterals | 50-80 | 30.6 |
| Sanitary Mains | 50-80 | 28.3 |
| Sanitary Manholes | 50-80 | 32.4 |
| Sanitary Pumping Stations | 20-30 | 15.2 |
| Sanitary Underground Enclosures | 50-55 | 13.3 |
| | | **30.4** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 5.1.11 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

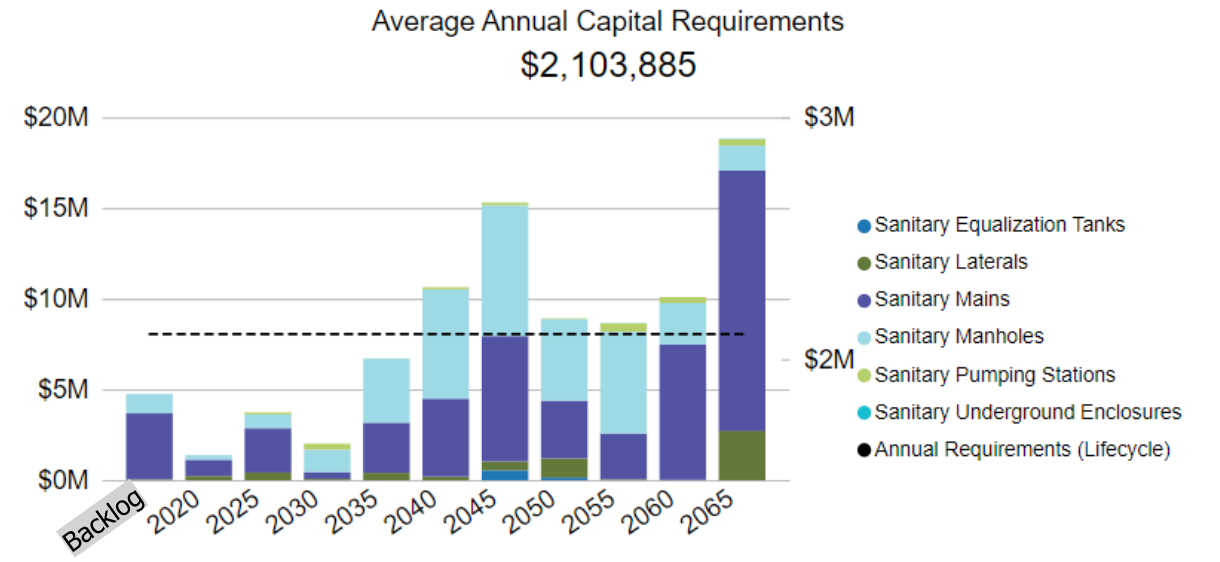
The following table outlines the Town's current lifecycle management strategy. Staff have noted that poor bedding has been an underlying issue for the Town's sanitary assets. Unlike water assets, much of the work on sewer assets have been funded through operations.

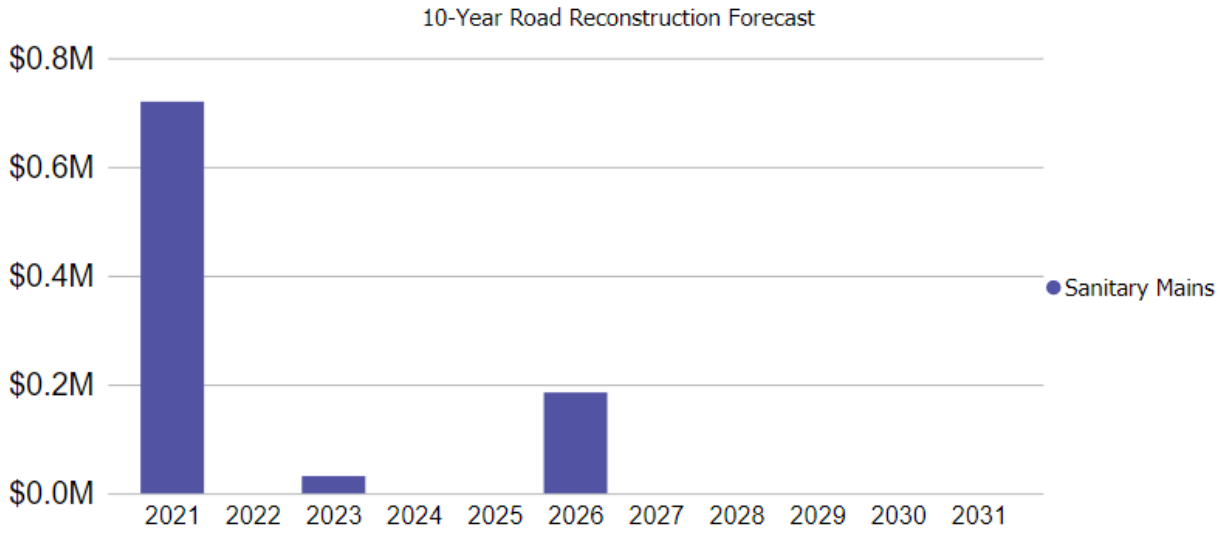
| Activity Type | Description of Current Strategy |
|---|---|
| Maintenance | Manhole deficiencies are collected through the collector app; repairs are then prioritized by condition |
| Rehabilitation | Manholes are lined on an as-needed basis, with the last major lining project occurring in 2016 |
| | Sewers have not been lined in the recent years, but it is an activity considered to improve condition and has been used in the past |
| Replacement | Many sanitary assets are considered for replacement during coordinated lifecycle activities with other work on localized assets, namely road reconstructions |

### Forecasted Capital Requirements

The following graphs forecast long-term capital requirements for the Sanitary Network. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs.

The graph labelled "Average Annual Capital Requirements" is developed using information from the CityWide software which relies on the capital needs within an asset category; The graph labelled, "10-Year Road Reconstruction Forecast", considers the capital needs of the sanitary mains resulting from coordination opportunities with roads reconstruction projects.



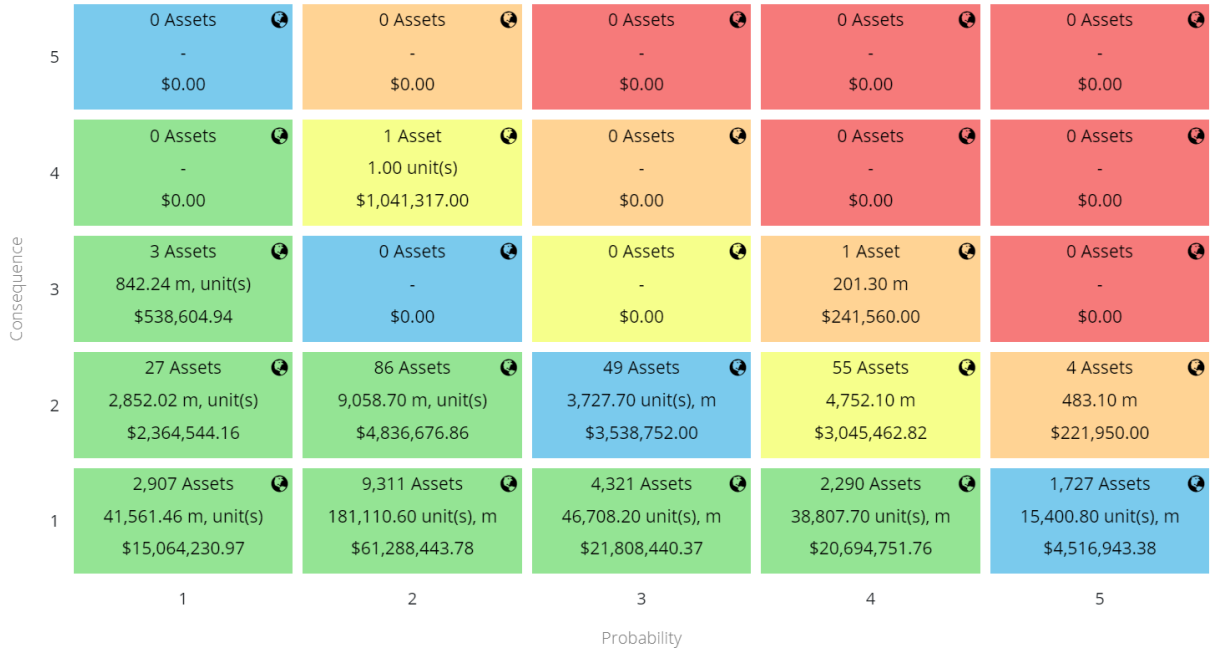




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

# 5.1.12 Risk & Criticality

## Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.




## Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

### Resource Capacity

Staff currently conduct condition/deficiency assessments on 10% of their sanitary laterals annually. With the large number of laterals, it is a cumbersome and time intensive activity to perform.

### Assessed Condition Data

Staff have indicated that many of the recent sanitary pipe replacements they have performed were due to poorly constructed bedding and backfill surrounding the pipes. This makes the pipes more susceptible to breakage and penetration by sharp objects, ultimately affecting the structural integrity and durability of the mains.

## 5.1.13 Levels of Service

The following tables identify the Town's current level of service for Sanitary Sewer Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

### Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Sanitary Sewer Network.

| Service Attribute | Qualitative Description | Current LOS (2020) |
|---|---|---|
| Scope | Description, which may include maps, of the user groups or areas of the municipality that are connected to the municipal wastewater system | See Appendix C |
| Reliability | Description of how combined sewers in the municipal wastewater system are designed with overflow structures in place which allow overflow during storm events to prevent backups into homes | The Town manages approximately 1.6km of sanitary sewers that connect to storm catch basins. At this time, there are no overflow structures in place. |
| | Description of the frequency and volume of overflows in combined sewers in the municipal wastewater system that occur in habitable areas or beaches | The Town does not have any connected engineered overflows at this time so there is no overflow volume entering habitable areas |
| | Description of how stormwater can get into sanitary sewers in the municipal wastewater system, causing sewage to overflow into streets or backup into homes | Stormwater can enter into sanitary sewers due to cracks in sanitary mains or through indirect connections (e.g. weeping tiles). In the case of heavy rainfall events, sanitary sewers may experience a volume of water and sewage that exceeds its designed capacity. In some cases, this can cause water and/or sewage to overflow backup into homes. The disconnection of weeping tiles from sanitary mains and the use of sump pumps and pits directing storm water to the storm drain |

| Service Attribute | Qualitative Description | Current LOS (2020) |
|---|---|---|
| | | system can help to reduce the chance of this occurring. |
| | Description of how sanitary sewers in the municipal wastewater system are designed to be resilient to stormwater infiltration | The municipality follows a series of design standards that integrate servicing requirements and land use considerations when constructing or replacing sanitary sewers. These standards have been determined with consideration of the minimization of sewage overflows and backups. |
| | Description of the effluent that is discharged from sewage treatment plants in the municipal wastewater system | N/A |

## Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Sanitary Sewer Network.

| Service Attribute | Technical Metric | Current LOS (2020) |
|---|---|---|
| Scope | % of properties connected to the municipal wastewater system | 96% |
| Reliability | # of events per year where combined sewer flow in the municipal wastewater system exceeds system capacity compared to the total number of properties connected to the municipal wastewater system | N/A |
| | # of connection-days per year having wastewater backups compared to the total number of properties connected to the municipal wastewater system | 0 |
| | # of effluent violations per year due to wastewater discharge compared to the total number of properties connected to the municipal wastewater system | N/A |
| | Total # of FTEs / 100 km Length | TBD |
| Cost Efficient | Total O&M Cost to Provide wastewater/ Population Served | $973 |
| | Five Year Average annual capital expenditure for Wastewater | $552,356 |

### 5.1.14 Recommendations

## Asset Inventory

- Although the CityWide inventory is well componentized, many of the components are not labelled clearly enough. Staff should consider adopting a parent-child relationship between assets to improve discernability.

## Condition Assessment Strategies

- Identify condition assessment strategies for high value and high-risk sanitary network assets.
- Incorporate condition assessments from CCTV inspections as they are made available

## Risk Management Strategies

- Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

## Lifecycle Management Strategies

- A trenchless lining strategy is expected to extend the service life of sanitary mains at a lower total cost of ownership.
- Evaluate the efficacy of the Town's lifecycle management strategies at regular intervals to determine the impact cost, condition and risk.

## Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the Town has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

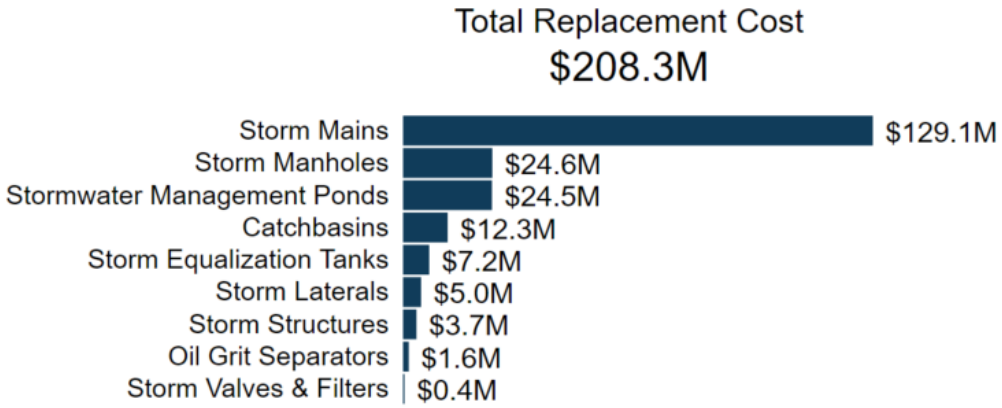
# Storm Network

The Town is responsible for owning and maintaining a stormwater network of storm sewer mains and other supporting infrastructure. Staff are working towards improving the accuracy and reliability of their Stormwater inventory to assist with long-term asset management planning.

## 5.1.15 Asset Inventory & Replacement Cost

The table below includes the quantity, replacement cost method and total replacement cost of each asset segment in the Town's Stormwater Network inventory. It is exported from the CityWide Asset Manager database.

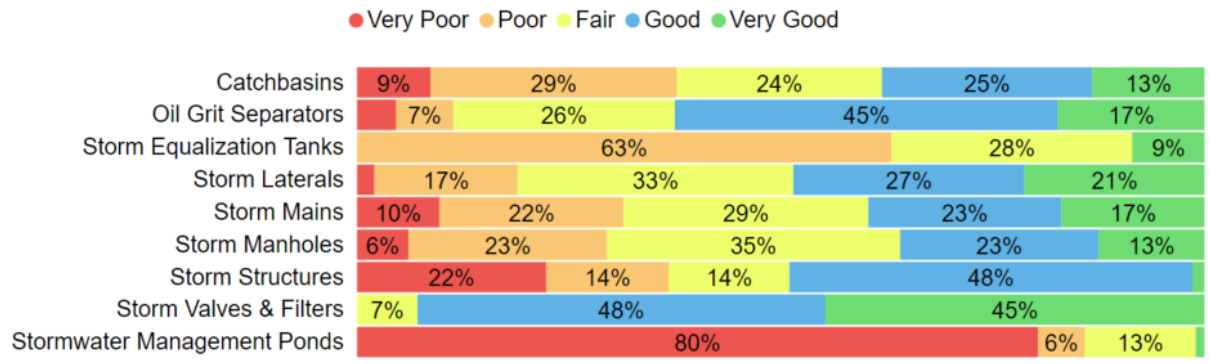
| Asset Segment | Quantity | Replacement Cost Method | Total Replacement Cost |
|---|---|---|---|
| Catchbasins | 5,130 | CPI Tables | $12,287,920 |
| Oil Grit Separators | 31 | CPI Tables | $1,598,829 |
| Storm Equalization Tanks | 19 | CPI Tables | $7,218,426 |
| Storm Laterals | 107 km | CPI Tables | $4,978,351 |
| Storm Mains | 236 km | Cost/Unit | $129,086,605 |
| Storm Manholes | 2,884 | CPI Tables | $24,552,258 |
| Storm Structures | 255 | 85% CPI Tables, 15% User-Defined Cost | $3,724,790 |
| Storm Valves & Filters | 7 | 10% CPI Tables, 90% User-Defined Cost | $417,105 |
| Stormwater Management Ponds | 34 Quantity, 126,607 Area (m2) | CPI Tables | $24,452,743 |
| | | | **$208,317,027** |



## 5.1.16 Asset Condition

The table below identifies the current average condition and source of available condition data for each asset segment. The Average Condition (%) is a weighted value based on replacement cost.

| | Average Condition (%) | Average Condition Rating | Condition Source |
|---|---|---|---|
| Catchbasins | 50% | Fair | Age-based |
| Oil Grit Separators | 62% | Good | Age-based |
| Storm Equalization Tanks | 43% | Fair | Age-based |
| Storm Laterals | 60% | Good | Age-based |
| Storm Mains | 53% | Fair | 1% Assessed |
| Storm Manholes | 53% | Fair | Age-based |
| Storm Structures | 62% | Good | 13% Assessed |
| Storm Valves & Filters | 82% | Very Good | Age-based |
| Stormwater Management Ponds | 9% | Very Poor | Age-based |
| | **48%** | **Fair** | **<1% Assessed** |




To ensure that the Town's Storm Network continues to provide an acceptable level of service, the Town should monitor the average condition of all assets. If the average condition declines, staff should re-evaluate their lifecycle management strategy to determine what combination of maintenance, rehabilitation and replacement activities is required to increase the overall condition of the Storm Network.

## Current Approach to Condition Assessment

Accurate and reliable condition data allows staff to more confidently determine the remaining service life of assets and identify the most cost-effective approach to managing assets. The following describes the municipality's current approach:

- Closed Circuit Television Video (CCTV) inspections are performed on 10% of the entire storm sewer network annually
- A comprehensive inspection of storm water management ponds is performed every 2 years
- Oil grit separators are inspected on an annual basis
- Catchbasins are inspected when cleaned, approximately 25% are inspected annually
- Other stormwater assets are inspected on an as-needed basis

# 5.1.17 Estimated Useful Life & Average Age

The Estimated Useful Life for Storm Network assets has been assigned according to a combination of established industry standards and staff knowledge. The Average Age of each asset is based on the number of years each asset has been in-service.

| Asset Segment | Estimated Useful Life (Years) | Average Age (Years) |
|---|---|---|
| Catchbasins | 50 | 26.3 |
| Oil Grit Separators | 30 | 13.3 |
| Storm Equalization Tanks | 50-55 | 23.0 |
| Storm Laterals | 50-80 | 28.0 |
| Storm Mains | 50-80 | 26.1 |
| Storm Manholes | 55 | 27.9 |
| Storm Structures | 55 | 25.9 |
| Storm Valves & Filters | 30 | 6.7 |
| Stormwater Management Ponds | 10-20 | 22.0 |
| | | **27.0** |

Each asset's Estimated Useful Life should be reviewed periodically to determine whether adjustments need to be made to better align with the observed length of service life for each asset type.

## 5.1.18 Lifecycle Management Strategy

The condition or performance of most assets will deteriorate over time. To ensure that municipal assets are performing as expected and meeting the needs of customers, it is important to establish a lifecycle management strategy to proactively manage asset deterioration.

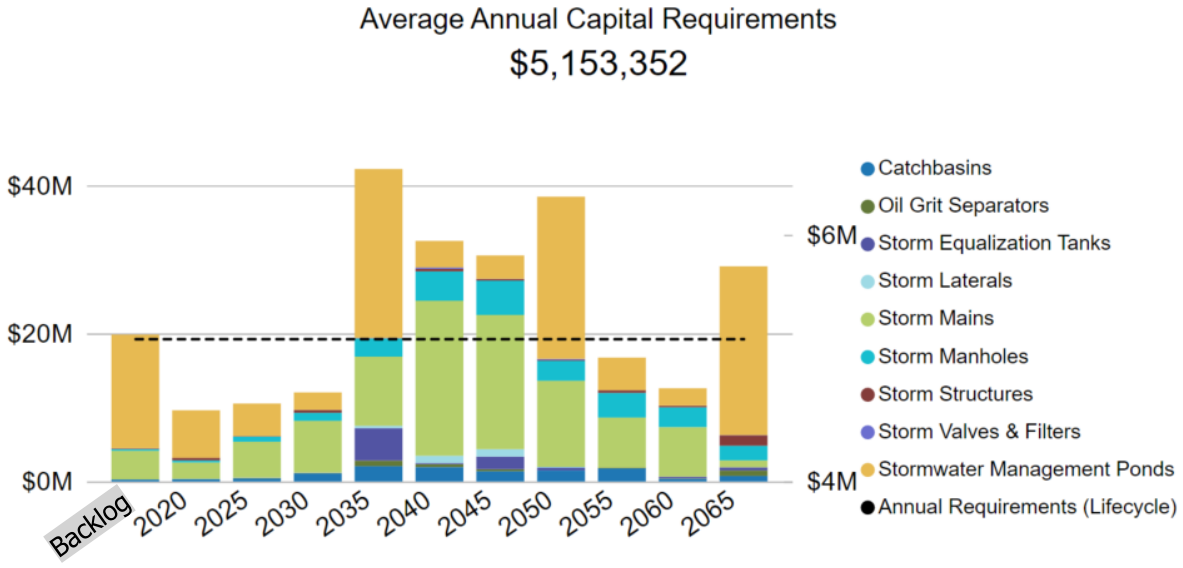
The following table outlines the Town's current lifecycle management strategy.

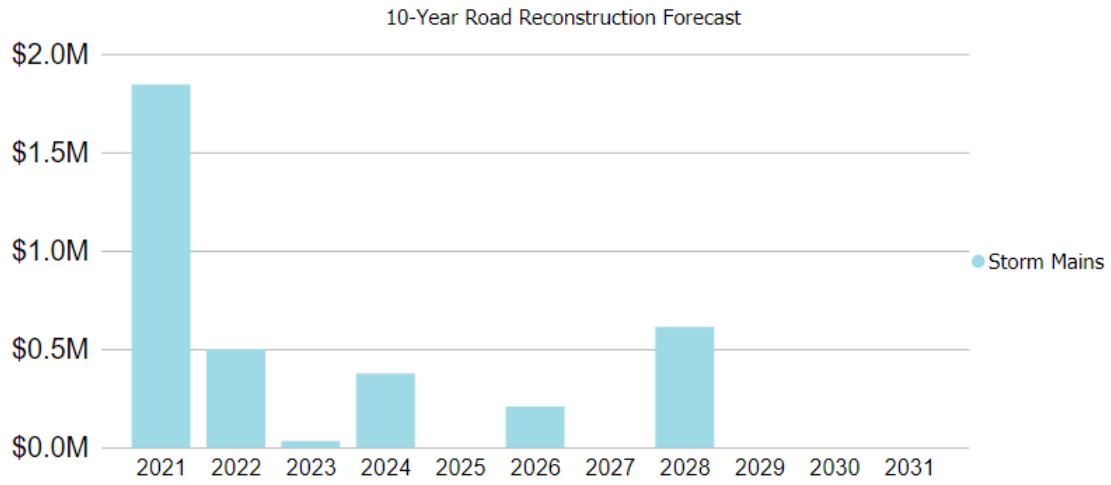
| Activity Type | Description of Current Strategy |
|---|---|
| Maintenance | Storm Master Plans are occasionally undertaken – the last one completed was in 2020 in conjunction with Lake Simcoe's Protection Plan |
| | 25% of catchbasins are cleaned out per year, repairs for catchbasins are usually coordinated with asphalt road repairs |
| | Storm equalization tanks are inspected yearly and receive cleaning and sediment removal |
| | Oil grit separators are cleaned as needed |
| Rehabilitation | Stormwater management ponds may undergo restorative activities such as silt removal, deepening of the pond, or redesign. Costs are noted to vary widely depending on the extent of restoration. Regular maintenance activities such as vegetation management, debris and litter removal, and clearing of inlet and outlet structures are performed as needed |
| | Trenchless sewer lining is considered on a case-by-case basis |
| Replacement | Many storm assets are replaced near the end of life. Earlier replacement is typically coordinated with other work on localized assets, namely the road assets |

### Forecasted Capital Requirements

The following graphs forecasts long-term capital requirements for the Storm network. The annual capital requirement represents the average amount per year that the Town should allocate towards funding rehabilitation and replacement needs. The graph labelled "Average Annual Capital Requirements" is developed using information from the CityWide software which relies on the capital needs within an asset category; The graph labelled, "10-Year Road Reconstruction Forecast", considers the capital needs of the storm mains resulting from coordination opportunities with roads reconstruction projects.

The capital costs will typically differ between these two graphs since a capital plan resulting from individual asset needs will be different than the capital plan resulting from a project-based approach. As Staff work towards refining the data and structure within CityWide, they will be able to run various risk and lifecycle strategies that will help them prioritize assets for rehabilitation and/or replacement effectively. In the meantime, the road reconstruction program from the pavement management system will provide a more accurate project-based forecast.




The projected cost of lifecycle activities that will need to be undertaken over the next 10 years to maintain the current level of service can be found in Appendix B.

# 5.1.19 Risk & Criticality

## Risk Matrix

The following risk matrix provides a visual representation of the relationship between the probability of failure and the consequence of failure for the assets within this asset category based on 2020 inventory data. See Appendix D for the criteria used to determine the risk rating of each asset.


This is a high-level model developed for the purposes of this AMP and Town staff should review and adjust the risk model to reflect an evolving understanding of both the probability and consequences of asset failure.

The identification of critical assets will allow the Town to determine appropriate risk mitigation strategies and treatment options. This may include asset-specific lifecycle strategies, condition assessment strategies, or simply the need to collect better asset data. Staff should continue to refine their risk and criticality modelling in order to supplement the outcomes from RoadMatrix.

## Risks to Current Asset Management Strategies

The following section summarizes key trends, challenges, and risks to service delivery that the Town is currently facing:

### Asset Data & Information

There is some concern with the accuracy of the Town's current asset inventory for stormwater infrastructure and available attribute information. A lack of confidence in the completeness of this data impacts the reliability of asset management and financial planning. Staff are in the process of evaluating the resources and activities required to build and/or improve the existing asset inventory.

### Climate Change & Extreme Weather Events

With climate change and extreme weather events becoming more prevalent, Staff require a better sense of the impacts of climate change on the stormwater network to inform retrofitting and replacement planning. Additional data will help address concerns with system capacity and the ability of the stormwater network to handle any potential increase in the intensity, frequency, and duration of rainfall events. Incorporating a monitoring and maintenance program for all stormwater infrastructure into the asset management plan can further support infrastructure resiliency and reduce risk. The Town will be conducting an analysis on its storm network's resiliency and adaptability in 2022.

## 5.1.20 Levels of Service

The following tables identify the Town's current level of service for Stormwater Network. These metrics include the technical and community level of service metrics that are required as part of O. Reg. 588/17 as well as any additional performance measures that the Town has selected for this AMP.

### Community Levels of Service

The following table outlines the qualitative descriptions that determine the community levels of service provided by Stormwater Network.

| Service Attribute | Qualitative Description | Current LOS (2020) |
|---|---|---|
| Scope | Description, which may include maps, of the user groups or areas of the municipality that are protected from flooding, including the extent of protection provided by the municipal stormwater system | See Appendix C |

### Technical Levels of Service

The following table outlines the quantitative metrics that determine the technical level of service provided by the Stormwater Network.

| Service Attribute | Technical Metric | Current LOS (2020) |
|---|---|---|
| Scope | % of properties in municipality resilient to a 100-year storm | 97% |
| | % of the municipal stormwater management system resilient to a 5-year storm | 100% |
| Reliability | Total # of FTEs / 100 km Length | TBD |
| Cost Efficient | Total O&M Cost to Provide storms/ Population Served | $60 |
| | Five Year Average annual capital expenditure for stormwater | $3,003,949 |

### 5.1.21 Recommendations

## Condition Assessment Strategies

- Update the condition information for storm mains as the information becomes available from CCTV inspections. Condition data for all other stormwater assets should be integrated into the asset inventory to support the development of appropriate maintenance, rehabilitation, and replacement strategies.

## Risk Management Strategies

- Implement risk-based decision-making as part of asset management planning and budgeting processes. This should include the regular review of high-risk assets to determine appropriate risk mitigation strategies. Review risk models on a regular basis and adjust according to an evolving understanding of the probability and consequences of asset failure.

## Lifecycle Management Strategies

- Document and review lifecycle management strategies for the Storm Network on a regular basis to achieve the lowest total cost of ownership while maintaining adequate service levels.

## Levels of Service

- Continue to measure current levels of service in accordance with the metrics that the Town has established in this AMP. Additional metrics can be established as they are determined to provide meaningful and reliable inputs into asset management planning.
- Work towards identifying proposed levels of service as per O. Reg. 588/17 and identify the strategies that are required to close any gaps between current and proposed levels of service.

# 6 Impacts of Growth

## Key Insights

- Understanding the key drivers of growth and demand will allow the Town to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure
- Significant population and employment growth is expected
- The costs of growth should be considered in long-term funding strategies that are designed to maintain the current level of service

# Description of Growth Assumptions

The demand for infrastructure and services will change over time based on a combination of internal and external factors. Understanding the key drivers of growth and demand will allow the Town to more effectively plan for new infrastructure, and the upgrade or disposal of existing infrastructure. Increases or decreases in demand can affect what assets are needed and what level of service meets the needs of the community.

## 6.1.1 York Region Official Plan 2010 (Consolidated April 2019)

Since the Town of Aurora is located within the Greater Golden Horseshoe, the 2017 Growth Plan must be referred as per O.Reg 588/17. As the projected population and employment growth was not explicitly cited within the 2017 growth plan, the upper tier municipality's, York Region, official plan growth forecasts are referenced.

The following table outlines the population and employment forecasts allocated to Aurora. The future estimates are consistent with the values cited from Aurora's Official Plan.

| Year | Population | Employment |
|---|---|---|
| 2006 | 49,700 | 20,300 |
| 2016 | 63,700 | 29,000 |
| 2021 | 68,100 | 32,400 |
| 2026 | 69,600 | 33,500 |
| 2031 | 70,200 | 34,200 |

York Region also references a regional intensification strategy through 2031. Aurora is expected to plan to meet or exceed 3,140 residential units. Furthermore, the intensification areas are expected to align with York's Regional Transit-Oriented Development Guidelines and the Region's implementation guidelines for regional centres and corridors.

### 6.1.2 Aurora Official Plan (September 2010)

The Official Plan is a planning document for the purpose of guiding the future development of the Town of Aurora. The last approved Official Plan was in September 2010.

Aurora expects to experience a significant amount of population and employment growth. By 2031, the Town's population is expected to grow by 70,200 people, with the number of jobs projected to reach 34,200. The official plan aims to ensure a sustainable development pattern to accommodate this growth by focusing on intensification of strategic areas, protection of existing Stable Neighborhoods, the revitalization of the Aurora Promenade, and the efficient use of the Town's remaining greenfield lands.

Approximately 34% of the new residential growth is expected to be accommodated through intensification, where the majority shall be in the Aurora Promenade area and a minor amount through new residential development of secondary suite units of stable neighborhoods. The remaining approximate of 66% of new residential growth shall be accommodated in identified Greenfield Residential Areas. Furthermore, new employment within the Greenfield areas must be planned to achieve a minimum gross density of 40 jobs per hectare.

Approximately 21% of the new job growth is expected to be accommodated through the intensification of Existing Employment Areas and development of vacant designated lands. Approximately 72% of the new job growth is expected to be accommodated within the identified Greenfield Employment area. The remaining 7% is expected to originate from additional home based jobs of existing land base.

### 6.1.3 Town of Aurora – Development Charges Background Study

The Town of Aurora prepared a Development Charges Background Study in 2019 through Watson & Associates Economists Ltd, pursuant to Section 10 of the Development Charges Act, 1997 (DCA). The Development Charges (DC) Study was later amended in April 2021. The DC Background Study addresses: the forecast amount, type, and location of growth; identification of the servicing needs to accommodate growth; the capital costs to provide the services; and the proposed by-law (No. 6357-21) which was written to impose and provide for the payment of development charges for municipal services in the Town.

The Study presents proposed new development charges based on costing and related assumptions found in this Background study and compares the proposed charges to the current charges. Development charges are broken down by each municipal-wide service for non-residential development and four different types of residential development. The proposed development charges are higher than current charges for each development type.

The Background Study, pursuant to the DCA, includes a reference to an Asset Management Plan (AMP) for the purposes of developing an asset management program that considers future growth. This AMP supports the objectives defined in the Development Charges Background Study.

The Study also provides a residential growth forecast summary in the table below:

| | Year | Population | Housing Units | | | | | Person Per Unit: |
|---|---|---|---|---|---|---|---|---|
| | | | Singles & Semi-Detached | Multiple Dwellings | Apartments | Other | Total Households | Total Pop/Total Households |
| Historical | Mid 2006 | 49,150 | 10,795 | 3,190 | 1,665 | 5 | 15,655 | 3.042 |
| | Mid 2011 | 54,900 | 12,035 | 3,565 | 1,810 | 11 | 17,691 | 3.007 |
| | Mid 2016 | 57,210 | 12,770 | 3,975 | 2,100 | 10 | 18,855 | 2.941 |
| Forecast | Mid 2019 | 61,320 | 13,877 | 4,311 | 2,145 | 10 | 20,343 | 2.921 |
| | Mid 2029 | 73,390 | 15,764 | 5,326 | 3,675 | 10 | 24,775 | 2.871 |
| | Mid 2031 | 74,900 | 15,892 | 5,454 | 4,059 | 10 | 25,415 | 2.856 |

# Impact of Growth on Lifecycle Activities

By July 1, 2025 the Town's asset management plan must include a discussion of how the assumptions regarding future changes in population and economic activity informed the preparation of the lifecycle management and financial strategy.

Planning for forecasted population growth may require the expansion of existing infrastructure and services. As growth-related assets are constructed or acquired, they should be integrated into the Town's AMP. While the addition of residential units will add to the existing assessment base and offset some of the costs associated with growth, the Town will need to review the lifecycle costs of growth-related infrastructure. These costs should be considered in long-term funding strategies that are designed to, at a minimum, maintain the current level of service.

## 6.1.4 Lifecycle Costs for Growth-related Assets

Municipal expenditures are expected to increase with growth in population. The following table, pulled from the 2019 DC Background Study, depicts the annual impact resulting from the proposed gross capital projects. It is critical to note that the costs associated with the new infrastructure would be delayed until the works are in place.

| Service | Gross Cost Less Benefit to Existing | Annual Lifecycle Expenditures | Annual Operating Expenditures | Total Annual Expenditures |
|---|---|---|---|---|
| Wastewater Services | $4,207,495 | $162,339 | $418,183 | $580,522 |
| Water Supply and Distribution Services | $259,600 | $15,821 | $1,050,381 | $1,066,202 |
| Services Related to a Highway | $37,565,987 | $2,560,458 | $1,774,665 | $4,335,123 |
| Fire Services | $10,853,700 | $467,774 | $2,299,200 | $2,766,974 |
| Parking Services | $60,535 | $22,509 | $- | $22,509 |
| Outdoor Recreation Services | $35,517,693 | $848,191 | $1,073,161 | $1,921,352 |
| Indoor Recreation Services | $48,195,075 | $3,060,350 | $1,320,423 | $4,380,773 |
| Library Services | $5,572,139 | $597,890 | $776,740 | $1,374,630 |
| General Government | $4,306,976 | $- | $- | $- |
| **Total** | **$146,539,200** | **$7,735,332** | **$8,712,755** | **$16,448,087** |

A further breakdown of the expenditures can be found in the DC background study.

The Town has made provision for the inclusion of new studies undertaken to facilitate the DC process. These studies include:

- Water and wastewater related studies;
- Stormwater master plans;
- Parks and recreation master plans;
- Fire master plans;
- Transportation related studies;
- Official Plan;
- Intensification studies;
- Development Charge studies;
- Long range fiscal studies; and
- Other growth-related studies.

Details of the expected timing of the various studies can be found in the DC background study. Once these are complete there will be additional data available to determine the cost of growth-related infrastructure costs more confidently for all core assets. The Town applies a uniform Town-wide approach to calculate development charges for all services.

Under O.Reg. 588/17 municipalities with a population above 25,000 must include the following details in their Asset Management Plan by July 1, 2025:

1. The estimated capital expenditures and operating costs to achieve the proposed levels of service in order to accommodate growth;
2. The funding projected to be available by source as a result of increased population and economic activity; and
3. An overview of risks associated with implementation of the asset management plan.

The Town is currently working towards gathering more accurate data to support these requirements but will need to develop proposed levels of service and a more in-depth overview of risks associated with their asset management program for the AMP by July 1, 2025.

# 7 Financial Strategy

## Key Insights

- The Town is committing approximately $12 million towards capital projects per year from sustainable revenue sources
- Given the annual capital requirement of $48.3 million, there is currently a funding gap of $36 million annually
- For tax-funded assets, we recommend increasing tax revenues by 2.9% each year for the next 20 years to achieve a sustainable level of funding
- For the Sanitary Network, we recommend increasing rate revenues by 0.4% annually for the next 10 years to achieve a sustainable level of funding
- For the Water Network, we recommend increasing rate revenues by 2.2% annually for the next 10 years to achieve a sustainable level of funding
- For the Storm Network, we recommend increasing rate revenues by 11% annually for the next 15 years to achieve a sustainable level of funding

# Financial Strategy Overview

For an asset management plan to be effective and meaningful, it must be integrated with financial planning and long-term budgeting. The development of a comprehensive financial plan will allow the Town of Aurora to identify the financial resources required for sustainable asset management based on existing asset inventories, desired levels of service, and projected growth requirements.

This report develops such a financial plan by presenting several scenarios for consideration and culminating with final recommendations. As outlined below, the scenarios presented model different combinations of the following components:

1. The financial requirements for:
    a. Existing assets
    b. Existing service levels
    c. Requirements of contemplated changes in service levels (none identified for this plan)
    d. Requirements of anticipated growth (none identified for this plan)
2. Use of traditional sources of municipal funds:
    a. Tax levies
    b. User fees
    c. Reserves
    d. Debt
3. Use of non-traditional sources of municipal funds:
    a. Reallocated budgets
    b. Partnerships
    c. Procurement methods
4. Use of Senior Government Funds:
    a. Gas tax
    b. Annual grants

Note: Periodic grants are normally not included due to Provincial requirements for firm commitments. However, if moving a specific project forward is wholly dependent on receiving a one-time grant, the replacement cost included in the financial strategy is the net of such grant being received.

If the financial plan component results in a funding shortfall, the Province requires the inclusion of a specific plan as to how the impact of the shortfall will be managed. In determining the legitimacy of a funding shortfall, the Province may evaluate a Town's approach to the following:

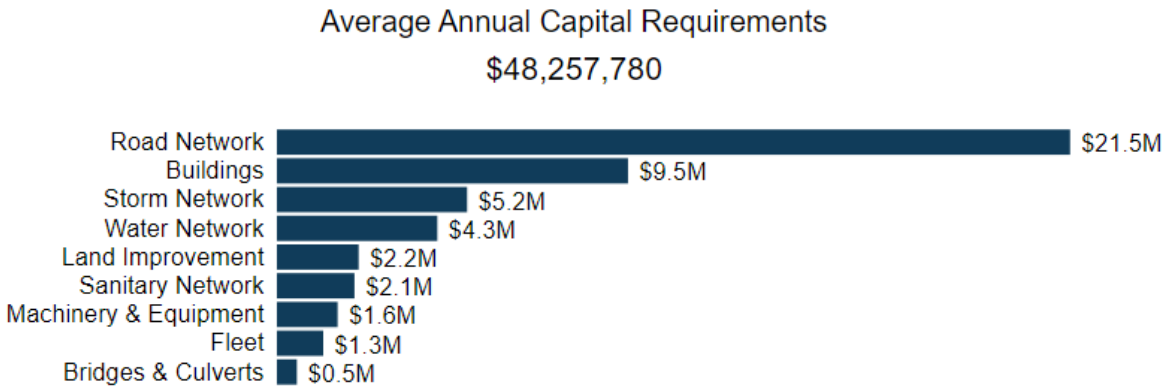
1. In order to reduce financial requirements, consideration has been given to revising service levels downward.
2. All asset management and financial strategies have been considered. For example:
    a. If a zero-debt policy is in place, is it warranted? If not, the use of debt should be considered.

b. Do user fees reflect the cost of the applicable service? If not, increased user fees should be considered.

### 7.1.1 Annual Requirements & Capital Funding

## Annual Requirements

The annual requirements represent the amount the Town should allocate annually to each asset category to meet replacement needs as they arise, prevent infrastructure backlogs and achieve long-term sustainability. In total, the Town must allocate approximately $48.3 million annually to address capital requirements for the assets included in this AMP.




For most asset categories the annual requirement has been calculated based on a "replacement only" scenario, in which capital costs are only incurred at the construction and replacement of each asset.

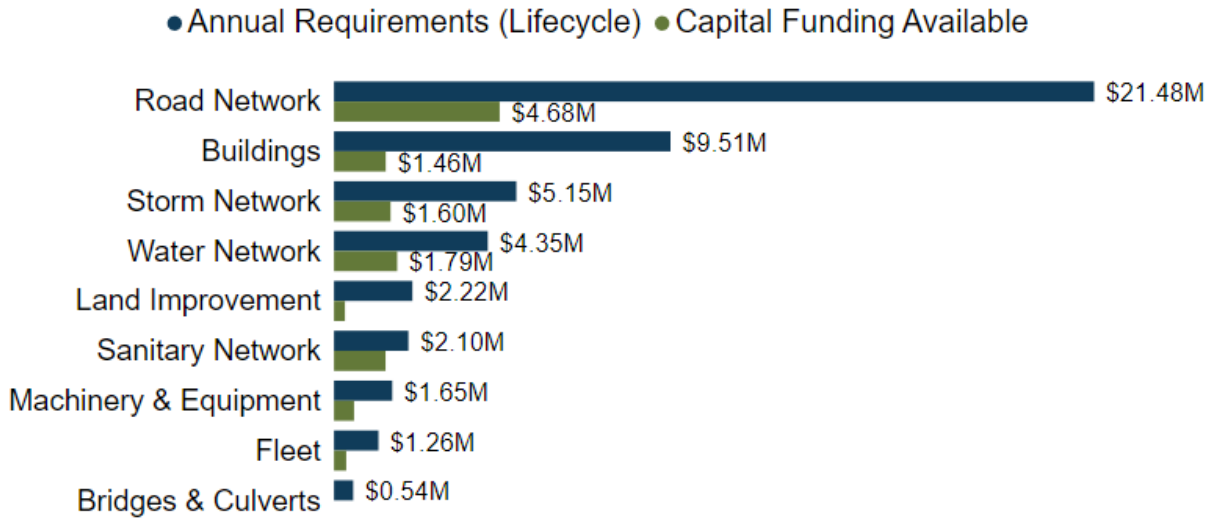
However, for the Road Network and Bridges & Culverts, lifecycle management strategies have been developed to identify capital costs that are realized through strategic rehabilitation and renewal of the Town's roads and structural bridges and culverts. The development of these strategies allows for a comparison of potential cost avoidance if the strategies were to be implemented.

1. **Replacement Only Scenario**: Based on the assumption that assets deteriorate and – without regularly scheduled maintenance and rehabilitation – are replaced at the end of their service life.
2. **Lifecycle Strategy Scenario**: Based on the assumption that lifecycle activities are performed at strategic intervals to extend the service life of assets until replacement is required.

The implementation of a proactive lifecycle strategy can lead to a potential annual cost avoidance. As the lifecycle strategy scenario represents the most optimal cost option available to the Town, we have used these annual requirements in the development of the financial strategy.

## Annual Funding Available

Based on a historical analysis of sustainable capital funding sources, the Town is committing approximately $12 million towards capital projects per year from sustainable revenue sources. Given the annual capital requirement of $48 million, there is currently a funding gap of $36 million annually.




# Funding Objective

We have developed a scenario that would enable Aurora to achieve full funding within 10 to 20 years for the following assets:

a) **Tax Funded Assets:** Road Network, Bridges & Culverts, Buildings, Machinery & Equipment, Land Improvement, Fleet
b) **Rate-Funded Assets:** Water Network, Sanitary Network, Storm Network

For each scenario developed we have included strategies, where applicable, regarding the use of cost containment and funding opportunities.

# Financial Profile: Tax Funded Assets

## 7.1.2 Current Funding Position

The following tables show, by asset category, Aurora's average annual CapEx requirements, current funding positions, and funding increases required to achieve full funding on assets funded by taxes.

| Asset Category | Avg. Annual Requirement | Annual Funding Available | | | | | Annual Deficit |
|---|---|---|---|---|---|---|---|
| | | Taxes | Gas Tax | OCIF | Stormwater Charges | Total Available | |
| Bridges & Culverts | $544,803 | - | | | - | - | $544,803 |
| Buildings | $9,509,582 | $1,464,700 | | | | $1,464,700 | $8,044,882 |
| Fleet | $1,258,223 | $346,700 | | | | $346,700 | $911,523 |
| Land Improvement | $2,216,879 | $311,400 | | | | $311,400 | $1,905,479 |
| Machinery & Equipment | $1,647,650 | $568,400 | | | | $568,400 | $1,079,250 |
| Road Network | $21,476,507 | $1,804,200 | $1,681,992 | $1,196,719 | | $4,682,911 | $16,793,596 |
| | **$36,653,644** | **$4,495,400** | **$1,681,992** | **$1,196,719** | | **$7,374,111** | **$29,279,533** |

The average annual CapEx requirement for the above categories is $36.6 million. Annual revenue currently allocated to these assets for capital purposes is $7.4 million leaving an annual deficit of $29.3 million. Put differently, these infrastructure categories are currently funded at 20% of their long-term requirements.

## 7.1.3 Full Funding Requirements

In 2020, Town of Aurora has annual tax revenues of $50.1 million. As illustrated in the following table, without consideration of any other sources of revenue or cost containment strategies, full funding would require the following tax change over time:

| Asset Category | Tax Change Required for Full Funding |
|---|---|
| Bridges & Culverts | 1.1% |
| Buildings | 16.1% |
| Fleet | 1.8% |
| Land Improvement | 3.8% |
| Machinery & Equipment | 2.2% |
| Road Network | 33.5% |
| | **58.5%** |

The following changes in costs and/or revenues over the next number of years should also be considered in the financial strategy:

a.) Aurora's debt payments for these asset categories will be decreasing by $367,000 over the next 10 years.

Our recommendations include capturing the above changes and allocating them to the infrastructure deficit outlined above. The table below outlines this concept and presents several options:

| | Without Capturing Changes | | | | With Capturing Changes | | | |
|---|---|---|---|---|---|---|---|---|
| | **5 Years** | **10 Years** | **15 Years** | **20 Years** | **5 Years** | **10 Years** | **15 Years** | **20 Years** |
| Infrastructure Deficit | 29,279,533 | 29,279,533 | 29,279,533 | 29,279,533 | 29,279,533 | 29,279,533 | 29,279,533 | 29,279,533 |
| Change in Debt Costs | N/A | N/A | N/A | N/A | -0 | -367,471 | -367,471 | -367,471 |
| Change in OCIF Grants | N/A | N/A | N/A | N/A | 0 | 0 | 0 | 0 |
| **Resulting Infrastructure Deficit** | 29,279,533 | 29,279,533 | 29,279,533 | 29,279,533 | 29,279,533 | 28,912,062 | 28,912,062 | 28,912,062 |
| Tax Increase Required | 58.4% | 58.4% | 58.4% | 58.4% | 58.4% | 57.7% | 57.7% | 57.7% |
| **Annually** | 11.7% | 5.8% | 3.9% | 2.9% | 11.7% | 5.8% | 3.8% | 2.9% |

## 7.1.4 Financial Strategy Recommendations

Considering all the above information, we recommend the 20-year option. This involves full CapEx funding being achieved over 20 years by:

a) when realized, reallocating the debt cost reductions to the infrastructure deficit as outlined above.
b) increasing tax revenue by 2.9% each year for the next 20 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
c) allocating the current gas tax and OCIF revenue as outlined previously.
d) allocating the scheduled OCIF grant increases to the infrastructure deficit as they occur.
e) reallocating appropriate revenue from categories in a surplus position to those in a deficit position.
f) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. By Provincial AMP rules, this periodic funding cannot be incorporated into an AMP unless there are firm commitments in place. We have included OCIF formula-based funding, if applicable, since this funding is a multi-year commitment[4].
2. We realize that raising tax revenues by the amounts recommended above for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

Although this option achieves full CapEx funding on an annual basis in 20 years and provides financial sustainability over the period modeled, the recommendations do require prioritizing capital projects to fit the resulting annual funding available. Current data shows a pent-up investment demand of $14.3 million for the Road Network, $26.1 million for the Buildings, $1.0 million for Machinery & Equipment, and $2.2 million for Fleet.

Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

[4] The Town should take advantage of all available grant funding programs and transfers from other levels of government. While OCIF has historically been considered a sustainable source of funding, the program is currently undergoing review by the provincial government. Depending on the outcome of this review, there may be changes that impact its availability.

# Financial Profile: Rate Funded Assets

## 7.1.5 Current Funding Position

The following tables show, by asset category, Aurora's average annual asset investment requirements, current funding positions, and funding increases required to achieve full funding on assets funded by rates.

| Asset Category | Avg. Annual Requirement | Annual Funding Available | | | | Annual Deficit |
|---|---|---|---|---|---|---|
| | | Rates | Gas Tax | OCIF | Total Available | |
| Water Network | $4,346,899 | $11,530,100 | - | - | $1,786,700 | $2,560,199 |
| Sanitary Network | $2,103,885 | $14,536,700 | - | - | $1,459,200 | $644,685 |
| Storm Network | $5,153,352 | $2,154,300 | | | $1,600,000 | $3,553,352 |
| | **$11,604,136** | **$23,375,200** | **-** | **-** | **$4,845,900** | **$6,758,236** |

The average annual investment requirement for the above categories is $11.6 million. Annual revenue currently allocated to these assets for capital purposes is $4.8 million leaving an annual deficit of $6.8 million. Put differently, these infrastructure categories are currently funded at 42% of their long-term requirements.

## 7.1.6 Full Funding Requirements

In 2020, Aurora had annual sanitary revenues of $14.5 million, annual water revenues of $11.5 million, and annual stormwater revenues of $2.2 million. As illustrated in the table below, without consideration of any other sources of revenue, full funding would require the following changes over time:

| Asset Category | Rate Change Required for Full Funding |
|---|---|
| Water Network | 22.2% |
| Sanitary Sewer Network | 4.4% |
| Storm Network | 164.9% |
| | **25.9%** |

In the following tables, we have expanded the above scenario to present multiple options. Due to the significant increases required, we have provided phase-in options of up to 20 years:

| | Water Network | | | | Sanitary Network | | | |
|---|---|---|---|---|---|---|---|---|
| | **5 Years** | **10 Years** | **15 Years** | **20 Years** | **5 Years** | **10 Years** | **15 Years** | **20 Years** |
| Infrastructure Deficit | 2,560,199 | 2,560,199 | 2,560,199 | 2,560,199 | 644,685 | 644,685 | 644,685 | 644,685 |
| Rate Increase Required | 22.2% | 22.2% | 22.2% | 22.2% | 4.4% | 4.4% | 4.4% | 4.4% |
| **Annually:** | **4.4%** | **2.2%** | **1.5%** | **1.1%** | **0.9%** | **0.4%** | **0.3%** | **0.2%** |

| | Storm Network | | | |
|---|---|---|---|---|
| | **5 Years** | **10 Years** | **15 Years** | **20 Years** |
| Infrastructure Deficit | 3,553,352 | 3,553,352 | 3,553,352 | 3,553,352 |
| Rate Increase Required | 164.9% | 164.9% | 164.9% | 164.9% |
| **Annually:** | **33.0%** | **16.5%** | **11.0%** | **8.2%** |

## 7.1.7 Financial Strategy Recommendations

Considering the above information, we recommend the 10-year option for the Water & Sanitary Sewer Networks, and the 15-year option for the Storm Network. This involves full CapEx funding being achieved over 10 years for the Water & Sanitary Sewer Networks, and 15 years for the Storm Network by:

a) increasing rate revenues by 2.2% for the Water Network and 0.4% for the Sanitary Sewer Network each year for the next 10 years solely for the purpose of phasing in full funding to the asset categories covered in this section of the AMP.
b) Increasing rate revenues by 11% for the Storm Network each year for the next 15 years solely for the purpose of phasing in full funding.
c) increasing existing and future infrastructure budgets by the applicable inflation index on an annual basis in addition to the deficit phase-in.

Notes:

1. As in the past, periodic senior government infrastructure funding will most likely be available during the phase-in period. This periodic funding should not be incorporated into an AMP unless there are firm commitments in place.
2. We realize that raising rate revenues for infrastructure purposes will be very difficult to do. However, considering a longer phase-in window may have even greater consequences in terms of infrastructure failure.

3. Any increase in rates required for operations would be in addition to the above recommendations.

Although this strategy achieves full CapEx funding for rate-funded assets in 10 years for the Water & Sanitary Sewer Networks, and in 15 years for the Storm Network, the recommendation does require prioritizing capital projects to fit the annual funding available. Current data shows a pent-up investment demand of $17.4 million for the Water Network, $4.7 million for the Sanitary Network, and $19.8 million for the Storm Network.

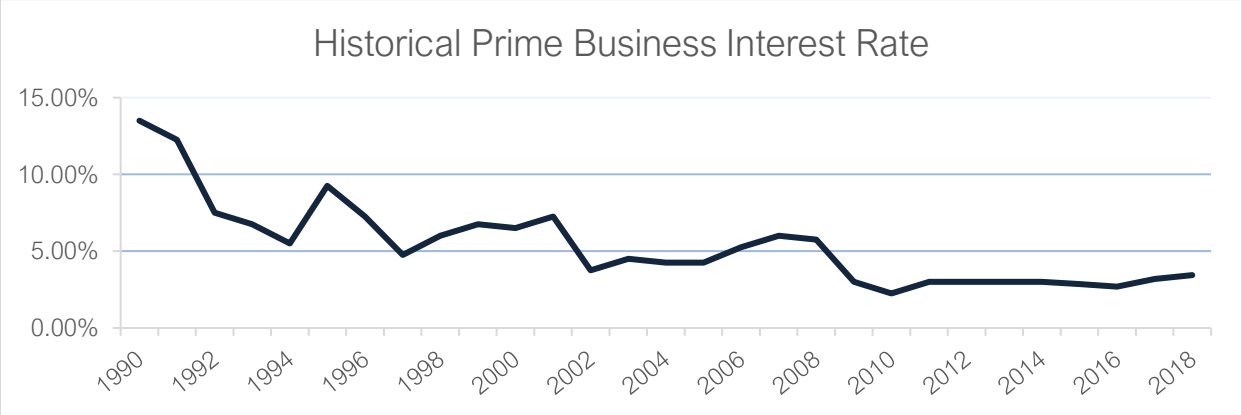
Prioritizing future projects will require the current data to be replaced by condition-based data. Although our recommendations include no further use of debt, the results of the condition-based analysis may require otherwise.

# Use of Debt

For reference purposes, the following table outlines the premium paid on a project if financed by debt. For example, a $1M project financed at 3.0%[5] over 15 years would result in a 26% premium or $260,000 of increased costs due to interest payments. For simplicity, the table does not consider the time value of money or the effect of inflation on delayed projects.

| Interest Rate | Number of Years Financed | | | | | |
|---|---|---|---|---|---|---|
| | 5 | 10 | 15 | 20 | 25 | 30 |
| **7.0%** | 22% | 42% | 65% | 89% | 115% | 142% |
| **6.5%** | 20% | 39% | 60% | 82% | 105% | 130% |
| **6.0%** | 19% | 36% | 54% | 74% | 96% | 118% |
| **5.5%** | 17% | 33% | 49% | 67% | 86% | 106% |
| **5.0%** | 15% | 30% | 45% | 60% | 77% | 95% |
| **4.5%** | 14% | 26% | 40% | 54% | 69% | 84% |
| **4.0%** | 12% | 23% | 35% | 47% | 60% | 73% |
| **3.5%** | 11% | 20% | 30% | 41% | 52% | 63% |
| **3.0%** | 9% | 17% | 26% | 34% | 44% | 53% |
| **2.5%** | 8% | 14% | 21% | 28% | 36% | 43% |
| **2.0%** | 6% | 11% | 17% | 22% | 28% | 34% |
| **1.5%** | 5% | 8% | 12% | 16% | 21% | 25% |
| **1.0%** | 3% | 6% | 8% | 11% | 14% | 16% |
| **0.5%** | 2% | 3% | 4% | 5% | 7% | 8% |
| **0.0%** | 0% | 0% | 0% | 0% | 0% | 0% |

It should be noted that current interest rates are near all-time lows. Sustainable funding models that include debt need to incorporate the risk of rising interest rates. The following graph shows where historical lending rates have been:




[5] Current municipal Infrastructure Ontario rates for 15-year money is 3.2%.

A change in 15-year rates from 3% to 6% would change the premium from 26% to 54%. Such a change would have a significant impact on a financial plan.

The following tables outline how Aurora has historically used debt for investing in the asset categories as listed. There is currently $1.9 million of debt outstanding for the assets covered by this AMP with corresponding principal and interest payments of $367,471, well within its provincially prescribed maximum of $20.8 million.

| Asset Category | Current Debt Outstanding | Use of Debt in the Last Five Years | | | | |
|---|---|---|---|---|---|---|
| | | 2016 | 2017 | 2018 | 2019 | 2020 |
| Bridges & Culverts | | | | | | |
| Buildings | | | | | | |
| Fleet | | | | | | |
| Land Improvement | | | | | | |
| Machinery & Equipment | | | | | | |
| Road Network | 1,888,864 | 3,121,380 | | 5,260,387 | | |
| **Total Tax Funded:** | **1,888,864** | **3,121,380** | | **5,260,387** | **0** | **0** |
| | | | | | | |
| Water Network | | | | | | |
| Sanitary Network | | | | | | |
| Storm Network | | | | | | |
| **Total Rate Funded:** | **0** | **0** | **0** | **0** | **0** | **0** |

| Asset Category | Principal & Interest Payments in the Next Ten Years | | | | | | |
|---|---|---|---|---|---|---|---|
| | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2030 |
| Bridges & Culverts | | | | | | | |
| Buildings | | | | | | | |
| Fleet | | | | | | | |
| Land Improvement | | | | | | | |
| Machinery & Equipment | | | | | | | |
| Road Network | 367,471 | 367,471 | 367,471 | 367,471 | 367,471 | 367,471 | |
| | | | | | | | |
| **Total Tax Funded:** | **367,471** | **367,471** | **367,471** | **367,471** | **367,471** | **367,471** | **0** |
| | | | | | | | |
| Water Network | | | | | | | |
| Sanitary Network | | | | | | | |
| Storm Network | | | | | | | |
| **Total Rate Funded:** | **0** | **0** | **0** | **0** | **0** | **0** | **0** |

The revenue options outlined in this plan allow Aurora to fully fund its long-term infrastructure requirements without further use of debt.

# Use of Reserves

## 7.1.8 Available Reserves

Reserves play a critical role in long-term financial planning. The benefits of having reserves available for infrastructure planning include:

a) the ability to stabilize tax rates when dealing with variable and sometimes uncontrollable factors
b) financing one-time or short-term investments
c) accumulating the funding for significant future infrastructure investments
d) managing the use of debt
e) normalizing infrastructure funding requirement

By asset category, the table below outlines the details of the reserves currently available to Aurora.

| Asset Category | Balance on December 31, 2020 |
|---|---|
| Bridges & Culverts[6] | 0 |
| Buildings | 5,616,900 |
| Fleet | 1,758,000 |
| Land Improvement | 3,373,800 |
| Machinery & Equipment | 1,472,200 |
| Road Network | 5,380,400 |
| **Total Tax Funded:** | **17,601,300** |
| | |
| Water Network | 8,917,400 |
| Sanitary Network | 1,877,100 |
| Storm Network | 7,613,000 |
| **Total Rate Funded:** | **18,407,500** |

There is considerable debate in the municipal sector as to the appropriate level of reserves that a Town should have on hand. There is no clear guideline that has gained wide acceptance. Factors that municipalities should take into account when determining their capital reserve requirements include:

a) breadth of services provided
b) age and condition of infrastructure
c) use and level of debt
d) economic conditions and outlook
e) internal reserve and debt policies.

[6] Bridges are repaired/replaced through the Roads R&R reserve while Culverts are funded through the Stormwater Services reserve.

These reserves are available for use by applicable asset categories during the phase-in period to full funding. This coupled with Aurora's judicious use of debt in the past, allows the scenarios to assume that, if required, available reserves and debt capacity can be used for high priority and emergency infrastructure investments in the short- to medium-term.

### 7.1.9 Recommendation

In 2025, Ontario Regulation 588/17 will require Aurora to integrate proposed levels of service for all asset categories in its asset management plan update. We recommend that future planning should reflect adjustments to service levels and their impacts on reserve balances.

# 8 Appendices

## Key Insights

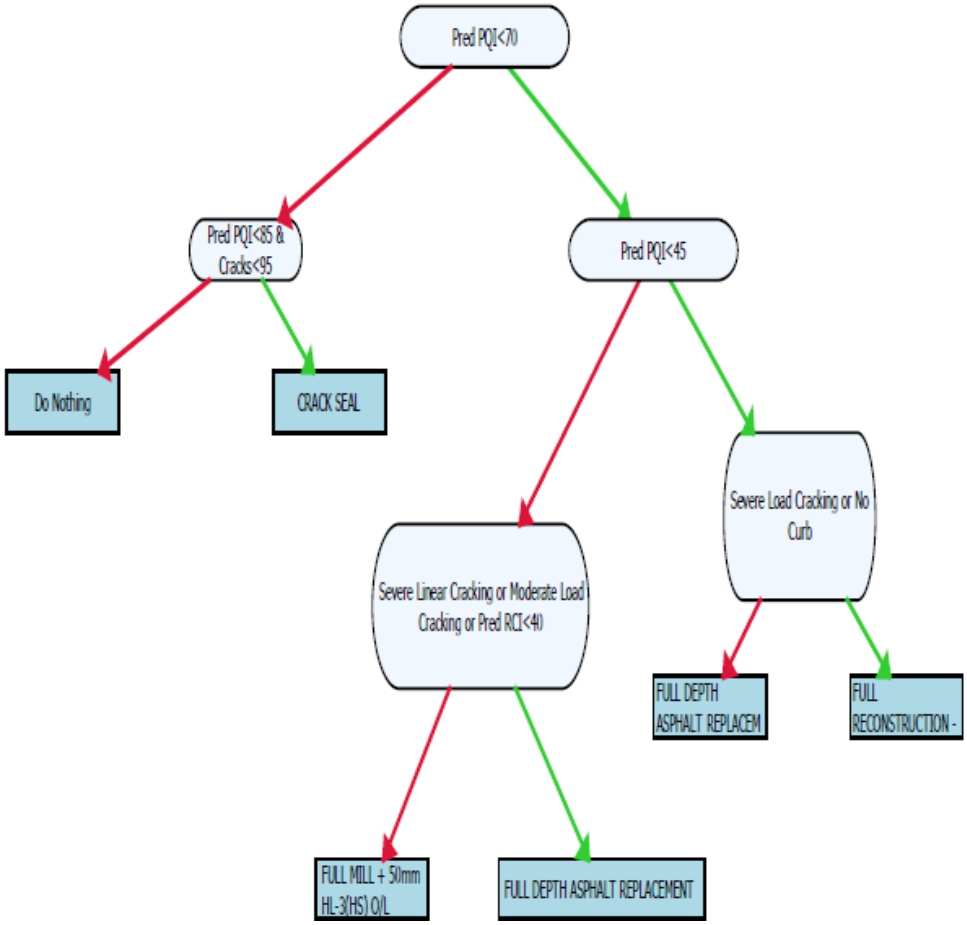
- Appendix A contains decision logic trees from Aurora's pavement management system, RoadMatrix, on lifecycle activities for paved road surfaces, classified by road classes
- Appendix B identifies projected 10-year capital requirements for each asset category
- Appendix C includes several maps that have been used to visualize the current level of service
- Appendix D identifies the criteria used to calculate risk for each asset category
- Appendix E provides a summary of the classification and patrolling frequency of roads according to the Minimum Maintenance Standards
- Appendix F provides additional guidance on the development of a condition assessment program

# Appendix A: RoadMatrix Decision Tree

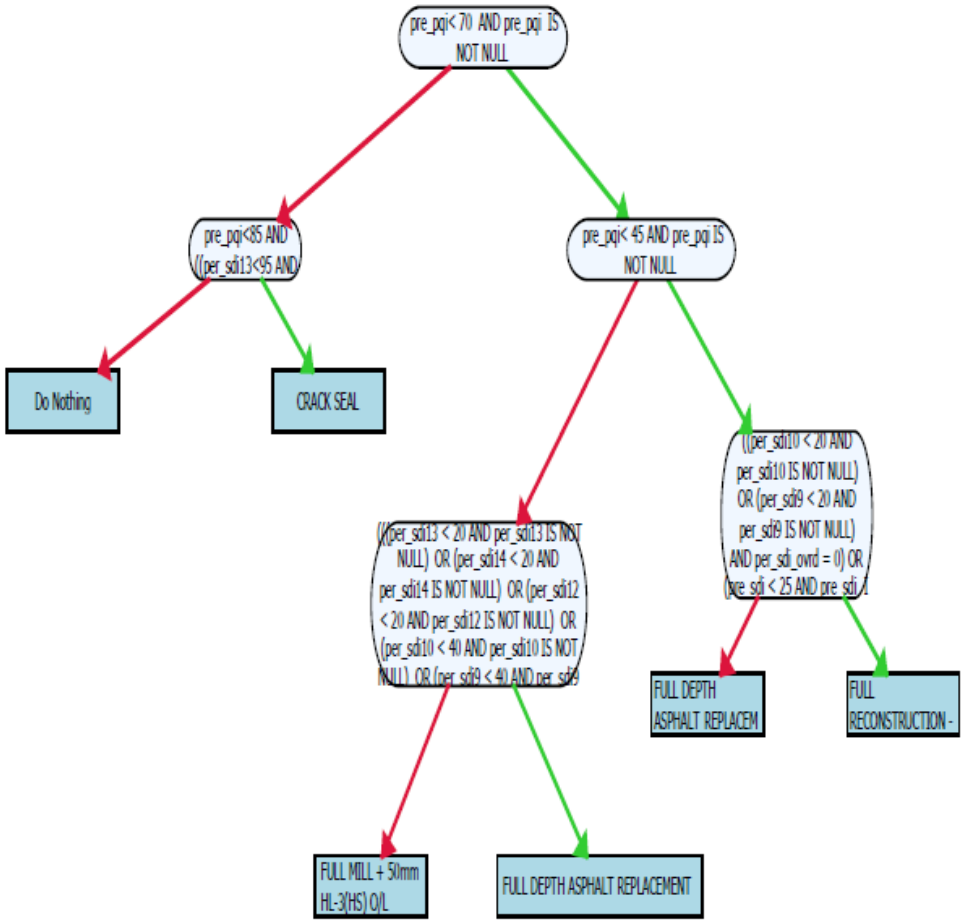
**Arterial Roads:**

Town of Aurora
**Report Trees**

**Functional Class: Arterial  Pavetype: Flexible**
Minimum Acceptable PQI: 70.0  Minimun Acceptable Life: 1



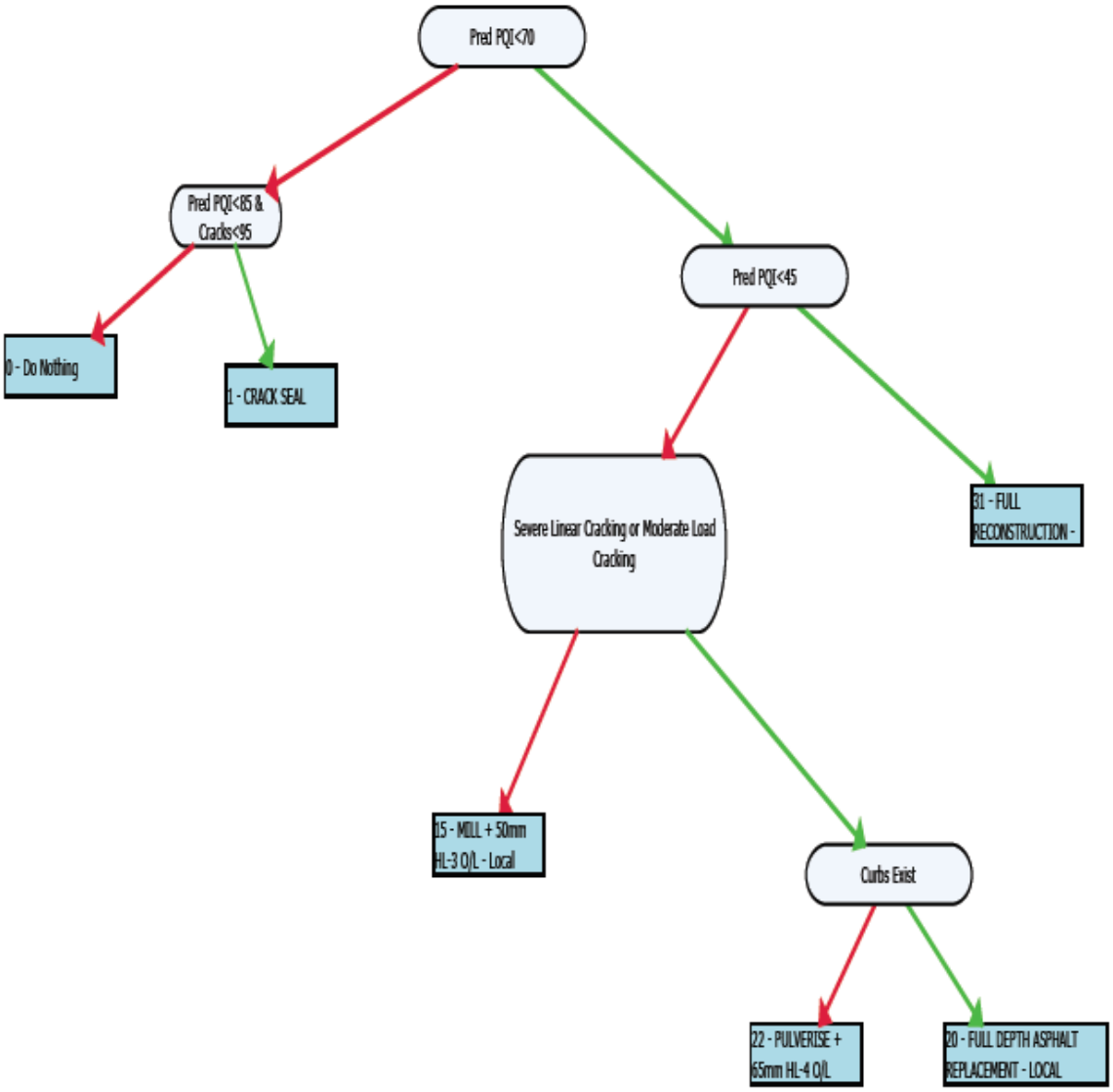
**Functional Class: Arterial  Pavetype: Flexible**
Minimum Acceptable PQI: 70.0  Minimun Acceptable Life: 1



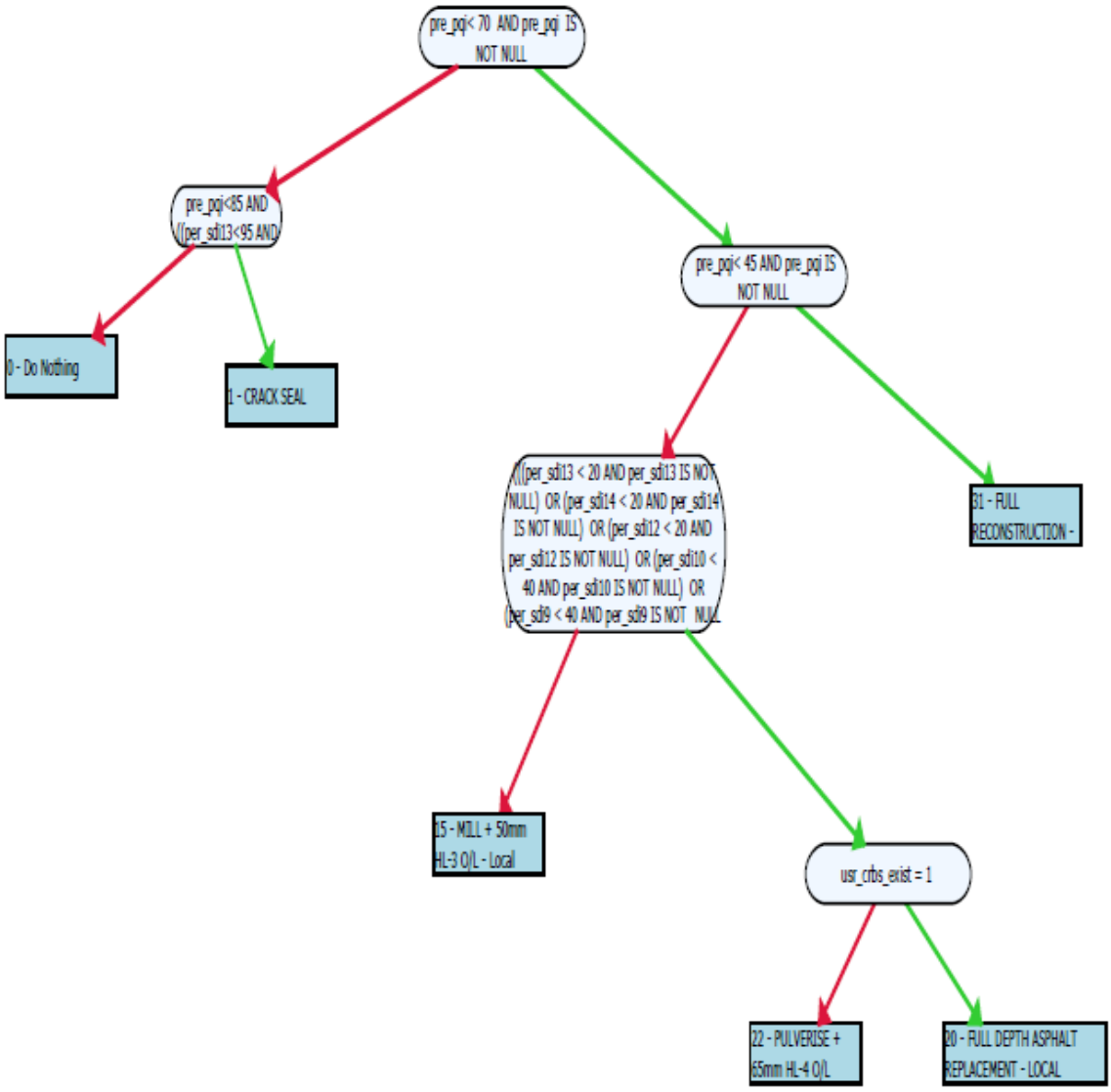
## Collector Roads:

Town of Aurora
**Report Trees**

**Functional Class: Collector  Pavetype: Flexible**
Minimum Acceptable PQI: 65.0  Minimun Acceptable Life: 1



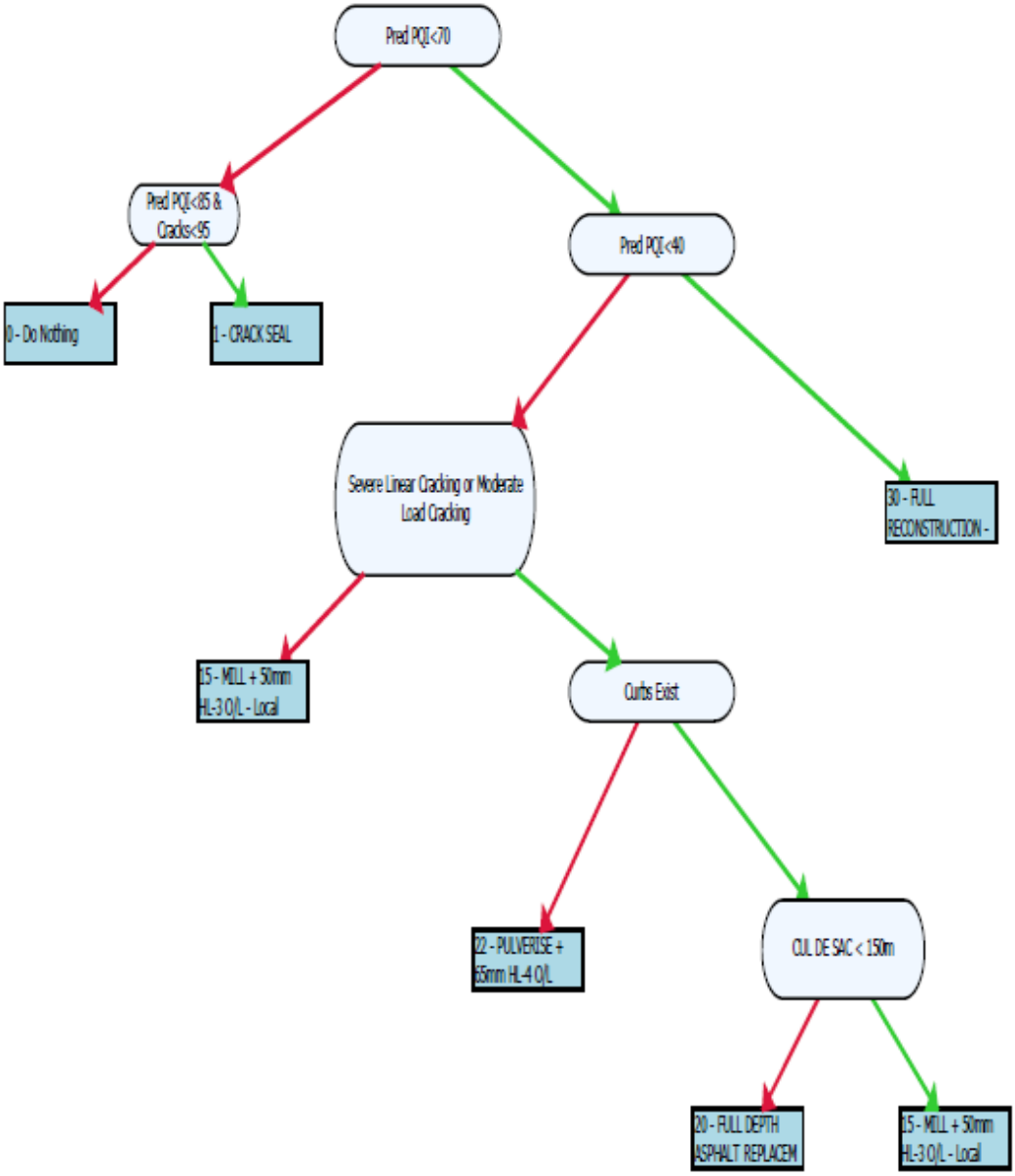
**Functional Class: Collector  Pavetype: Flexible**
Minimum Acceptable PQI: 65.0  Minimun Acceptable Life: 1



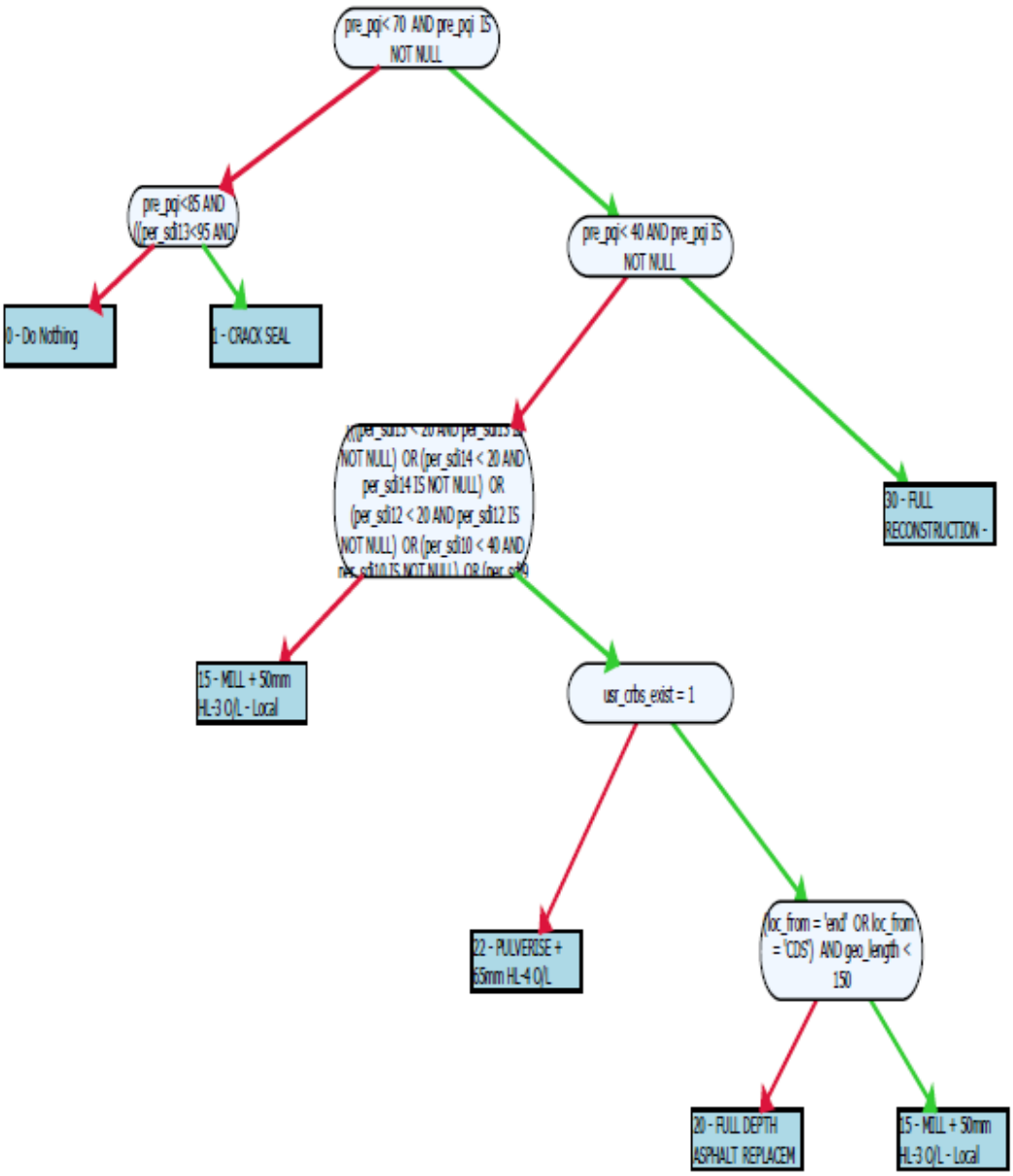
**Local Roads:**

Town of Aurora
**Report Trees**

**Functional Class: Local  Pavetype: Flexible**
Minimum Acceptable PQI: 65.0  Minimun Acceptable Life: 1



**Functional Class: Local  Pavetype: Flexible**
Minimum Acceptable PQI: 65.0  Minimun Acceptable Life: 1



# Appendix B: 10-Year Capital Requirements

The following tables identify the capital cost requirements for each of the next 10 years in order to meet projected capital requirements and maintain the current level of service.

| Road Network | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Paved Roads | $3,336,879.59 | $81,022.01 | $- | $- | $- | $184,773.44 | $168,104.30 | $969,324.59 | $1,201,351.62 | $1,686,614.07 | $2,443,823.75 |
| Retaining Walls | $- | $58,651.00 | $- | $- | $- | $- | $189,996.00 | $- | $- | $- | $- |
| Road Signs & Fencing | $492,278.00 | $3,858.00 | $28,583.00 | $23,460.00 | $29,644.00 | $25,372.00 | $124,326.00 | $30,319.00 | $80,699.00 | $79,098.00 | $39,149.00 |
| Sidewalks | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Small Culverts | $2,965,751.00 | $28,913.00 | $- | $490,295.00 | $2,349.00 | $339,691.00 | $53,052.00 | $- | $92,887.00 | $- | $1,103,942.00 |
| Streetlights & Traffic Lights | $7,515,240.00 | $740,722.00 | $258,322.00 | $351,506.00 | $196,272.00 | $792,809.00 | $625,235.00 | $1,228,927.00 | $576,521.00 | $749,857.00 | $294,829.00 |
| | $14,310,148.59 | $913,166.01 | $286,905.00 | $865,261.00 | $228,265.00 | $1,342,645.44 | $1,160,713.30 | $2,228,570.59 | $1,951,458.62 | $2,515,569.07 | $3,881,743.75 |

| Bridges & Culverts | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Bridges | $- | $- | $- | $8,000.00 | $500,000.00 | $- | $- | $- | $- | $- | $- |
| Structural Culverts | $- | $- | $- | $57,000.00 | $1,049,600.00 | $315,392.00 | $- | $250,000.00 | $- | $2,556,170.00 | $3,579,007.00 |
| | $- | $- | $- | $65,000.00 | $1,549,600.00 | $315,392.00 | $- | $250,000.00 | $- | $2,556,170.00 | $3,579,007.00 |

| Storm Network | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Oil Grit Separators | $- | $- | $- | $- | $- | $- | $73,716.00 | $- | $- | $21,743.00 | $- |
| Storm Equalization Tanks | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Storm Laterals | $5,261.00 | $- | $5,151.00 | $- | $276.00 | $257.00 | $- | $56,837.00 | $8,144.00 | $3,885.00 | $- |
| Storm Mains | $3,881,055.24 | $11,660.00 | $410,807.00 | $- | $572,073.98 | $1,235,359.13 | $235,268.68 | $3,444,332.49 | $266,351.21 | $625,122.05 | $245,263.39 |
| Storm Manholes | $231,187.00 | $- | $47,443.00 | $- | $75,334.00 | $152,866.00 | $14,931.00 | $493,707.00 | $46,557.00 | $92,518.00 | $43,527.00 |
| Storm Structures | $94,704.00 | $- | $305,928.80 | $- | $37,352.00 | $- | $- | $29,409.00 | $7,134.00 | $20,754.00 | $5,454.00 |
| Storm Valves & Filters | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Stormwater Management Ponds | $15,361,680.00 | $839,667.00 | $2,210,522.00 | $1,680,055.00 | $535,390.00 | $1,159,142.00 | $2,215,128.00 | $184,320.00 | $1,767,157.00 | $- | $235,039.00 |
| | $19,847,046.24 | $854,793.00 | $3,183,729.80 | $1,702,747.00 | $1,287,450.98 | $2,594,151.13 | $2,551,394.68 | $4,284,130.49 | $2,183,270.21 | $868,031.05 | $643,243.39 |

| Buildings | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| General Government | $8,293,464.87 | $85,082.23 | $987,714.36 | $952,789.80 | $210,611.49 | $3,832,942.00 | $8,899,355.01 | $796,849.00 | $100,745.00 | $351,526.30 | $232,594.36 |
| Protection Services | $901,503.00 | $- | $2,096,906.00 | $- | $- | $- | $155,142.27 | $- | $31,788.00 | $- | $1,677,652.00 |
| Recreation & Cultural Services | $16,892,912.01 | $42,510.00 | $466,552.99 | $1,485,027.24 | $2,946,926.83 | $8,963,331.73 | $1,612,653.70 | $9,154,973.56 | $2,153,413.37 | $179,344.35 | $7,894,258.74 |
| Transportation Services | $8,279.00 | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| | $26,096,158.88 | $127,592.23 | $3,551,173.35 | $2,437,817.04 | $3,157,538.32 | $12,796,273.73 | $10,667,150.98 | $9,951,822.56 | $2,285,946.37 | $530,870.65 | $9,804,505.10 |

| Machinery & Equipment | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| General Government | $891,534.00 | $108,643.00 | $804,376.00 | $1,494,459.00 | $1,567,023.00 | $1,138,456.00 | $1,259,282.00 | $1,098,394.00 | $1,644,396.00 | $620,720.00 | $1,093,637.00 |
| Protection Services | $125,525.00 | $- | $106,726.00 | $254,785.00 | $106,726.00 | $165,305.00 | $152,094.00 | $471,268.00 | $129,884.00 | $197,328.00 | $149,293.00 |
| Recreation & Cultural Services | $- | $506,683.00 | $425,759.00 | $473,849.00 | $- | $- | $92,782.00 | $- | $450,272.00 | $425,759.00 | $473,849.00 |
| | $1,017,059.00 | $615,326.00 | $1,336,861.00 | $2,223,093.00 | $1,673,749.00 | $1,303,761.00 | $1,504,158.00 | $1,569,662.00 | $2,224,552.00 | $1,243,807.00 | $1,716,779.00 |

| Fleet | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Equipment/Attachments | $767,050.00 | $298,630.00 | $21,257.00 | $95,128.00 | $46,983.00 | $150,100.00 | $37,995.00 | $388,115.00 | $653,150.00 | $769,459.00 | $- |
| Fire Vehicles | $82,678.00 | $60,575.00 | $912,603.00 | $29,246.00 | $18,702.00 | $117,620.00 | $38,302.00 | $11,808.00 | $852,543.00 | $629,547.00 | $333,117.00 |
| Heavy Duty | $712,634.00 | $- | $114,874.00 | $190,815.00 | $- | $196,719.00 | $- | $421,729.00 | $229,426.00 | $607,843.00 | $- |
| Light Duty | $637,867.00 | $114,475.00 | $121,338.00 | $331,261.00 | $578,443.00 | $156,270.00 | $70,459.00 | $273,547.00 | $159,999.00 | $167,532.00 | $- |
| Medium Duty | $- | $64,094.00 | $- | $- | $212,011.00 | $64,610.00 | $143,916.00 | $185,169.00 | $142,802.00 | $177,872.00 | $- |
| Small Engine | $12,767.00 | $- | $20,766.00 | $- | $- | $- | $- | $- | $- | $- | $25,084.00 |
| | $2,212,996.00 | $537,774.00 | $1,190,838.00 | $646,450.00 | $856,139.00 | $685,319.00 | $290,672.00 | $1,280,368.00 | $2,037,920.00 | $2,352,253.00 | $358,201.00 |

| Land Improvement | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Athletic Fields | $1,119,031.00 | $25,324.00 | $119,237.00 | $28,867.00 | $207,327.00 | $- | $2,457,481.00 | $24,859.00 | $- | $3,814.00 | $54,636.00 |
| Fencing & Gates | $320,569.00 | $222,672.00 | $715,494.00 | $127,343.00 | $144,855.00 | $69,939.00 | $165,276.00 | $56,398.00 | $76,234.00 | $33,771.00 | $3,126.00 |
| Park Fixtures & Lighting | $2,026,617.00 | $211,981.00 | $68,243.00 | $47,554.00 | $497,907.00 | $792,625.00 | $483,706.00 | $127,355.00 | $116,896.00 | $398,623.00 | $134,317.00 |
| Park Structures | $31,152.00 | $- | $- | $- | $- | $- | $- | $- | $243,539.00 | $- | $25,488.00 |
| Parking Lots | $1,524,997.57 | $- | $- | $- | $- | $- | $361,294.00 | $251,335.54 | $- | $692,438.40 | $- |
| Playgrounds & Splashpads | $933,234.00 | $34,957.00 | $10,342.00 | $80,883.00 | $102,765.00 | $180,695.00 | $10,342.00 | $266,871.00 | $10,342.00 | $218,270.00 | $118,173.00 |
| Trails & Walkways | $454,899.00 | $196,080.00 | $76,451.00 | $747,886.00 | $45,698.00 | $79,509.00 | $184,648.00 | $694,918.00 | $159,339.00 | $73,250.00 | $978,066.00 |
| | $6,410,499.57 | $691,014.00 | $989,767.00 | $1,032,533.00 | $998,552.00 | $1,122,768.00 | $3,662,747.00 | $1,421,736.54 | $606,350.00 | $1,420,166.40 | $1,313,806.00 |

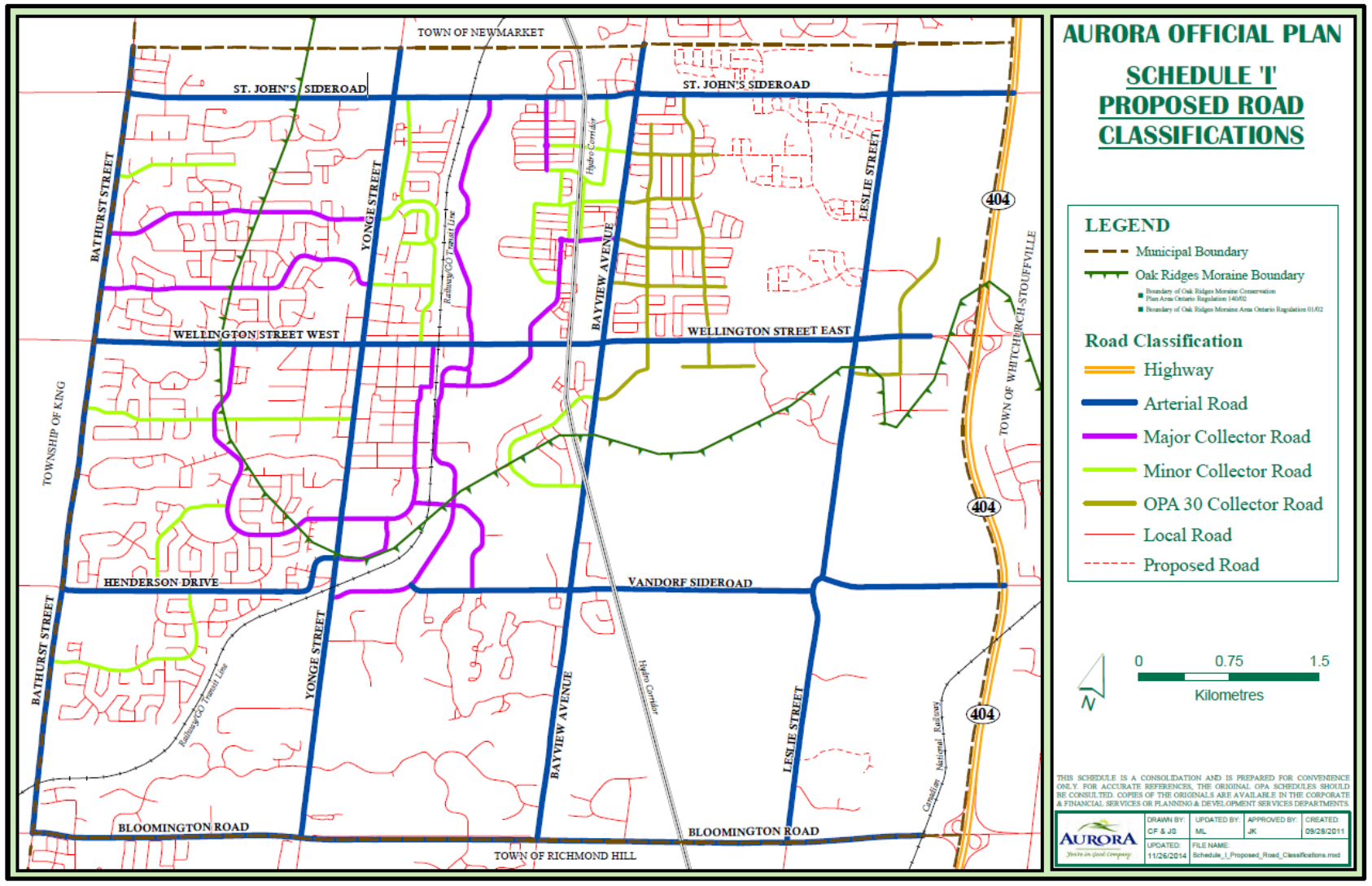
| Water Network | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Hydrants | $1,273,264.00 | $314,858.00 | $82,732.00 | $212,993.00 | $63,440.00 | $214,812.00 | $117,517.00 | $181,798.00 | $152,016.00 | $82,394.00 | $79,000.00 |
| Water Booster & Sampling Stations | $- | $- | $- | $- | $- | $- | $- | $- | $- | $559,715.00 | $- |
| Water Mains | $2,608,083.00 | $- | $527,483.50 | $- | $1,735,408.00 | $168,144.00 | $4,630,394.74 | $314,961.25 | $8,925.00 | $1,256.00 | $98,364.50 |
| Water Meters | $9,378,231.00 | $533,262.00 | $528,781.00 | $525,343.00 | $498,585.00 | $488,156.00 | $- | $- | $- | $- | $- |
| Water Service Connections | $897.00 | $- | $- | $- | $- | $- | $- | $- | $228.00 | $- | $2,164.00 |
| Water Underground Enclosures | $87,372.00 | $- | $- | $5,022.00 | $- | $- | $- | $- | $48,152.00 | $11,384.00 | $18,468.00 |
| Water Valves | $4,043,953.00 | $639,864.00 | $211,252.00 | $645,895.00 | $200,545.00 | $687,182.00 | $267,120.00 | $546,041.00 | $413,605.00 | $341,569.00 | $205,221.00 |
| | $17,391,800.00 | $1,487,984.00 | $1,350,248.50 | $1,389,253.00 | $2,497,978.00 | $1,558,294.00 | $5,015,031.74 | $1,042,800.25 | $622,926.00 | $996,318.00 | $403,217.50 |

| Sanitary Sewer Network | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | Backlog | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 |
| Sanitary Equalization Tanks | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- | $- |
| Sanitary Laterals | $42,926.00 | $- | $7,783.00 | $7,602.00 | $- | $215,281.00 | $1,565.00 | $413,460.00 | $- | $- | $1,731.00 |
| Sanitary Mains | $3,646,440.64 | $23,831.92 | $- | $247,258.06 | $- | $620,844.42 | $327,231.15 | $2,102,981.00 | $6,426.11 | $- | $5,191.95 |
| Sanitary Manholes | $1,058,385.00 | $- | $99,506.00 | $28,945.00 | $28,569.00 | $99,193.00 | $36,907.00 | $534,391.00 | $55,116.00 | $55,541.00 | $74,187.00 |
| Sanitary Pumping Stations | $- | $- | $- | $- | $- | $- | $1,412.00 | $62,056.00 | $56,419.00 | $- | $- |
| | $4,747,751.64 | $23,831.92 | $107,289.00 | $283,805.06 | $28,569.00 | $935,318.42 | $367,115.15 | $3,112,888.00 | $117,961.11 | $55,541.00 | $81,109.95 |

| 10-Year Road Reconstruction Forecast | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Asset Segment | 2021 | 2022 | 2023 | 2024 | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 | 2031 |
| Paved Roads | $4,113,000.00 | $4,309,700.00 | $3,214,900.00 | $6,228,700.00 | $5,338,800.00 | $5,574,800.00 | $5,983,500.00 | $6,466,100.00 | $6,835,100.00 | $7,252,700.00 | $7,784,000.00 |
| Water Mains | $460,000.00 | $198,300.00 | $9,200.00 | $263,400.00 | $- | $218,600.00 | $- | $335,300.00 | $- | $- | $- |
| Sanitary Mains | $720,000.00 | $- | $31,800.00 | $- | $- | $185,500.00 | $- | $- | $- | $- | $- |
| Storm Mains | $1,844,600.00 | $500,000.00 | $33,200.00 | $376,500.00 | $- | $208,500.00 | $- | $613,100.00 | $- | $- | $- |
| | $7,137,600.00 | $5,008,000.00 | $3,289,100.00 | $6,868,600.00 | $5,338,800.00 | $6,187,400.00 | $5,983,500.00 | $7,414,500.00 | $6,835,100.00 | $7,252,700.00 | $7,784,000.00 |

# Appendix C: Level of Service Maps

**Road Network Map**



**Images of Bridge in Good Condition**
Bridge 16 – John West Way
Inspected: October 10th, 2020


North Approach


East Elevation


Substandard Buried End Treatment


South Abutment

**Images of Culvert in Fair Condition**
Culvert 27 - Vandorf Sideroad
Inspected: October 9th, 2020

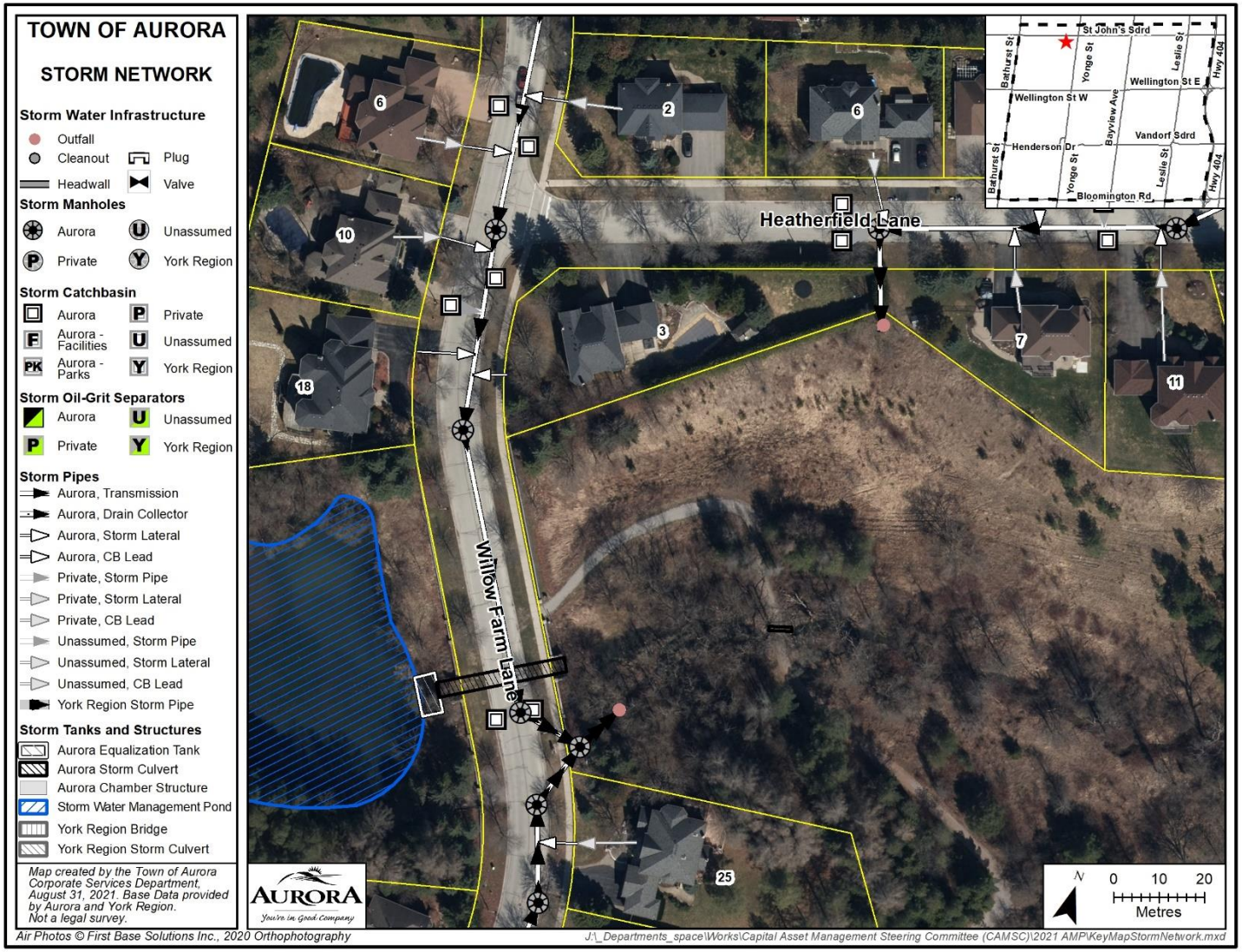

Looking East


South Elevation

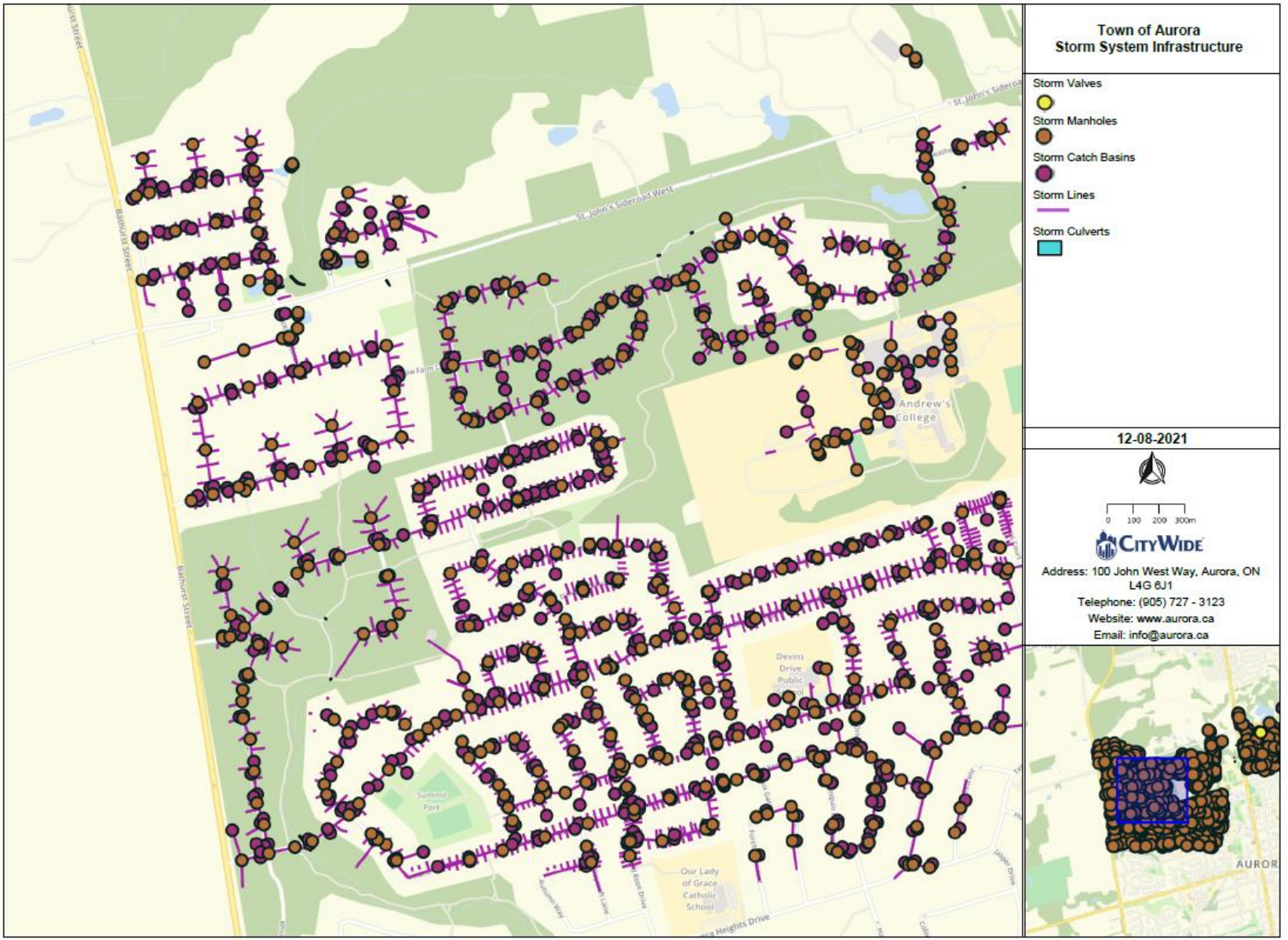

Barrel Looking North


Spall and Delamination with Exposed Reinforcing Steel

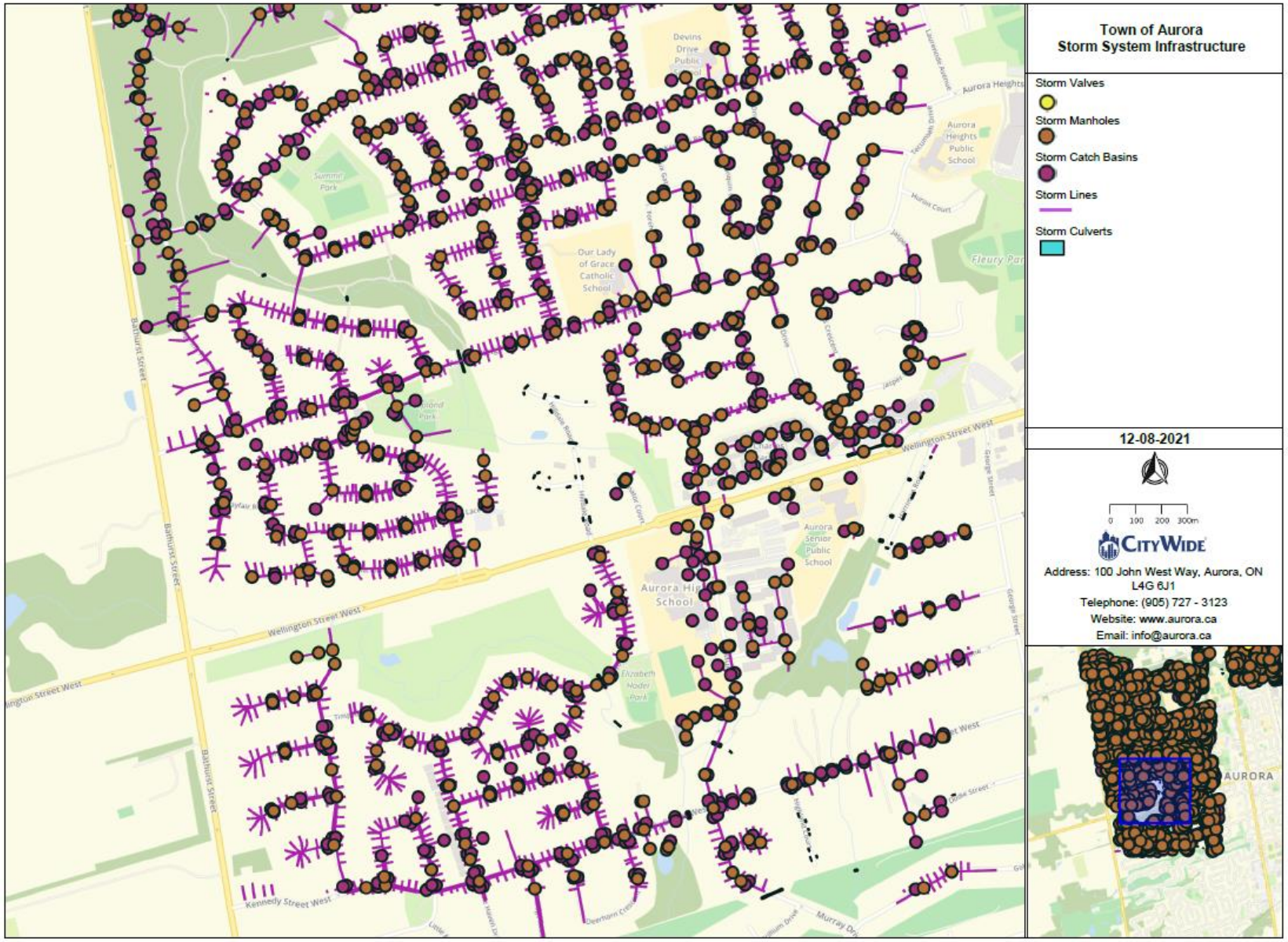
## Stormwater Network Maps (26 Maps in total)



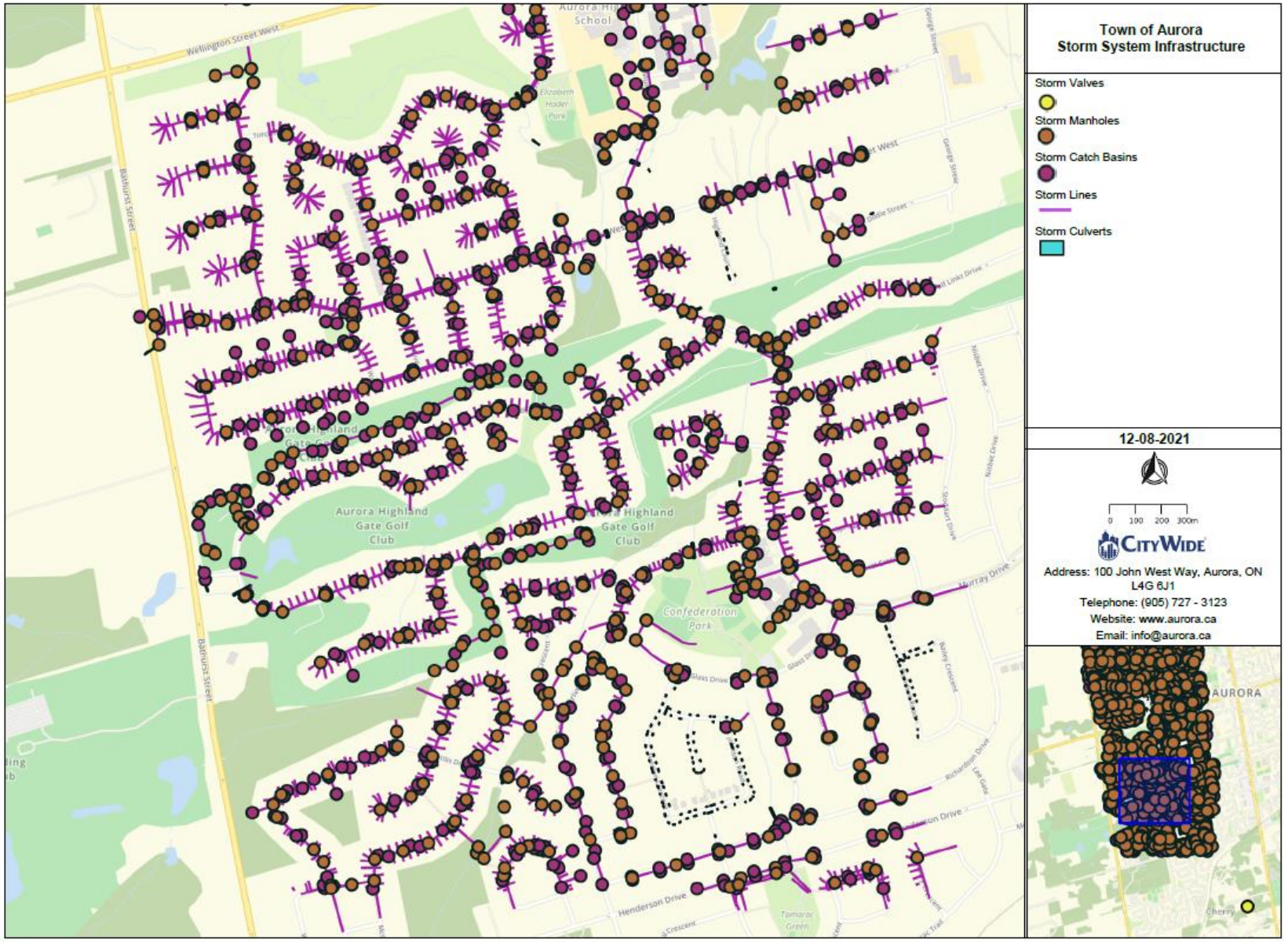
## Aurora Storm System Map – Part 1



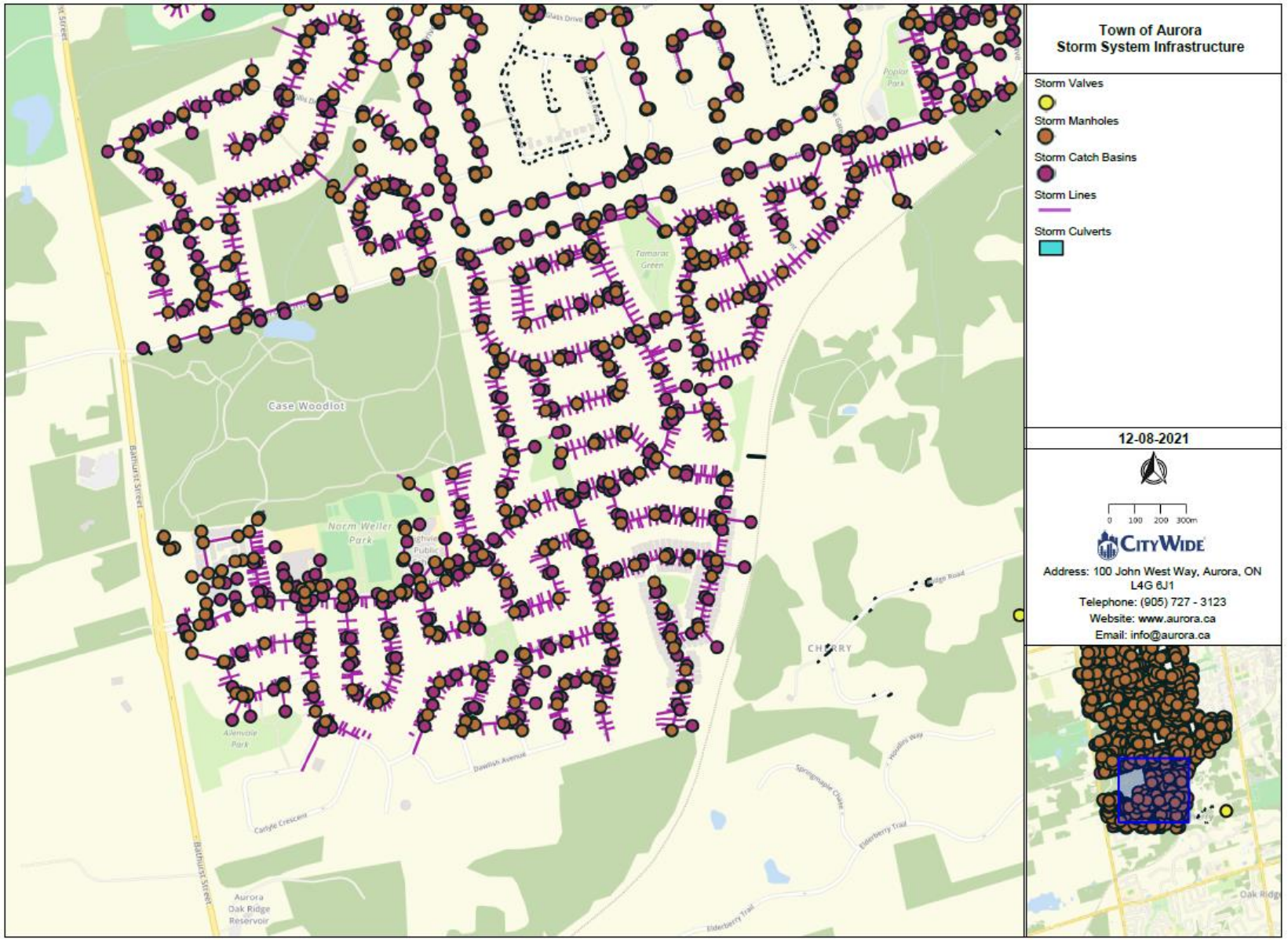
## Aurora Storm System Map – Part 2



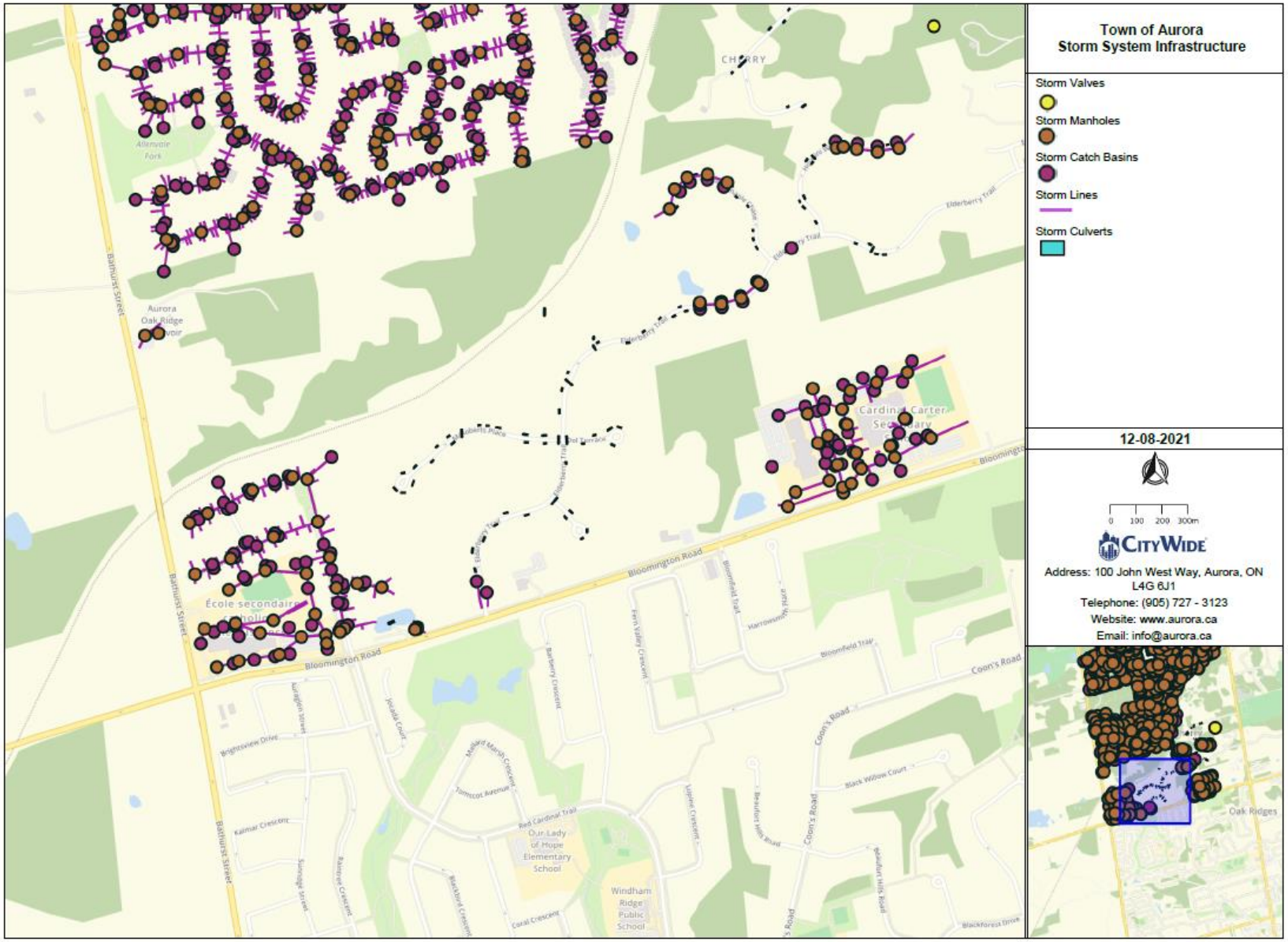
## Aurora Storm System Map – Part 3



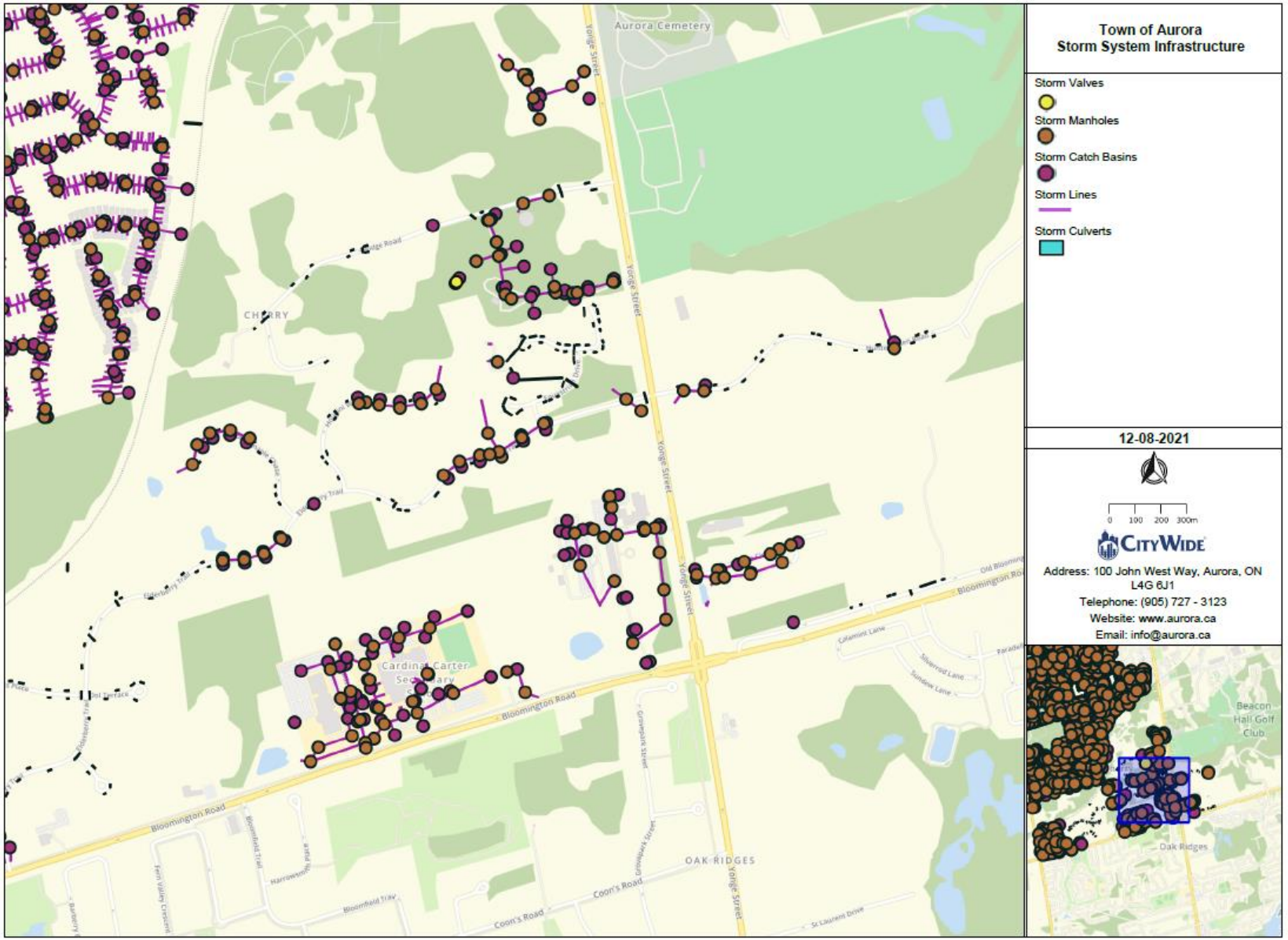
## Aurora Storm System Map – Part 4



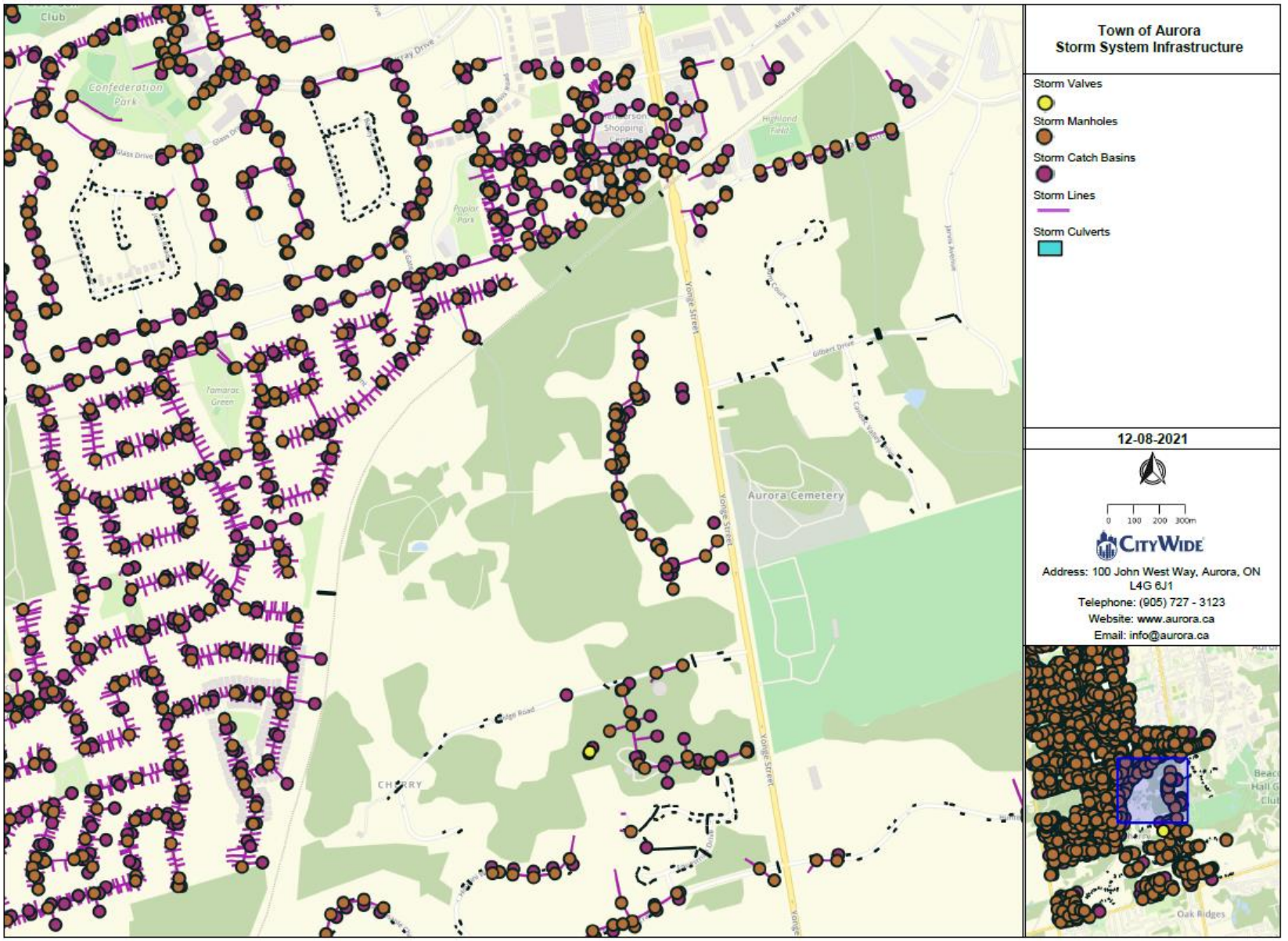
## Aurora Storm System Map – Part 5



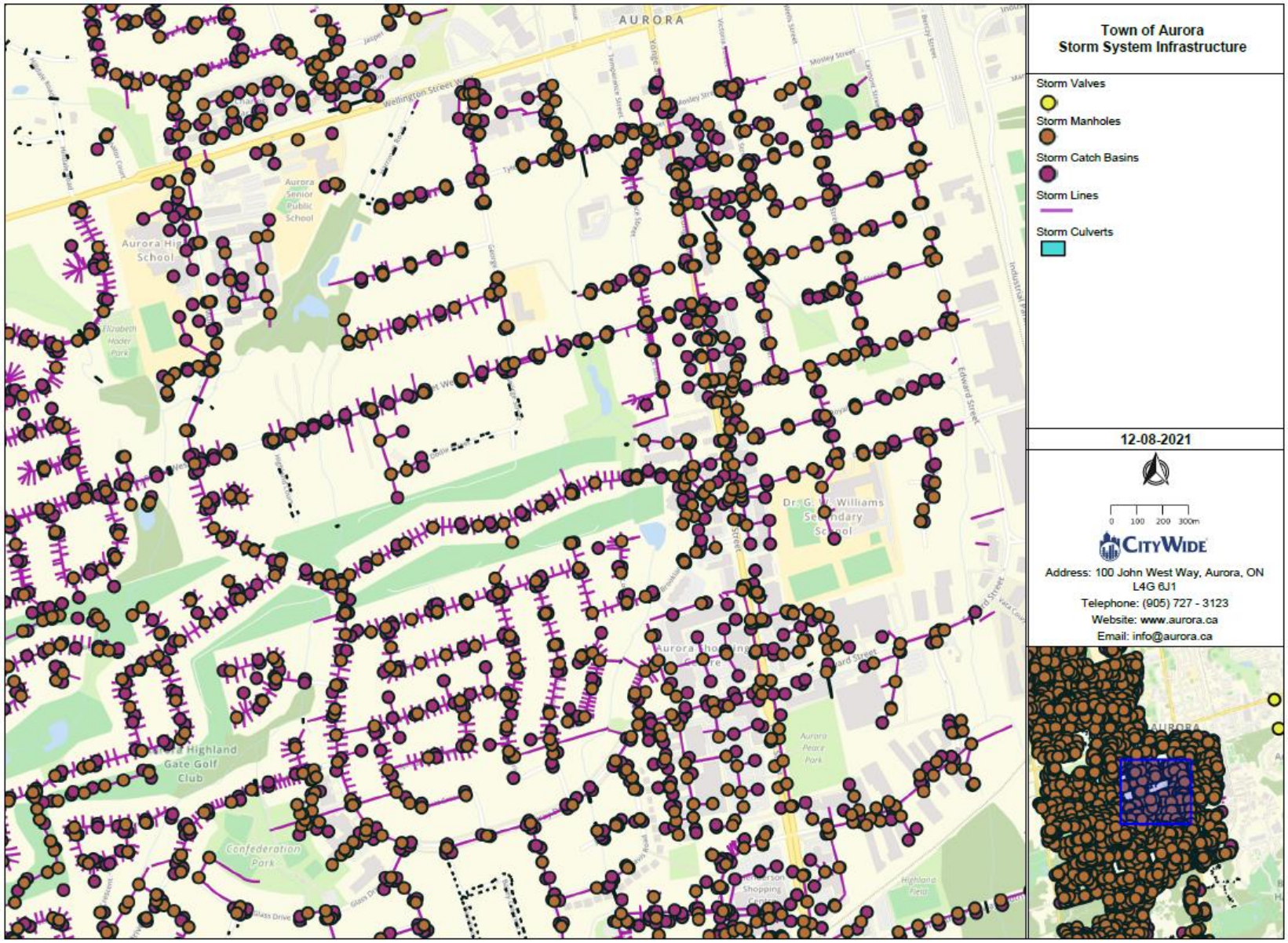
## Aurora Storm System Map – Part 6



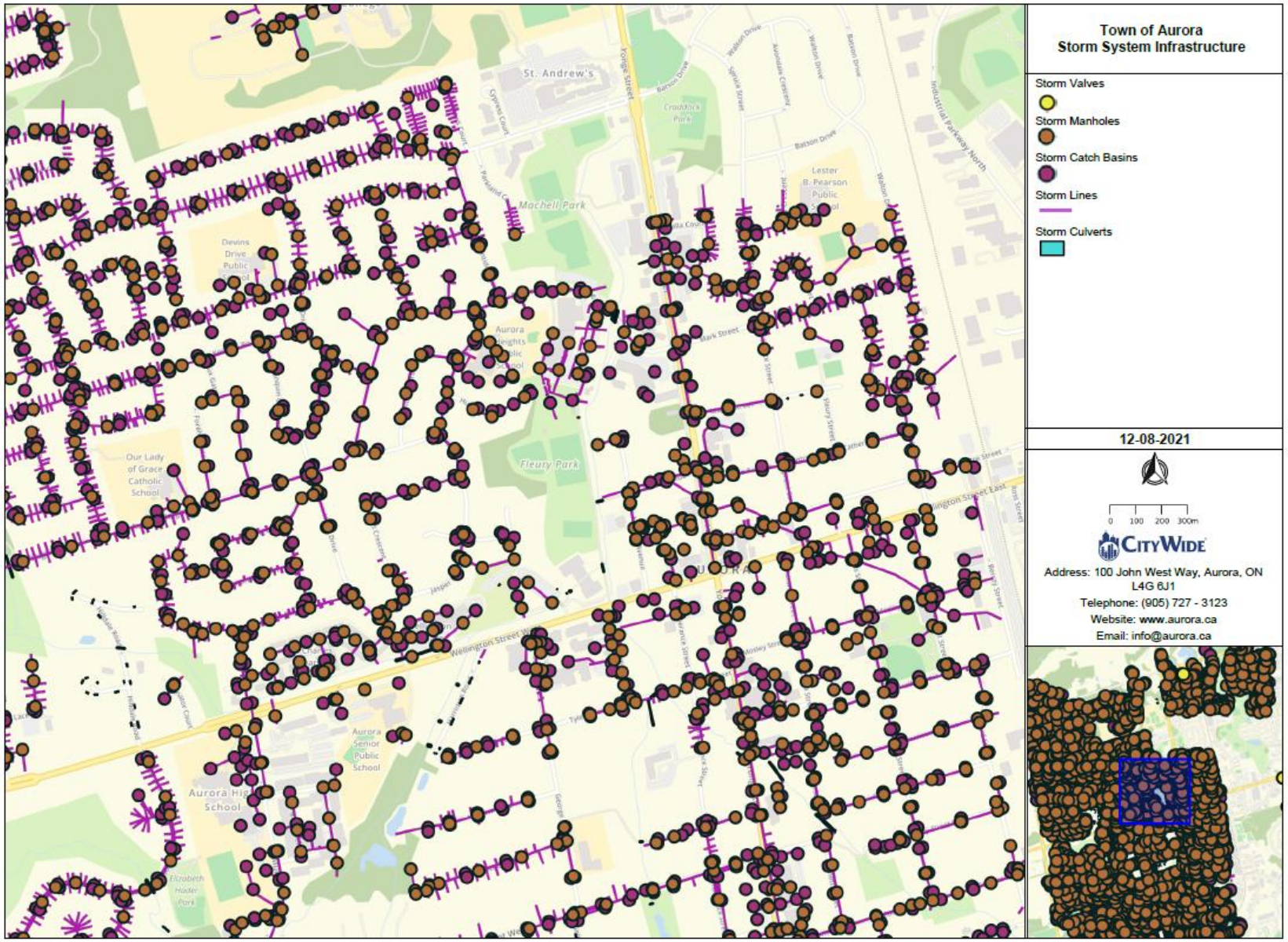
## Aurora Storm System Map – Part 7



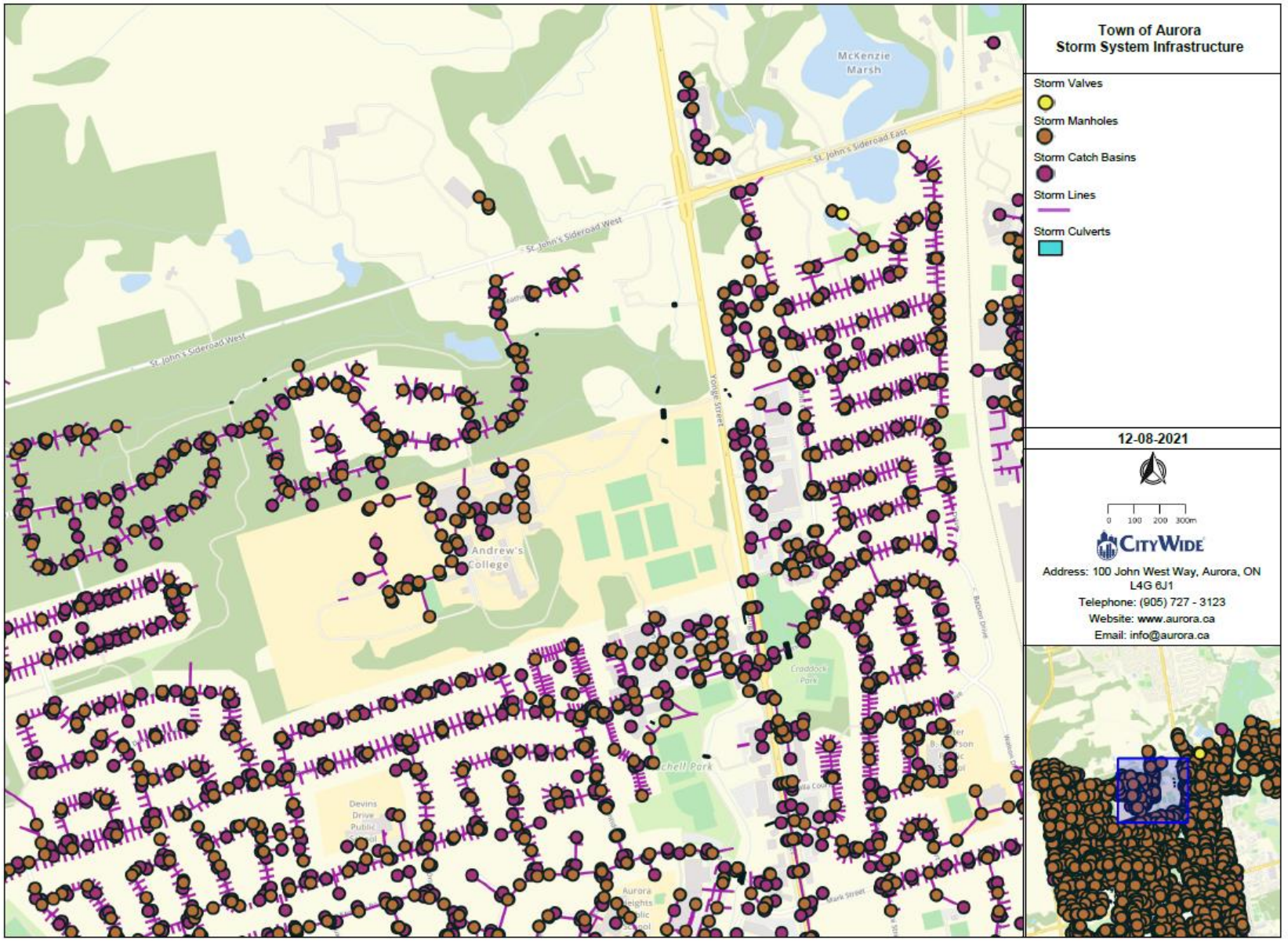
## Aurora Storm System Map – Part 8



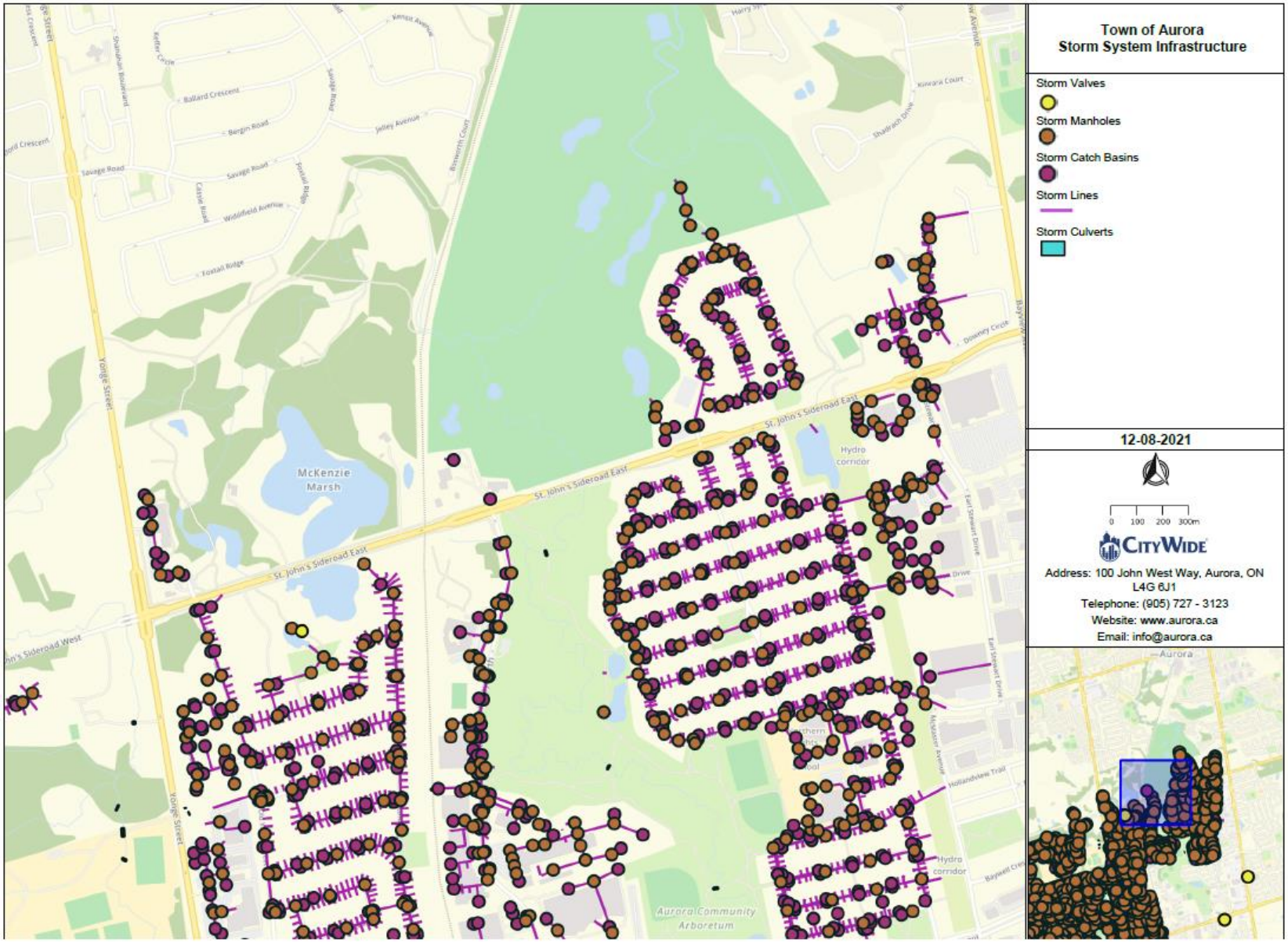
## Aurora Storm System Map – Part 9



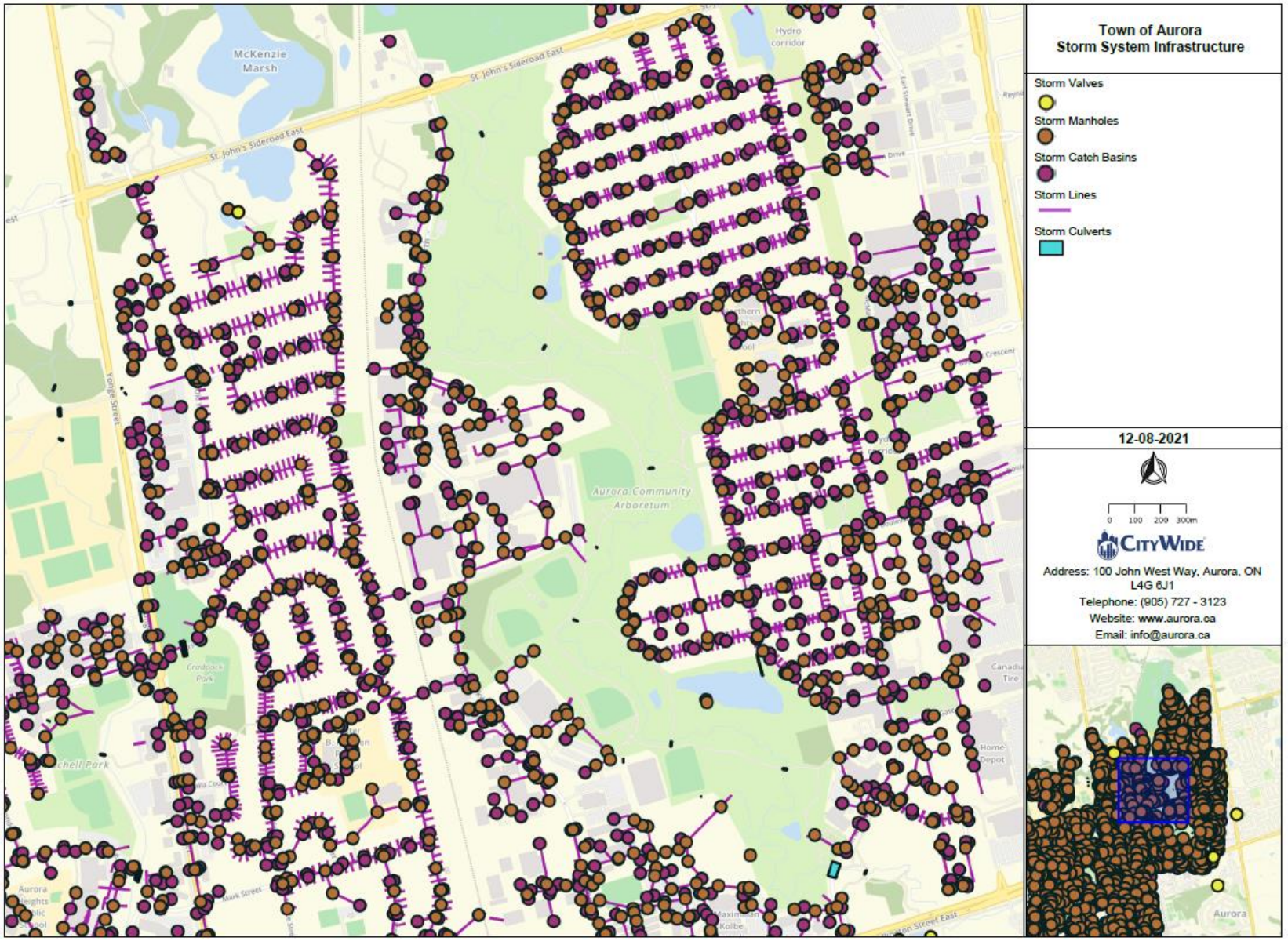
## Aurora Storm System Map – Part 10



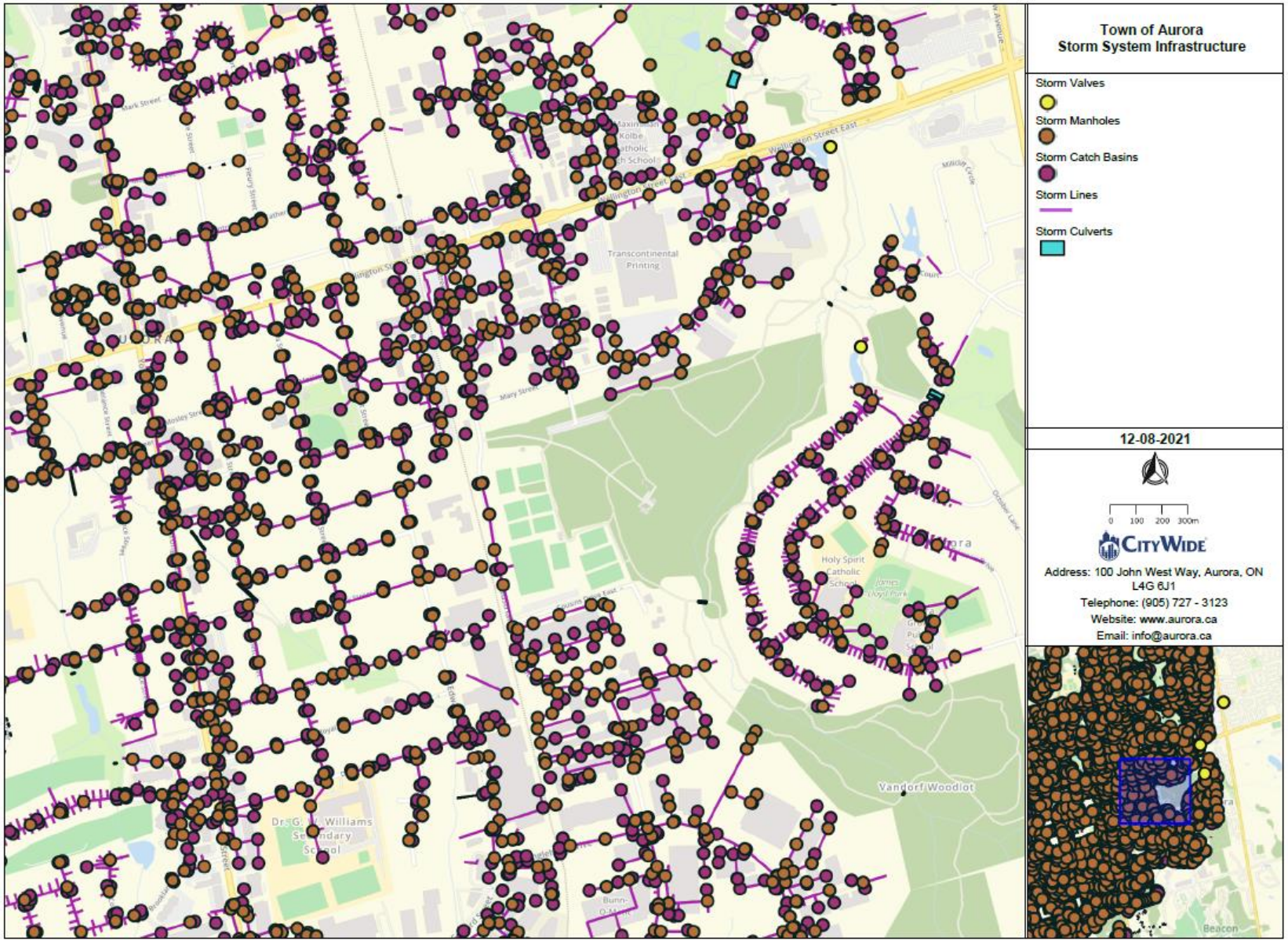
## Aurora Storm System Map – Part 11



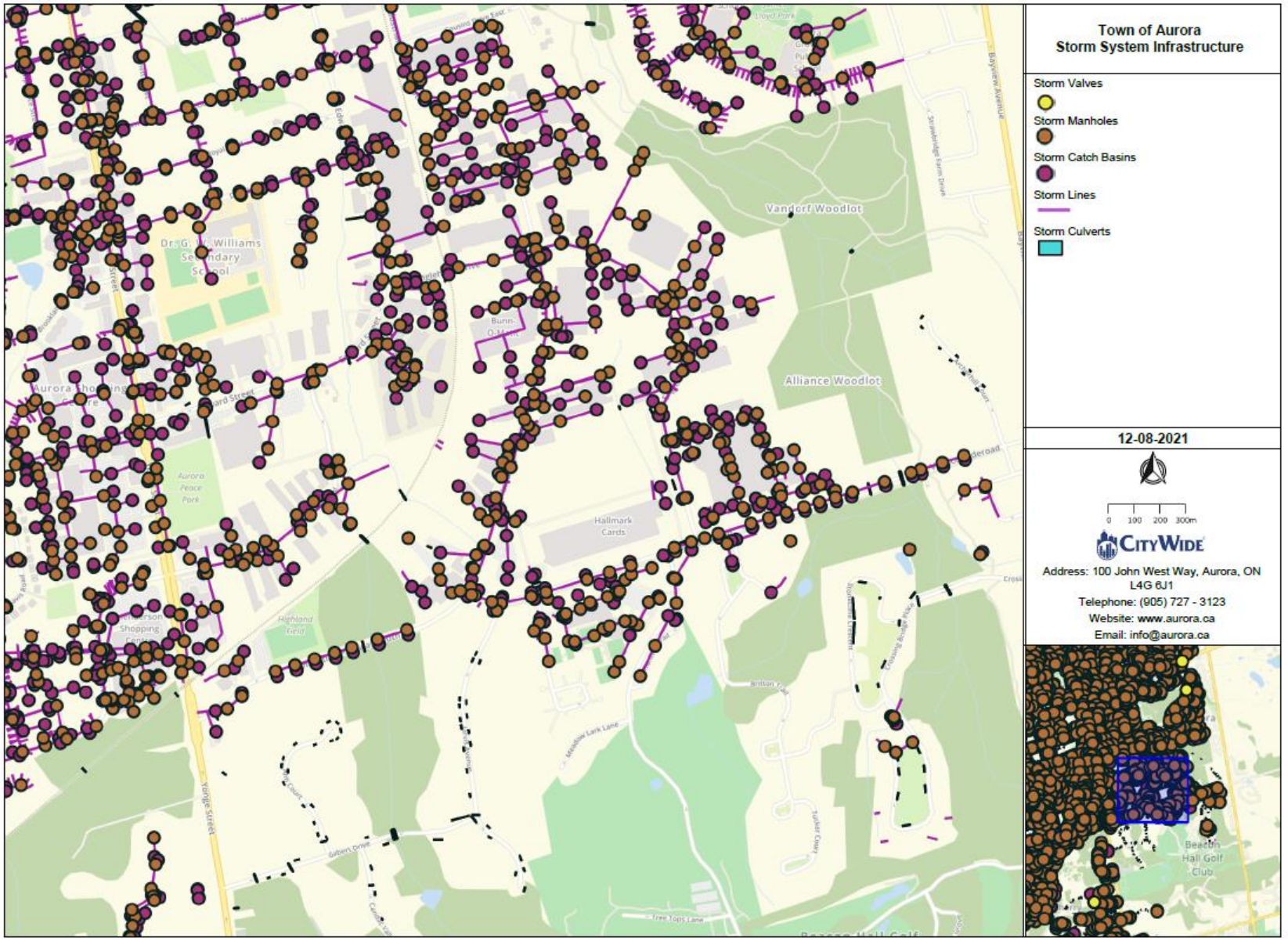
## Aurora Storm System Map – Part 12



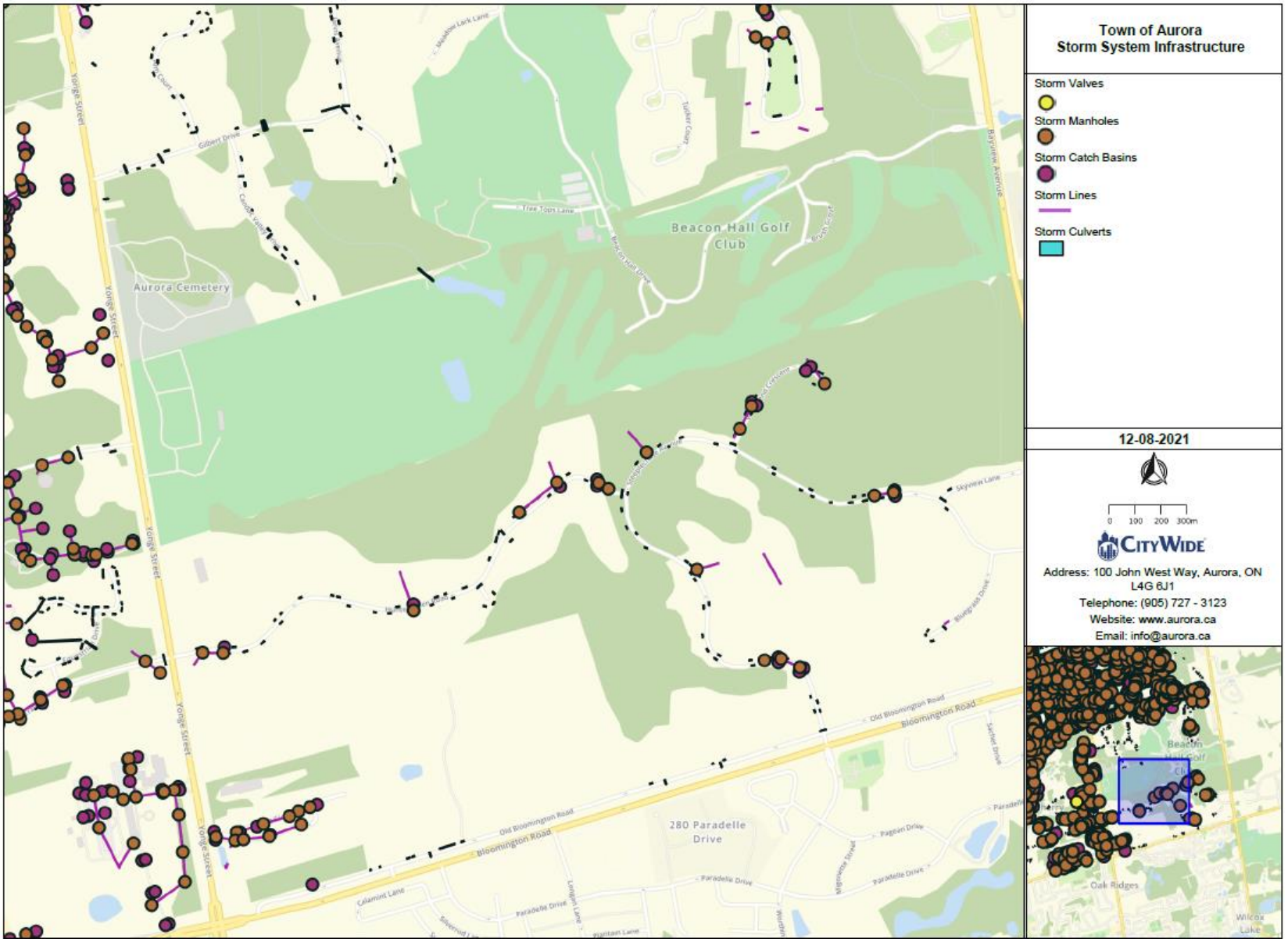
## Aurora Storm System Map – Part 13



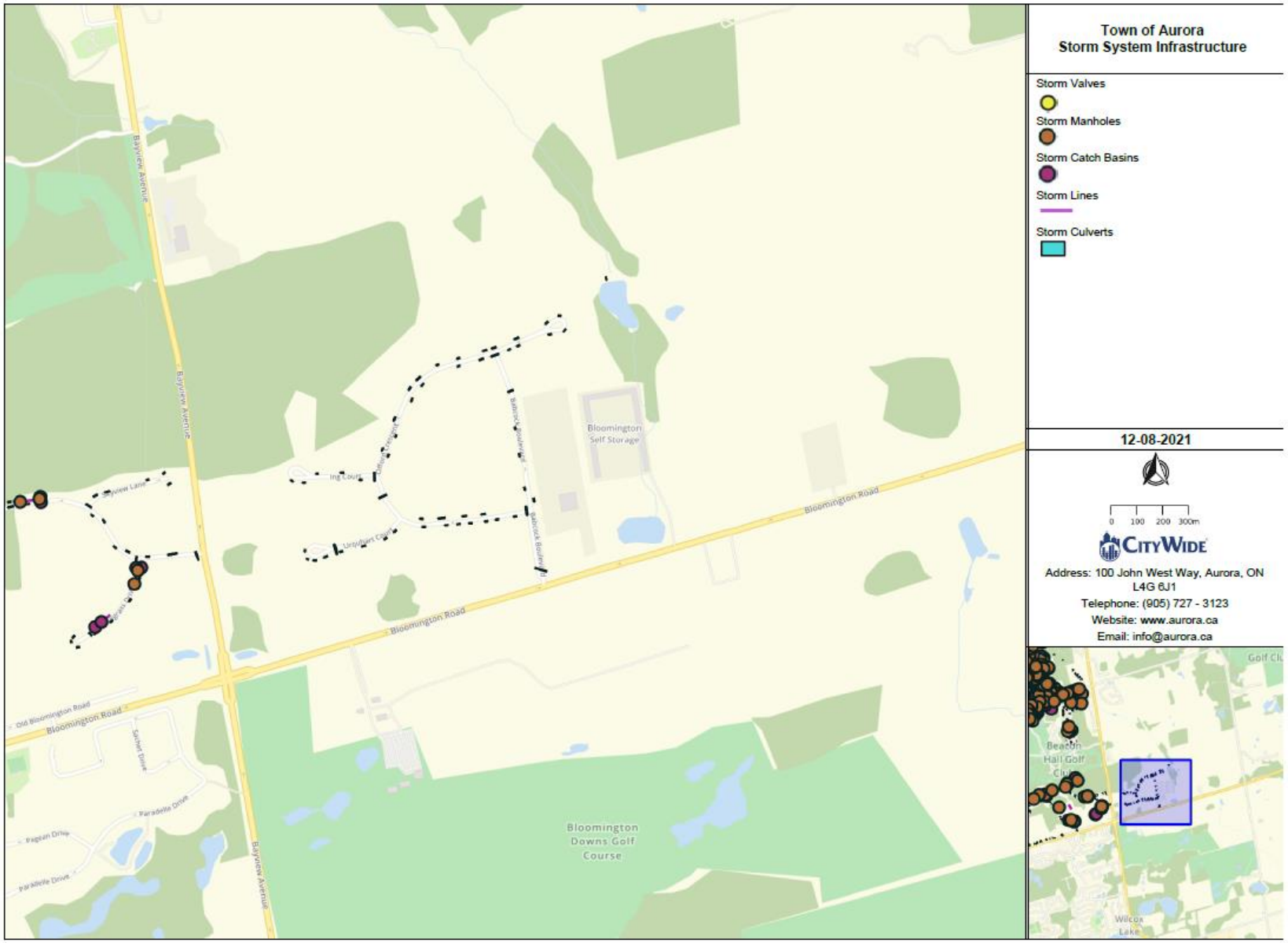
## Aurora Storm System Map – Part 14



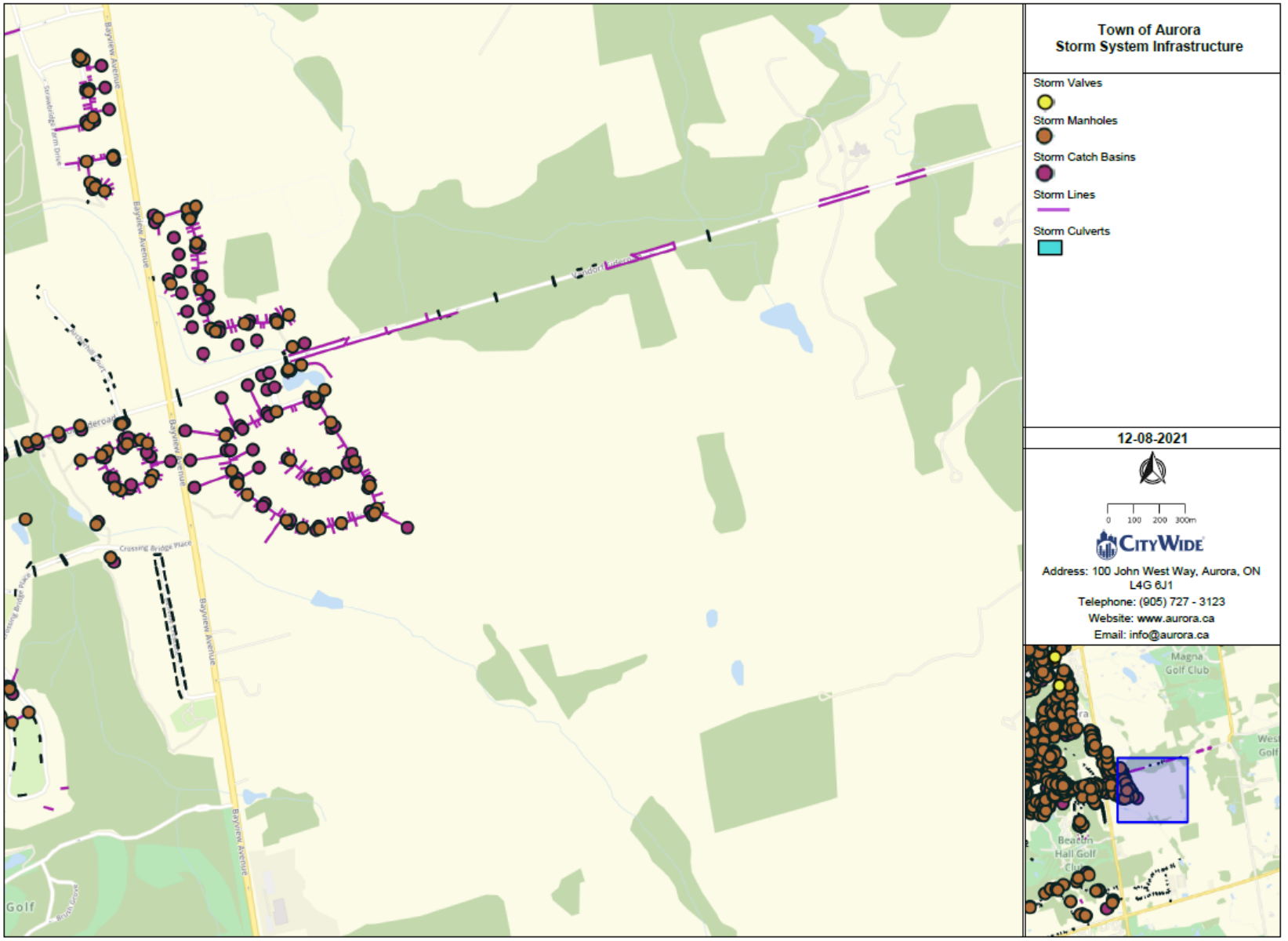
## Aurora Storm System Map – Part 15



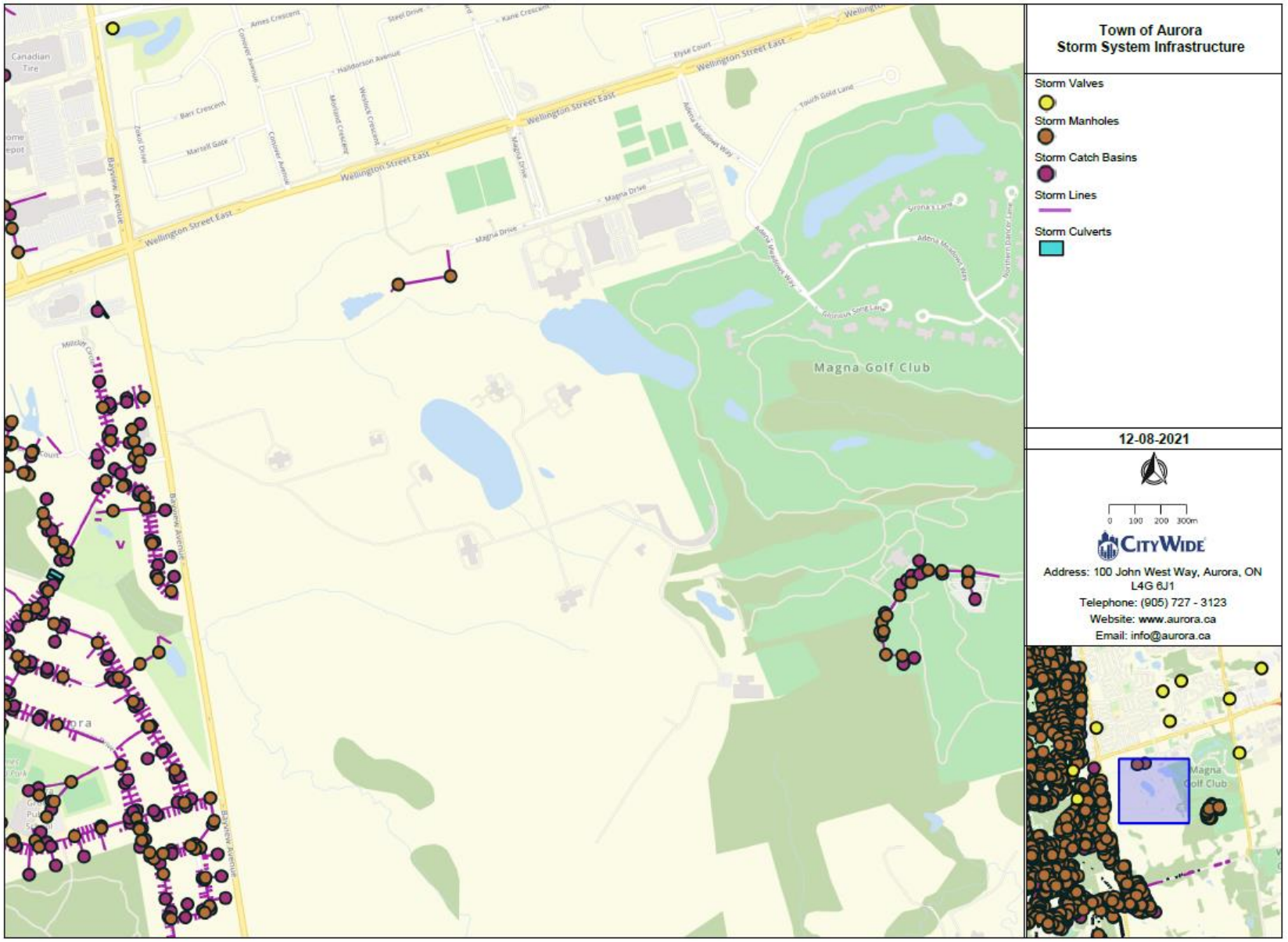
## Aurora Storm System Map – Part 16



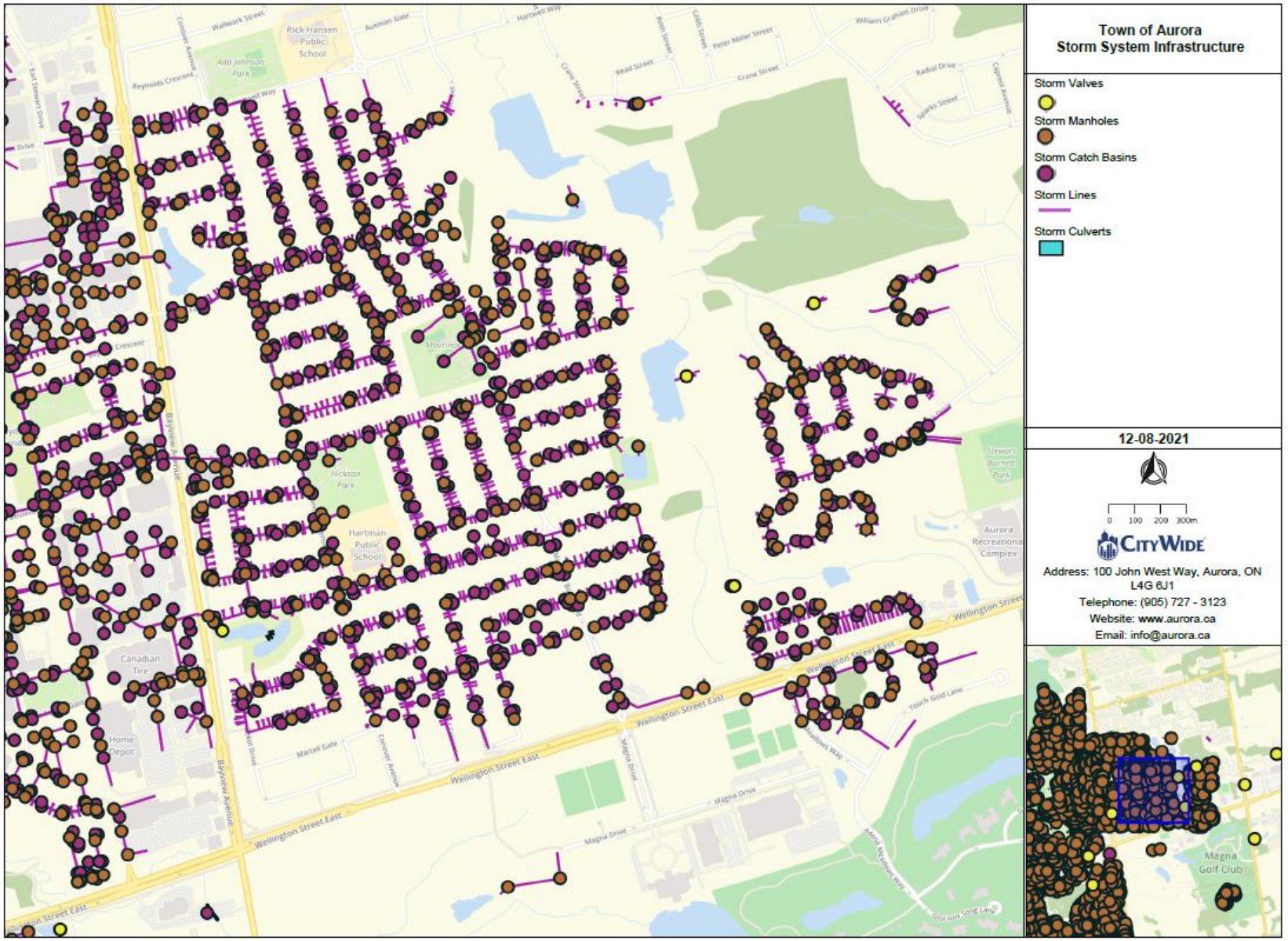
## Aurora Storm System Map – Part 17



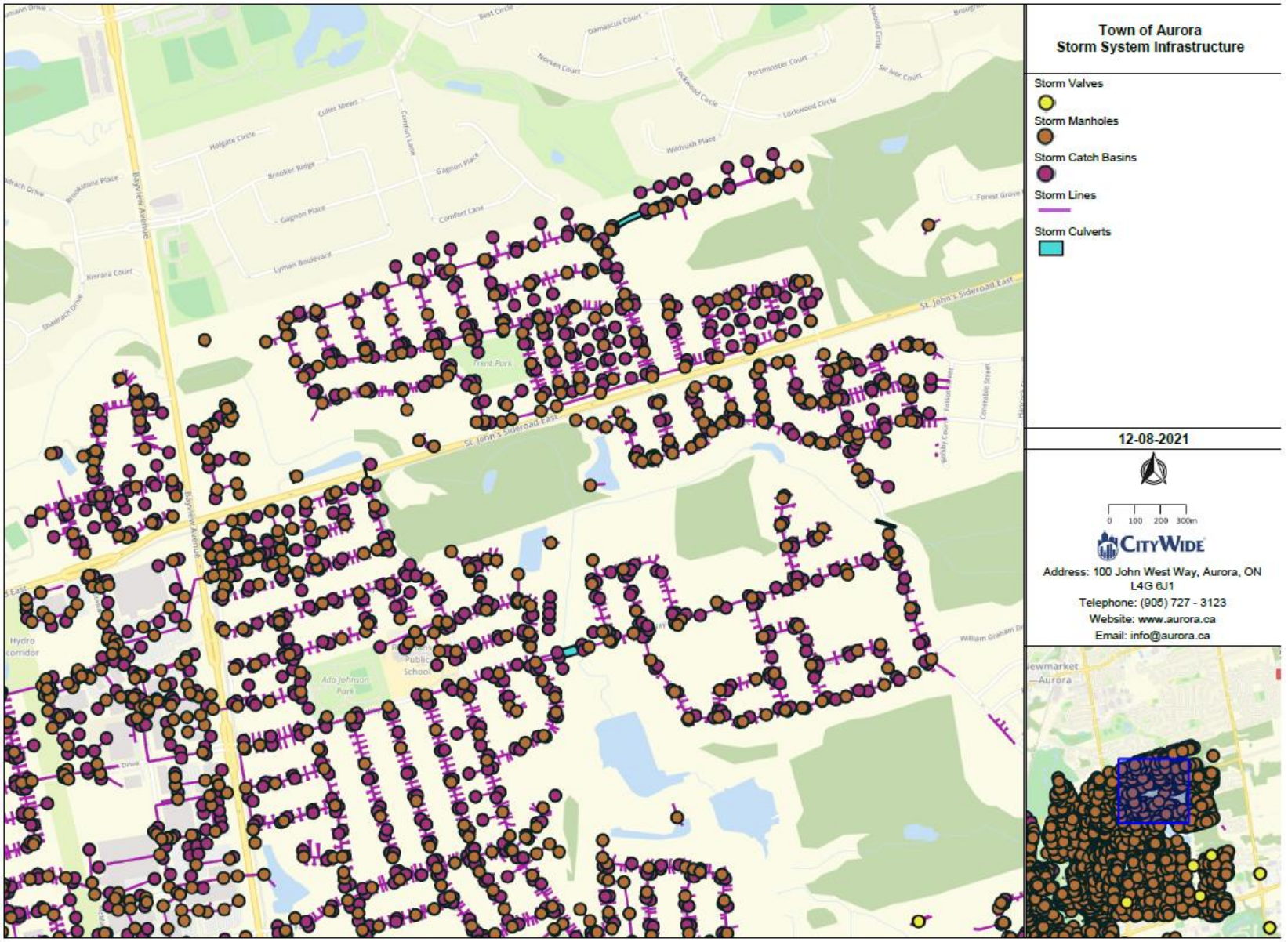
## Aurora Storm System Map – Part 18



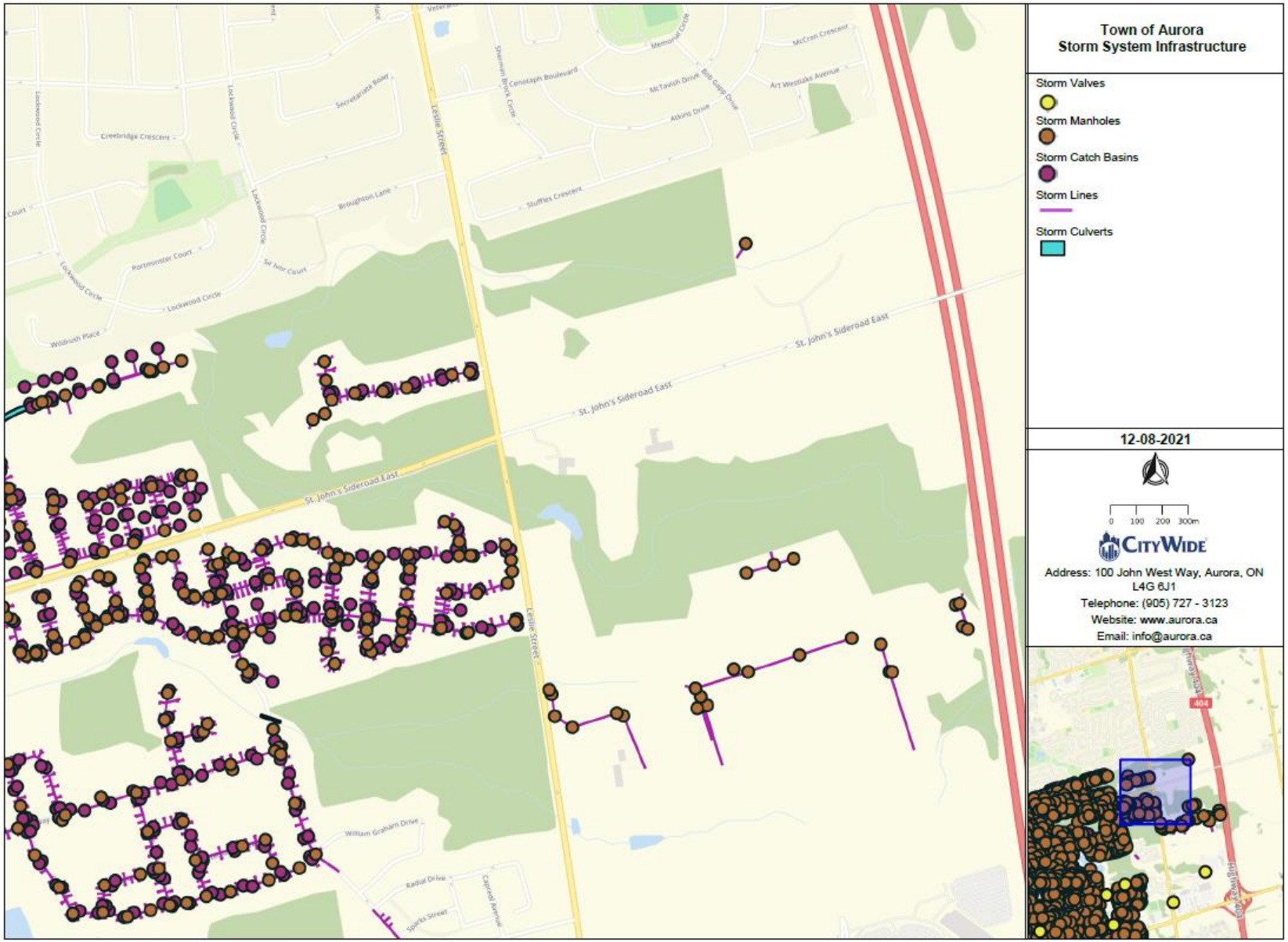
## Aurora Storm System Map – Part 19



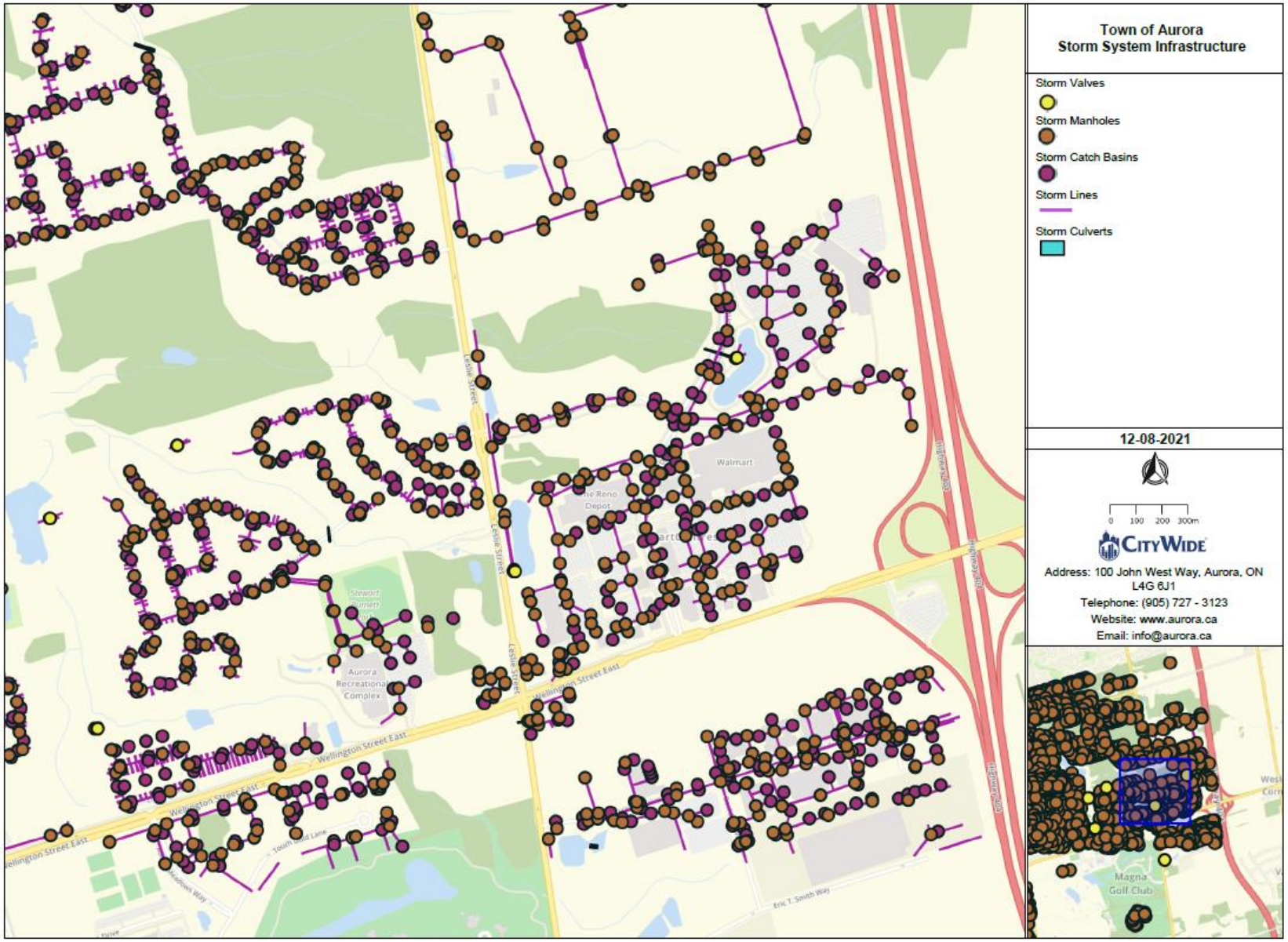
## Aurora Storm System Map – Part 20



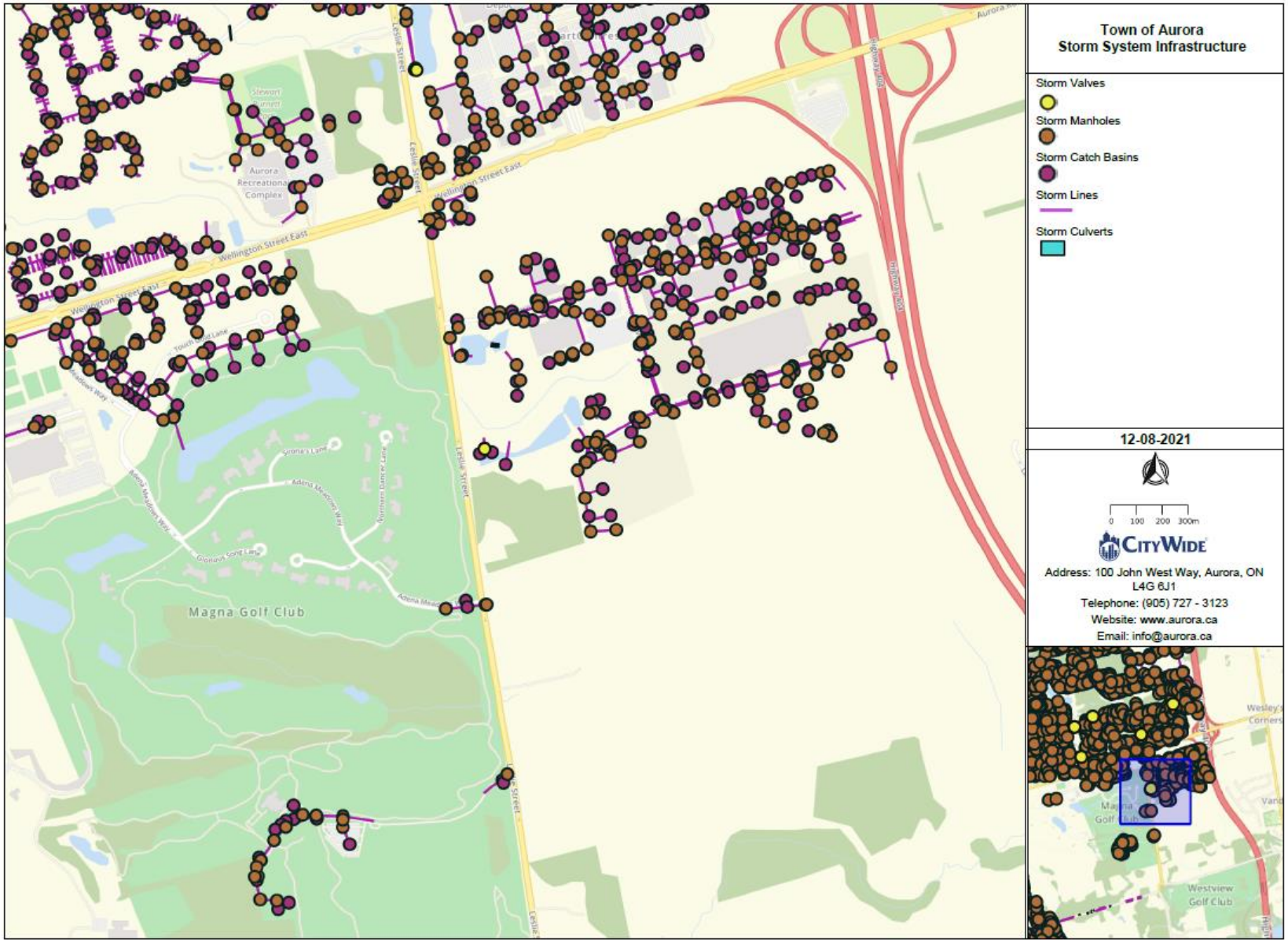
## Aurora Storm System Map – Part 21



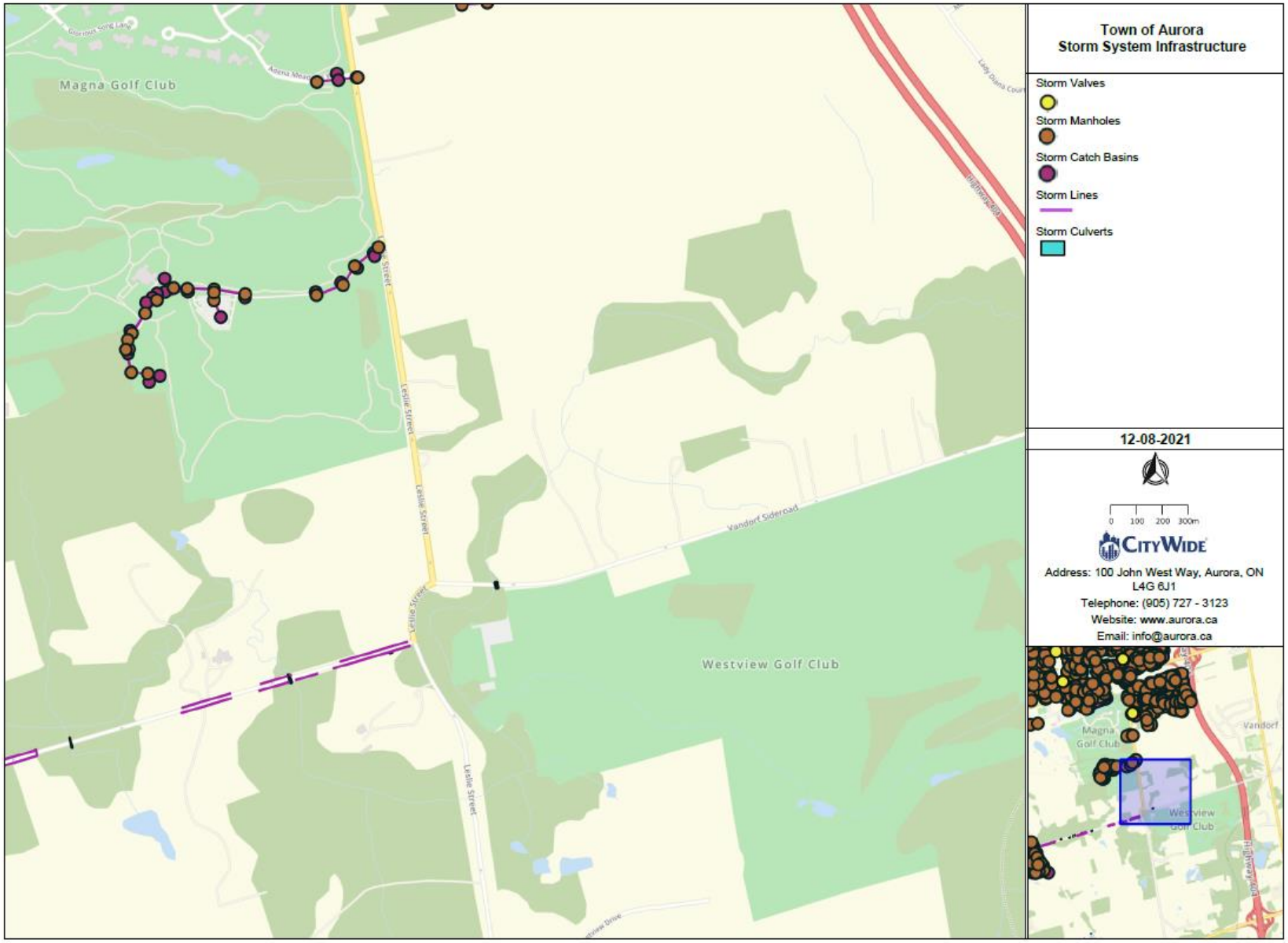
## Aurora Storm System Map – Part 22



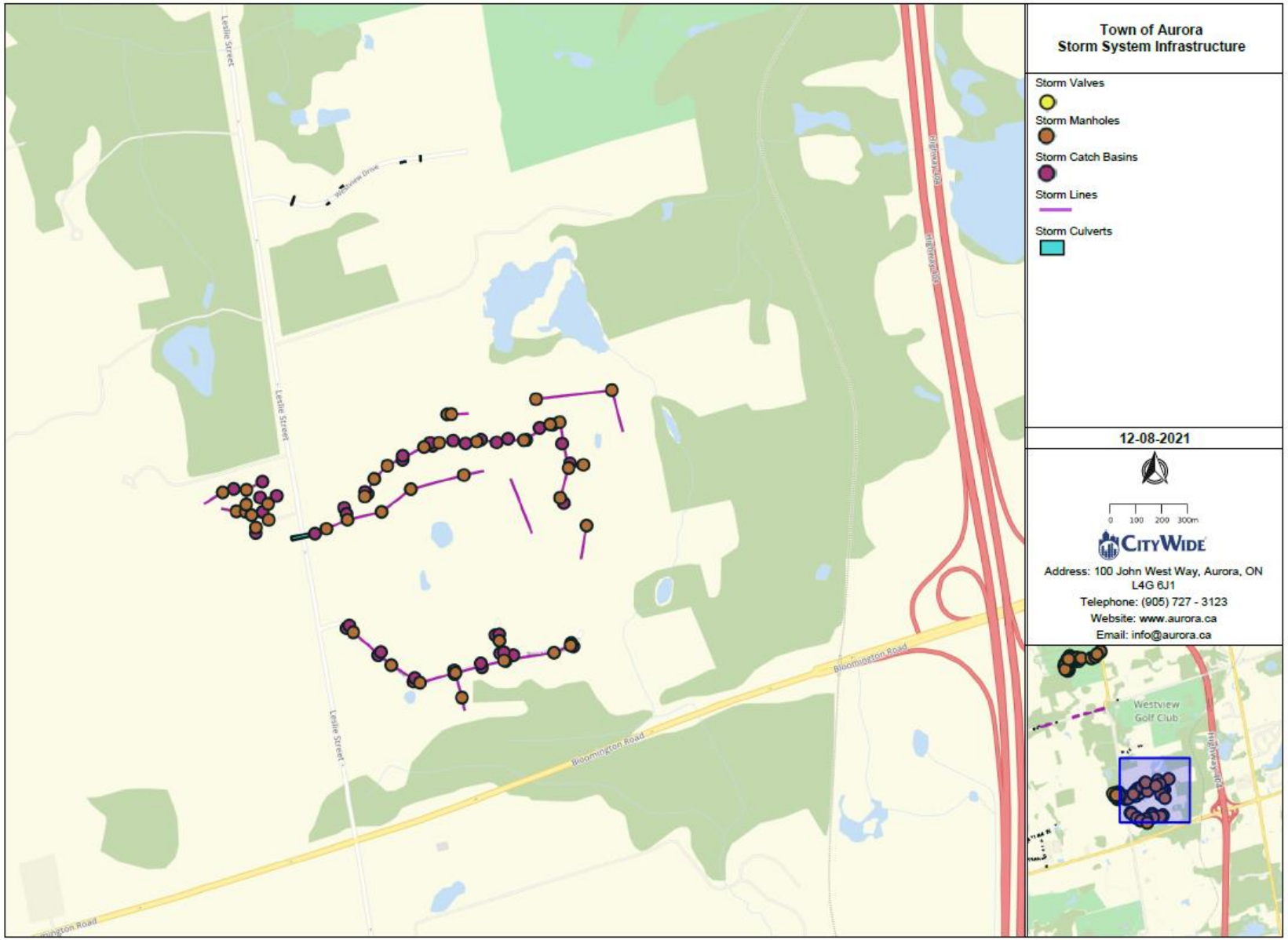
## Aurora Storm System Map – Part 23



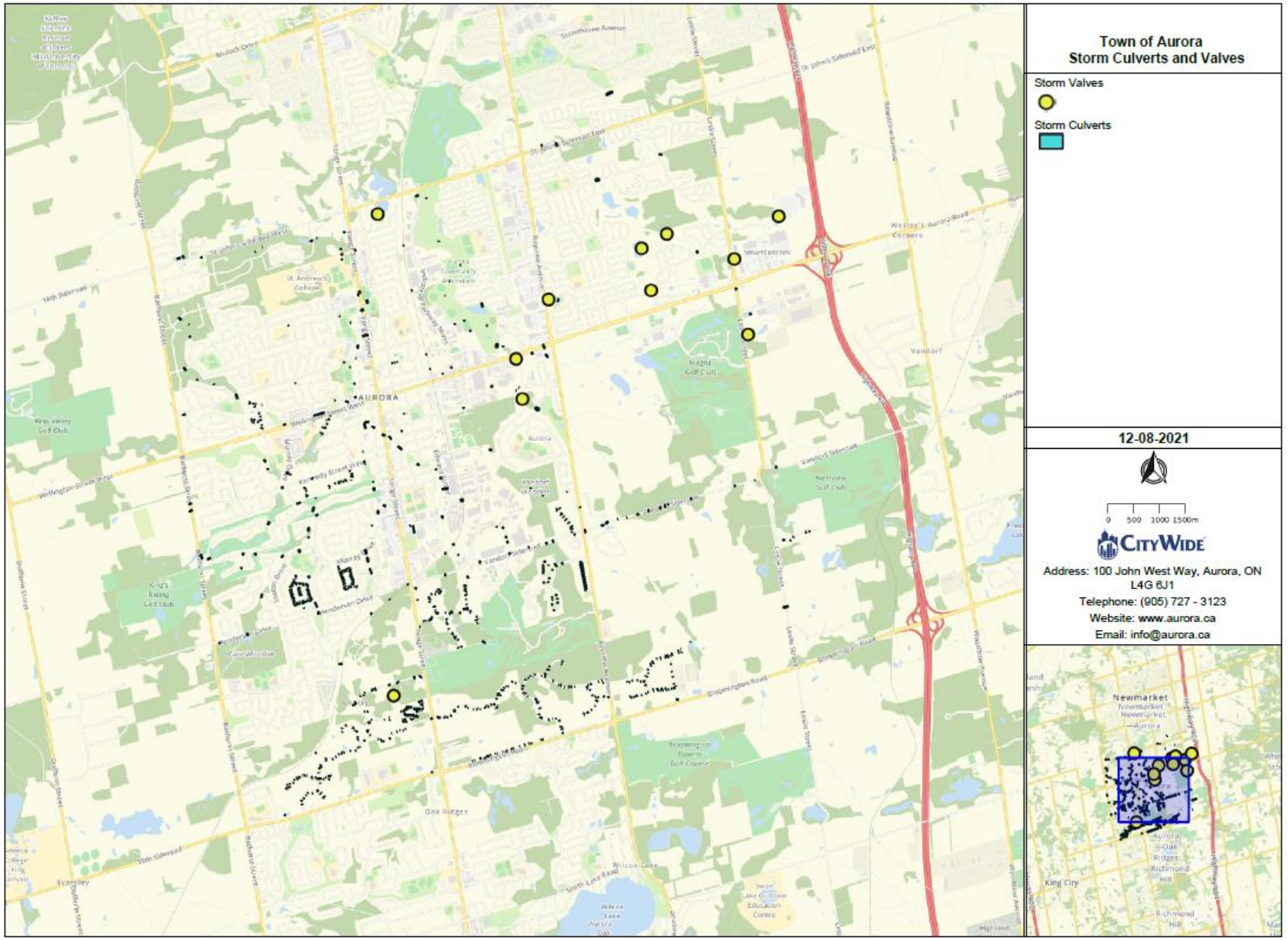
## Aurora Storm System Map – Part 24



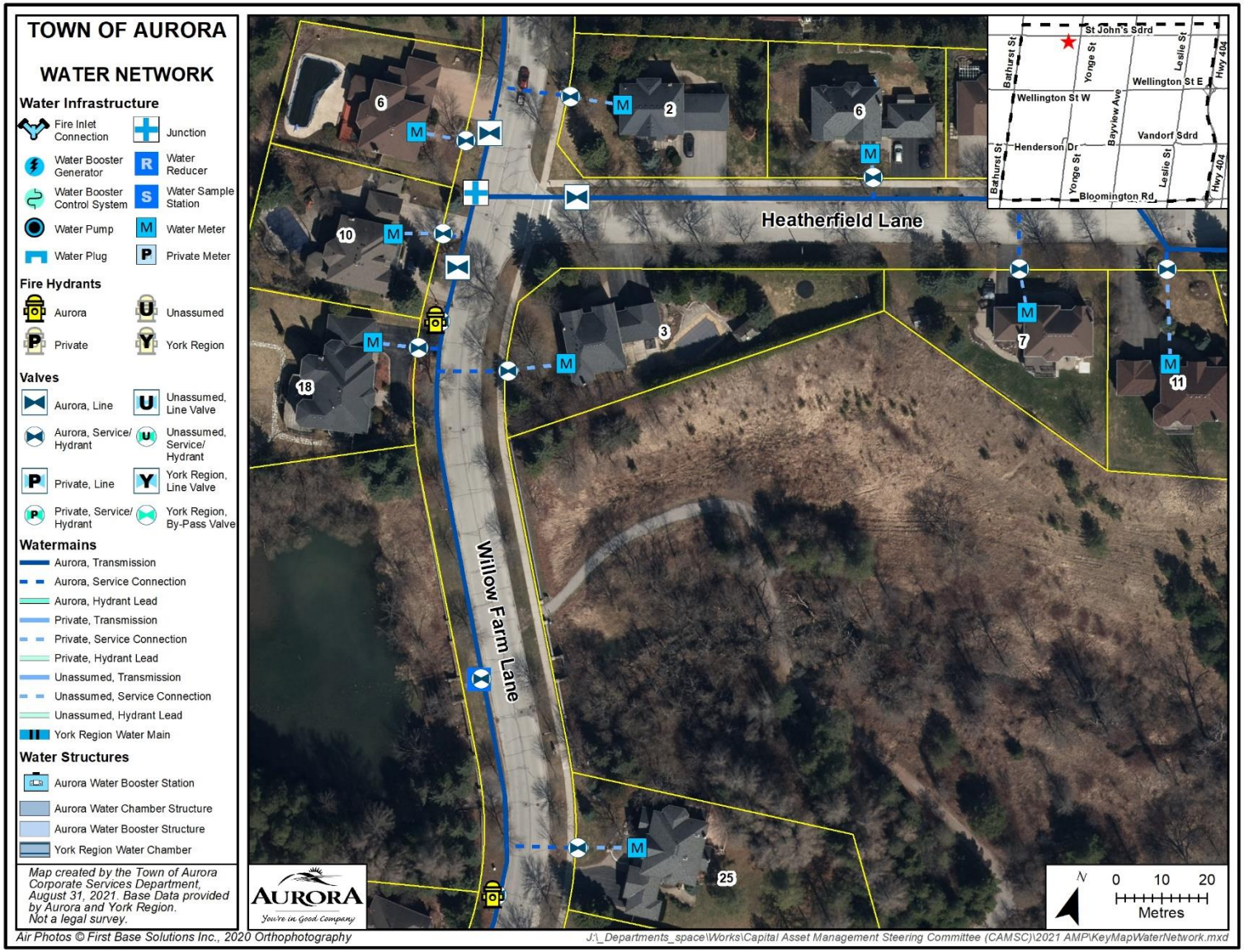
## Aurora Storm System Map – Part 25



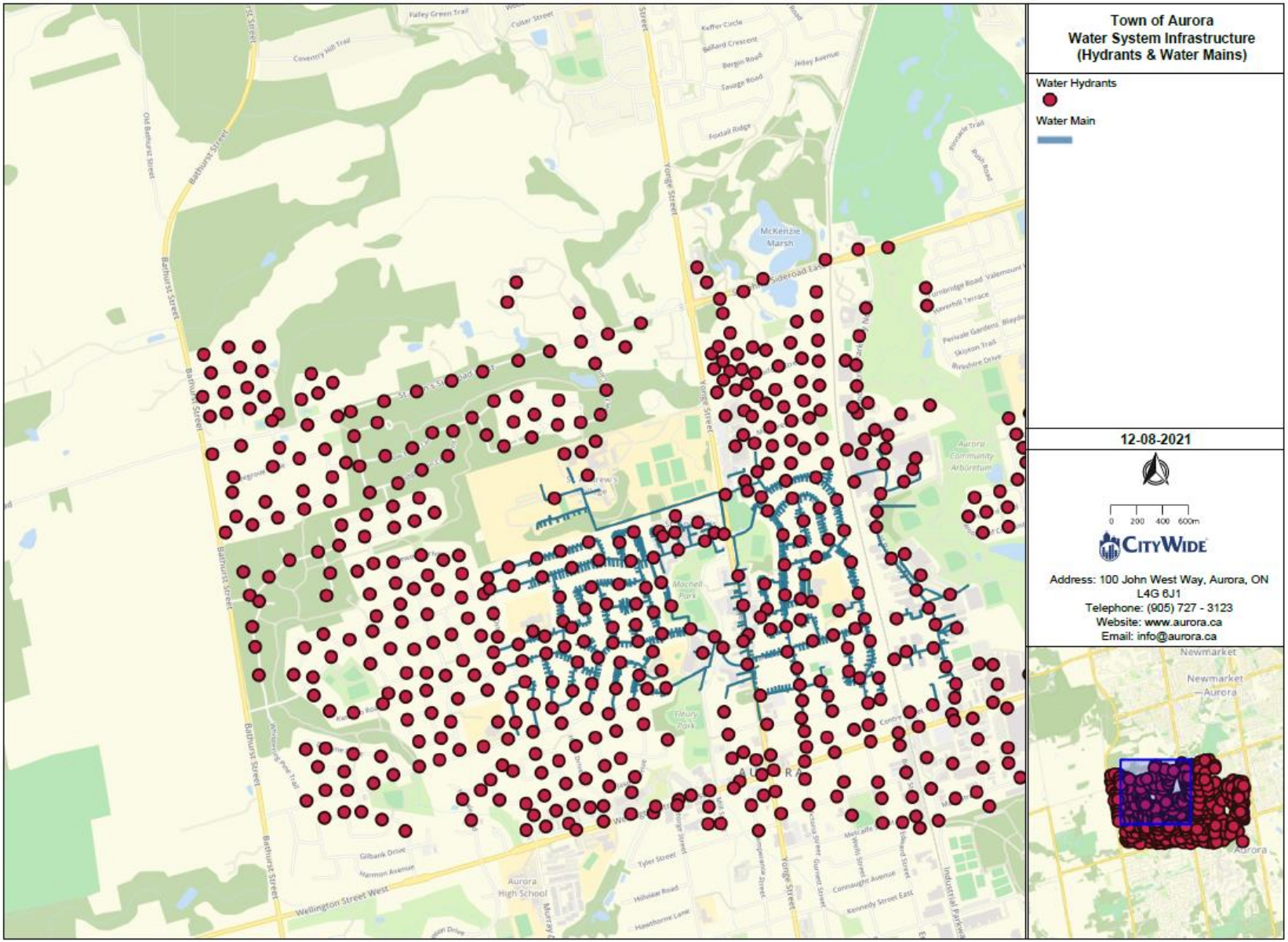
## Aurora Storm System Map – Part 26



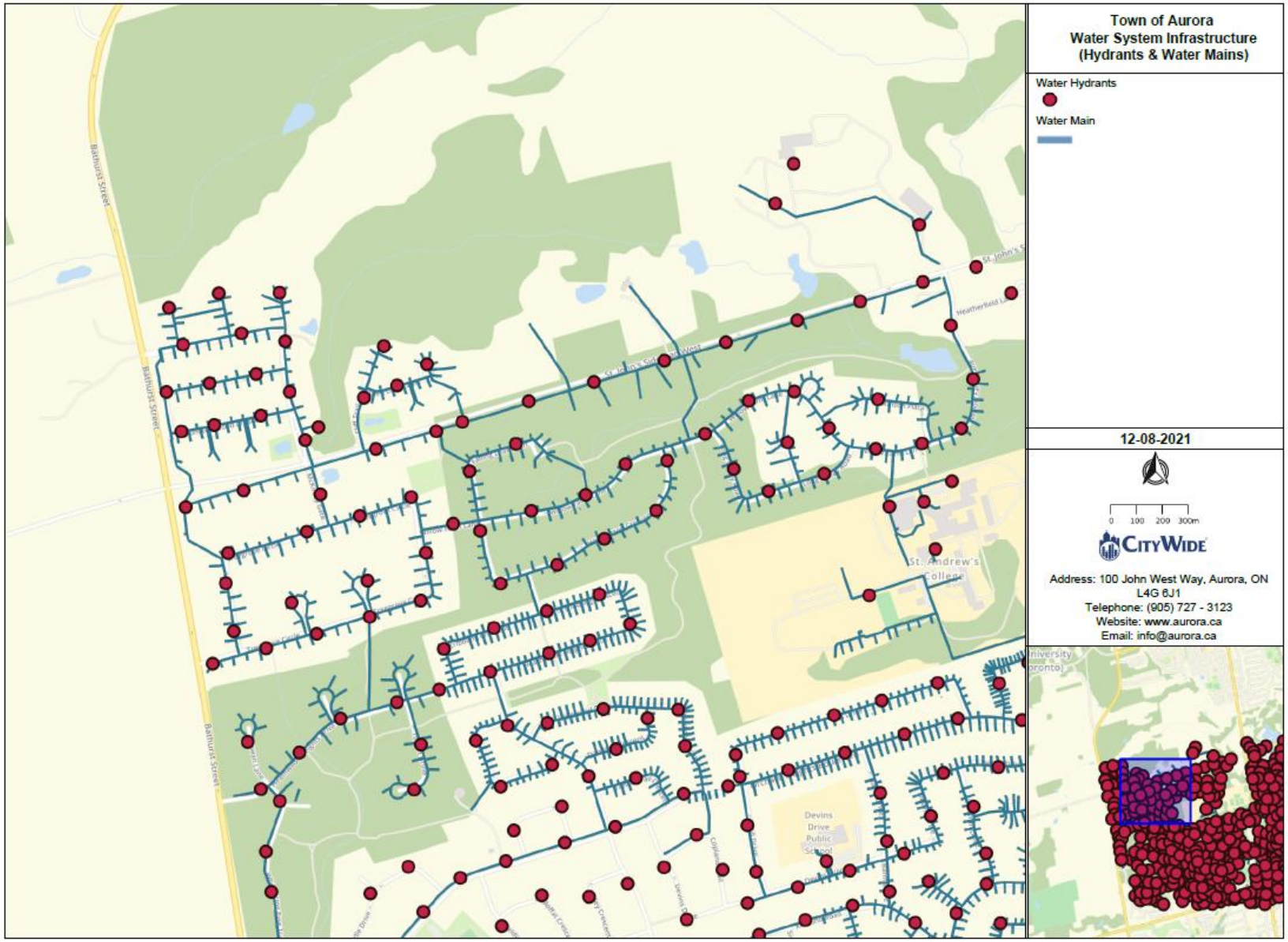
## Water Network Maps (27 Maps total)



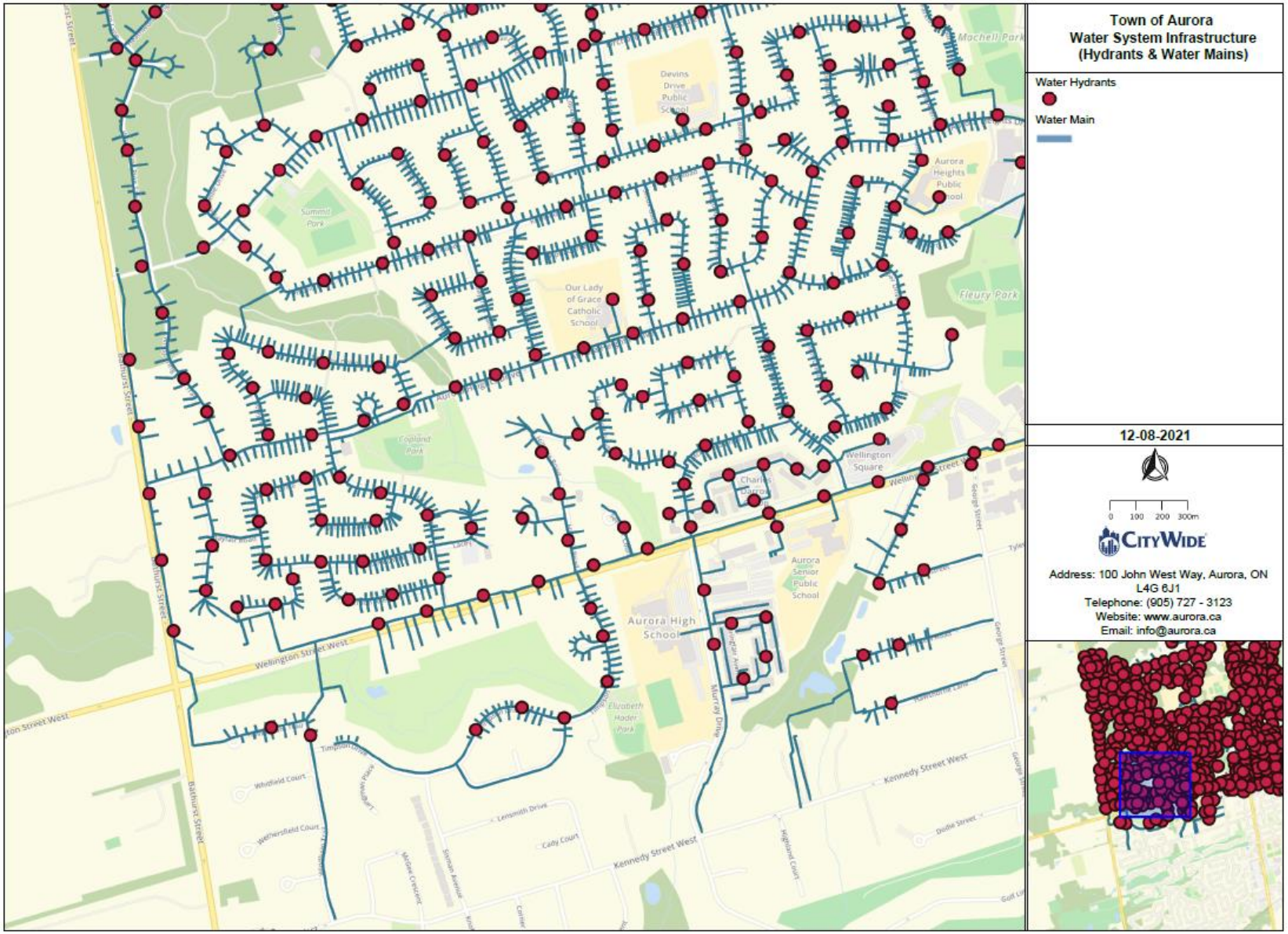
## Water System Infrastructure (Hydrants and Water Mains) – Part 1



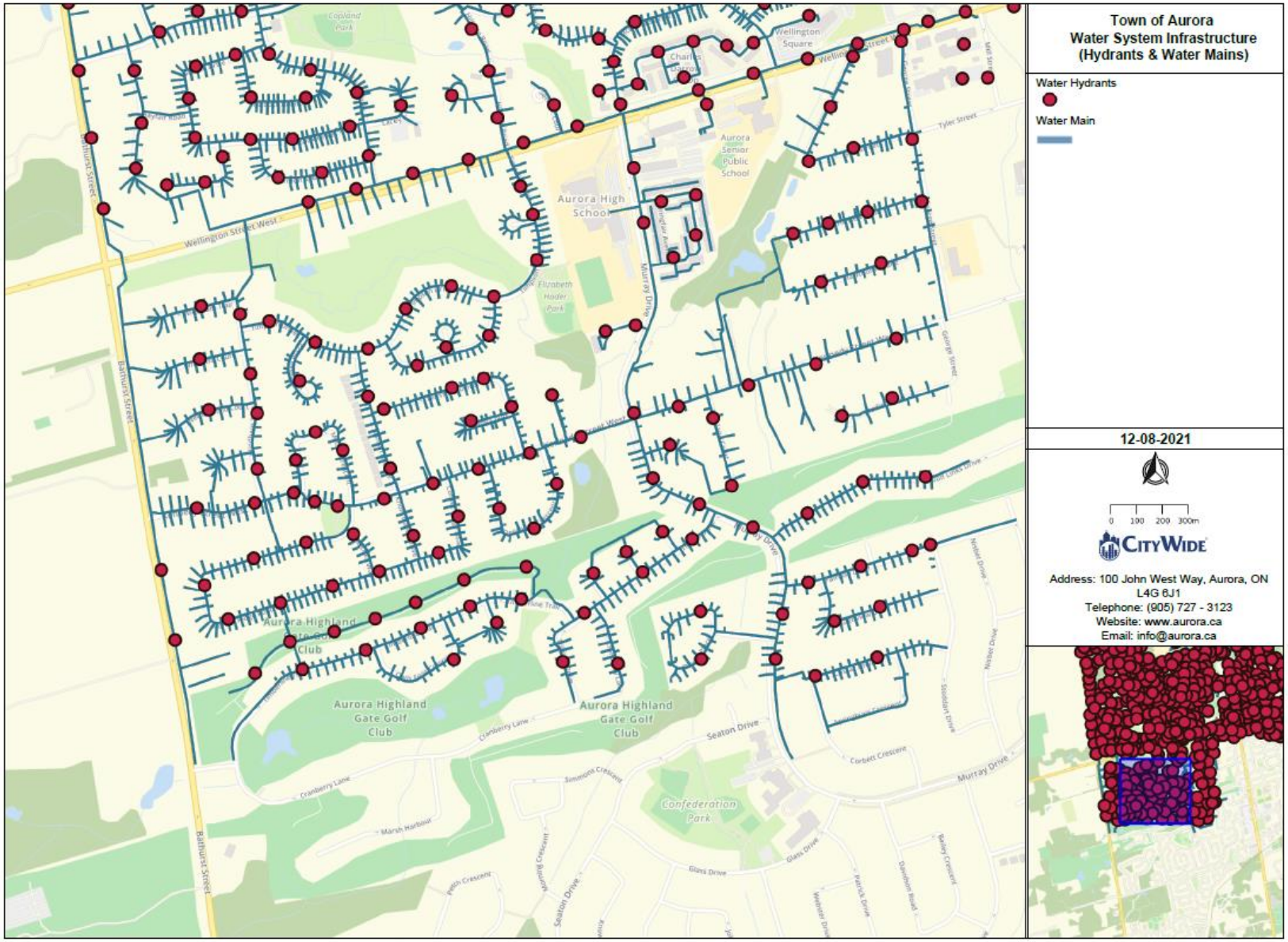
## Water System Infrastructure (Hydrants and Water Mains) – Part 2



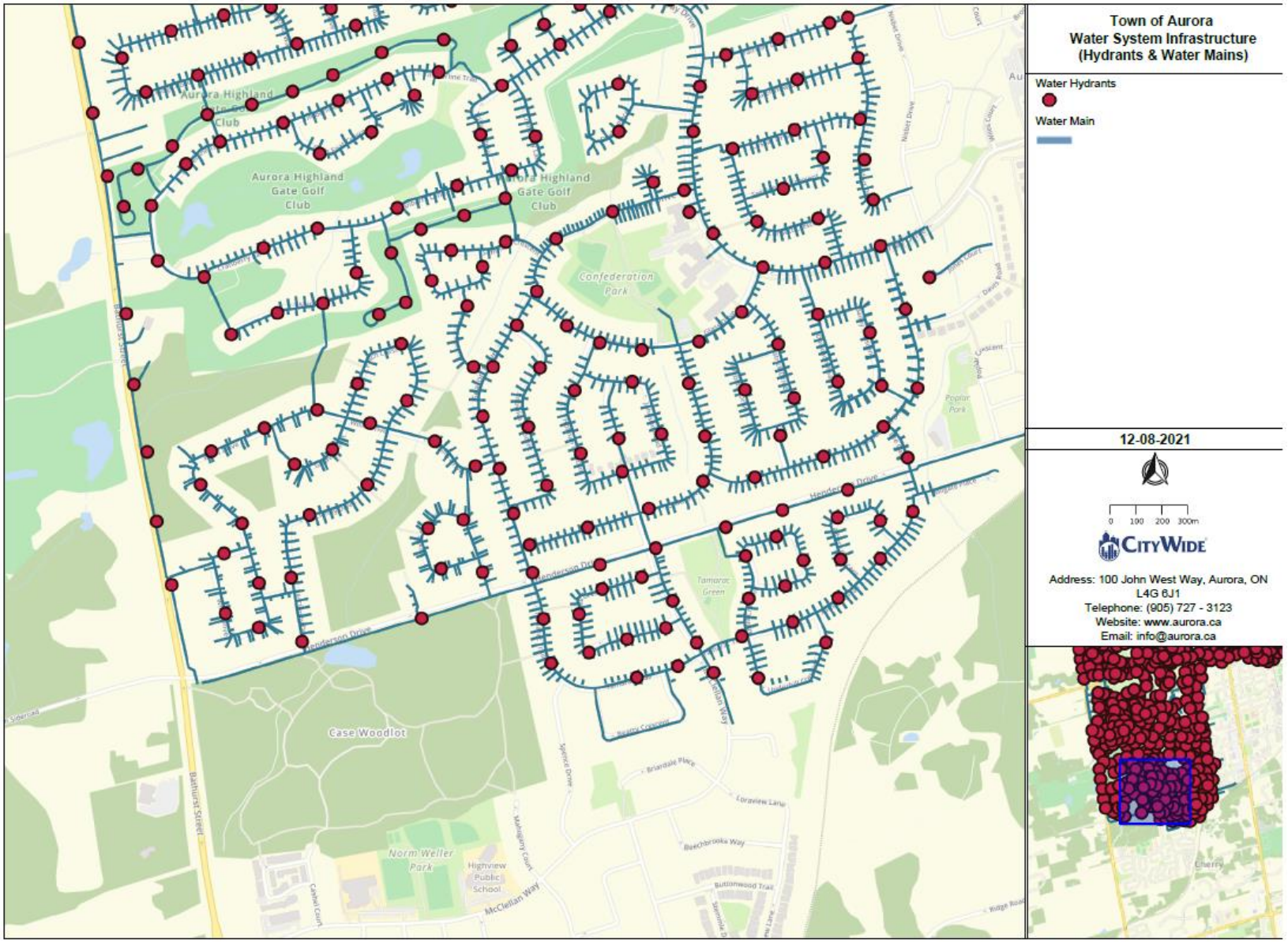
## Water System Infrastructure (Hydrants and Water Mains) – Part 3



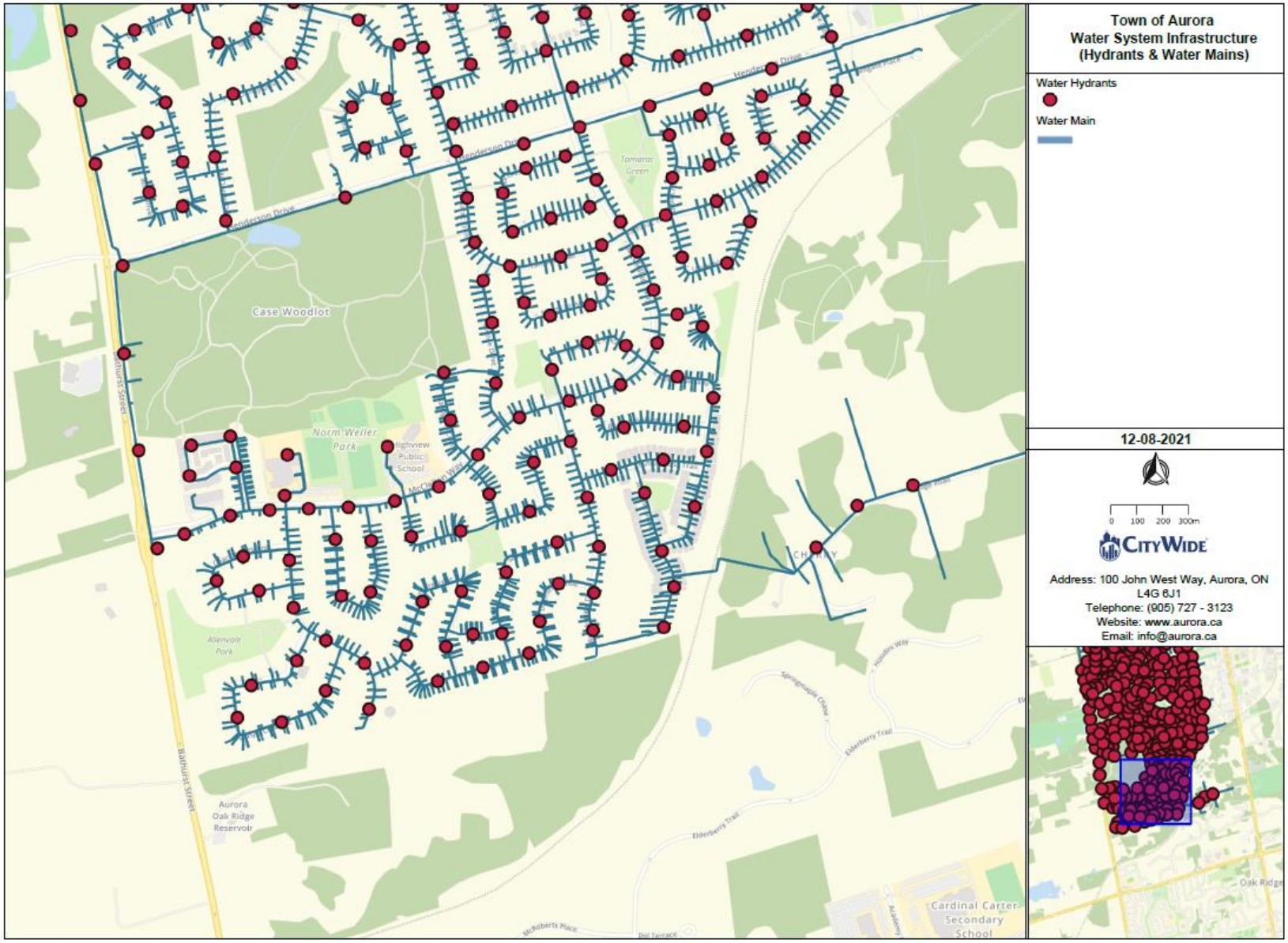
## Water System Infrastructure (Hydrants and Water Mains) – Part 4



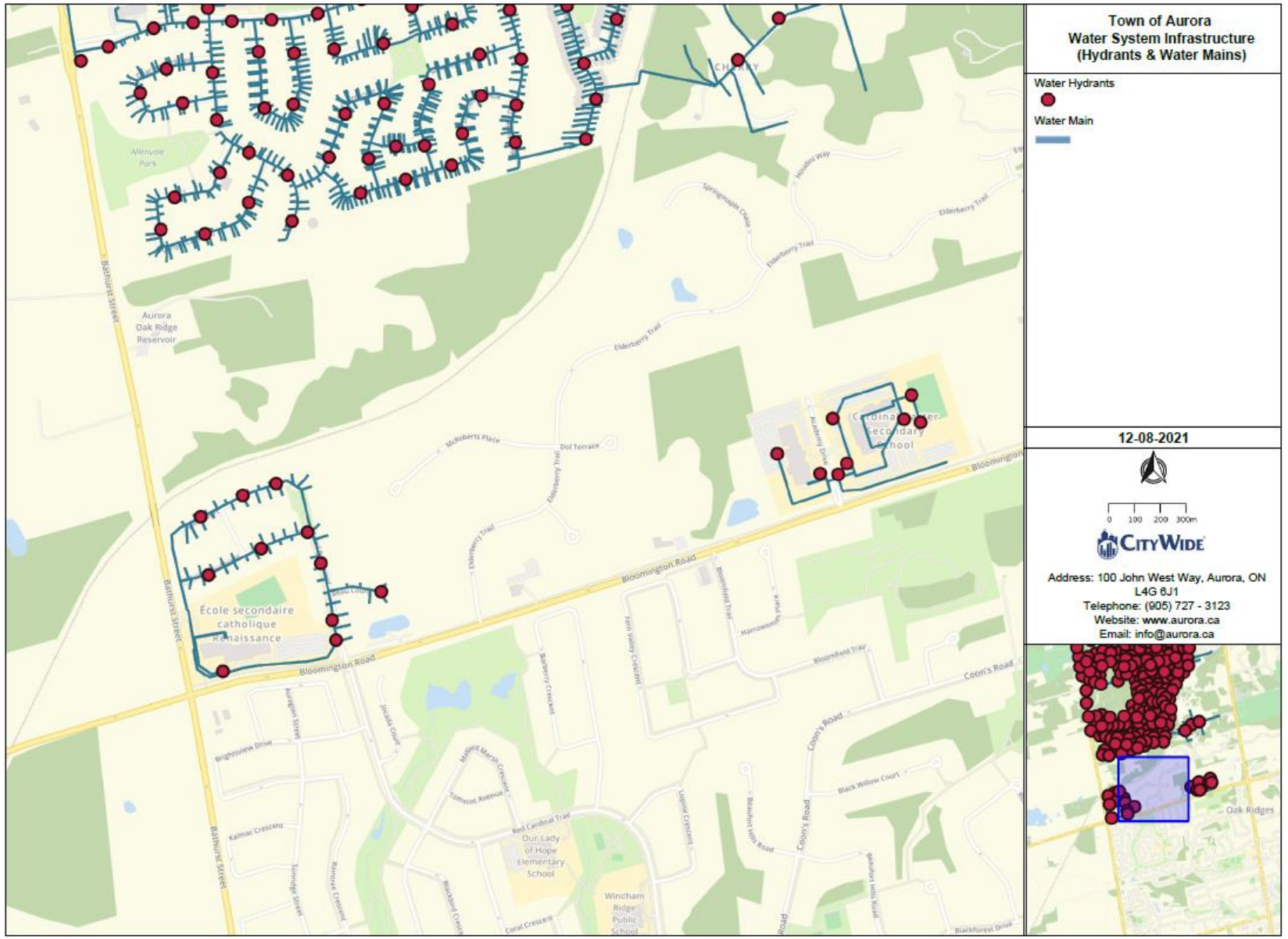
## Water System Infrastructure (Hydrants and Water Mains) – Part 5



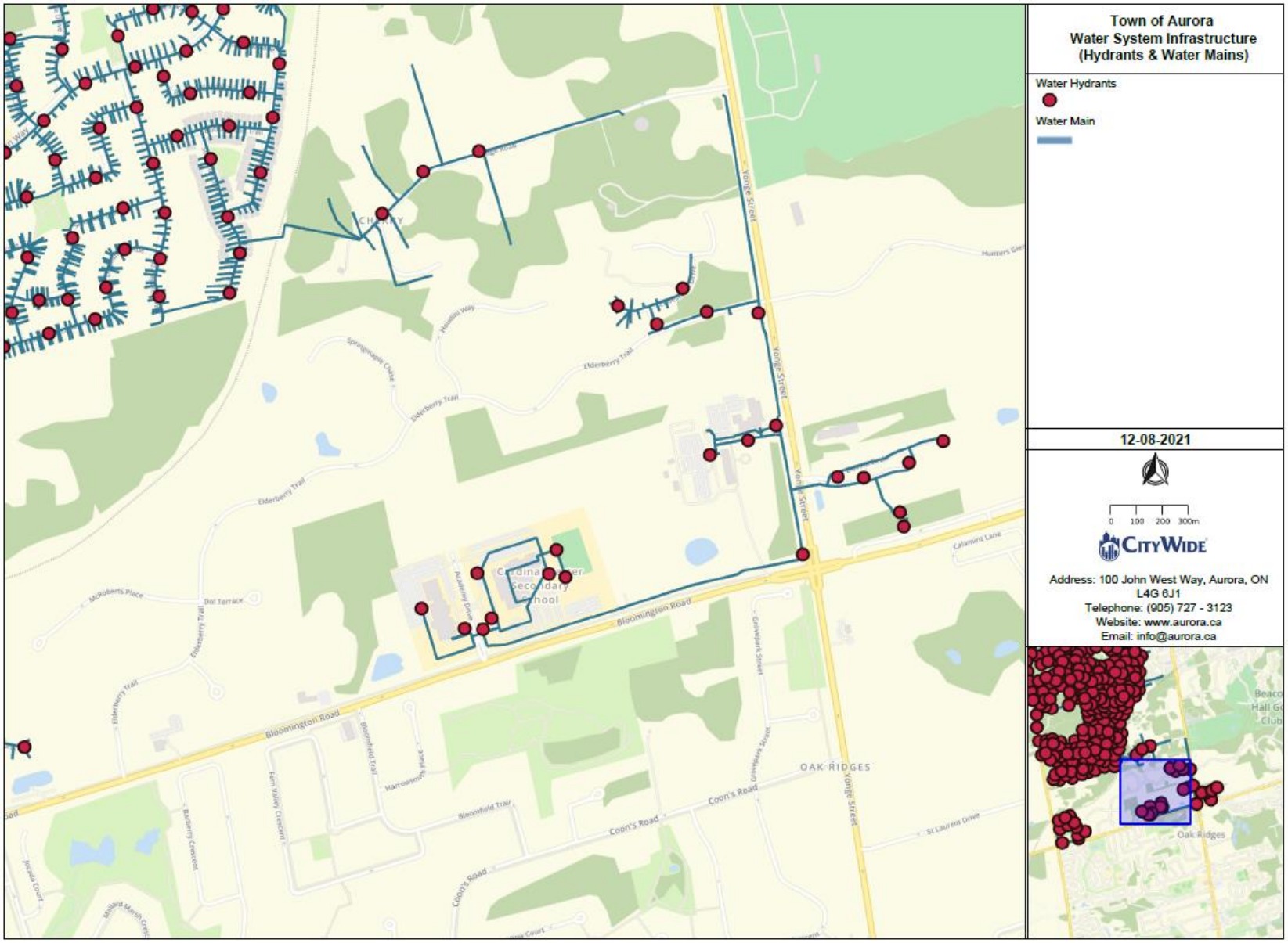
## Water System Infrastructure (Hydrants and Water Mains) – Part 6



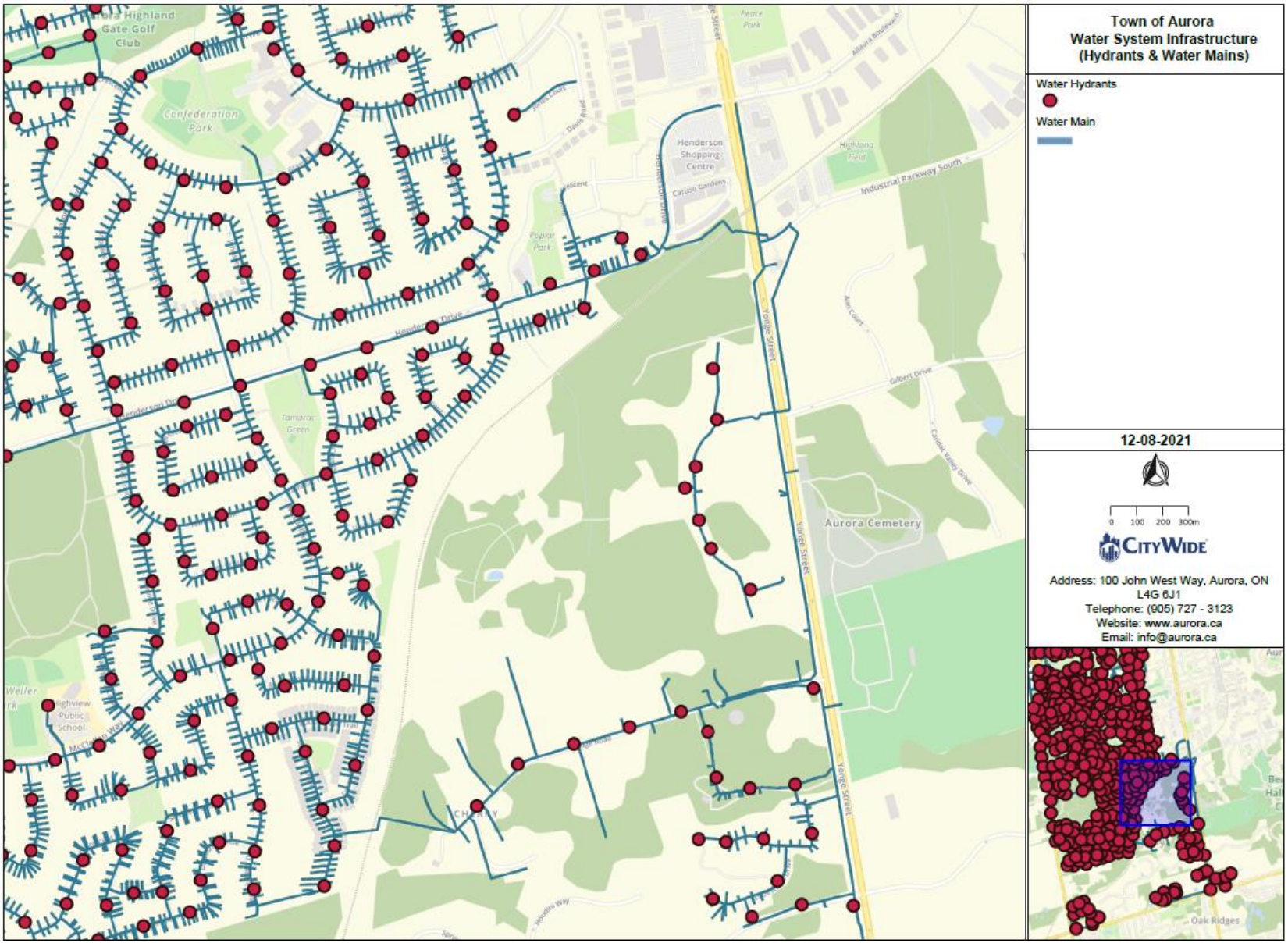
## Water System Infrastructure (Hydrants and Water Mains) – Part 7



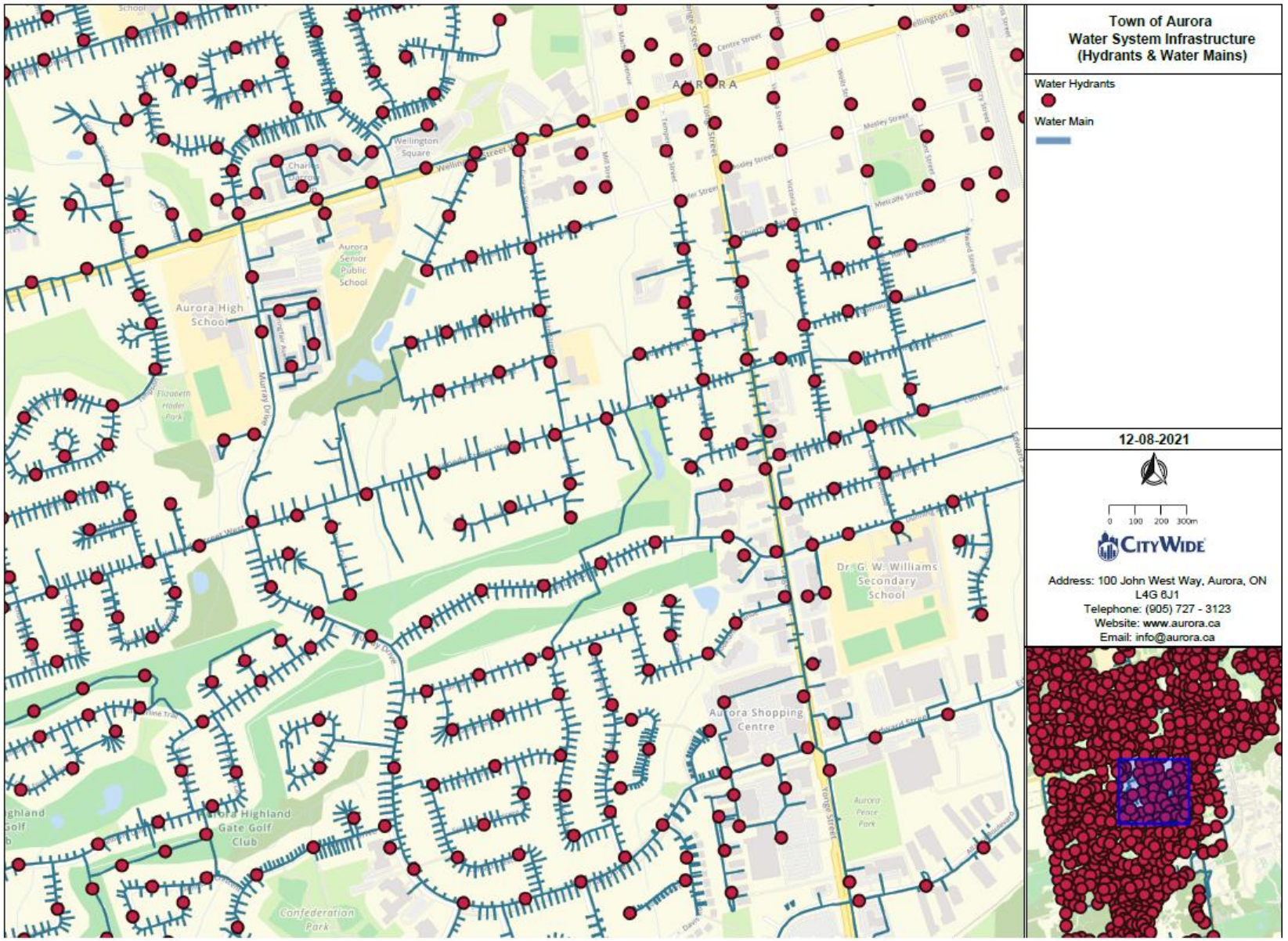
## Water System Infrastructure (Hydrants and Water Mains) – Part 8



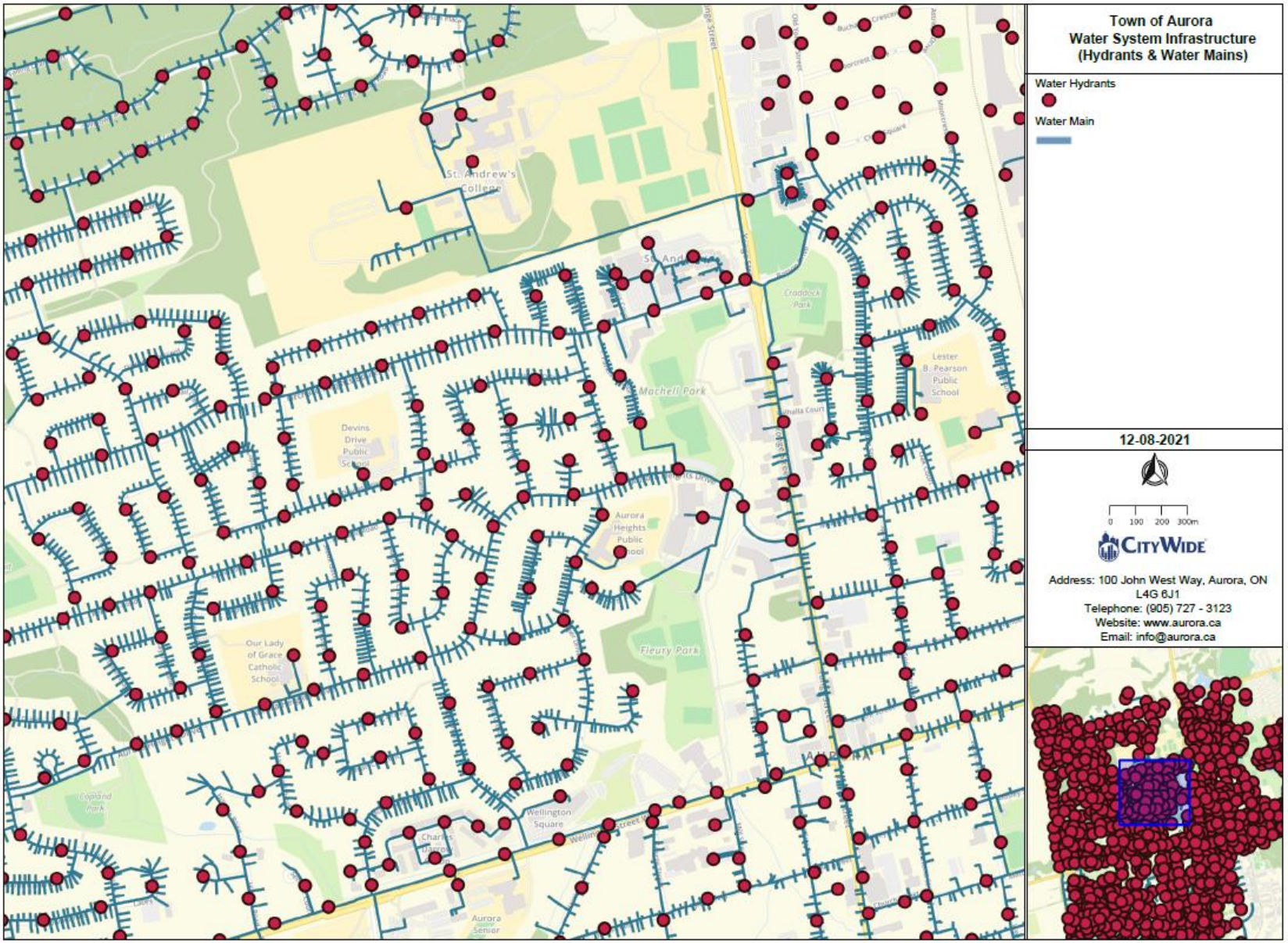
## Water System Infrastructure (Hydrants and Water Mains) – Part 9



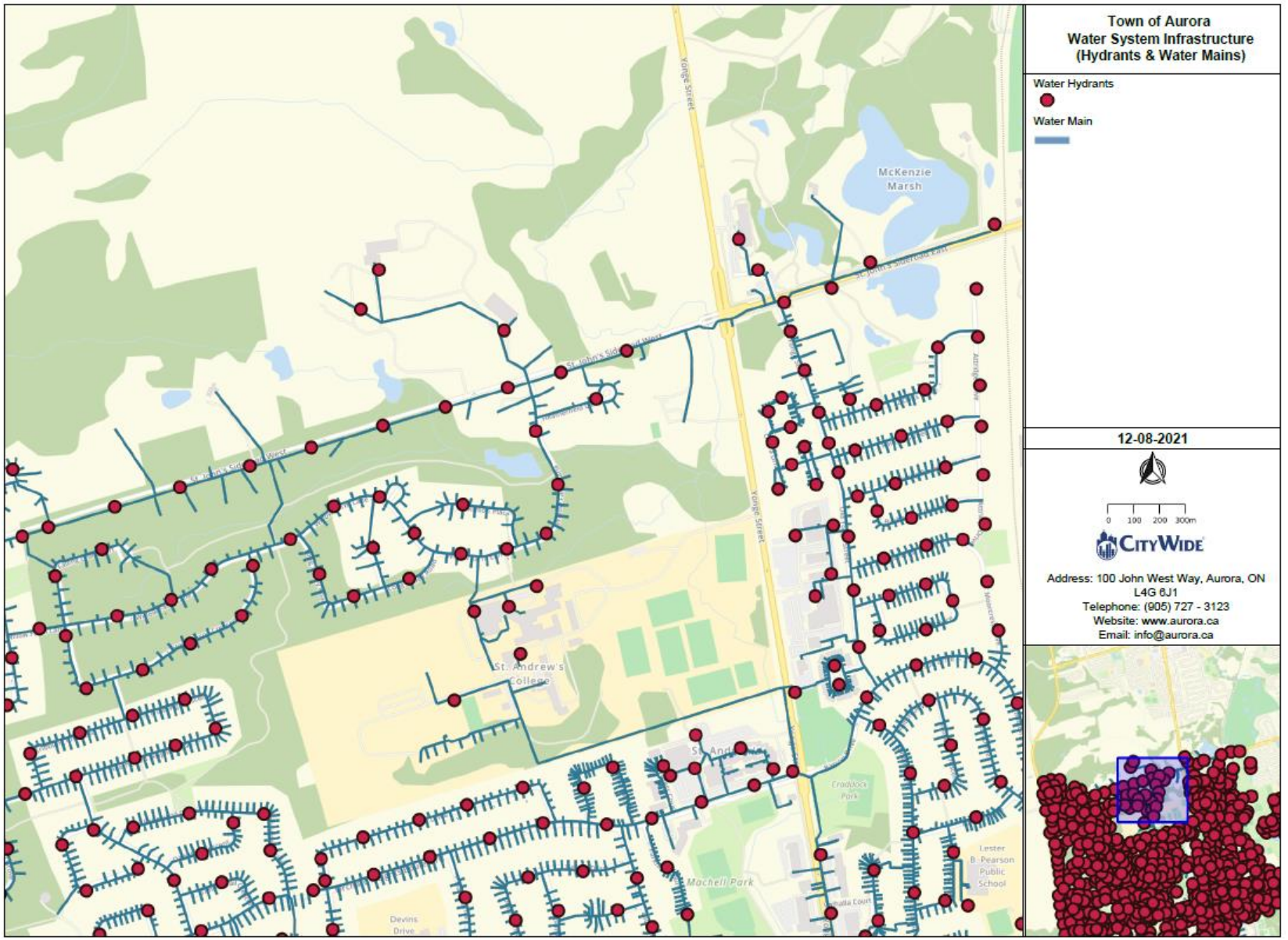
## Water System Infrastructure (Hydrants and Water Mains) – Part 10



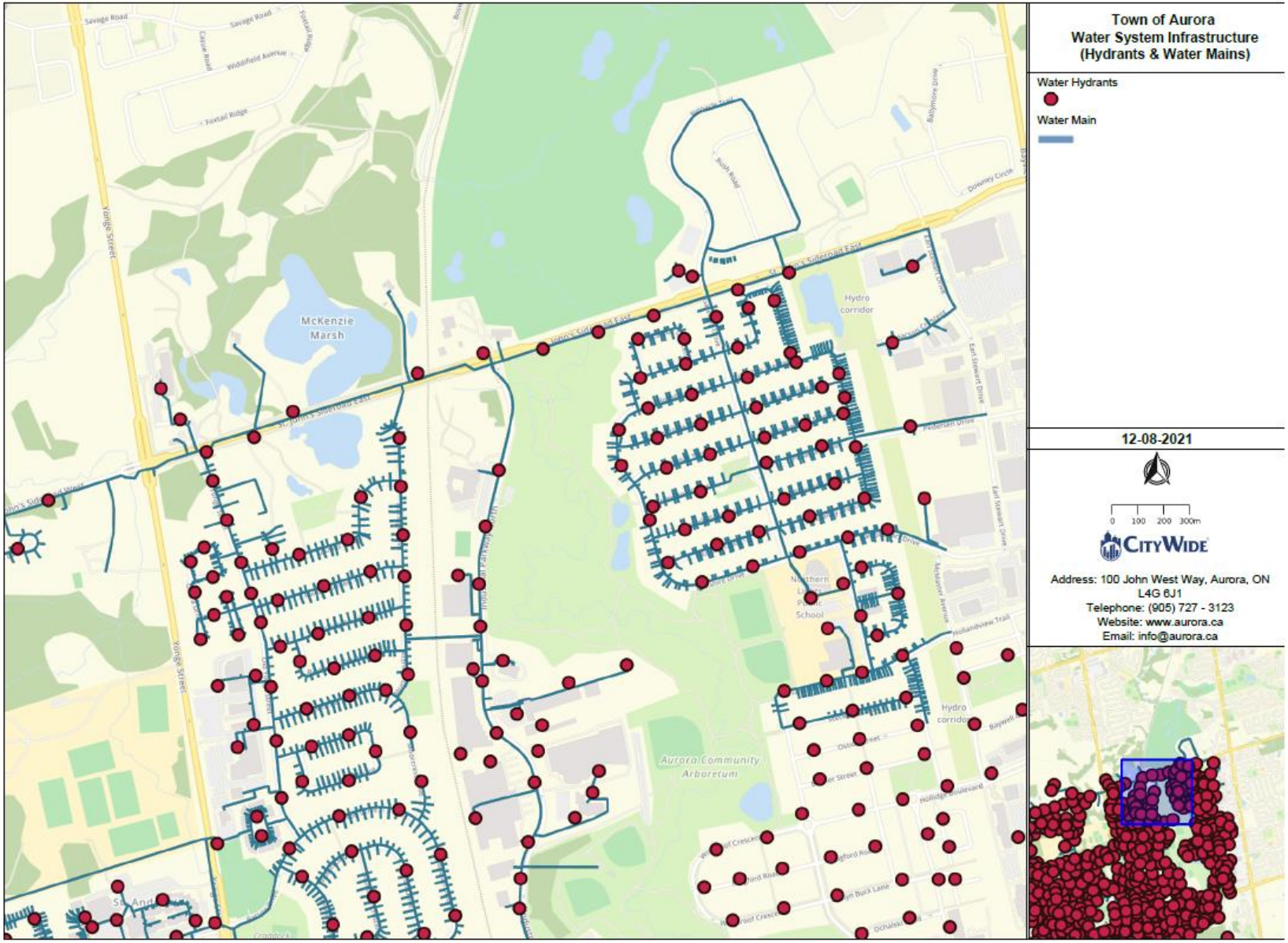
## Water System Infrastructure (Hydrants and Water Mains) – Part 11



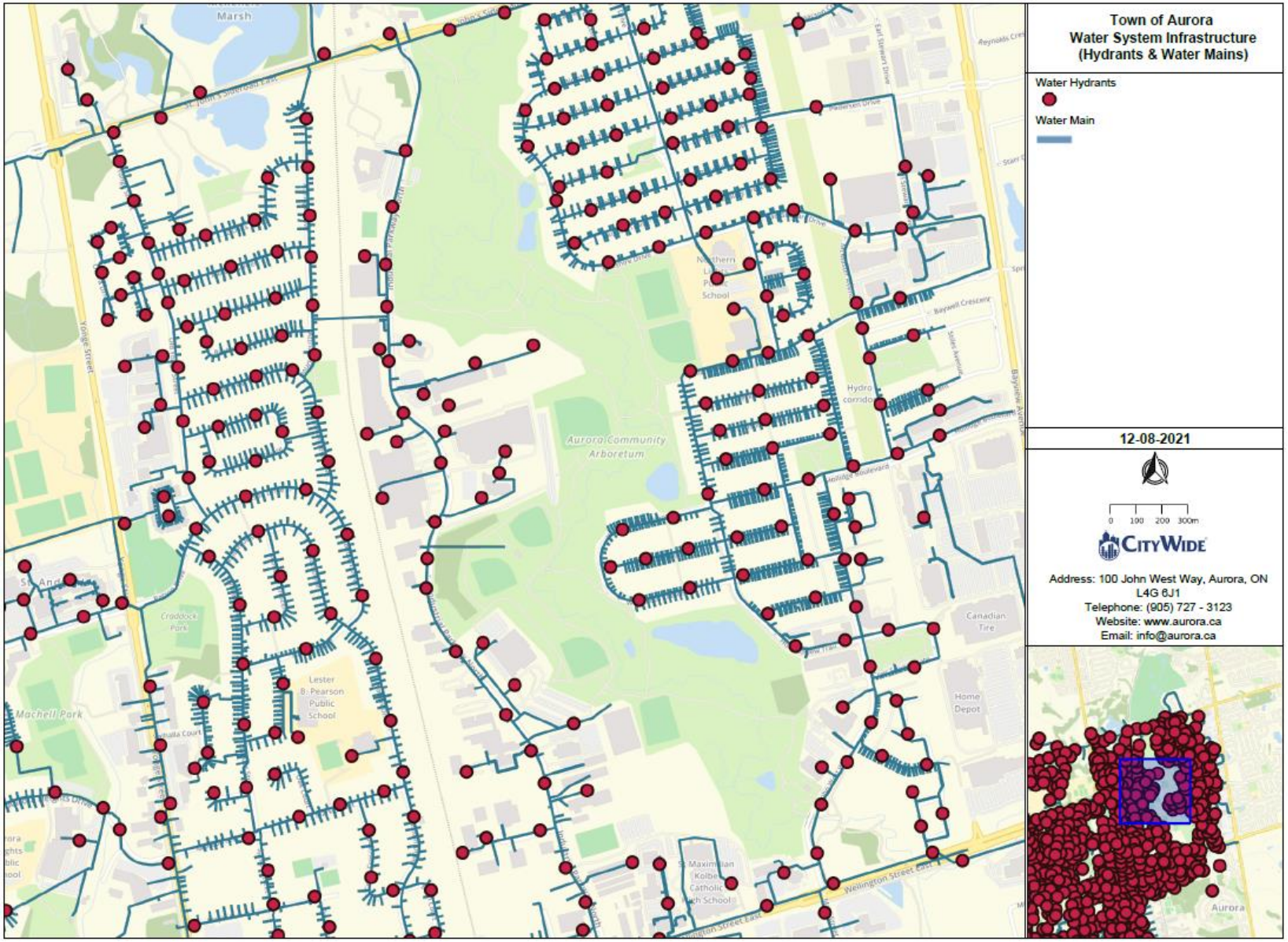
## Water System Infrastructure (Hydrants and Water Mains) – Part 12



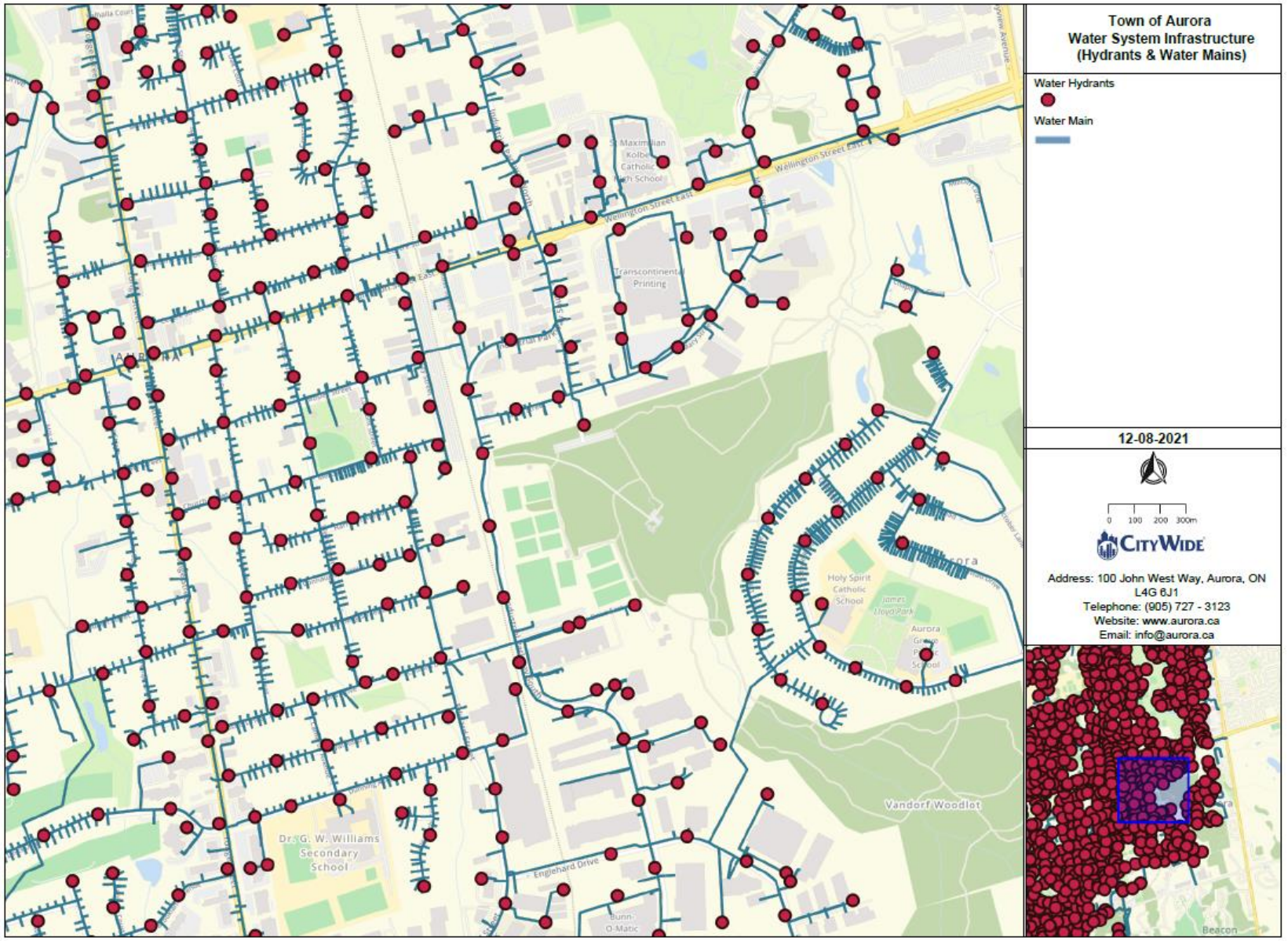
## Water System Infrastructure (Hydrants and Water Mains) – Part 13



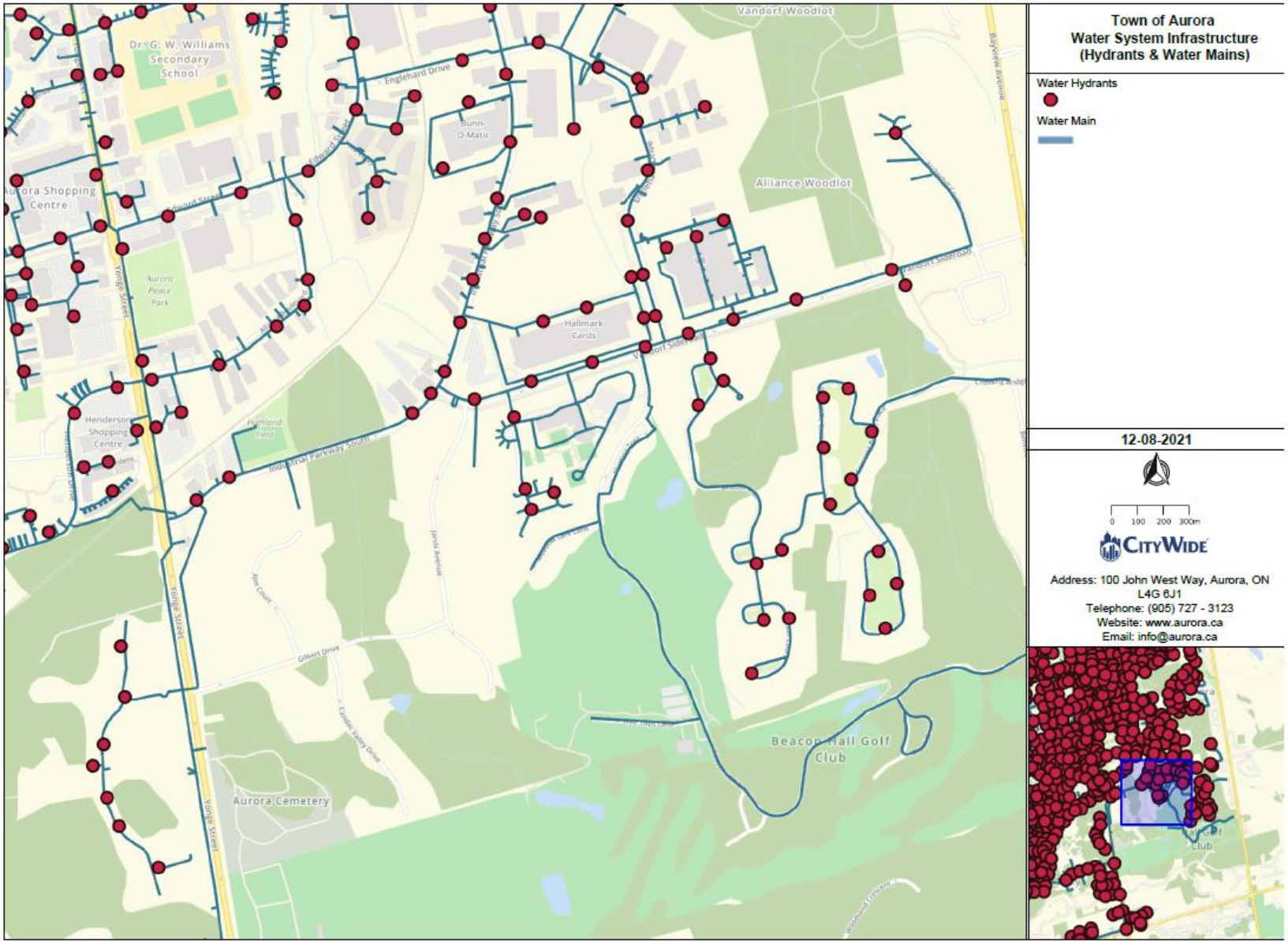
## Water System Infrastructure (Hydrants and Water Mains) – Part 14



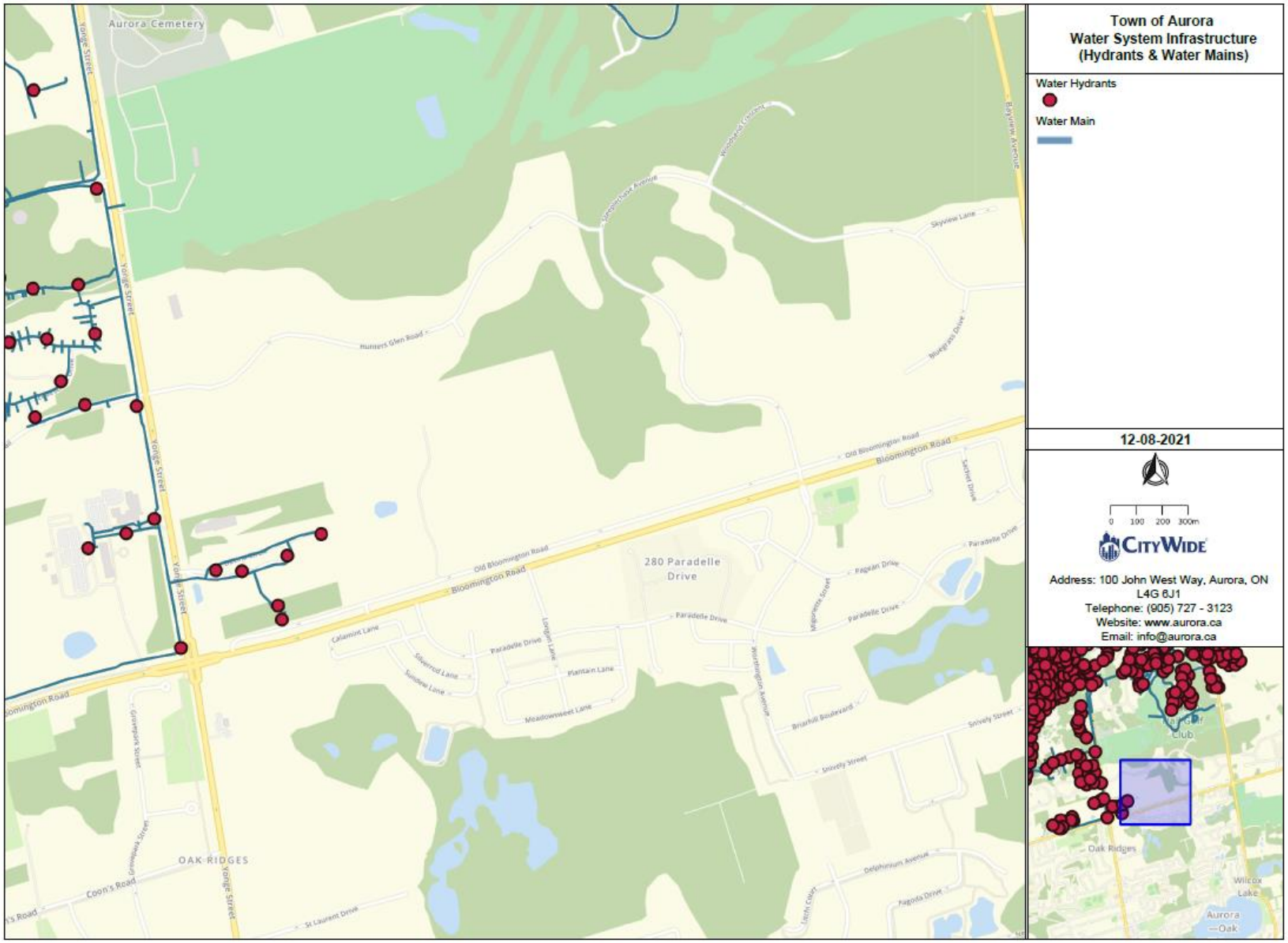
## Water System Infrastructure (Hydrants and Water Mains) – Part 15



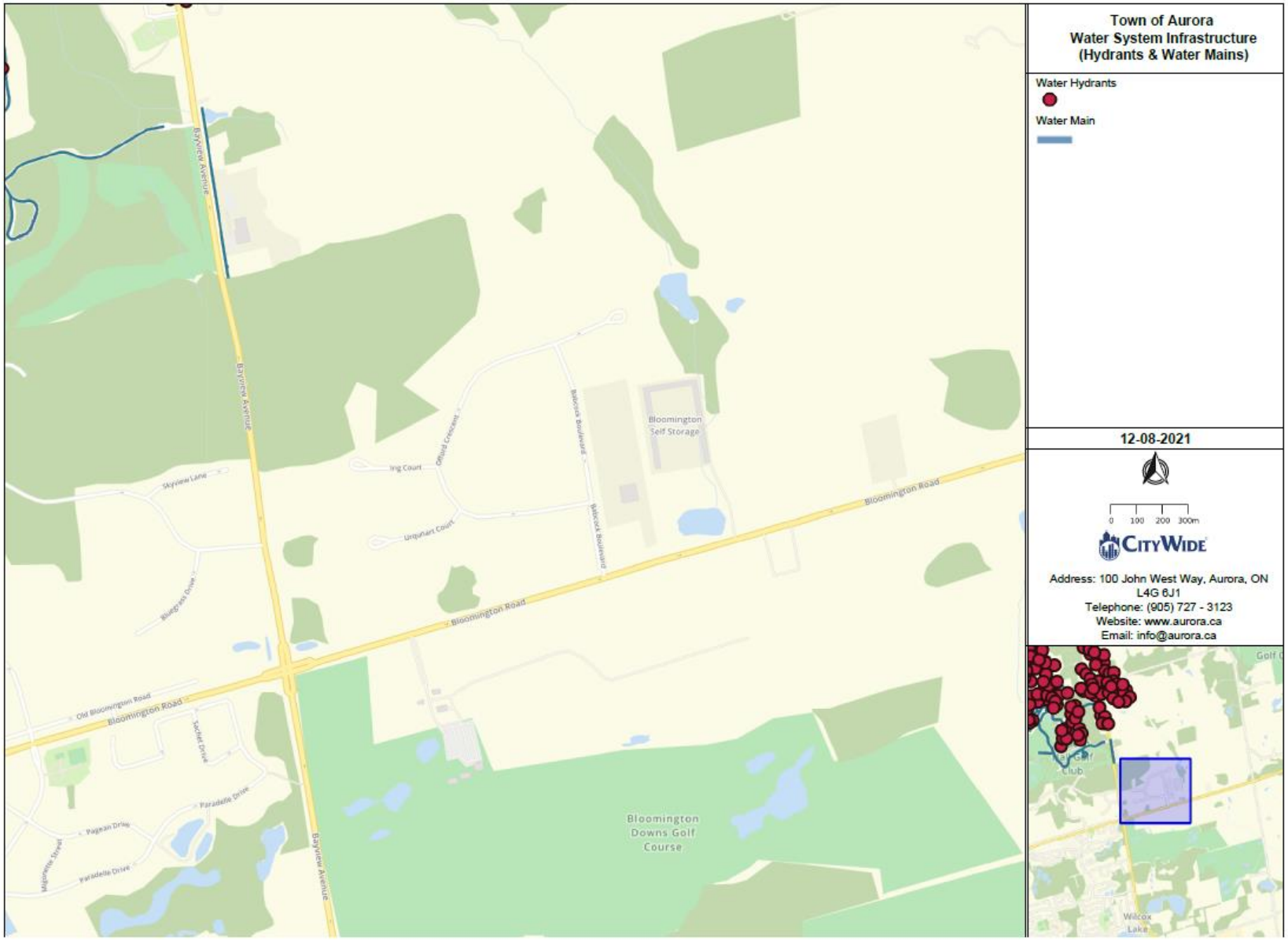
## Water System Infrastructure (Hydrants and Water Mains) – Part 16



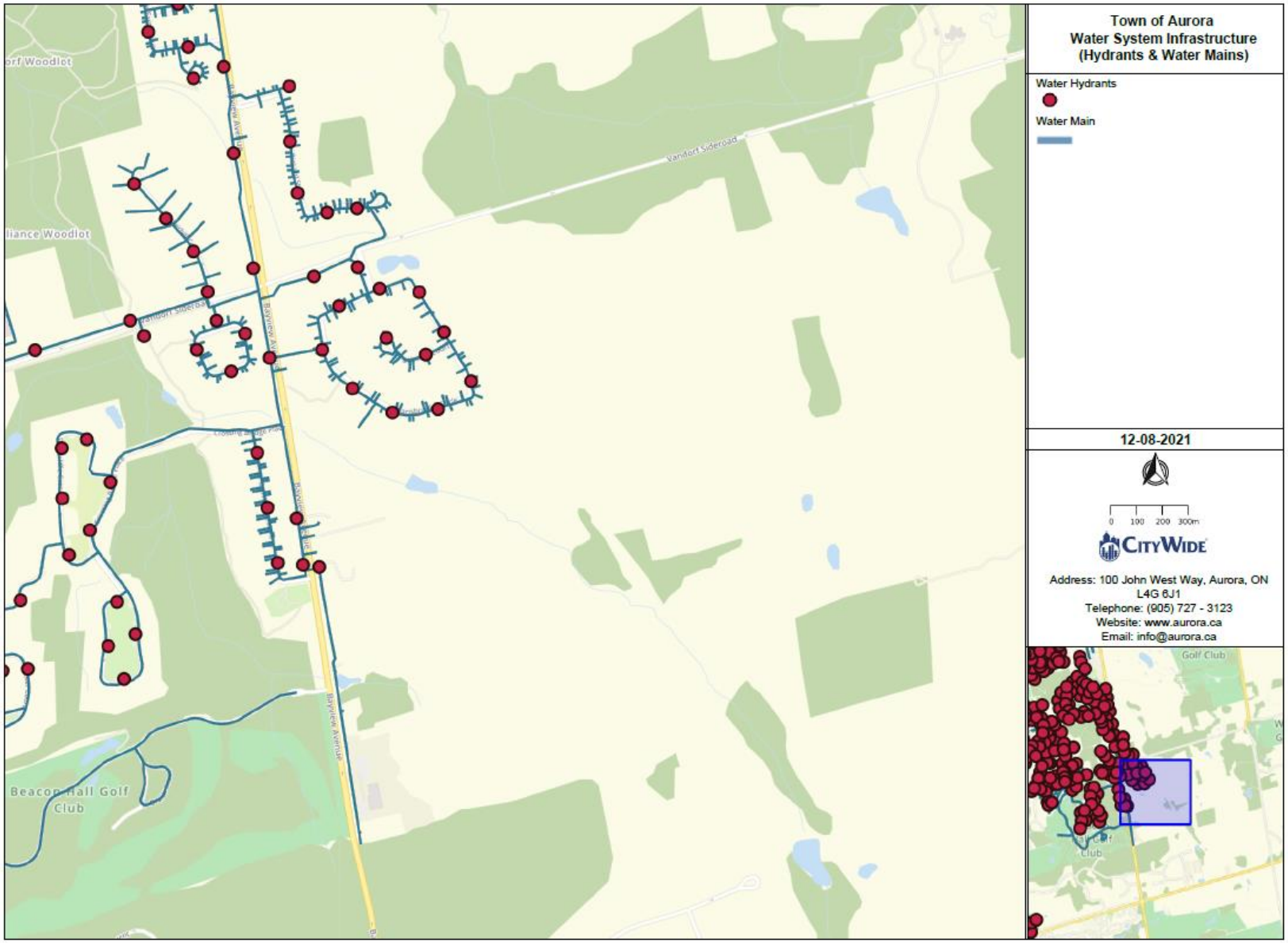
## Water System Infrastructure (Hydrants and Water Mains) – Part 17



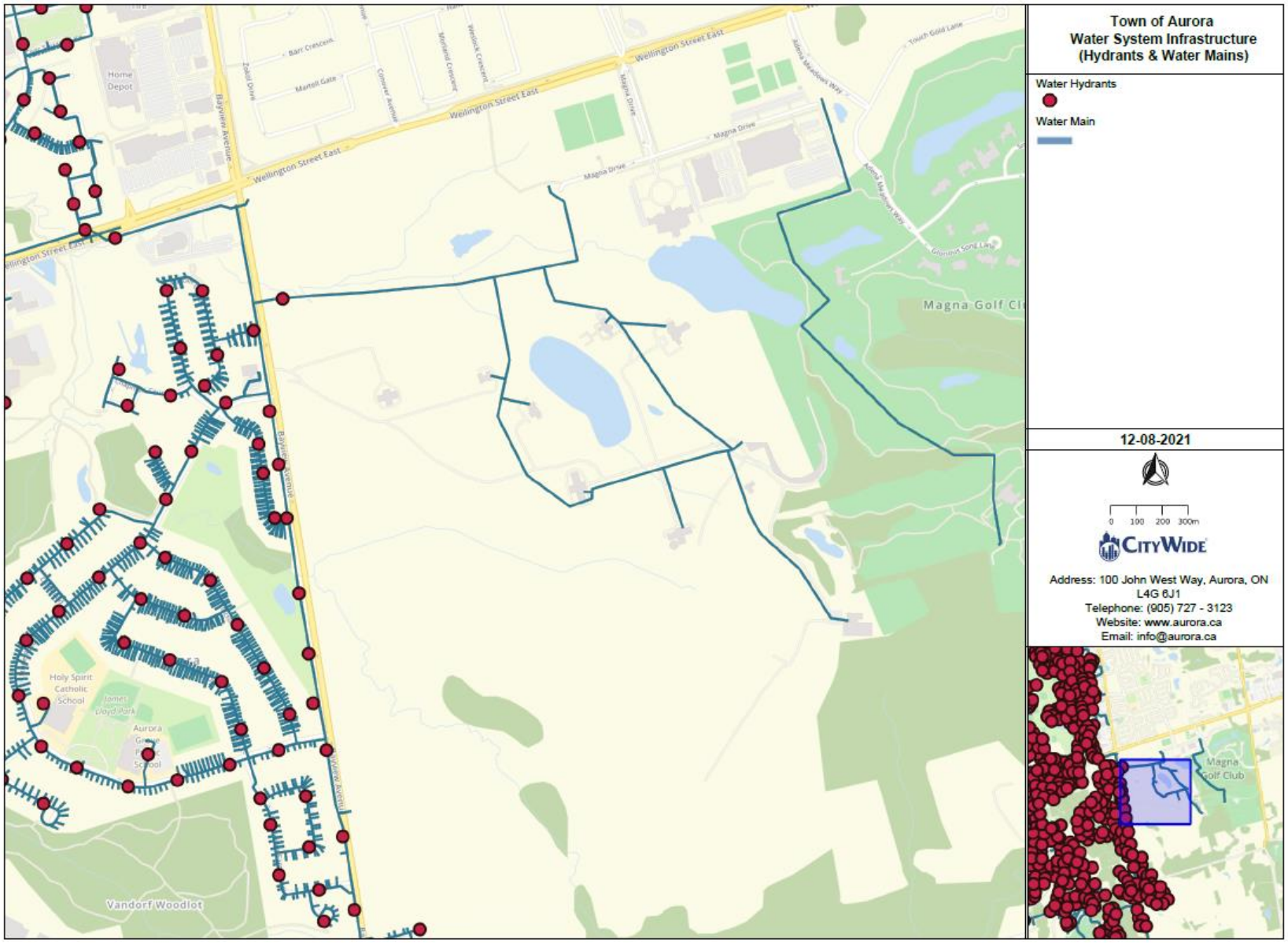
## Water System Infrastructure (Hydrants and Water Mains) – Part 18



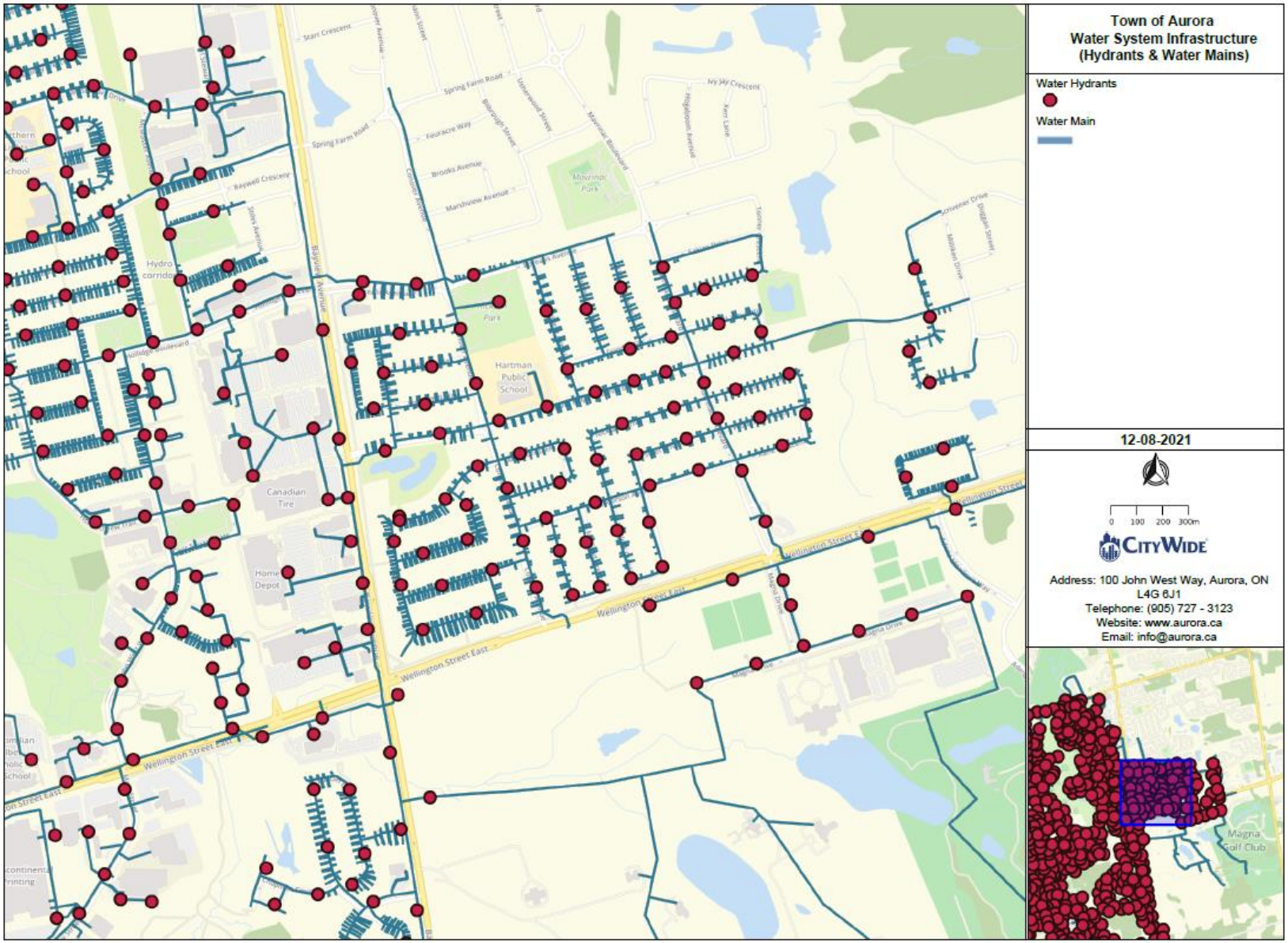
## Water System Infrastructure (Hydrants and Water Mains) – Part 19



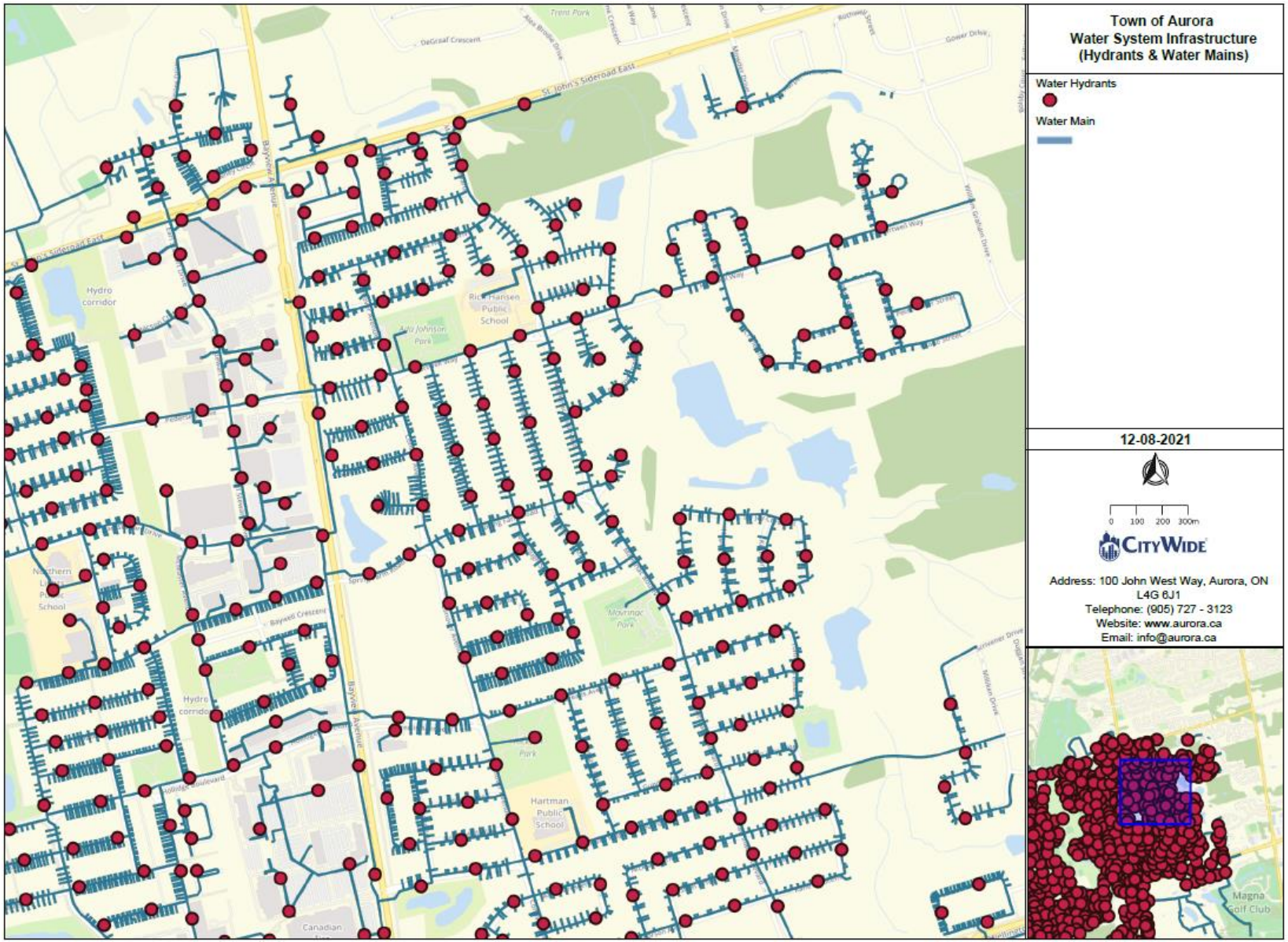
## Water System Infrastructure (Hydrants and Water Mains) – Part 20



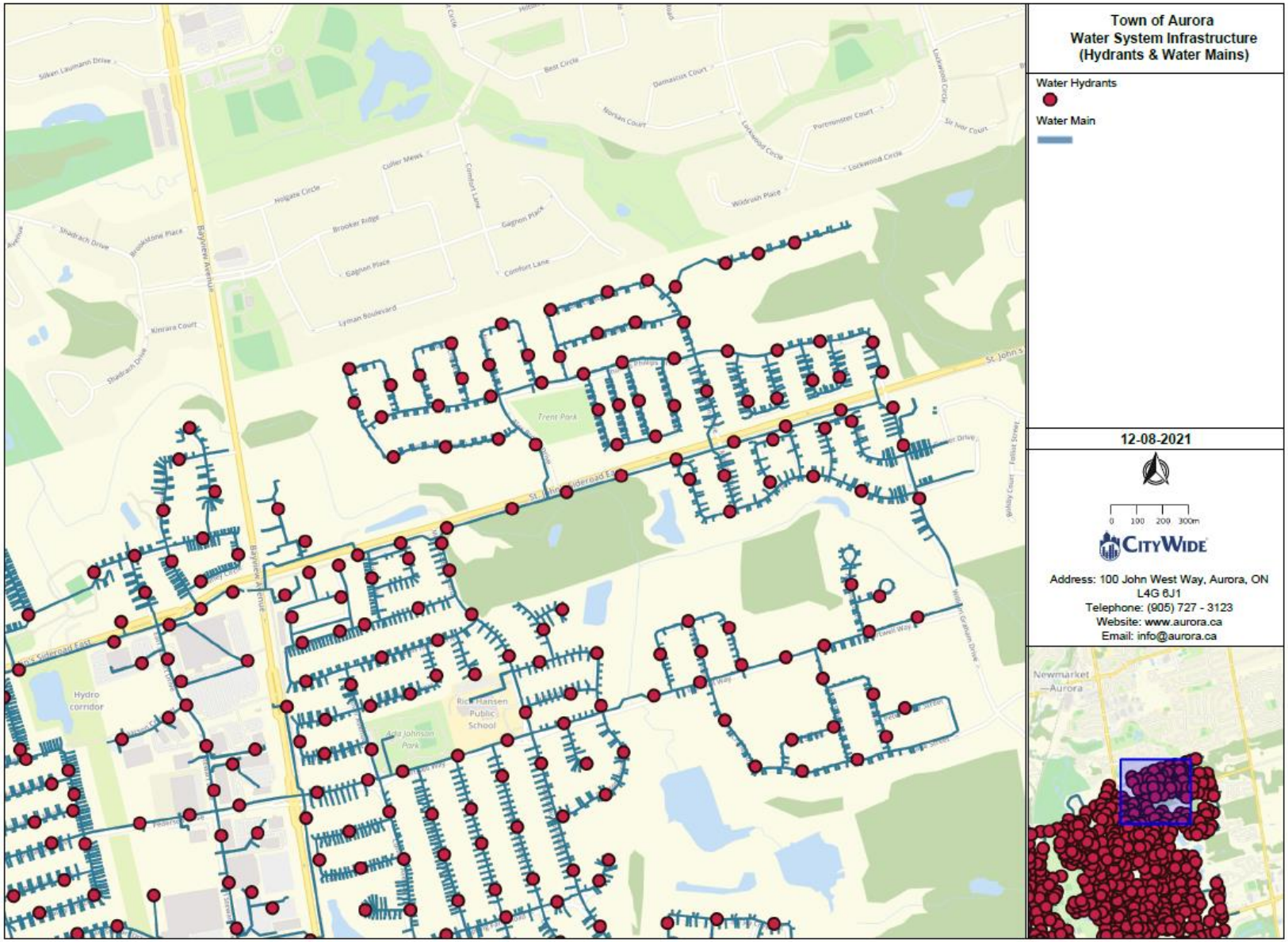
## Water System Infrastructure (Hydrants and Water Mains) – Part 21



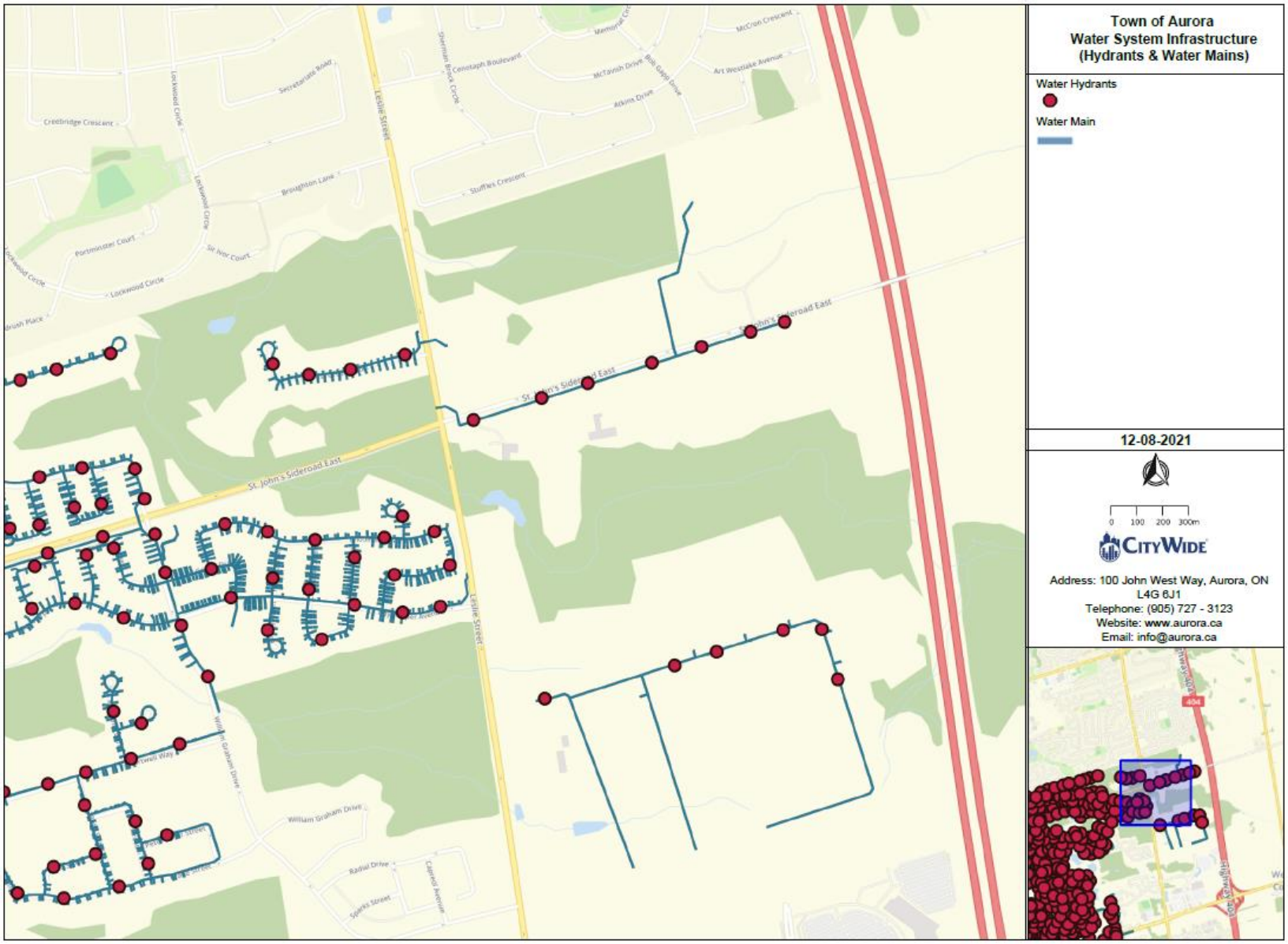
## Water System Infrastructure (Hydrants and Water Mains) – Part 22



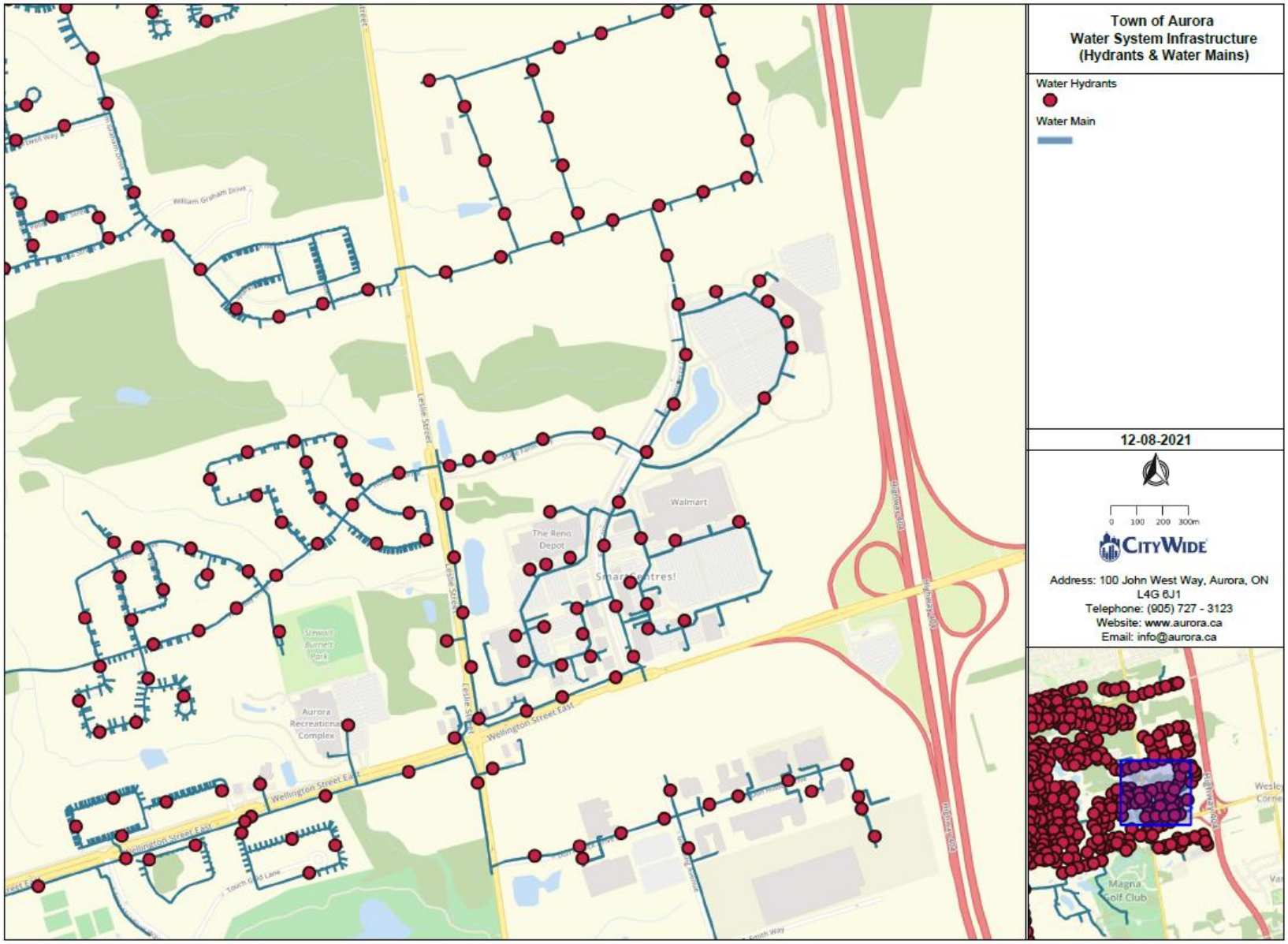
## Water System Infrastructure (Hydrants and Water Mains) – Part 23



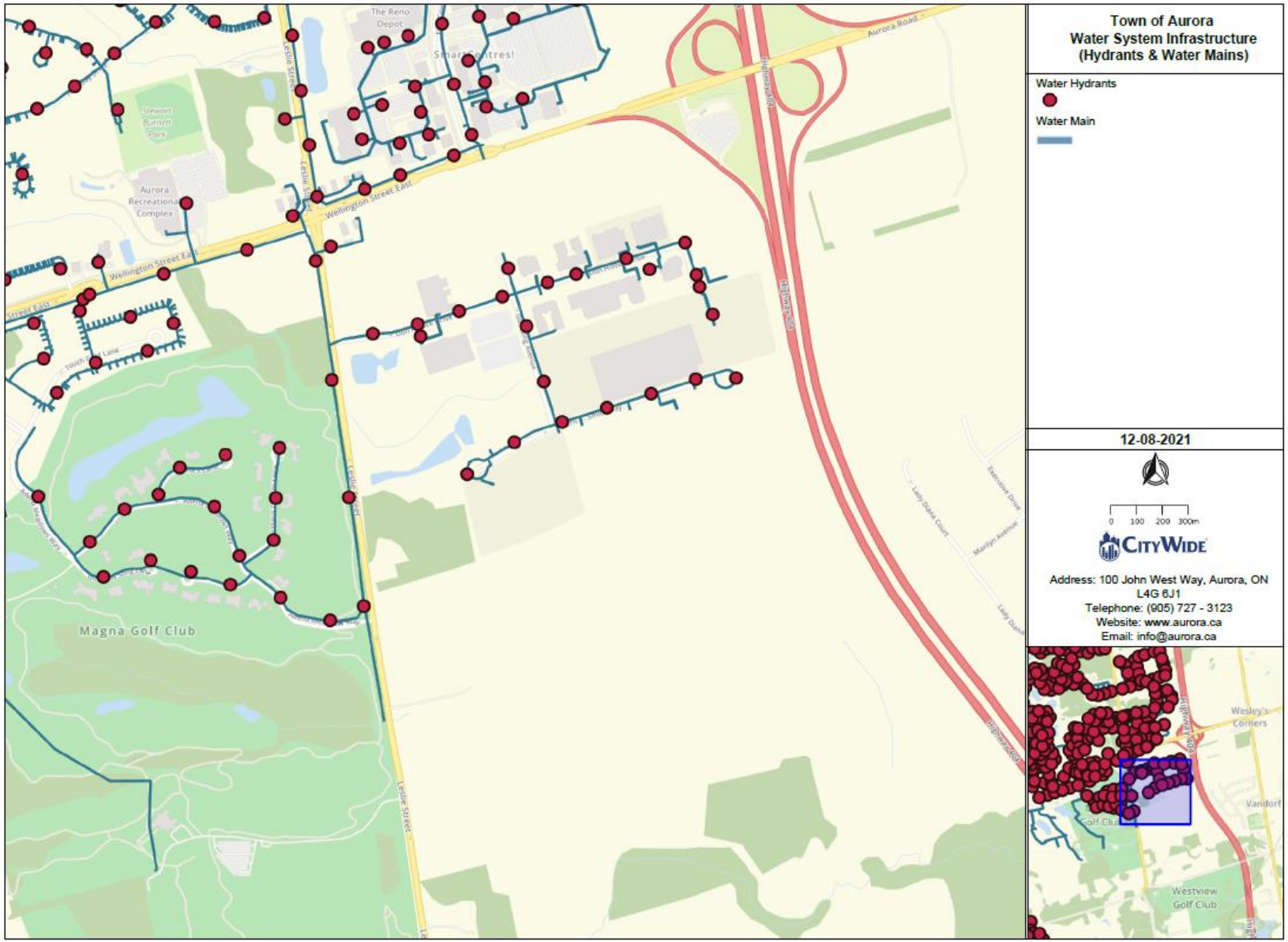
## Water System Infrastructure (Hydrants and Water Mains) – Part 24



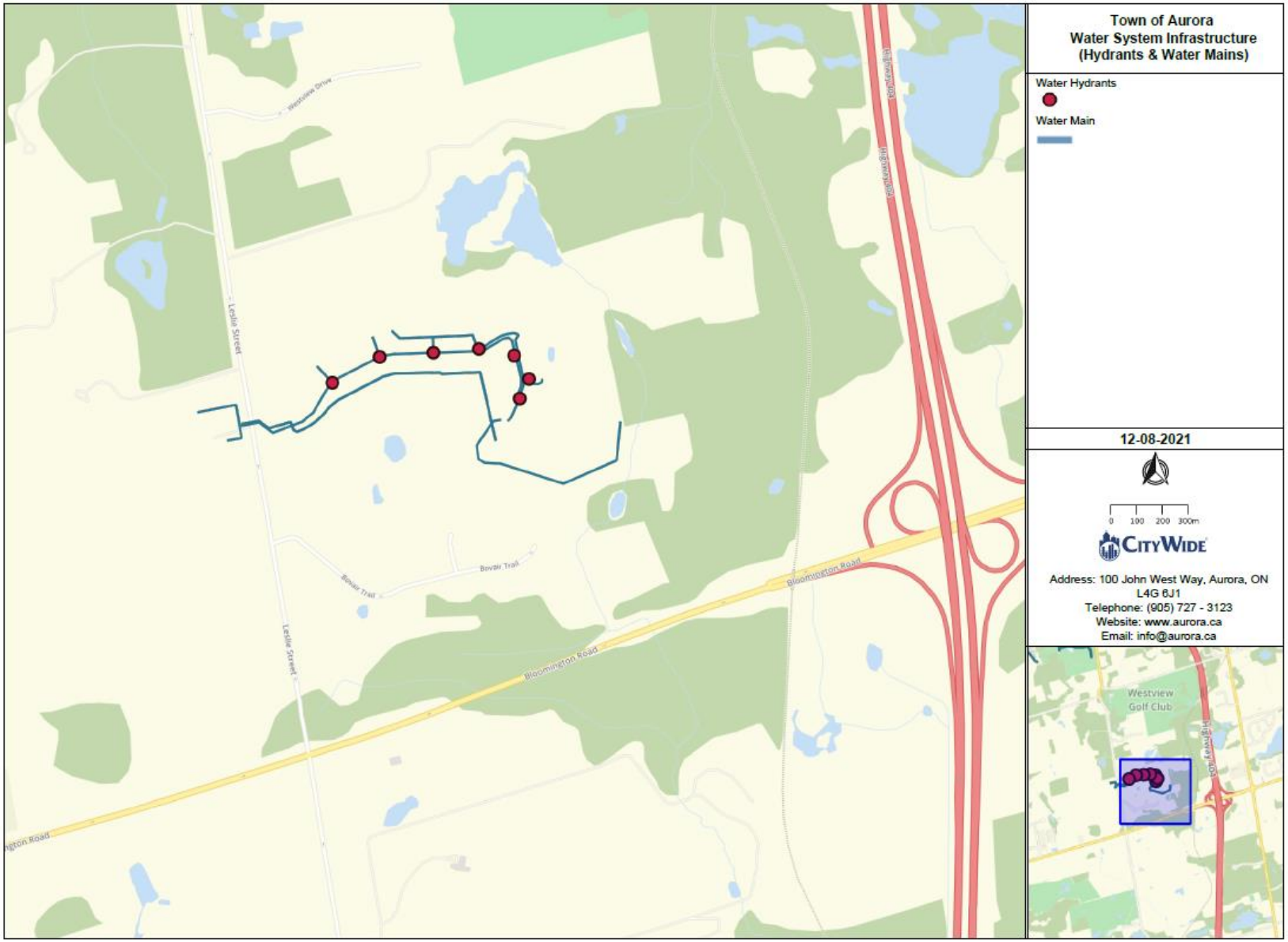
## Water System Infrastructure (Hydrants and Water Mains) – Part 25



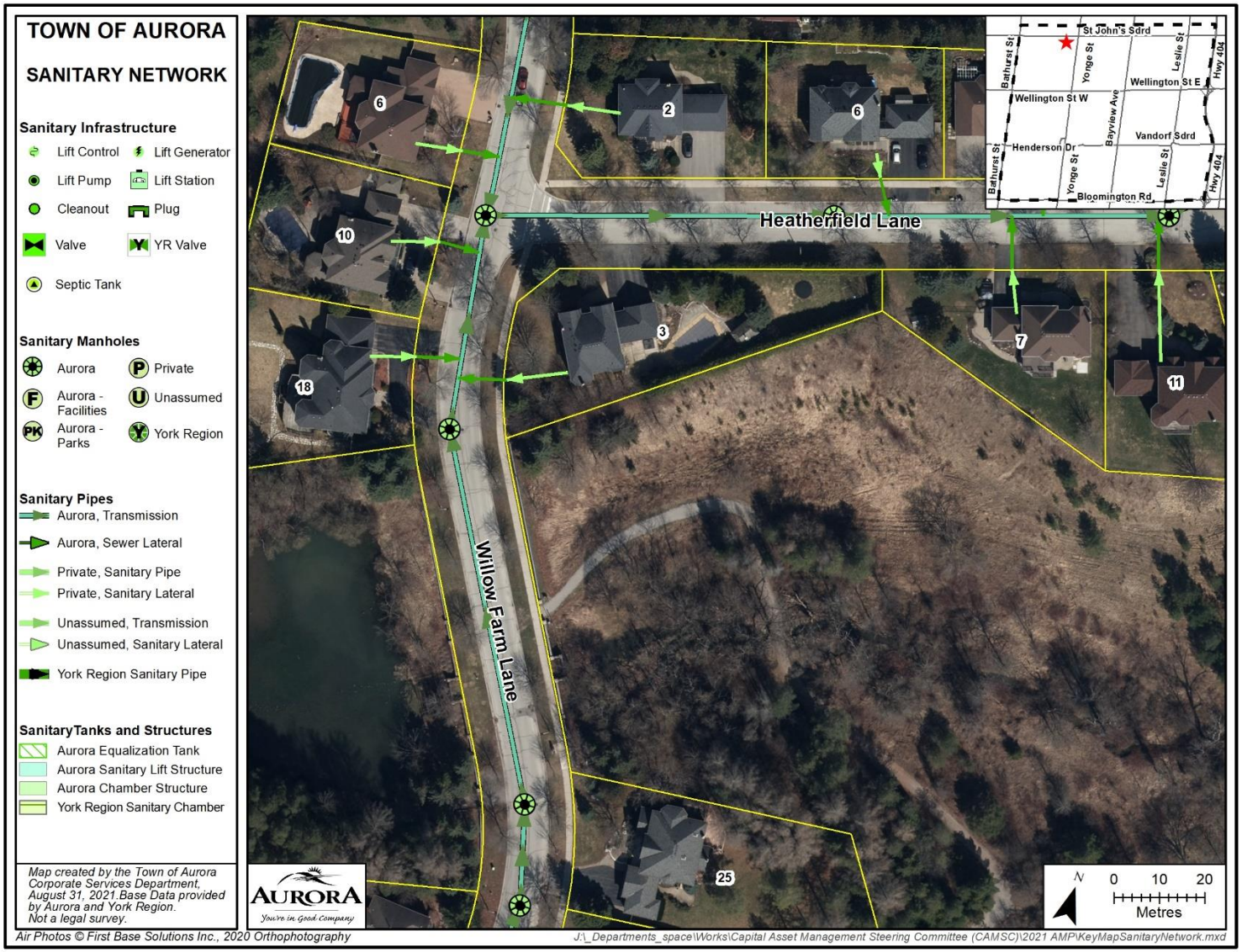
## Water System Infrastructure (Hydrants and Water Mains) – Part 26



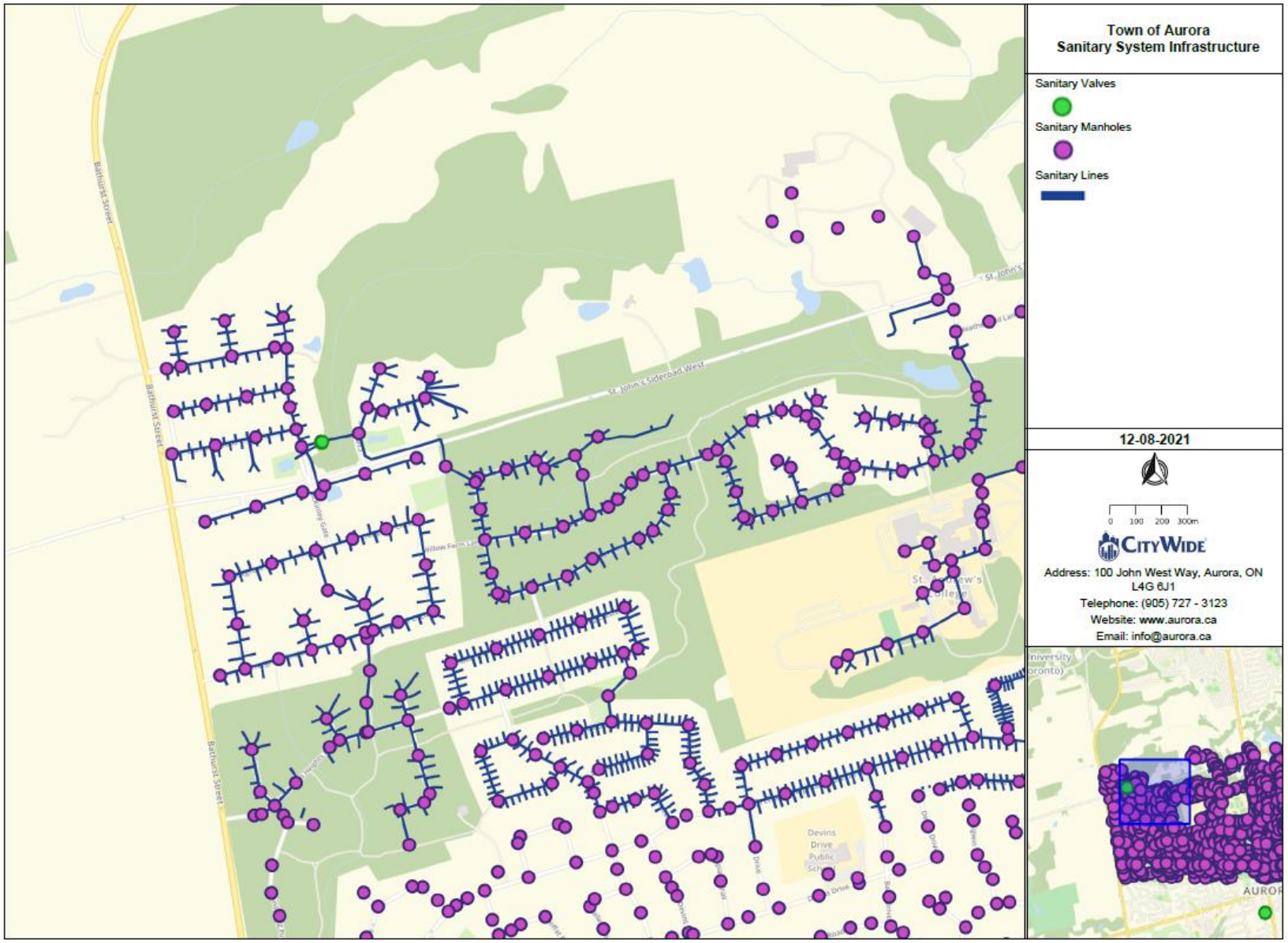
## Water System Infrastructure (Hydrants and Water Mains) – Part 27



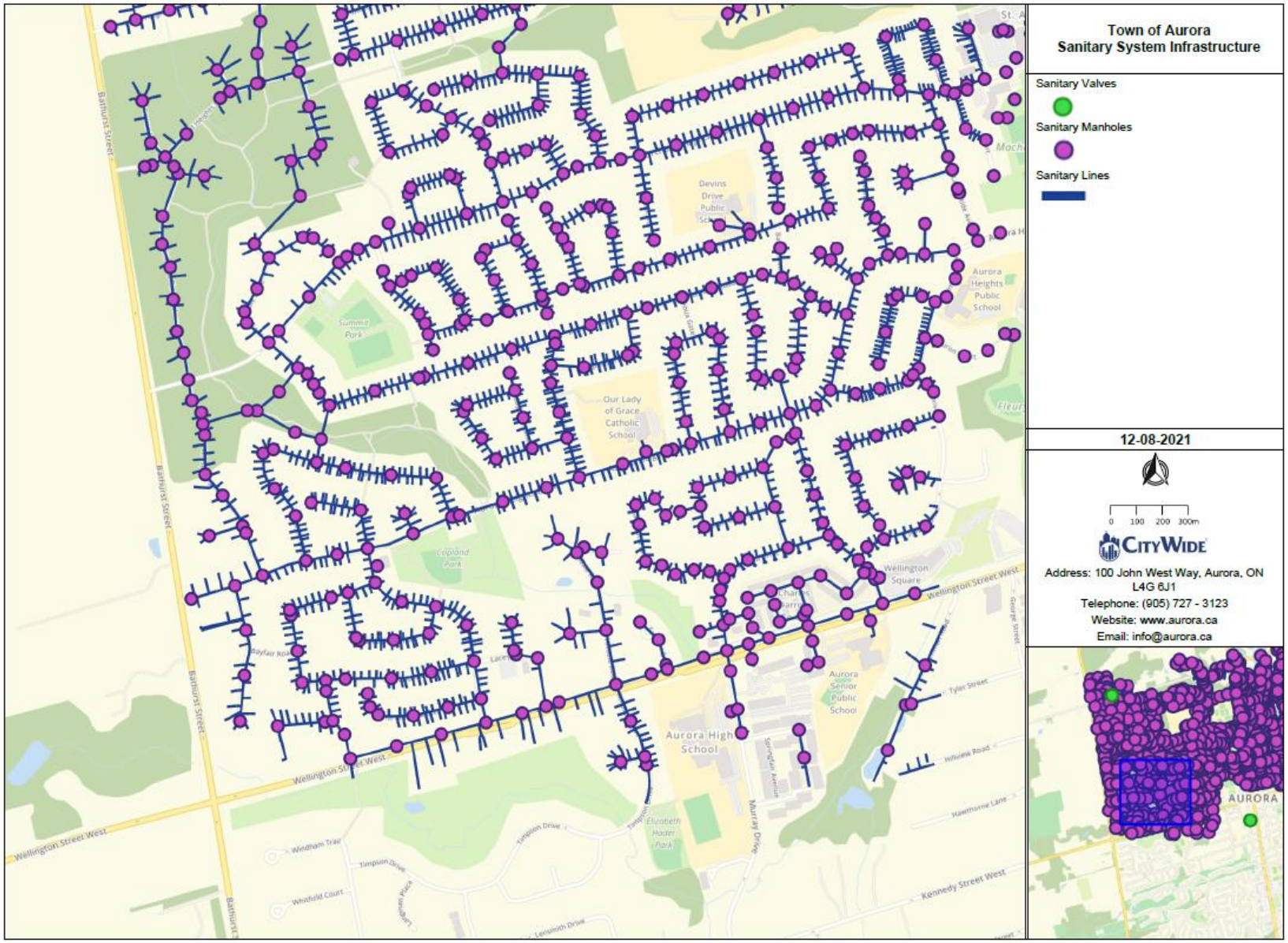
## Sanitary Network Maps (27 Maps total)



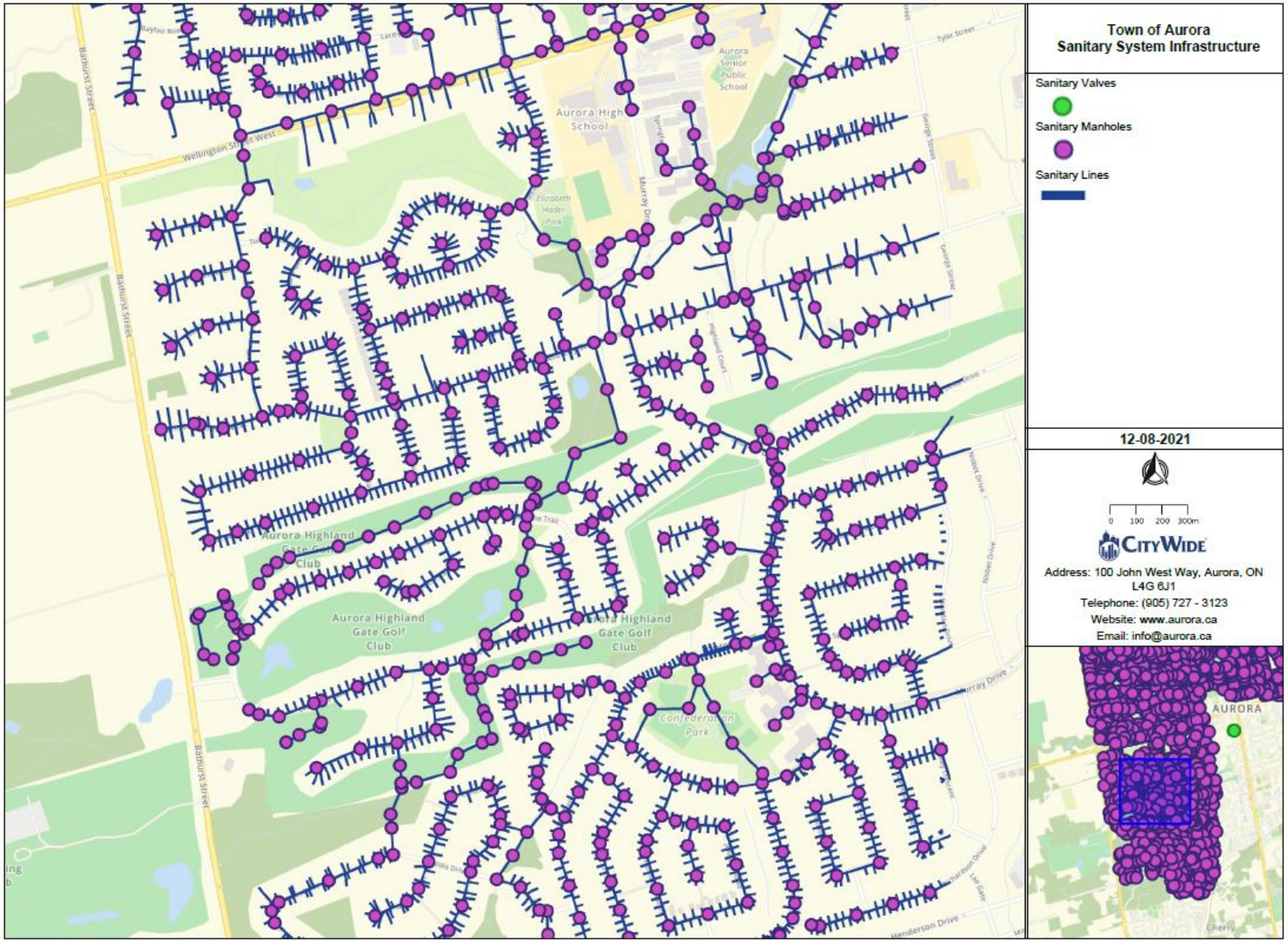
## Sanitary System Infrastructure – Part 1



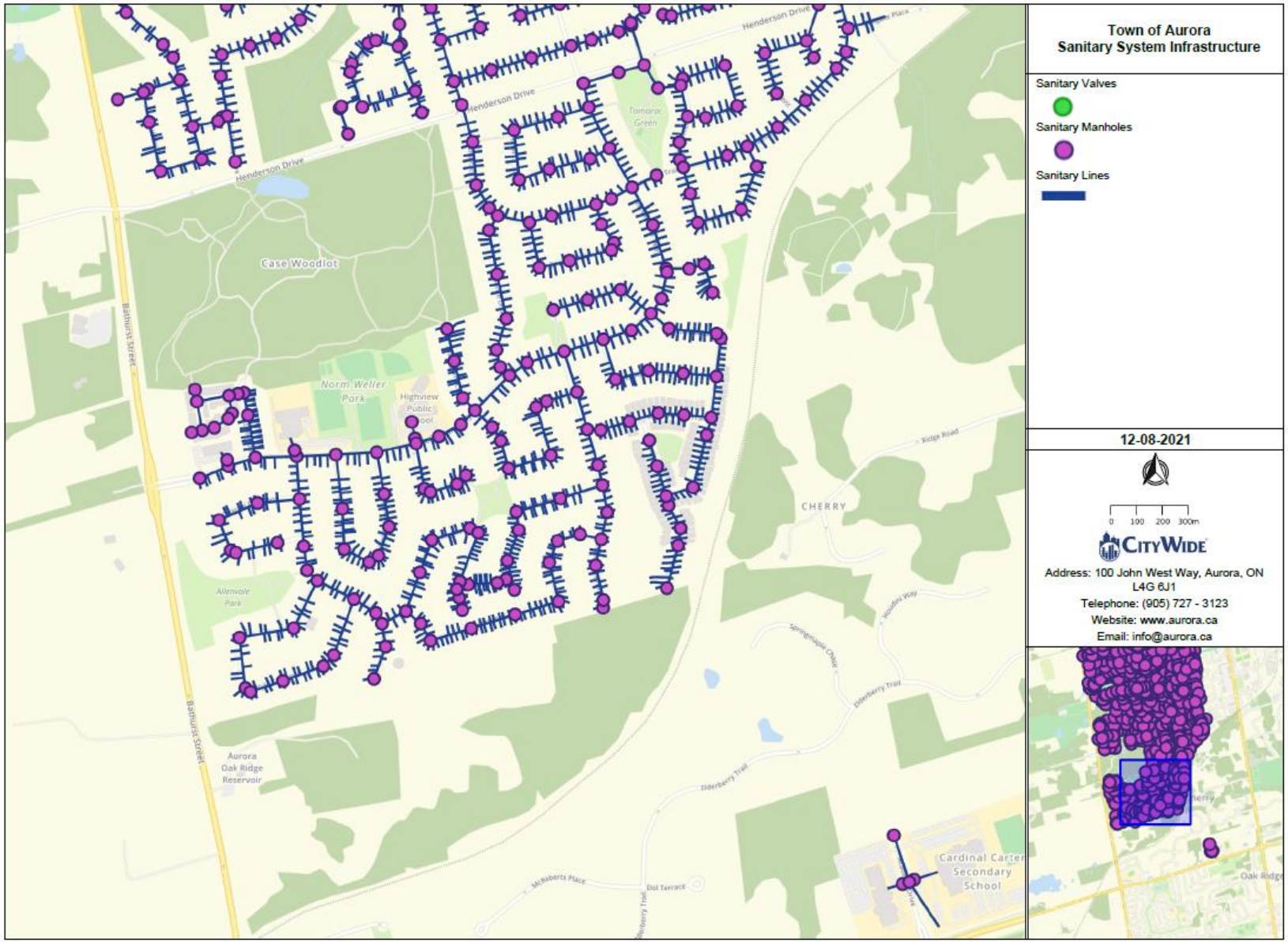
## Sanitary System Infrastructure – Part 2



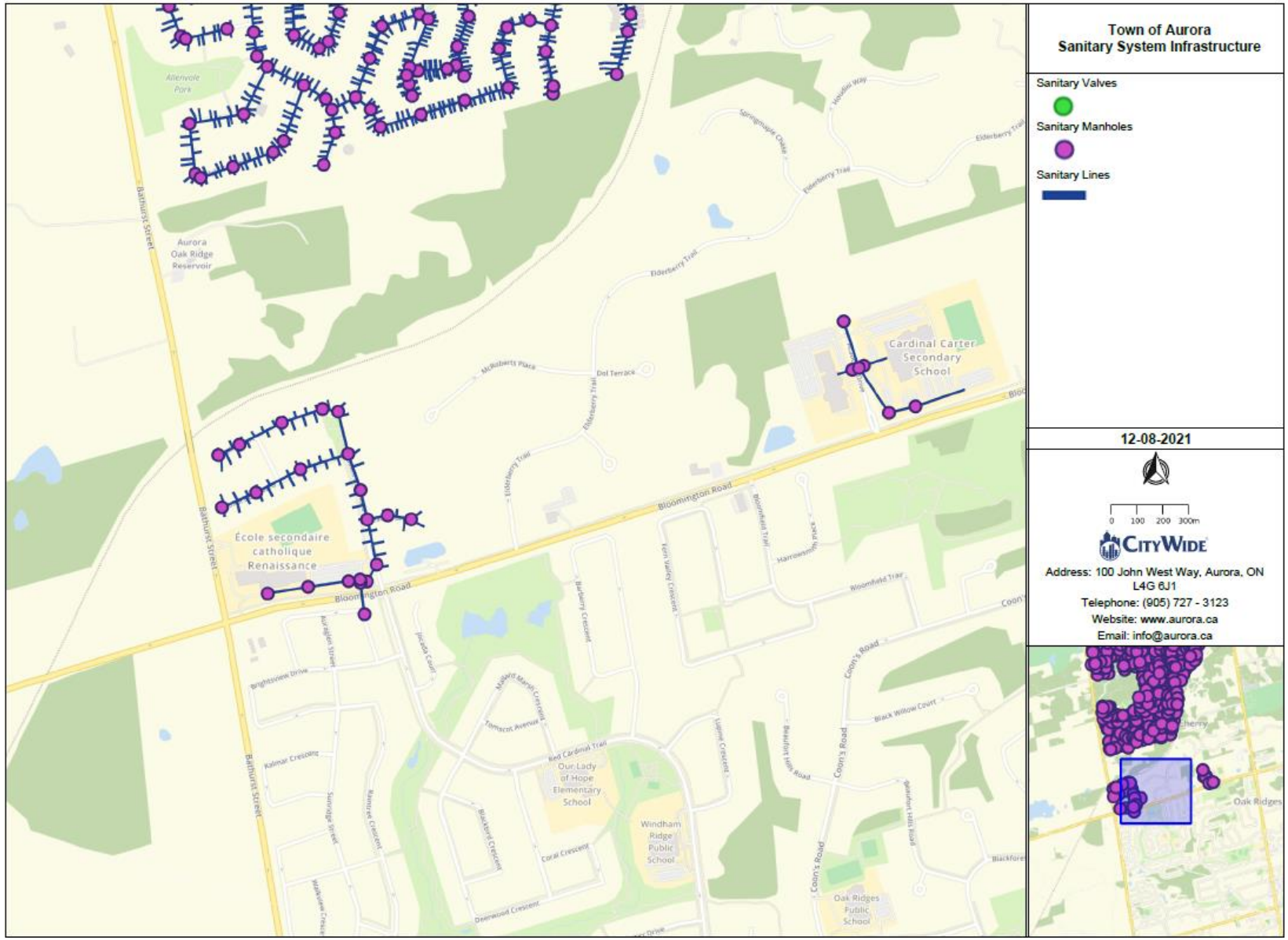
## Sanitary System Infrastructure – Part 3



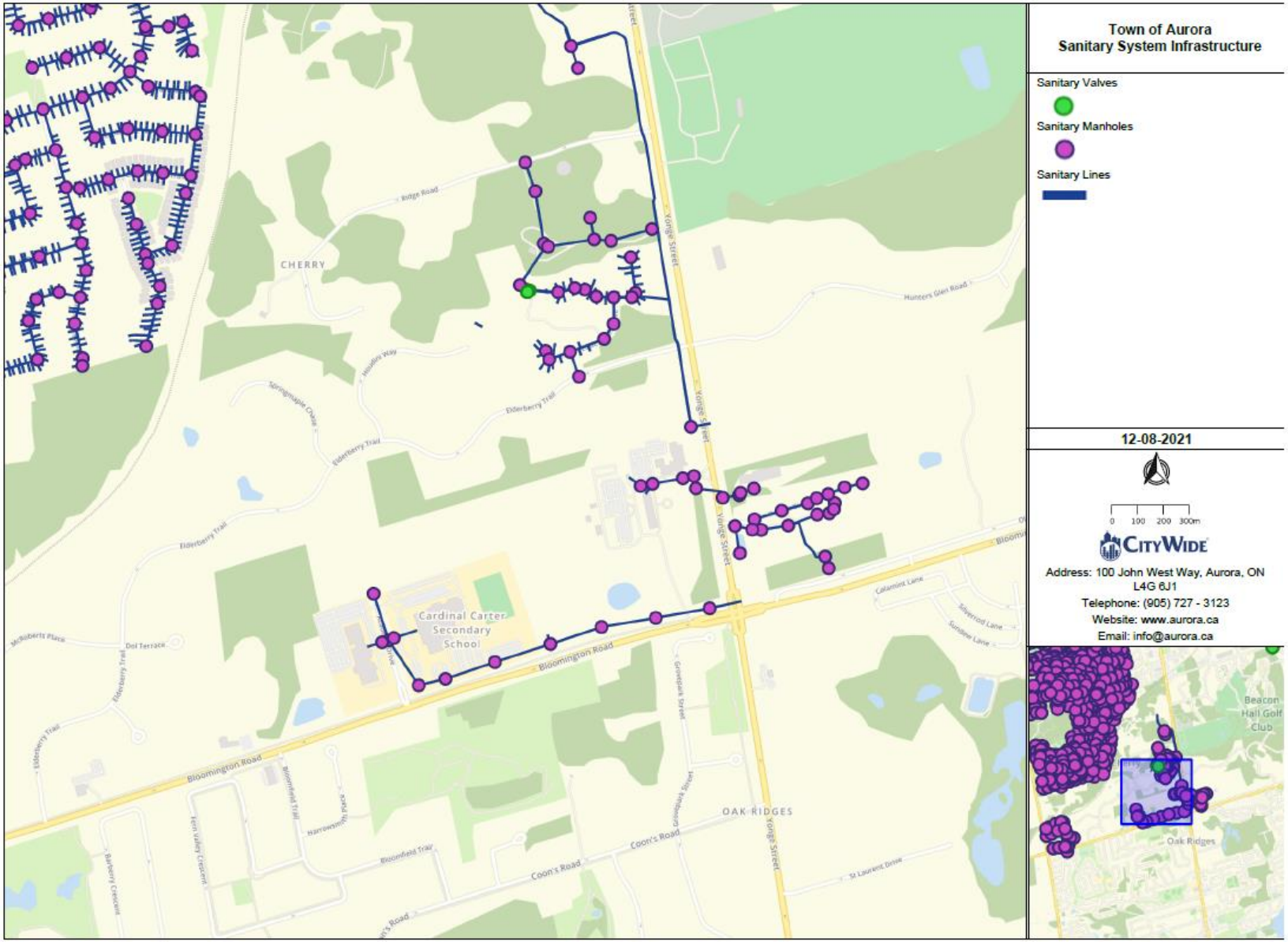
## Sanitary System Infrastructure – Part 4



## Sanitary System Infrastructure – Part 5

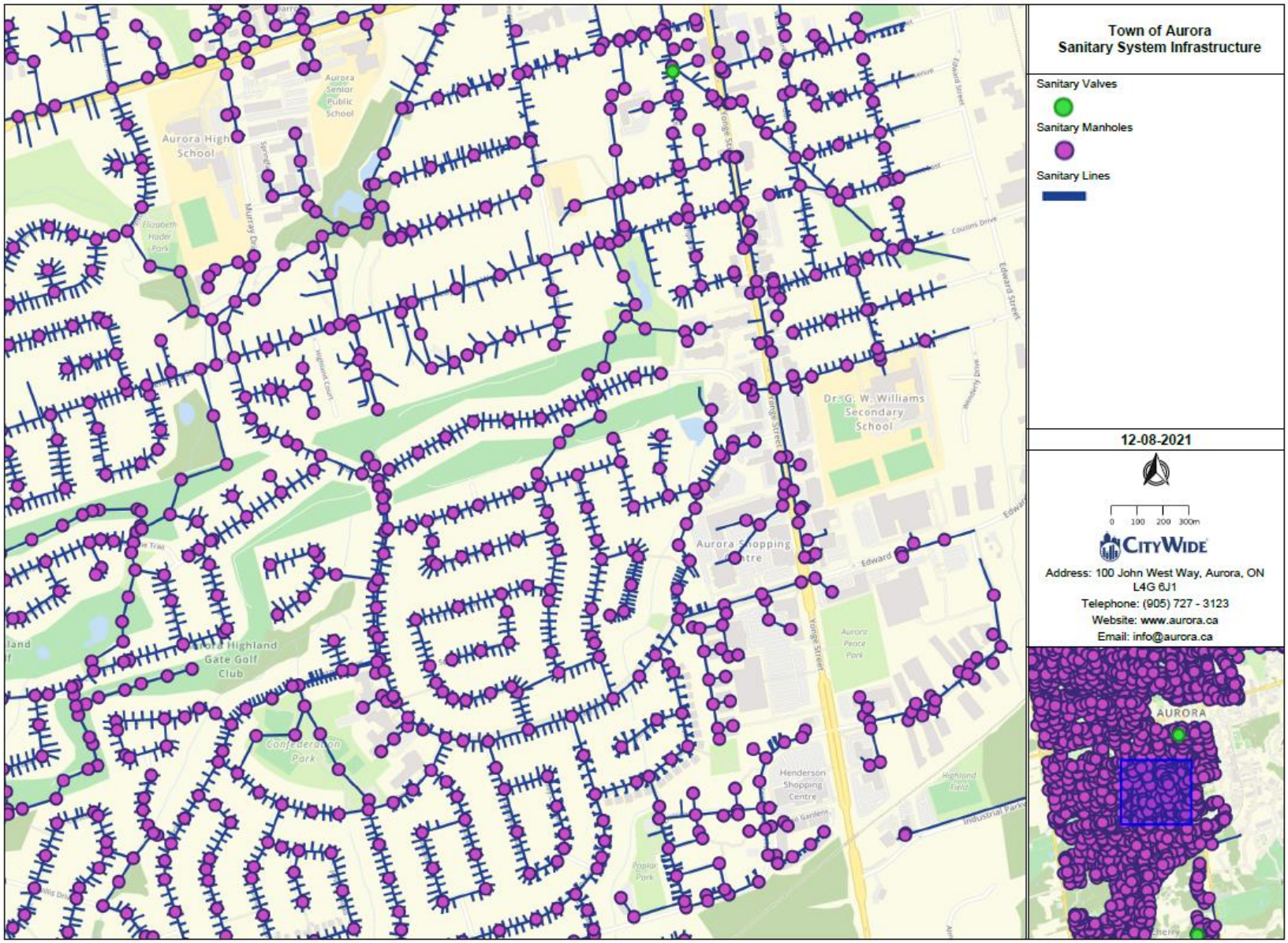


## Sanitary System Infrastructure – Part 6

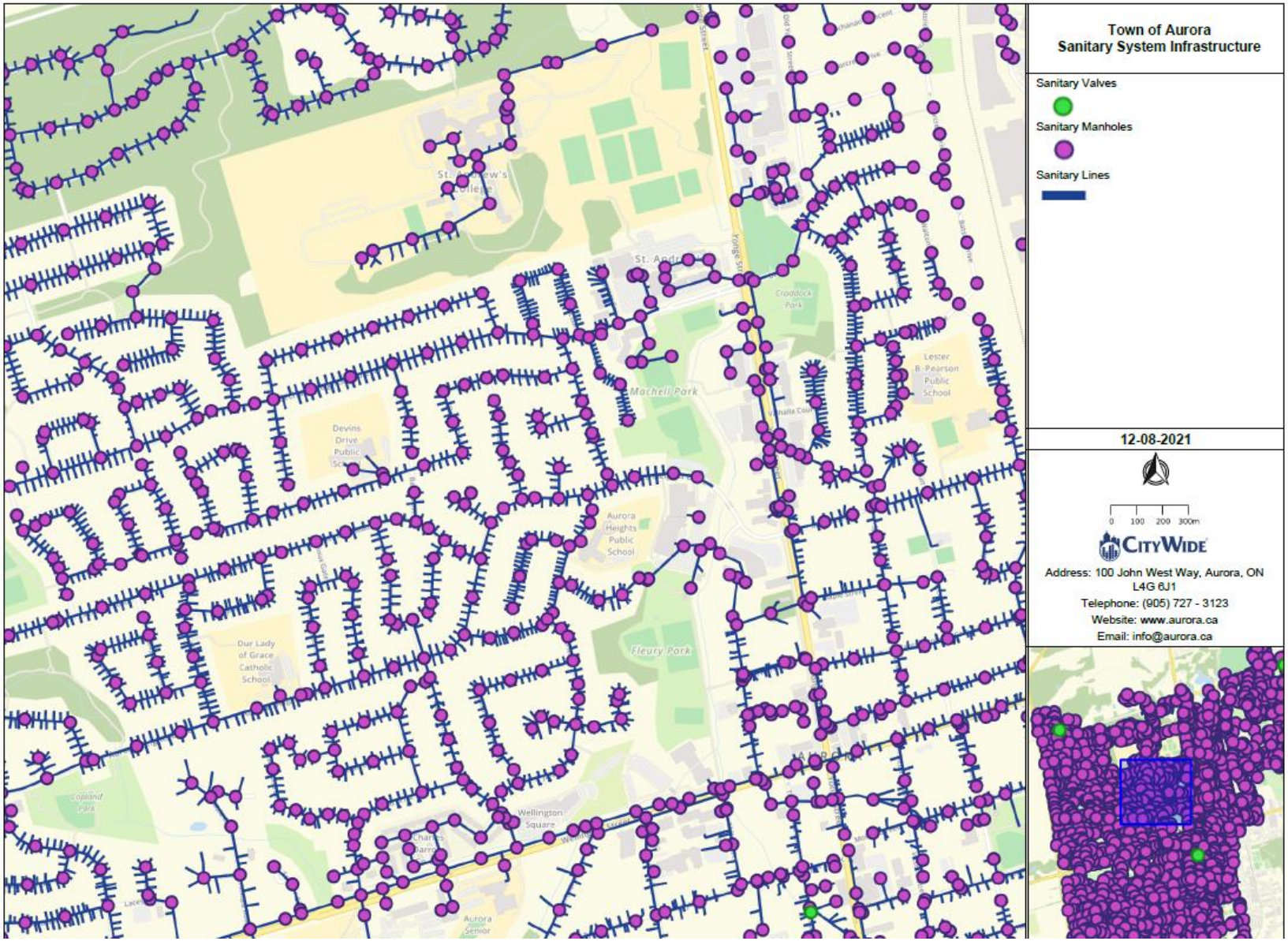


## Sanitary System Infrastructure – Part 7

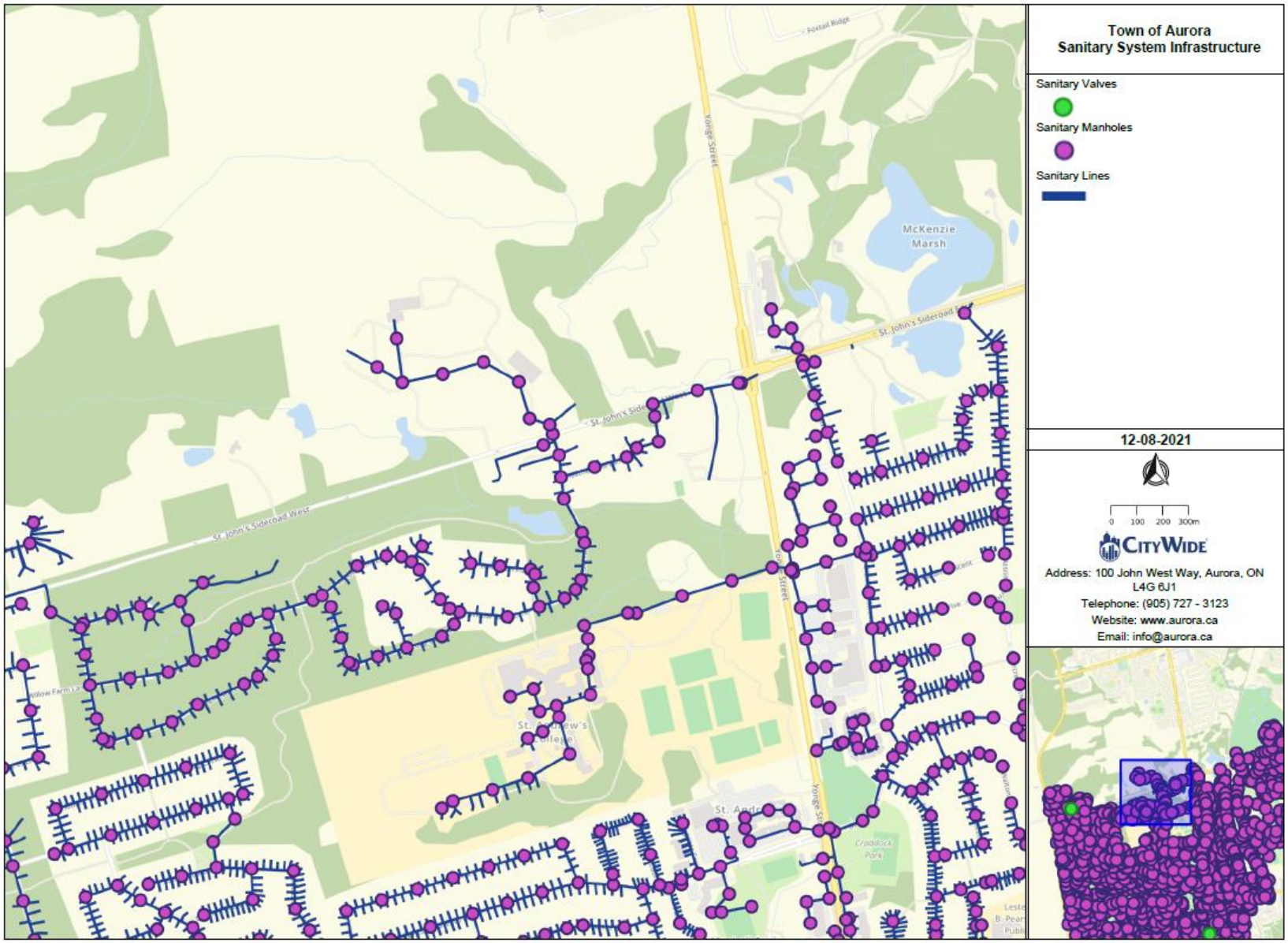
## Sanitary System Infrastructure – Part 8



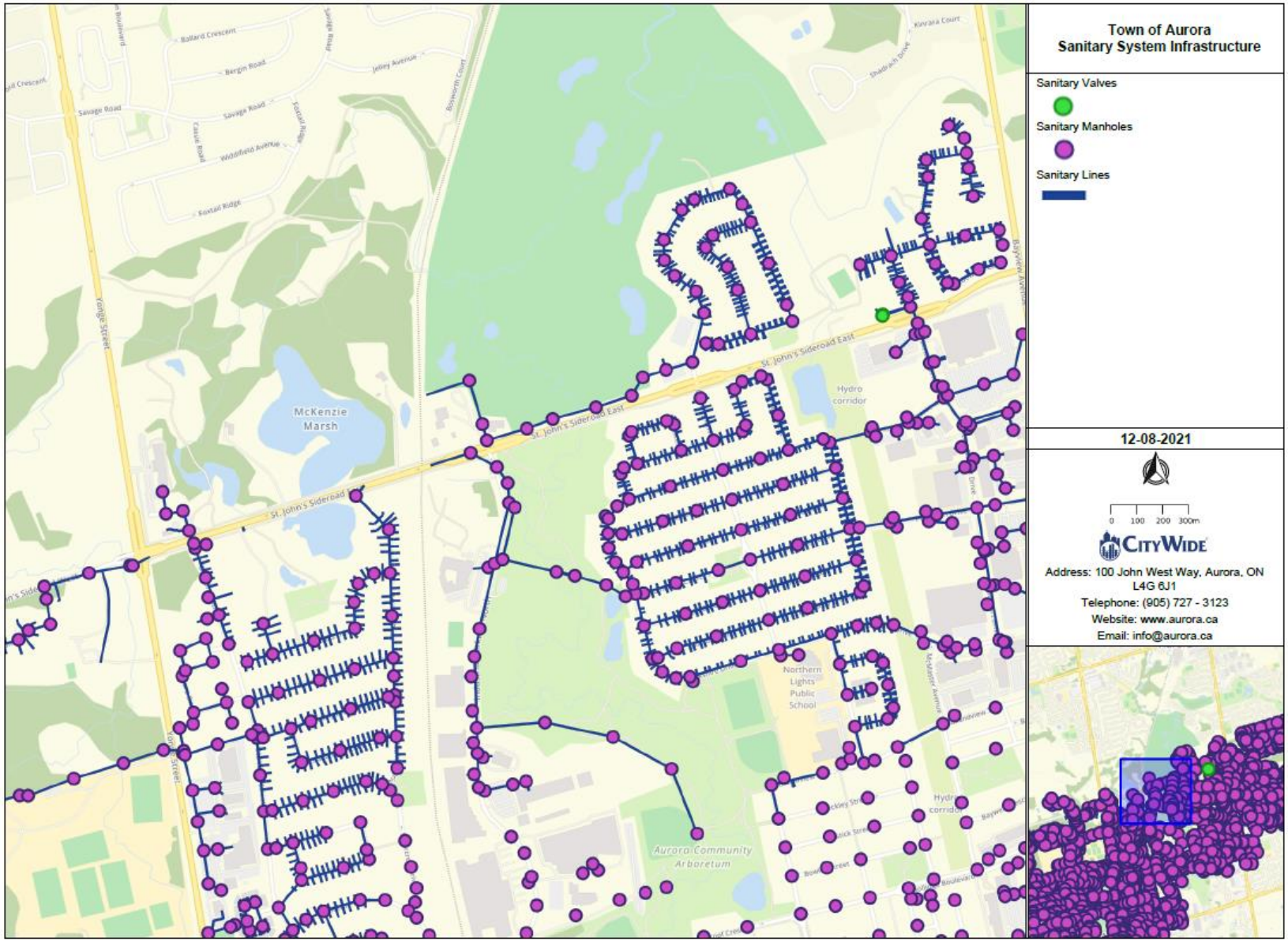
## Sanitary System Infrastructure – Part 9



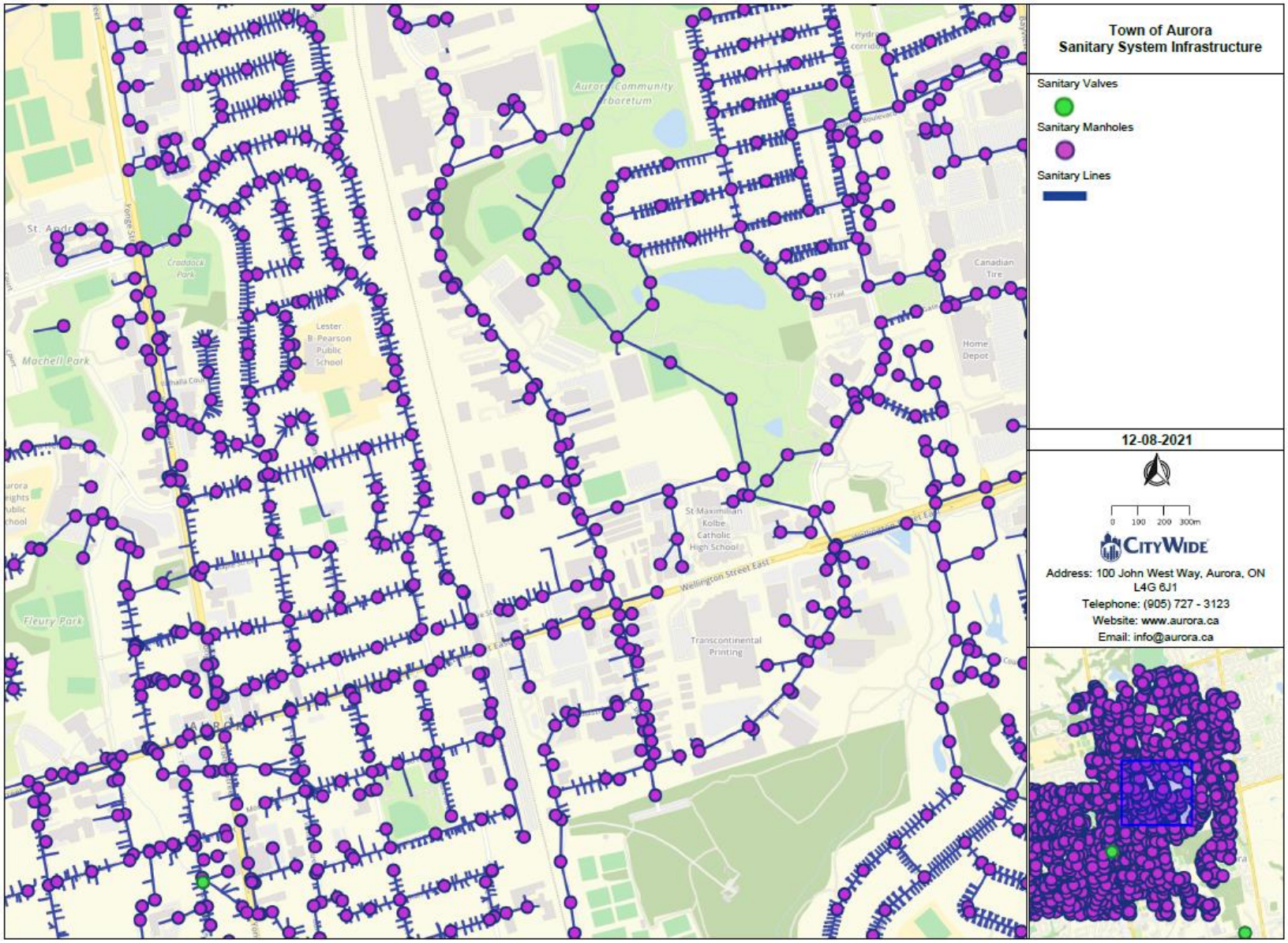
## Sanitary System Infrastructure – Part 10



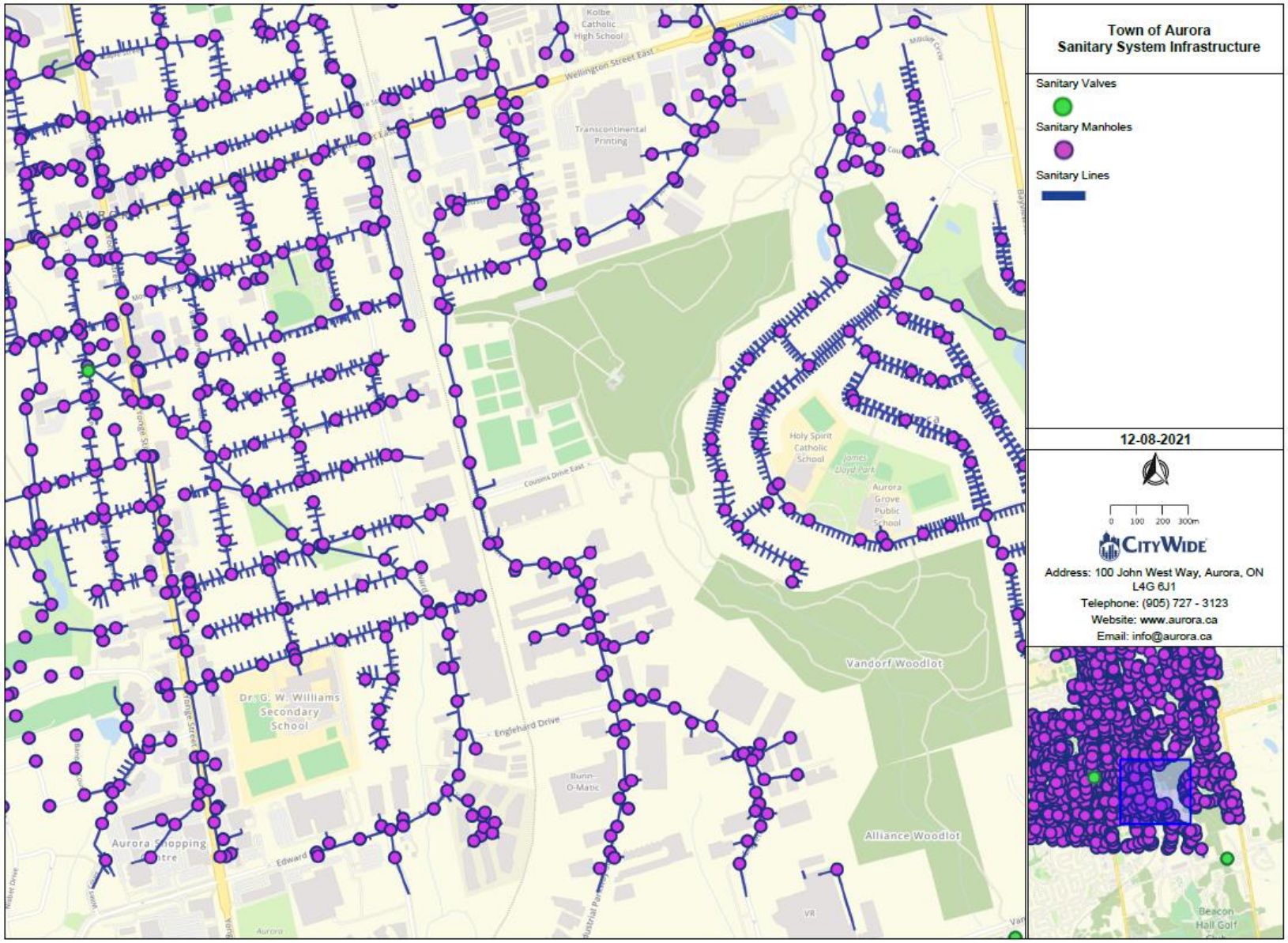
## Sanitary System Infrastructure – Part 11



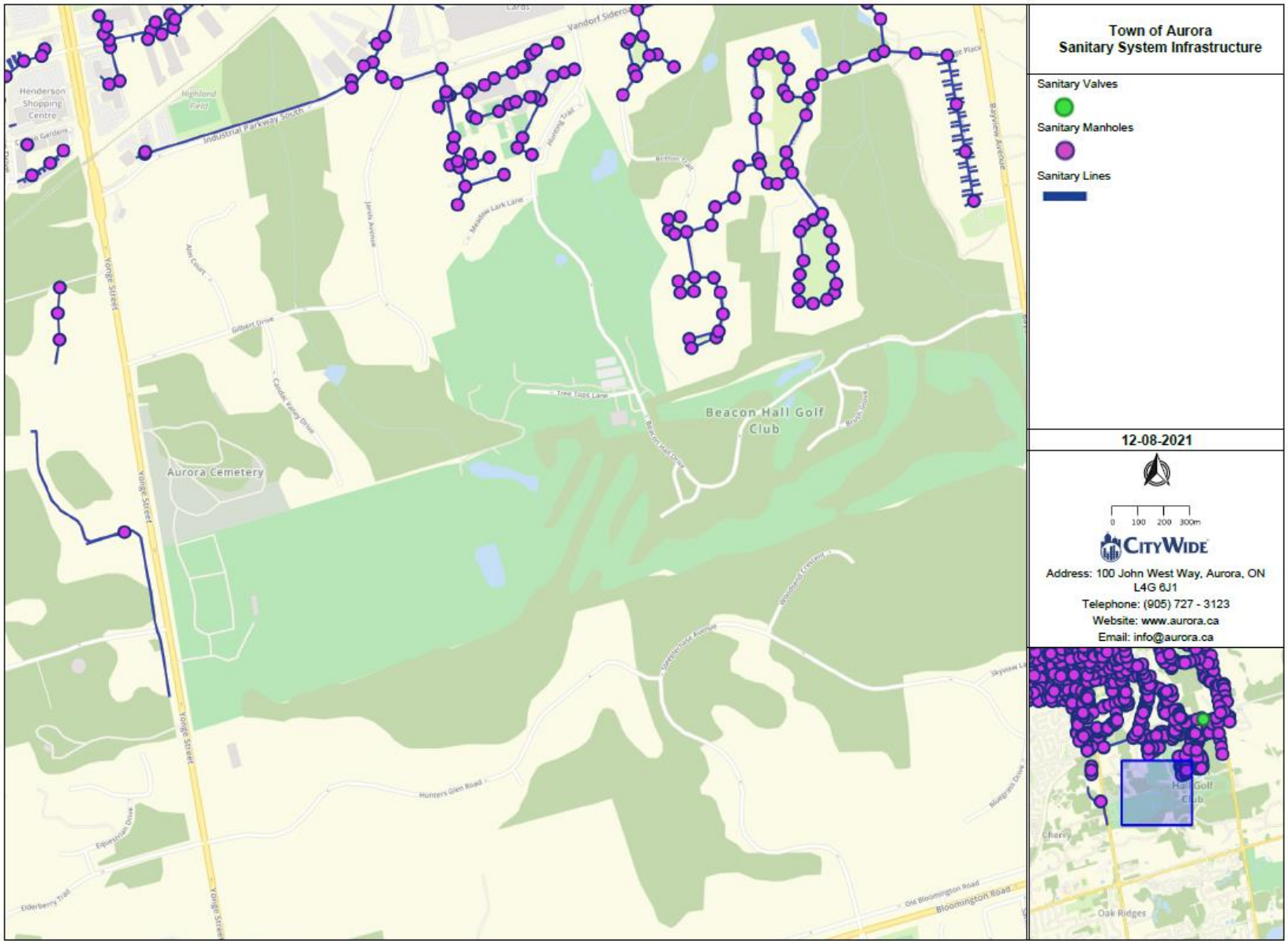
## Sanitary System Infrastructure – Part 12



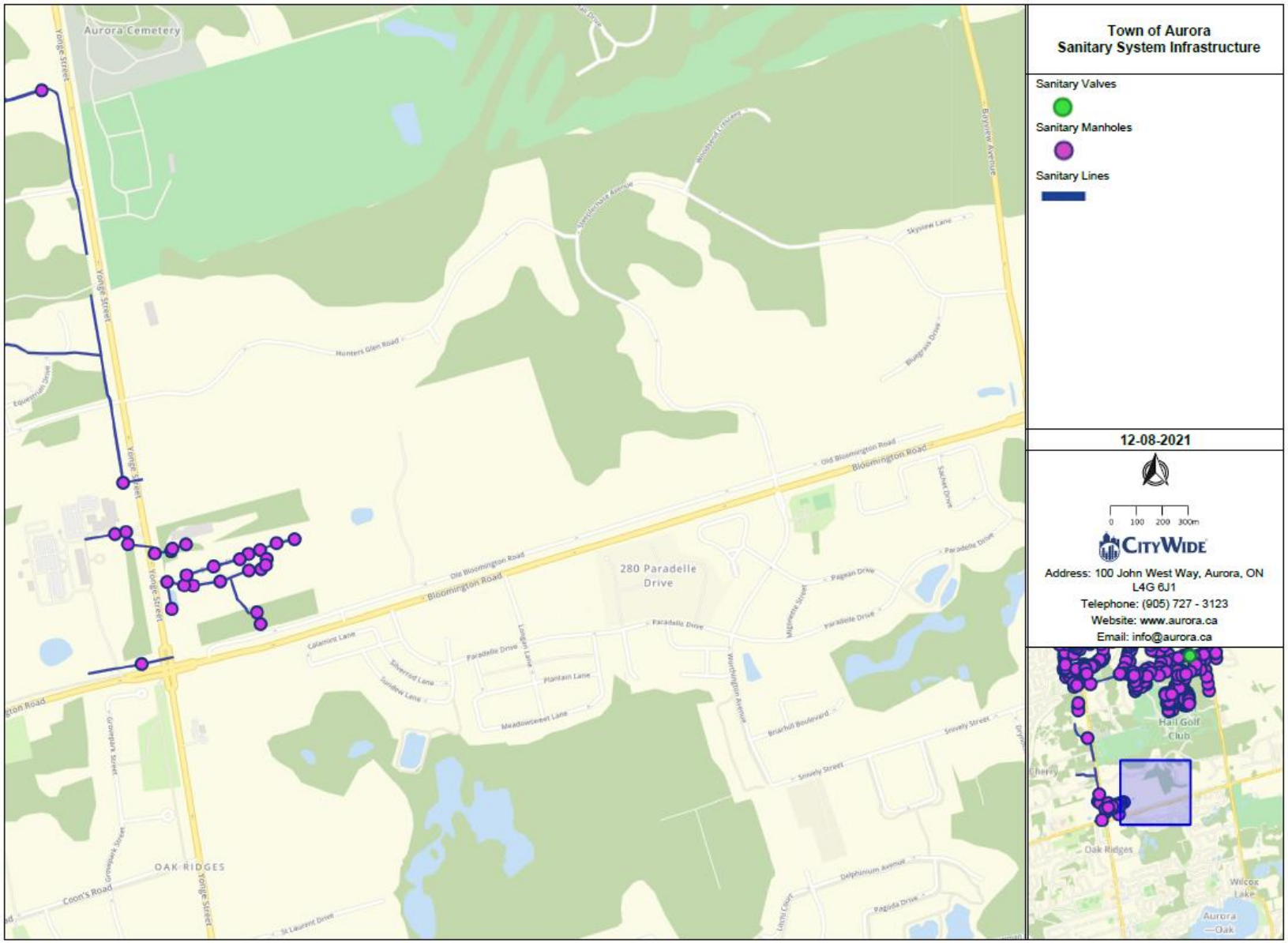
## Sanitary System Infrastructure – Part 13



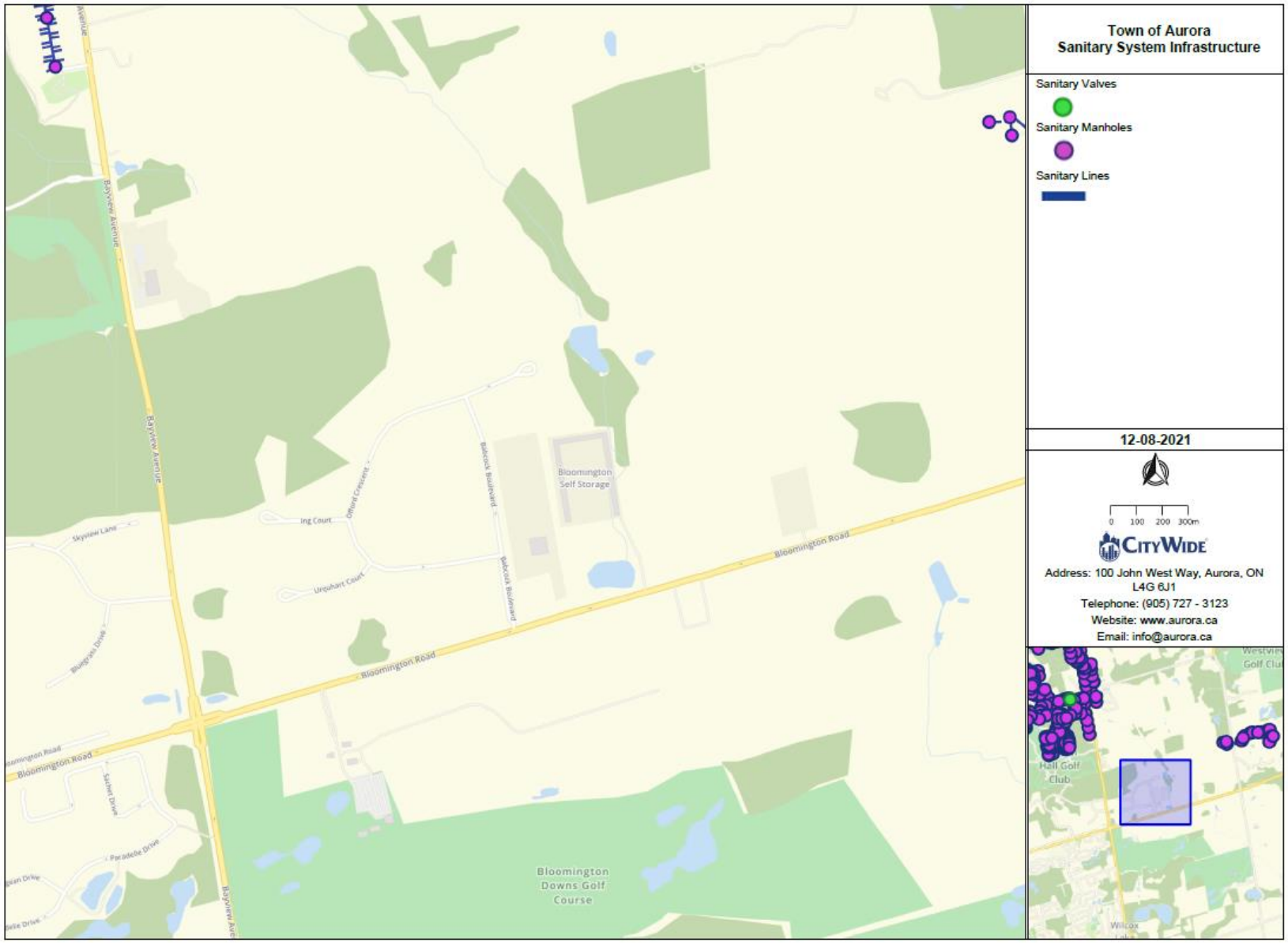
## Sanitary System Infrastructure – Part 14



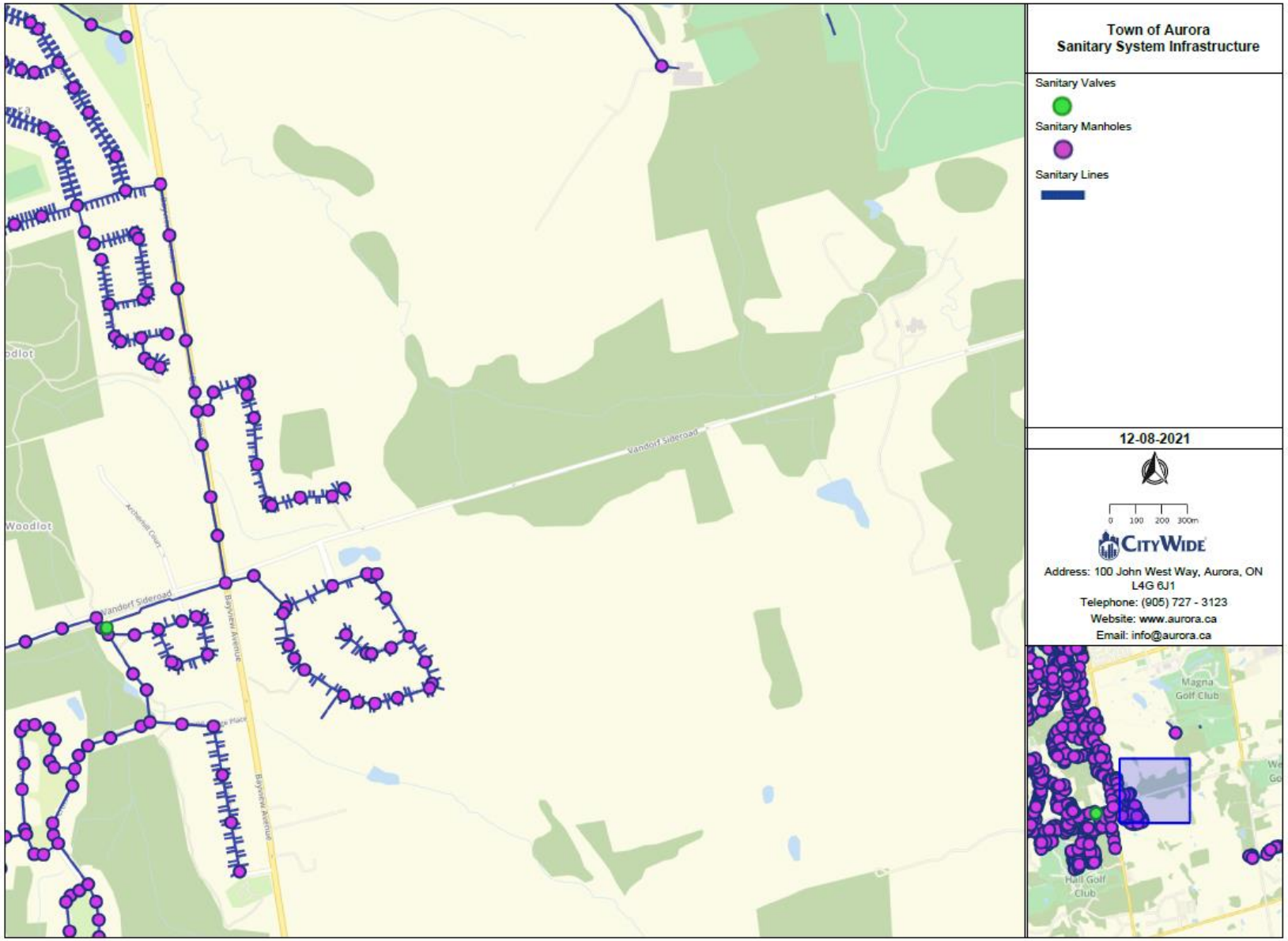
## Sanitary System Infrastructure – Part 15



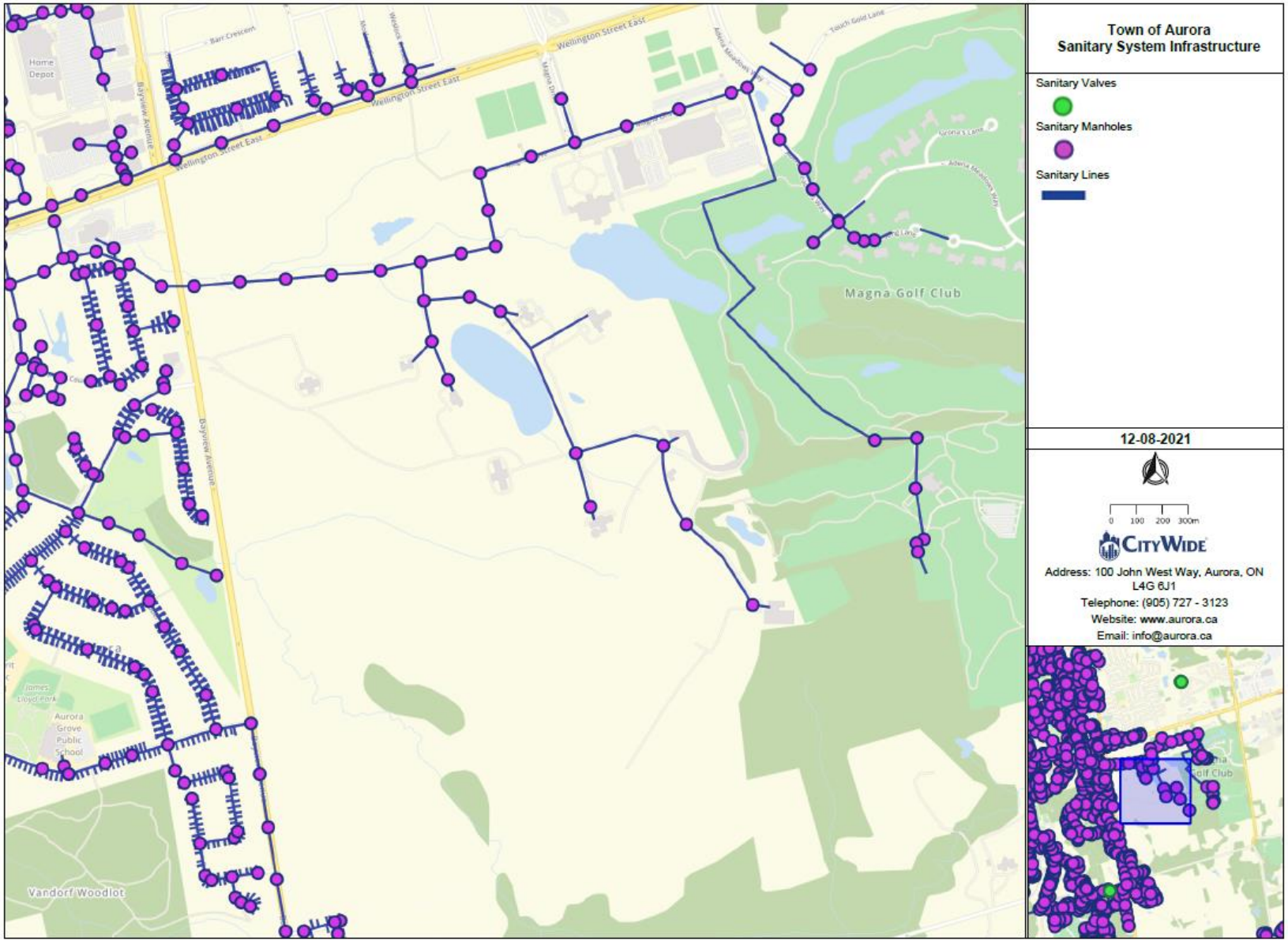
## Sanitary System Infrastructure – Part 16



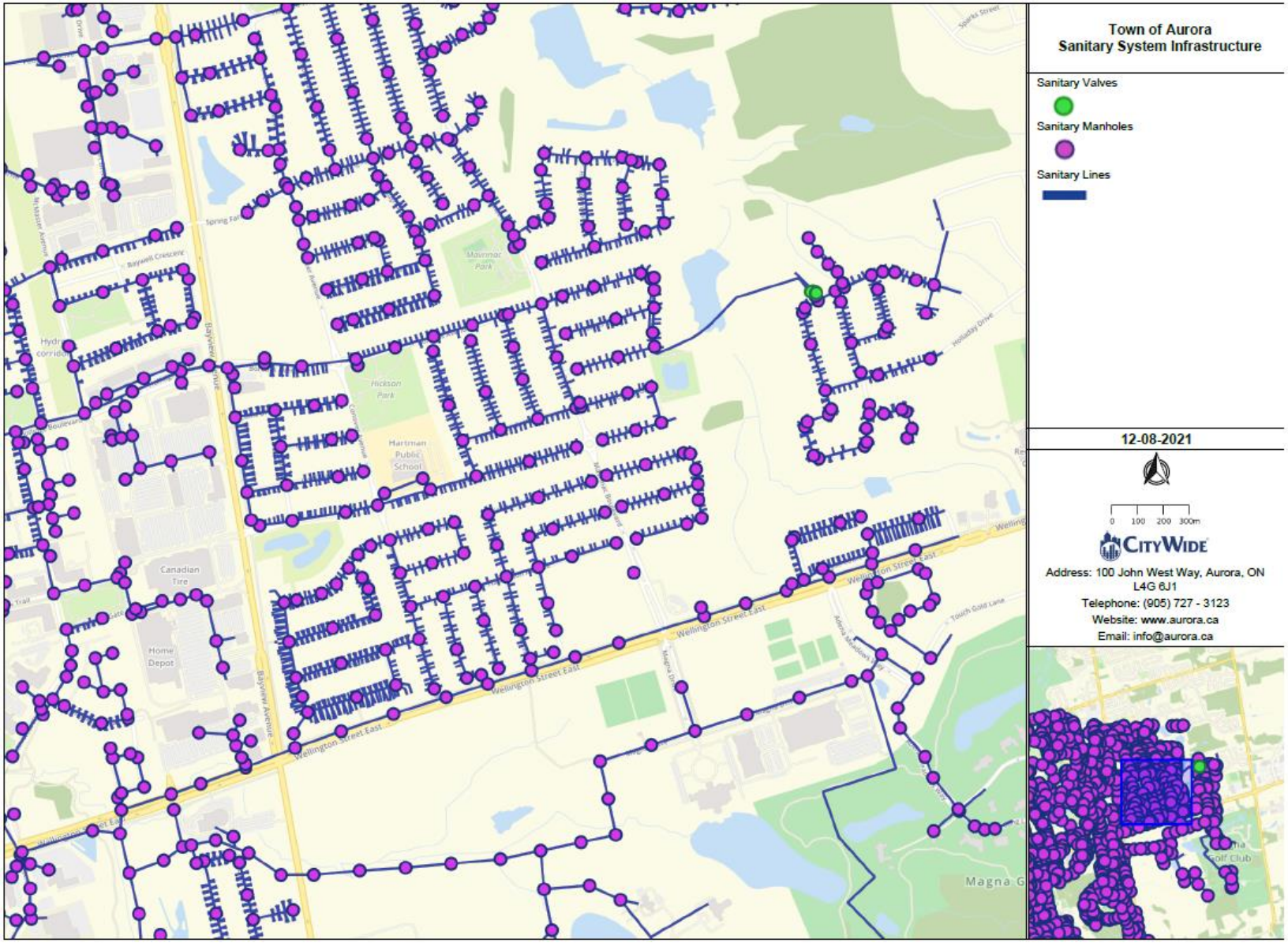
## Sanitary System Infrastructure – Part 17



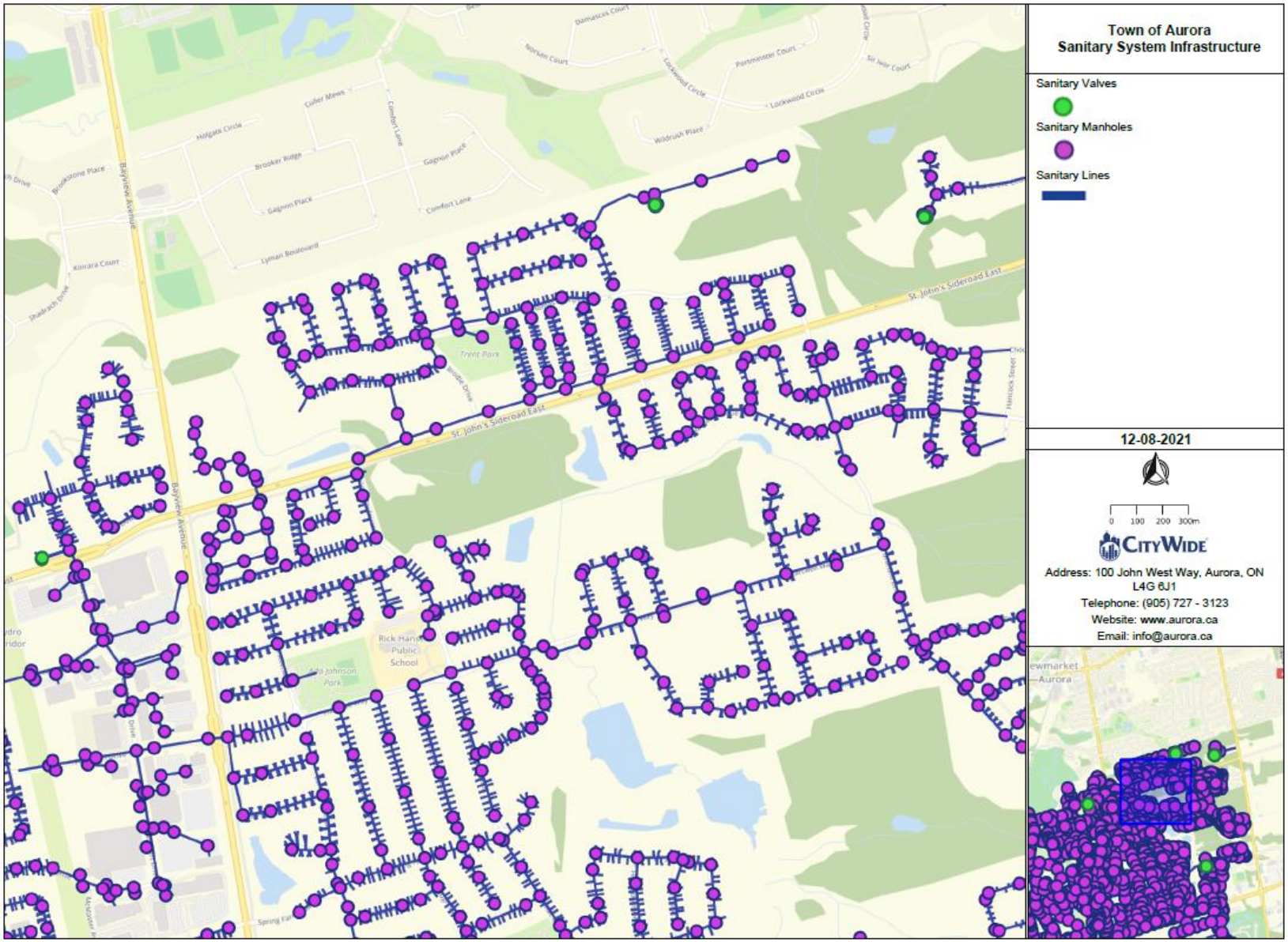
## Sanitary System Infrastructure – Part 18



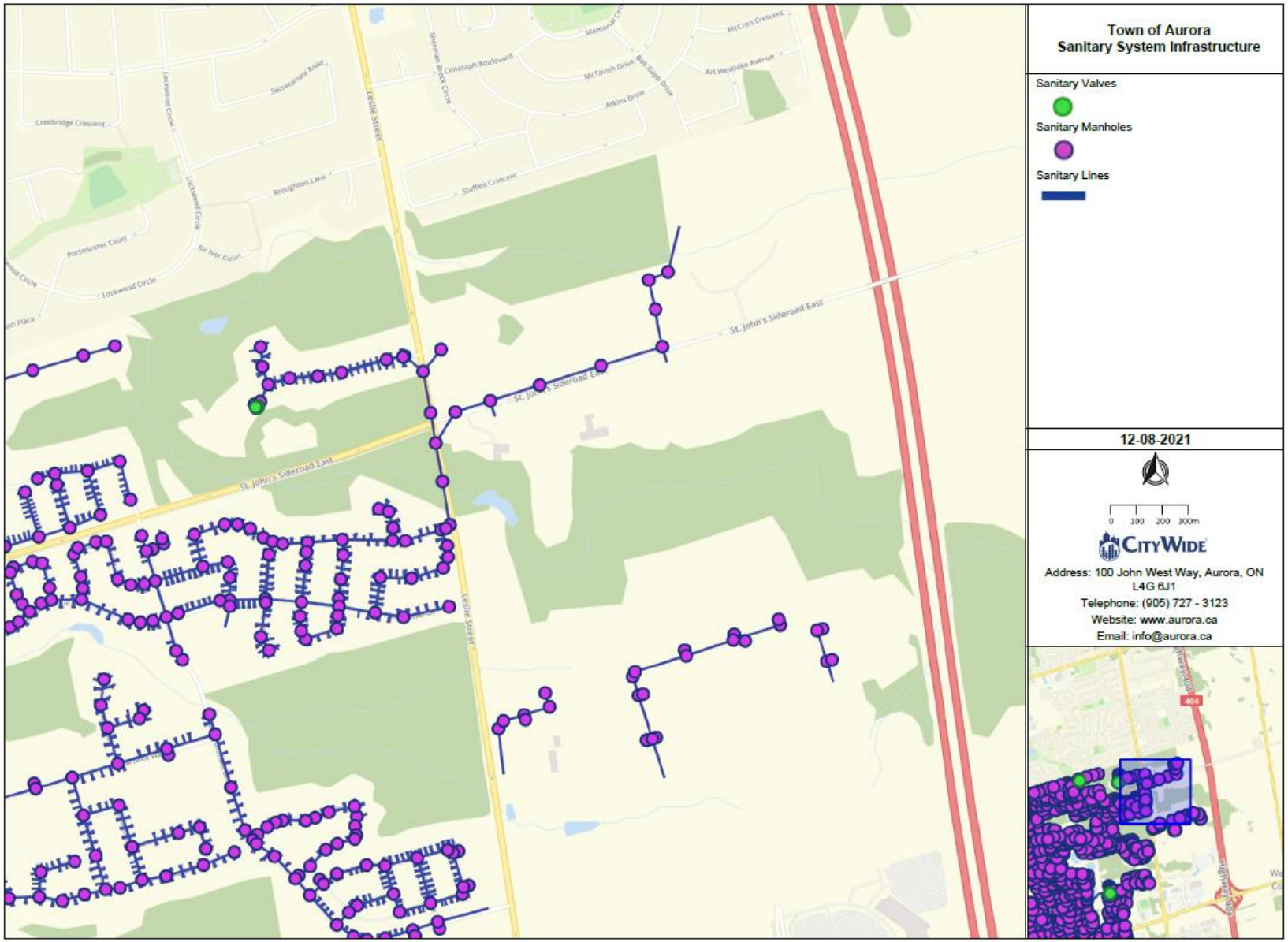
## Sanitary System Infrastructure – Part 19



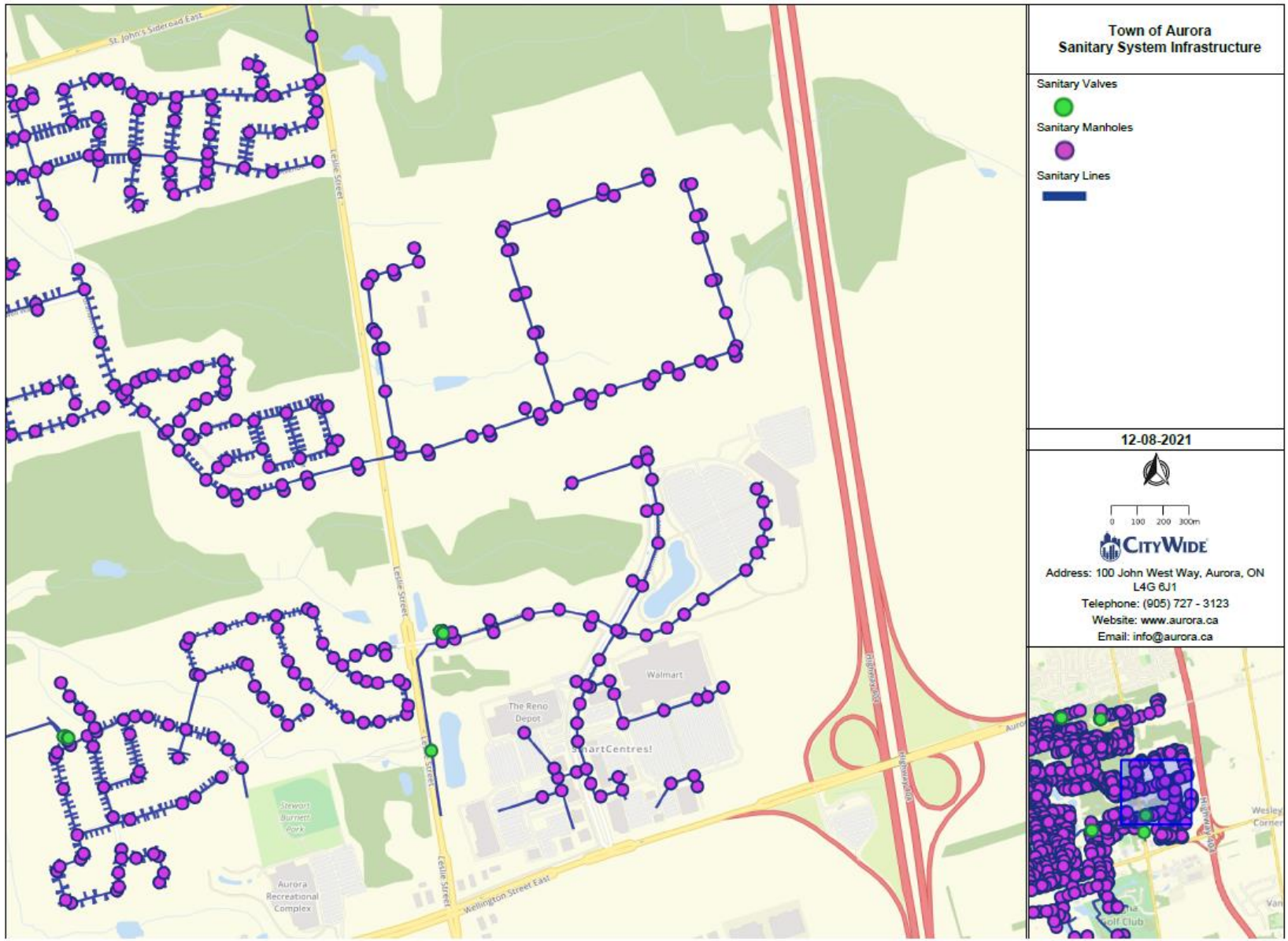
## Sanitary System Infrastructure – Part 20



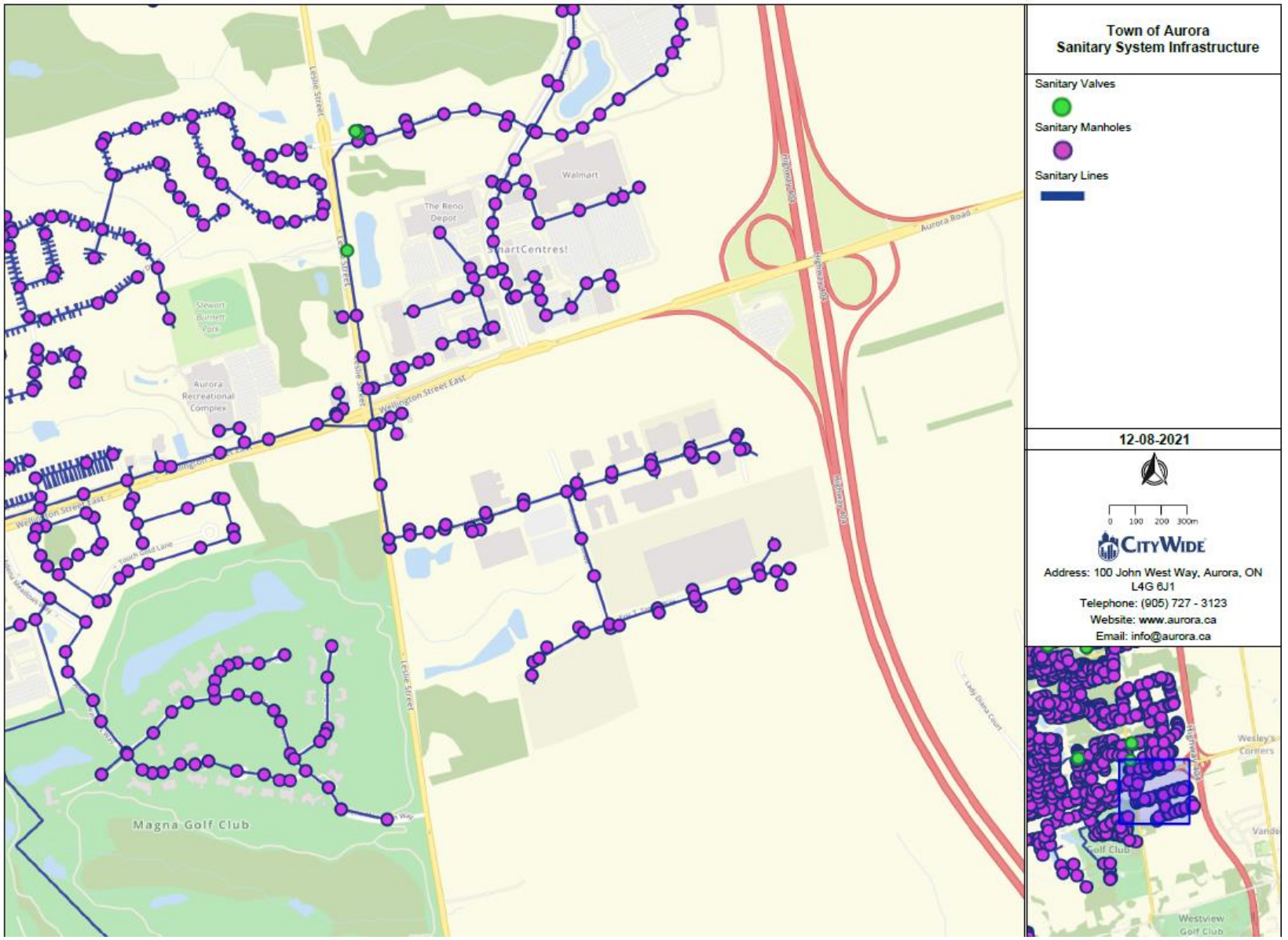
## Sanitary System Infrastructure – Part 21



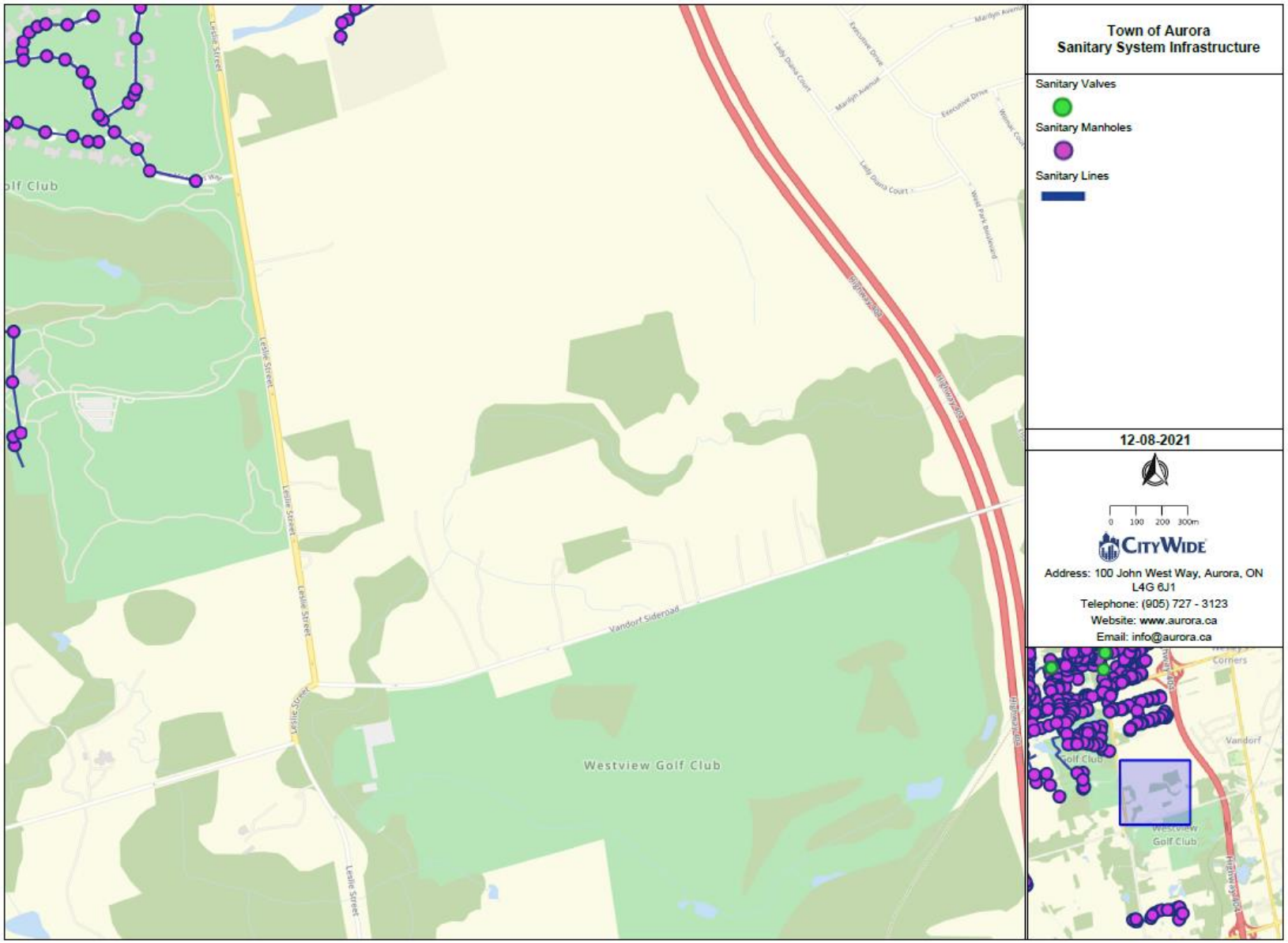
## Sanitary System Infrastructure – Part 22



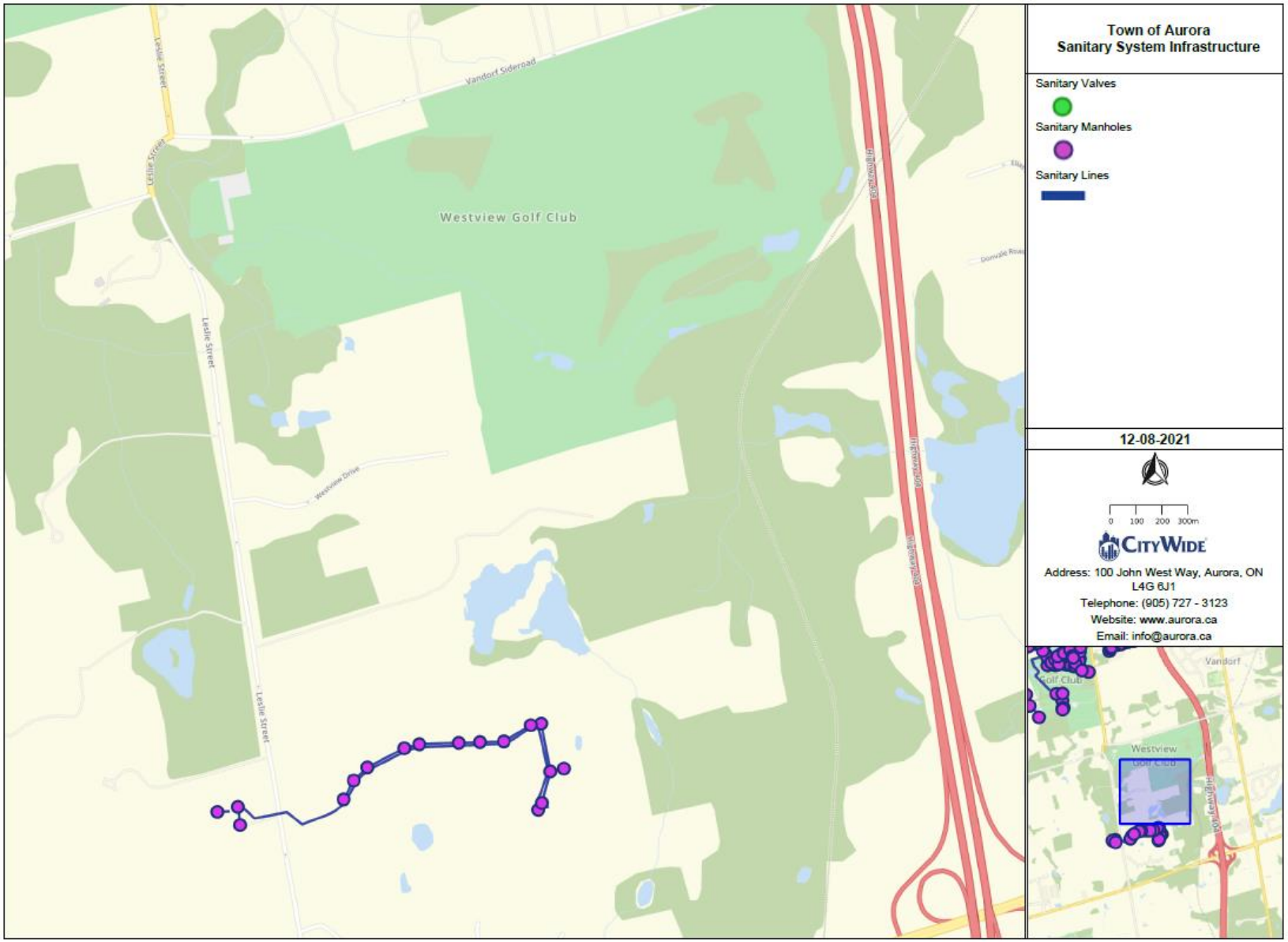
## Sanitary System Infrastructure – Part 23



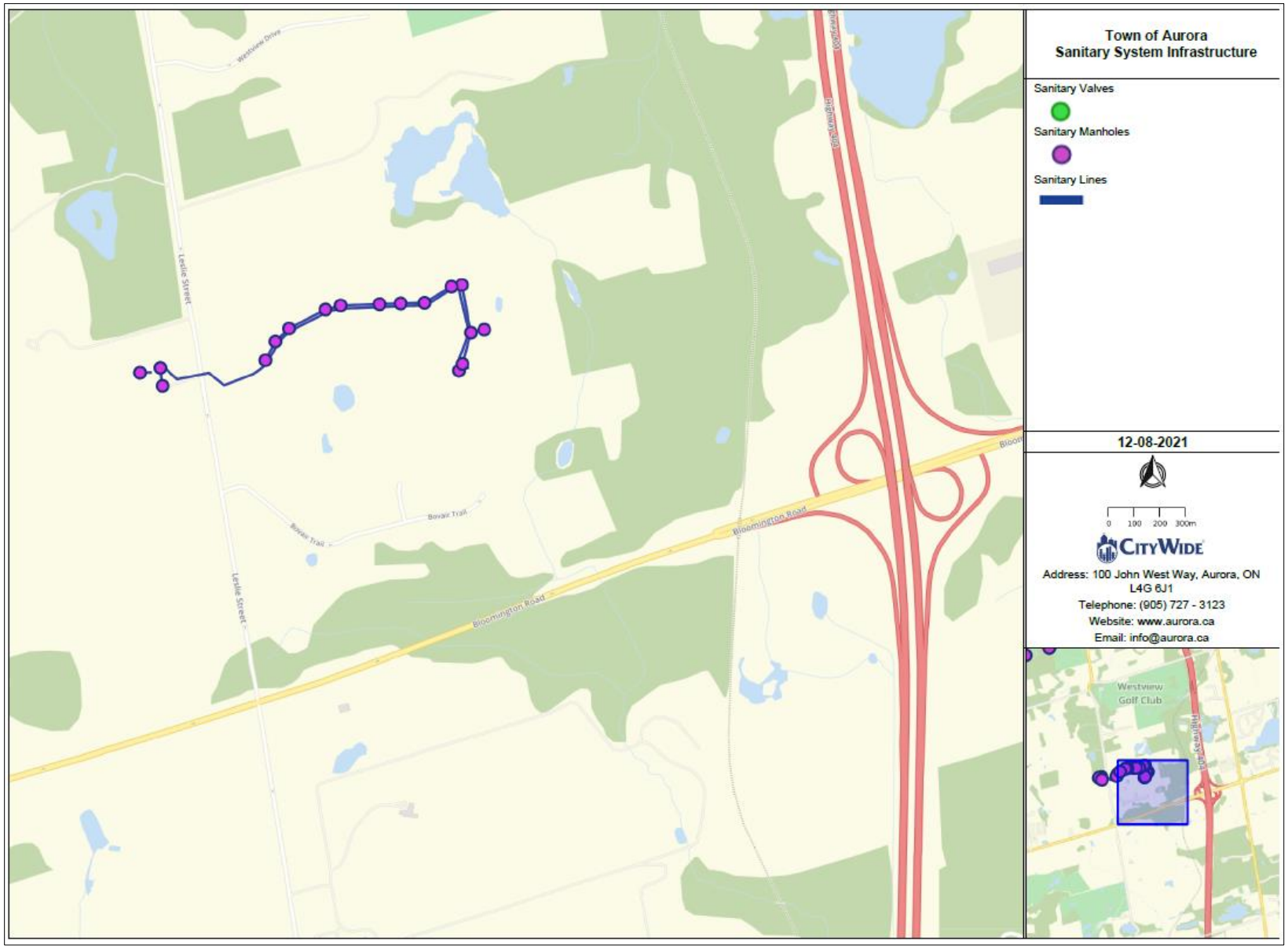
## Sanitary System Infrastructure – Part 24



## Sanitary System Infrastructure – Part 25



## Sanitary System Infrastructure – Part 26



# Appendix D: Risk Rating Criteria

## Probability of Failure

| Asset Category | Risk Criteria | Criteria Weighting | Value/Range | Probability of Failure Score |
|---|---|---|---|---|
| Road Network | Condition | 75% | 80-100 | 1 |
| | | | 60-79 | 2 |
| | | | 40-59 | 3 |
| | | | 20-39 | 4 |
| | | | 0-19 | 5 |
| | Traffic Count | 25% | 0-999 | 1 |
| | | | 1000-2999 | 2 |
| | | | 3000-5999 | 3 |
| | | | 6000-7999 | 4 |
| | | | 8000+ | 5 |
| Bridges & Culverts | Condition | 60% | 80-100 | 1 |
| | | | 60-79 | 2 |
| | | | 40-59 | 3 |
| | | | 20-39 | 4 |
| | | | 0-19 | 5 |
| | Service Life Remaining | 20% | 80-100 | 1 |
| | | | 60-79 | 2 |
| | | | 40-59 | 3 |
| | | | 20-39 | 4 |
| | | | 0-19 | 5 |
| | Material | 20% | Concrete-Precast | 3 |
| | | | Corrugated Steel Pipe | 4 |
| | | | Large Concrete Culvert | 5 |

| Asset Category | Risk Criteria | Criteria Weighting | Value/Range | Probability of Failure Score |
|---|---|---|---|---|
| Sanitary Mains | Condition | 70% | 80-100 | 1 |
| | | | 60-79 | 2 |
| | | | 40-59 | 3 |
| | | | 20-39 | 4 |
| | | | 0-19 | 5 |
| | Material | 30% | HDPE | 2 |
| | | | PVC | 2 |
| | | | Ductile Iron | 3 |
| | | | Cast Iron | 3 |
| | | | Asbestos Cement | 4 |
| | | | Concrete Pipe | 4 |
| | | | Vitrified Clay | 5 |
| | | | Clay Pipe | 5 |
| Water Mains | Condition | 70% | 80-100 | 1 |
| | | | 60-79 | 2 |
| | | | 40-59 | 3 |
| | | | 20-39 | 4 |
| | | | 0-19 | 5 |
| | Material | 30% | HDPE | 2 |
| | | | PVC | 2 |
| | | | Copper | 3 |
| | | | Cast Iron | 3 |
| | | | Ductile Iron | 3 |
| | | | Concrete Pipe | 4 |
| | | | Reinforced Concrete | 4 |
| | | | Asbestos Cement | 5 |
| Storm Mains | Condition | 70% | 80-100 | 1 |
| | | | 60-79 | 2 |
| | | | 40-59 | 3 |
| | | | 20-39 | 4 |

| Asset Category | Risk Criteria | Criteria Weighting | Value/Range | Probability of Failure Score |
|---|---|---|---|---|
| | | | 0-19 | 5 |
| | Material | 30% | HDPE | 2 |
| | | | PVC | 2 |
| | | | Cast Iron | 3 |
| | | | CB Lead | 3 |
| | | | Corrugated Steel Pipe | 3 |
| | | | Concrete Pipe | 4 |
| | | | Concrete Cast-In Place | 4 |
| | | | CP | 4 |
| | | | Vitrified Clay | 5 |
| | | | Asbestos Cement | 5 |
| | | | Clay Pipe | 5 |
| Default (All other assets) | Condition | 100% | 80-100 | 1 |
| | | | 60-79 | 2 |
| | | | 40-59 | 3 |
| | | | 20-39 | 4 |
| | | | 0-19 | 5 |

## Consequence of Failure

| Asset Category | Risk Classification | Risk Criteria | Value/Range | Consequence of Failure Score |
|---|---|---|---|---|
| Road Network | Economic (90%) | Replacement Cost (100%) | $0-$50,000 | 1 |
| | | | $50,000-$100,000 | 2 |
| | | | $100,000-$250,000 | 3 |
| | | | $250,000-$500,000 | 4 |
| | | | $500,000+ | 5 |
| | Operational (10%) | Lane Count (100%) | 1 | 1 |
| | | | 2 | 2 |
| | | | 3 | 3 |
| | | | 4 | 4 |
| Bridges & Culverts | Economic (80%) | Replacement Cost (100%) | $0-$100,000 | 1 |
| | | | $100,000-$250,000 | 2 |
| | | | $250,000-$500,000 | 3 |
| | | | $500,000-$1,000,000 | 4 |
| | | | $1,000,000+ | 5 |
| | Social (20%) | Detour Distance [km] (100%) | 0-2 | 1 |
| | | | 3-5 | 2 |
| | | | 6-8 | 3 |
| | | | 9-10 | 4 |
| | | | 10+ | 5 |
| Sanitary Mains | Economic (70%) | Replacement Cost (100%) | $0-$50,000 | 1 |
| | | | $50,000-$150,000 | 2 |
| | | | $150,000-$250,000 | 3 |
| | | | $250,000-$500,000 | 4 |
| | | | $500,000+ | 5 |
| | Operational (30%) | Diameter [mm] (100%) | 0-50 | 1 |
| | | | 50-150 | 2 |
| | | | 150-250 | 3 |
| | | | 250-450 | 4 |
| | | | 450+ | 5 |

| Asset Category | Risk Classification | Risk Criteria | Value/Range | Consequence of Failure Score |
|---|---|---|---|---|
| Water Mains | Economic (70%) | Replacement Cost (100%) | $0-$100,000 | 1 |
| | | | $100,000-$250,000 | 2 |
| | | | $250,000-$500,000 | 3 |
| | | | $500,000-$1,000,000 | 4 |
| | | | $1,000,000+ | 5 |
| | Operational (30%) | Diameter [mm] (100%) | 0-50 | 1 |
| | | | 50-150 | 2 |
| | | | 150-250 | 3 |
| | | | 250-400 | 4 |
| | | | 400+ | 5 |
| Storm Mains | Economic (70%) | Replacement Cost (100%) | $0-$10,000 | 1 |
| | | | $10,000-$25,000 | 2 |
| | | | $25,000-$50,000 | 3 |
| | | | $50,000-$100,000 | 4 |
| | | | $100,000+ | 5 |
| | Operational (30%) | Diameter [mm] (100%) | 0-150 | 1 |
| | | | 150-300 | 2 |
| | | | 300-500 | 3 |
| | | | 500-750 | 4 |
| | | | 750+ | 5 |
| Default (All other assets) | Economic (100%) | Historical Cost (100%) | $0-$100,000 | 1 |
| | | | $100,000-$250,000 | 2 |
| | | | $250,000-$500,000 | 3 |
| | | | $500,000-$1,000,000 | 4 |
| | | | $1,000,000+ | 5 |

# Appendix E: MMS– Classification & Patrolling Frequency of Roads

Arterials Roads are a Class 1 or Class 2; Collector Roads are a Class 3 or Class 4; and Local Roads are a Class 5 or Class 6. The higher the Class of road, the less patrolling is performed on it.

CLASSIFICATION OF HIGHWAYS

| Average Daily Traffic (number of motor vehicles) | 91 - 100 km/h speed limit | 81 - 90 km/h speed limit | 71 - 80 km/h speed limit | 61 - 70 km/h speed limit | 51 - 60 km/h speed limit | 41 - 50 km/h speed limit | 1 - 40 km/h speed limit |
|---|---|---|---|---|---|---|---|
| 53,000 or more | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 23,000 - 52,999 | 1 | 1 | 1 | 2 | 2 | 2 | 2 |
| 15,000 - 22,999 | 1 | 1 | 2 | 2 | 2 | 3 | 3 |
| 12,000 - 14,999 | 1 | 1 | 2 | 2 | 2 | 3 | 3 |
| 10,000 - 11,999 | 1 | 1 | 2 | 2 | 3 | 3 | 3 |
| 8,000 - 9,999 | 1 | 1 | 2 | 3 | 3 | 3 | 3 |
| 6,000 - 7,999 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| 5,000 - 5,999 | 1 | 2 | 2 | 3 | 3 | 4 | 4 |
| 4,000 - 4,999 | 1 | 2 | 3 | 3 | 3 | 4 | 4 |
| 3,000 - 3,999 | 1 | 2 | 3 | 3 | 3 | 4 | 4 |
| 2,000 - 2,999 | 1 | 2 | 3 | 3 | 4 | 5 | 5 |
| 1,000 - 1,999 | 1 | 3 | 3 | 3 | 4 | 5 | 5 |
| 500 - 999 | 1 | 3 | 4 | 4 | 4 | 5 | 5 |
| 200 - 499 | 1 | 3 | 4 | 4 | 5 | 5 | 6 |
| 50 - 199 | 1 | 3 | 4 | 5 | 5 | 6 | 6 |
| 0 - 49 | 1 | 3 | 6 | 6 | 6 | 6 | 6 |

PATROLLING FREQUENCY

| Class of Highway | Patrolling Frequency |
|---|---|
| 1 | 3 times every 7 days |
| 2 | 2 times every 7 days |
| 3 | once every 7 days |
| 4 | once every 14 days |
| 5/6 | once every 30 days |

# Appendix F: Condition Assessment Guidelines

The foundation of good asset management practice is accurate and reliable data on the current condition of infrastructure. Assessing the condition of an asset at a single point in time allows staff to have a better understanding of the probability of asset failure due to deteriorating condition.

Condition data is vital to the development of data-driven asset management strategies. Without accurate and reliable asset data, there may be little confidence in asset management decision-making which can lead to premature asset failure, service disruption and suboptimal investment strategies. To prevent these outcomes, the Town's condition assessment strategy should outline several key considerations, including:

- The role of asset condition data in decision-making
- Guidelines for the collection of asset condition data
- A schedule for how regularly asset condition data should be collected

## Role of Asset Condition Data

The goal of collecting asset condition data is to ensure that data is available to inform maintenance and renewal programs required to meet the desired level of service. Accurate and reliable condition data allows municipal staff to determine the remaining service life of assets, and identify the most cost-effective approach to deterioration, whether it involves extending the life of the asset through remedial efforts or determining that replacement is required to avoid asset failure.

In addition to the optimization of lifecycle management strategies, asset condition data also impacts the Town's risk management and financial strategies. Assessed condition is a key variable in the determination of an asset's probability of failure. With a strong understanding of the probability of failure across the entire asset portfolio, the Town can develop strategies to mitigate both the probability and consequences of asset failure and service disruption. Furthermore, with condition-based determinations of future capital expenditures, the Town can develop long-term financial strategies with higher accuracy and reliability.

## Guidelines for Condition Assessment

Whether completed by external consultants or internal staff, condition assessments should be completed in a structured and repeatable fashion, according to consistent and objective assessment criteria. Without proper guidelines for the completion of condition assessments there can be little confidence in the validity of condition data and asset management strategies based on this data.

Condition assessments must include a quantitative or qualitative assessment of the current condition of the asset, collected according to specified condition rating criteria, in a format that

can be used for asset management decision-making. As a result, it is important that staff adequately define the condition rating criteria that should be used and the assets that require a discrete condition rating. When engaging with external consultants to complete condition assessments, it is critical that these details are communicated as part of the contractual terms of the project.

There are many options available to the Town to complete condition assessments. In some cases, external consultants may need to be engaged to complete detailed technical assessments of infrastructure. In other cases, internal staff may have sufficient expertise or training to complete condition assessments.

## Developing a Condition Assessment Schedule

Condition assessments and general data collection can be both time-consuming and resource-intensive. It is not necessarily an effective strategy to collect assessed condition data across the entire asset inventory. Instead, the Town should prioritize the collection of assessed condition data based on the anticipated value of this data in decision-making. The International Infrastructure Management Manual (IIMM) identifies four key criteria to consider when making this determination:

1. **Relevance**: every data item must have a direct influence on the output that is required
2. **Appropriateness**: the volume of data and the frequency of updating should align with the stage in the assets life and the service being provided
3. **Reliability**: the data should be sufficiently accurate, have sufficient spatial coverage and be appropriately complete and current
4. **Affordability**: the data should be affordable to collect and maintain