WATER AND SANITARY SYSTEMS

SERVICING STRATEGY

JANUARY 26, 2022

Prepared for:

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EXECUTIVE SUMMARY

Triton Engineering Services Limited (Triton) has prepared this Water and Sanitary Servicing Strategy (Servicing Strategy) for the Town of Minto (Town) to assist with infrastructure planning for its three urban centres of Palmerston, Harriston and Clifford, which are each serviced by municipal water and sanitary systems. This Servicing Strategy provides guidance for upgrades, expansions and operation changes to the Town's horizontal and vertical infrastructure for each of the municipal water and sanitary systems to service the existing and future populations.

In order to determine the performance of the municipal systems, the existing and future population is calculated based on Town records for serviced households and growth projections included in the County of Wellington's comprehensive review of its Official Plan, respectively. The adjusted growth allocations are considered a conservative approach from an engineering design perspective and is limited by the County's allocated growth to 2051. Therefore, although there may be land available within the Town to intensify and develop at a higher growth rate than provided in the Official Plan, growth is ultimately limited to the County's allocation for the Town. It should be noted that the County's growth rate is used as a baseline for planning capital work and that the rate of growth within the Town may occur faster or slower than projected. Therefore, this Servicing Strategy should be considered a living document that needs to be amended/updated, as required, to ensure that projections for demands on the municipal water and sanitary systems and associated recommendations are representative of current conditions.

Palmerston is located in the south end of the Town, has a footprint of approximately 372 ha and is the most populated of the Town's urban centres, with an existing serviced population of 3,123. Harriston is centrally located within the Town and has a footprint of 338 ha and an existing population of 2,405. Clifford is located in the northwest portion of the Town, covers 210 ha, and is the least populated of the three urban areas, with an existing population of 995.

Horizontal infrastructure (i.e., the water distribution network and sewage collection network) is assessed using computer simulation models based on full development of viable lands (i.e., land available for development with 16 households (ERU) per hectare for residential uses, consistent with the County's Official Plan density target for greenfield housing) to 2051, regardless of whether the subject lands have an associated committed number of households allocated to them. Vertical infrastructure (i.e., water supply, water storage, and sewage treatment systems) is assessed based on the County's growth targets to 2051 and does not consider the physical location of where development will occur within the urban centre.

With respect to its municipal water systems, water supply was assessed based on source and firm capacity. Source capacity is the total production capability of the water supply, and firm capacity is the capacity of the system (i.e., source capacity) with the largest pump or well out of service. It is recommended that the source capacity of a water supply system should be greater than the maximum day demand (MDD) so that daily demand of the connected population can be met if the water storage system is offline. Firm capacity is used to determine whether there is sufficient redundancy in the system for water supply and treatment in the event of contamination, equipment or facility decline or failure. Treated water storage requirements include fire storage, equalization storage and emergency storage, which are calculated based on the 2008 Ministry of the Environment, Conservation and Parks (MECP) Water System Design Guidelines. The review of the water distribution network included an analysis of its ability to service future development areas and for the typical water pressure and fire flow throughout the system to provide sufficient service for the anticipated demand.

With respect to its municipal sanitary systems, the reserve capacity was calculated to assess the

available treatment capacity of the existing sewage treatment works. The review of the sewage collection network included an analysis of capacity in the existing sewers and ability to service future development areas.

A summary of the state of each community's water and wastewater systems is presented below and a detailed list of the specific projects identified to meet future servicing needs and the forecasted timing for implementation is provided in Appendix K of the Report.

Palmerston

The source capacity of Palmerston's municipal water system is expected to be sufficient beyond calendar year 2051. Firm capacity is expected to be exceeded between 2031 and 2036 and therefore, additional source capacity is required to provide adequate system redundancy. Additional water storage will be required in Palmerston between 2041 and 2046. Therefore, a Municipal Class Environmental Assessment (Class EA) should be initiated by 2022 and 2032 to increase firm capacity and system storage, respectively.

The existing distribution network is expected to provide fire flows within the acceptable ranges based on theoretical demands to 2051; however, it is recommended that existing watermains less than 150 mm in diameter or those constructed of materials that are approaching the end of the estimated service life (i.e., copper, cast iron, ductile iron and asbestos cement watermain) are replaced and dead ends are removed, where possible. Watermain extensions will be required to service future developments and should be designed to provide interconnection and looping for the existing network. It is recommended these upgrades to the existing network be completed through planned road upgrade projects, sewer replacement projects, or through development application cost-sharing, where applicable. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

Palmerston's sanitary sewer collection network is sufficient to 2051 with respect to capacity; however, there are sections of sewer that are approaching the accepted surcharge/capacity limits and should be upsized during future reconstruction projects. Sanitary sewer extensions will be required to service future developments. Regarding the physical condition of the sewers, it is recommended that all sewers be videoed prior to the reconstruction of a street in order to assess the condition of the pipe and identify any I&I flow sources and whether rehabilitation or replacement is required. It should be noted that it is expected that asbestos cement and vitrified clay sewers are approaching the end of its estimated service life and should be replaced as road upgrades are undertaken or watermains are being replaced. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

It should be noted that existing By-Laws 2013-87 and 2011-43 were enacted to regulate available sewage treatment capacity at the Palmerston WWTP. Since the available treatment capacity and available sewage capacity units have changed since the By-Laws were enacted, it is recommended that the existing By-Laws be repealed and replaced by a new policy to regulate growth and manage the available water and sewage capacity for each of the Town's systems.

The design capacity of the Palmerston wastewater treatment plant is expected to be exceeded between 2031 and 2036, therefore, a Class EA and associated technical studies to increase treatment capacity should be initiated by 2026.

Harriston

The source capacity of Harriston's municipal water system is expected to be sufficient beyond

calendar year 2051. Firm capacity is expected to be exceeded between 2031 and 2036 and therefore, additional source capacity will be required to provide adequate system redundancy. Therefore, a Class EA should be initiated by 2022 to increase firm capacity.

With respect to Harriston's water distribution network, the existing distribution network is expected to provide fire flows within the acceptable ranges based on theoretical demands; however, upsizing and looping existing watermain is required to achieve a target flow rate of 150 L/s in the Harriston Industrial Park, as per the recommendations in the Harriston Industrial Park Class EA. It is anticipated that the expected demand within the Harriston Industrial Park will not be sufficient to necessitate the extensive reconstruction of existing roads as proposed in the associated Class EA Screening Report and further because the footprint of the Harriston Industrial Park has been significantly reduced since completion of the Class EA; therefore, investigation into upgrading the trunk mains should be completed. Further, it is recommended that existing watermains less than 150 mm in diameter or those constructed of materials that are approaching the end of the estimated service life (i.e., copper, cast iron and ductile iron watermain) are replaced and dead ends removed, where possible. Watermain extensions will be required to service future developments and should be designed to provide interconnection and looping for the existing network. It is recommended any recommended upgrades to the existing network be completed through planned road upgrade projects, sewer replacement projects, or through development application cost-sharing, where applicable. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

The sanitary sewer collection network in Harriston is expected to be sufficient to convey sewage for the existing and projected future population beyond 2051; however, the existing sanitary sewer on John Street is to be replaced, extended and deepened, consistent with the outcome of the Harriston Industrial Park Class EA. Regarding the physical condition of the sewers, it is recommended that all sewers be videoed prior to the reconstruction of a street in order to assess the condition of the pipe and identify any I&I flow sources and whether rehabilitation or replacement is required. It should be noted that it is expected that asbestos cement sewers will be approaching the end of its estimated service life and should be replaced as road upgrades are undertaken or watermains are being replaced. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

There is sufficient wastewater treatment capacity at the sewage treatment works to service the projected future population beyond 2051 in Harriston.

Clifford

Clifford's water system is expected to provide sufficient source and firm capacity and storage volume to service the projected population beyond 2051.

The existing distribution network is expected to provide fire flows within the acceptable ranges based on theoretical demands to 2051; however, it is recommended that existing watermains less than 150 mm in diameter or those constructed of materials that are approaching the end of the estimated service life (i.e., copper, cast iron and ductile iron watermain) are replaced and dead ends are removed, where possible. Watermain extensions will be required to service future developments and should be designed to provide interconnection and looping for the existing network. It is recommended that any upgrades to the existing network be completed through planned road upgrade projects, sewer replacement projects, or through development application cost-sharing, where applicable. Prioritization of capital projects should be calculated as per the Town's Asset

Management Plan (PSD, November 2019).

Further, the capacity of the existing sanitary sewer collection network is sufficient to covey sewage for the existing and projected future population beyond 2051. In terms of the wastewater treatment capacity, there is sufficient treatment capacity within the wastewater treatment lagoons to service the projected future population beyond 2051. Regarding the physical condition of the sewers, it is recommended that all sewers be videoed prior to the reconstruction of a street in order to assess the condition of the pipe and identify any I&I flow sources and whether rehabilitation or replacement is required. As per the Town's Service Extension and Connection Policy 4.17 (effective March 9, 2005 and revised January 23, 2019), specific to Clifford, existing ultra-rib sewer mains may need to be replaced, potentially at the cost of the developer, where multiple new service connections are required. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

Next Steps

Water Systems

In general, for all of the municipal water distribution networks, watermain extensions will be required to service some of the future developments. Based on the Town's anticipated timing for committed development and anticipated development scenarios, extensions will be required within the next ten (10) years. It is expected that extensions will be constructed to offer interconnection and looping for the system and the location and sizing of watermain will be confirmed at the preliminary design stage of the proposed development. Further, upgrades will be required, including the replacement of existing watermain having a diameter less than 150 mm and replacement of watermain approaching the end of its estimated service life (existing asbestos cement, copper, ductile iron and cast iron watermain), or as required for watermain having a history of breaks or servicing issues, as part of road upgrade or sewer replacement projects or through development application cost-sharing, where applicable. There are no concerns with respect to system pressures and fire flow capabilities for the existing population or projected growth through to 2051 with the exception of the Harriston Industrial Park watermain upgrades, as noted above. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

The projected demands of the future population are expected to exceed the firm capacity of the Palmerston and Harriston water systems between 2031 and 2036. Therefore, the Town should be proactive in securing additional water sources to increase firm capacity to satisfy the estimated MDD of the projected future population and ensure it is in place at least two years in advance of the need, as a contingency to deal with any unforeseen issues. The addition of new water sources may also affect the configuration and sizing of future watermain upgrades and extensions of the existing municipal system, and could impact the configuration of proposed future developments. Therefore, it is recommended that the Town make it a priority to develop a well exploration program within Palmerston and Harriston to ensure that potential future sources of drinking water are identified; noting that a Class EA will also be required to evaluate alternatives to provide additional capacity for the system. The associated financial budget/planning should also be considered by the Town. Since preliminary studies, design and approvals related to system upgrades typically require at least three to five years, it is recommended that the well exploration program is initiated by 2022 to support a Class EA.

In Palmerston, the existing water storage volume will be exceeded between 2041 and 2046. It is recommended that the Town complete an annual assessment of storage availability/requirement in order to predict storage needs well in advance of a forecasted deficit. Additional storage capacity

should be in place at least two years in advance of the need to meet the projected needs of future growth, and as a contingency to deal with any unforeseen issues. Since preliminary studies, design and approvals related to system upgrades typically require at least three to five years, it is recommended that a Municipal Class EA should be initiated at least ten years in advance of the forecasted deficit to evaluate alternatives to increase the total available storage.

There are no storage concerns for Harriston's water system with respect to servicing the future population to 2051 and there are no capacity or storage concerns related to Clifford's water system in servicing the existing and projected future population to 2051.

The annual water supply RCC should also be completed for all of the municipal water systems on an annual basis, as a measure to monitor the system's ability to meet future MDD requirements and regularly monitor current usage and future needs and to ensure that Class EA projects are initiated at a suitable time. It is recommended that any future ICI users receive an allocated reserve capacity in terms of equivalent residential units (ERU), which would be considered in future water supply RCC. This can be completed through the process of site plan approval and can be outlined within the site plan agreement.

Additionally, it is recommended that the Town develop and adopt a water and sewer allocations policy to regulate growth and manage the available water and sewage capacity for each of the Town's systems. Specifically, the intent would be to regulate ICI growth in all three urban centres and residential growth in Harriston. The new policy would also encompass the intent of existing By-Laws 2013-87 and 2011-43, which were enacted to regulate available sewage treatment capacity in Palmerston, therefore, the existing by-laws should be repealed.

Wastewater Systems

For the Town's wastewater systems, the design capacity of the Palmerston wastewater treatment plant is expected to be exceeded between 2031 and 2036. As a contingency to deal with any unforeseen issues, additional treatment capacity should be in place at least two years in advance of the projected deficit. Therefore, it is recommended that the Town initiate technical studies, including associated financial budget/planning, and a Class EA by 2026 to review viable options to increase reserve sewage treatment capacity in Palmerston. It is also recommended that the Town continue to actively pursue sewer inflow and infiltration (I&I) monitoring and replace or repair any sanitary sewers experiencing high I&I to aid in reducing wastewater flows at the WWTP and to address short-term capacity concerns. Of additional importance is the consideration of the types of future industries that propose development within the serviced area. If "wet" industries are permitted to connect to the municipal wastewater system, the available reserve capacity of the system will decrease at an accelerated rate.

For all of the municipal wastewater systems, the annual sewage RCC should be completed on an annual basis. Regularly updating RCC will allow the Town to monitor the system's ability to meet future ADF requirements, current sewage flow and estimate future projections to ensure that Class EA projects are initiated at a suitable time so that additional treatment capacity will be in place at least two years in advance of the need. Further, it is recommended that any proposed/future ICI users receive an allocated reserve capacity in terms of ERU, which would be considered in future sewage RCC. This can be completed through the process of site plan approval and outlined within the site plan agreement.

Further, as previously mentioned, it is recommended that the Town develop and adopt a water and sewer allocations policy to regulate growth and manage the available water and sewage capacity for

each of the Town's systems. Specifically, the intent would be to regulate ICI growth in all three urban centres and residential growth in Harriston. The new policy would also encompass the intent of existing By-Laws 2013-87 and 2011-43, which were enacted to regulate available sewage treatment capacity in Palmerston, therefore, the existing by-laws should be repealed.

Similar to the water distribution system, extensions will be required for the sewage collection network in Palmerston, Harriston and Clifford to service future developments within the next ten years. For all future developments requiring sanitary sewer extensions from the existing collection system, it is expected that if the lands to be developed cannot be serviced by gravity sewer, then a sewage pumping station or low-pressure sanitary system can be installed to provide connection to the nearest sewer, which would be determined at the preliminary design stage of the proposed development.

It is expected that upgrades will be required in Palmerston by 2051 to address sewers approaching the accepted surcharge/capacity limits, which can be completed as part of road upgrade and reconstruction projects. Regarding the physical condition of the sewers in all of the Town's sewage collection networks, it is recommended that all sewers be videoed prior to the reconstruction of a street in order to assess the condition of the pipe and identify any I&I flow sources and whether rehabilitation or replacement is required. It should be noted that it is expected that asbestos cement and vitrified clay sewers will be approaching the end of their estimated service life and should be replaced as road upgrades are undertaken or watermains are being replaced. Ultra-rib sewer mains may need to be replaced if multiple new service connections are being made. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

As per the Harriston Industrial Park Class EA, replacement of the existing gravity sewer on John Street with a deeper gravity sewer that is extended through the Industrial Park will be required to support development.

It is recommended the Town consider its watermain and sanitary sewer replacement strategy in context with its road condition reporting and storm drainage needs. Road and storm infrastructure replacement can advance or delay progress on water and sewer replacement and upgrades. The Town should undertake a ten-year capital planning process during its annual budget to identify water, sanitary sewer, storm drainage and road related projects that are required to meet growth-related needs.

The Town shall continue to operate on the basis that it is responsible for maintaining and repairing existing water and sanitary sewer infrastructure used by current residents and businesses. As a general principle, the Town supports developers paying the full cost of providing appropriate water, sanitary sewer and all other services for future residents and businesses in Minto. Where private development interests are consistent with Town land development needs, such as in the Palmerston or Harriston Industrial Parks (or other Town owned lots), cost sharing may be considered that is fair and equable to both parties. In all cases, the Town will undertake to ensure that such partnerships do not place an unreasonable burden on municipal ratepayers and water and sewer system users.

Conclusion

The assessments made in this document reflect the information available at the time of preparation; therefore, the findings, recommendations and conclusions must be confirmed as growth progresses and developments are proposed. This report should be considered a living document that needs to be amended/updated, as required, to ensure that strategies for municipal water/sanitary infrastructure servicing is appropriate for the development proposed, as well as updating timelines for the initiation of specific Class EA projects. Further, it is recommended that this report and recommendations within be adopted by Town Council.

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1 INTRODUCTION

1.1 Purpose

This Water and Sanitary Servicing Strategy (Servicing Strategy) Report (Report) has been prepared by Triton Engineering Services Limited (Triton) for the Town of Minto (Town) to assist with infrastructure planning. This Servicing Strategy provides guidance for upgrades, expansions and operation changes to its water and sanitary systems in order for these municipal services to continue to service the existing and future populations within its growing urban areas of Palmerston, Harriston and Clifford.

The Report describes the tasks completed as part of this Servicing Strategy, which included the following:

- Collect and review background information;
- Define existing conditions of the Town's water and sanitary systems;
- Evaluate the ability/performance of the Town's water and sanitary systems to meet the needs of existing and future development;
- Identify system infrastructure upgrades/extension alternatives required to service future development; and
- Formulate a long-term strategy for servicing future developments within the Town.

Given that development and the progression of growth may not occur as anticipated, the recommendations and conclusions in this document must be confirmed as growth progresses and developments are proposed. This report should be considered a living document that needs to be amended/updated, as required, to ensure that strategies for municipal water and sanitary infrastructure servicing is appropriate for the development proposed, as well as updating timelines for the initiation of specific Class EA projects.

1.2 General Description of the Town and Urban Communities

The Town is a predominantly rural municipality that is situated in the northwestern corner of Wellington County (County) and is bordered by Huron, Perth, Grey and Bruce Counties. The Town's land base is approximately 300 square kilometers (km^2) (30,000 hectares [ha]). It is comprised of the urban areas of Palmerston (former Town of Palmerston), Harriston (former Town of Harriston) and Clifford (former Village of Clifford), which are each serviced by municipal water and sanitary systems. The surrounding rural areas within the Town include the smaller communities of Cotswald, Drew, Fultons, Glenlee, Greenbush and the Hamlet of Teviotdale. The Town of Minto is presented on Schedule A5 of the County of Wellington Official Plan (last updated January 8, 2021) and is included in Appendix A.

1.2.1 Palmerston

Palmerston is located in the south end of the Town and borders the Municipality of North Perth. It is the Town's most populated urban area and its urban boundary forms a footprint of approximately 372 ha. Palmerston is generally bisected by Main Street (County Road 123). The existing development within the community is as follows:

- *Residential:* Primarily single-family detached dwellings and some semi-detached, row houses and multi-family units.

- *Commercial:* The majority of commercial development is located along Main Street West and along James Street and William Street (between Main Street West and Bell Street), with additional highway commercial development located along King Street.
- *Industrial:* The majority of industrial development is located along the west and east extents of the urban boundary, with additional industrial development located along Norman Street.
- *Institutional:* Includes a primary school, high school, several churches, recreational facilities, hospital, retirement living and long-term care centre and County housing.

Palmerston is mainly surrounded by agricultural land. Core Greenlands (Palmerston North Wetland Complex) are adjacent to and partially within the northern extent of the urban boundary at the end of Minto Road. Refer to Schedule A5 in Appendix A for the location of Palmerston within the Town.

1.2.2 Harriston

Harriston is centrally located within the Town and is located at the intersection of Arthur Street (Ontario Highway 89/Ontario Highway 23) and Elora Street (County Road 109/Ontario Highway 9). Harriston is the Town's second most populated urban community and its urban boundary forms a footprint of approximately 338 ha. The existing development within the community is as follows:

- *Residential:* Primarily single-family detached dwellings and some semis and multi-family units.
- *Commercial:* The central business district is located in the downtown core on Elora Street between Union Street and Young Street. Highway Commercial developments are located at the north and south extents of Elora Street within the urban boundary and along Arthur Street.
- *Industrial:* The majority of industrial development is located in the northwest corner of Harriston.
- *Institutional:* Includes a primary school, a nursing and retirement home, community living centre, several churches, recreational facilities.

Harriston is mainly surrounded by agricultural land. The Maitland River, which bisects the community, and its associated floodplain are designated as Core Greenlands. The Maitland River and its tributaries and associated floodplains are also located to the east, west, and south of Harriston's urban boundaries. Refer to Schedule A5 in Appendix A for the location of Harriston within the Town.

1.2.3 Clifford

Clifford is located in the northwest portion of the Town and borders the Township of Howick. It is generally centred on the intersection of Elora Street (Ontario Highway 9) and Allan Street (County Road 2). Its urban boundary forms a footprint of approximately 210 ha. Clifford is the Town's least populated urban community. The existing development within the community is as follows:

- *Residential:* Primarily single family detached with a small number of row houses and multi-family units.
- *Commercial:* Located in the downtown core along Elora Street, with additional highway commercial lands generally located at the north extent of Elora Street North within the urban boundary; however, a parcel of land zone for highway commercial is located at the corner of Elora Street South and Mill Street East.
- *Industrial:* The majority of industrial land is located in the northeast and southeast limits of the urban boundary.
- *Institutional:* Includes a church and recreational facilities.

Clifford is primarily surrounded by agricultural land and Core Greenlands along the northeast and southeast urban boundaries. Refer to Schedule A5 in Appendix A for the location of Clifford within the Town.

2 BACKGROUND

2.1 General

An accurate representation of existing conditions and estimation of future development is required to provide implementation strategies for servicing within the Town's urban areas. These strategies require accurate projections for population growth, housing unit creation and employment needs. The Province of Ontario mandates planning periods in its Provincial Policy documents (i.e., Provincial Policy Statement, 2020 [PPS], A Place to Grow: Growth Plan for the Greater Golden Horseshoe [Growth Plan] and associated Land Needs Assessment Methodology for the Greater Golden Horseshoe [LNA]), which indicate establishing a population of 160,000 people and 70,000 employment units for the County of Wellington by 2051 (as per 2020 Growth Plan Schedule 3). This projected growth to 2051 has been broken down by County of Wellington staff for long-range planning into local municipal growth projections.

The local municipal growth projections specific to the Town have been incorporated into this Servicing Strategy for consistency; noting that the Provincial planning period (i.e., to calendar year 2051) is much longer than most municipalities usually consider to prioritize the implementation of infrastructure upgrades and extensions. This Servicing Strategy also considers future growth projections to 2051 to assist the Town with determining infrastructure requirements and associated processes to implement specific infrastructure needs for the existing and future population future development. Earlier planning documents (i.e., prior to the Growth Plan) for the Town and the County used population projections through to year 2041. Summaries of the relevant planning documents for this Servicing Strategy are provided in the following sections.

2.2 Provincial Policy

The Servicing Strategy must also be considered in context with the 2020 Provincial Policy Statement (PPS) under the *Planning Act*, which came into effect May 1, 2020, and the Growth Plan for the Greater Golden Horseshoe (Growth Plan) of May 2019 and associated Land Needs Assessment Methodology for A Place to Grow: Growth Plan for the Greater Golden Horseshoe (LNA) which became effective on August 28, 2020. As per the 2020 PPS, The Growth Plan and associated LNA "take precedence over the policies of the PPS to the extent of any conflict, except where the relevant legislation provides otherwise" and unless policies in the PPS "do not overlap with policies in the provincial plans…" then "…the policies in the PPS must be independently satisfied".

2.2.1 Provincial Policy Statement (PPS), 2020

The PPS is Ontario's vision for the land use planning system in the province and includes policies to build strong health communities, promote wise use and management of resources, and protect public health and safety. This Servicing Strategy directly and indirectly relates to many specific policy areas of the PPS, including the following:

- Settlement Areas (1.1.3)
- Coordination (1.2)
- Infrastructure and Public Service Facilities (1.6)

- Long-term Economic Prosperity (1.7)
- Energy Conservation, Air Quality and Climate Change (1.8)

Settlement Areas are the cities, towns, villages and hamlets across Ontario, which are to be the focus of growth and development. Settlement Areas must grow efficiently with infrastructure planning so there are no unjustified or uneconomical expansions. Financially viable infrastructure over its lifecycle is to be planned in designated growth areas to protect public safety and the environment.

Coordination policies encourage integrated planning between lower and upper tier municipalities, agencies and senior levels of government to manage and promote growth integrated with infrastructure planning. Infrastructure includes sewage and water systems, stormwater management as well as utilities such as electricity, waste management, transit, oil, gas and telecommunications.

Infrastructure and public service facilities are to maintain financial viability over their life cycle demonstrated through asset management planning and coordination with land use planning. Before new infrastructure is developed, existing infrastructure should be optimized through intensification and adaptive re-use. The municipal servicing hierarchy states municipal sewer and water services are the preferred form for settlement areas. Lot creation is allowed if there is sufficient reserve sewage system capacity and reserve water system capacity, in that design or planned capacity not committed to existing or approved development.

Long term economic prosperity is to be achieved by optimizing long-term land resource availability, infrastructure and public service facilities, minimizing impacts of climate change and considering the ecological benefits provided by nature. Sewage treatment, water supply and stormwater management must be financially and environmentally sustainable and prepare for the “impacts of a changing climate” (extreme weather and extreme variability). Energy conservation policies promote compact development, energy efficiency, green infrastructure and maximizing vegetation within settlement areas where feasible.

The 2020 PPS requires land set aside for a “mix of land uses” for 25 years (previously 20 years), although infrastructure may be planned beyond 25 years. Sufficient land shall be identified to meet housing needs for 15 years (previously 10 years) with enough service capacity for five years (previously three years). Infrastructure policy now emphasizes “protecting public health and safety”, erosion control and “changes in water balance”, as well as climate change and green infrastructure.

2.2.2 Provincial Growth Plan

The Growth Plan effective May 2019 builds upon Provincial Policy, but “takes precedence over” it with specific directions on future development in the Greater Golden Horseshoe. The Growth Plan has more restrictive policy, requiring coordination between Upper and Local tier municipalities. Minto is in the most northwest edge of the “outer ring” of the Greater Golden Horseshoe Plan Area. As per the Growth Plan, Clifford, Harriston and Palmerston are designated as “Built-up Areas Conceptual.”

Infrastructure planning in the Growth Plan aligns with Ontario’s approach set out in the *Infrastructure for Jobs and Prosperity Act*, 2015. It requires principled, evidence-based and strategic long-term infrastructure planning. The Growth Plan supports the Provincial asset management regulation to improve how municipal infrastructure is expanded. It promotes aligning land use and infrastructure planning to achieve significant cost savings by optimizing existing infrastructure before building new infrastructure of all forms.

The Growth Plan states that upper and lower tier municipalities must establish a "hierarchy of settlement areas", and establish infrastructure plans based on full "life cycle costs", along "transit and transportation corridors", to build "complete communities" using a "compact built form", while protecting the environment. Except for minor exceptions, boundaries of settlement areas such as Clifford, Harriston and Palmerston are to be expanded during a "municipal comprehensive review", required of Upper tier municipalities to implement Growth Plan Policies.

2.3 County of Wellington Official Plan (Office Consolidation) (May 6, 1999, Last Revised August 15, 2019)

The County of Wellington Official Plan (County Official Plan) provides planning policies for local member municipalities to manage development within their communities. Regarding development within urban boundaries, the County Official Plan states: *"Wellington [County] will provide for the efficient and environmentally sound use of land by encouraging full municipal water and wastewater services for new development."*

Section 11.2 of the County Official Plan contains policies for water and sewage including local planning policy to protect ground and surface water quality and quantity, and require adequate potable water and sewage disposal for development. The County Official Plan supports Provincial Policy to optimize existing infrastructure, maintain efficient water use and minimize waste water flow. Adequate water and sewer capacity is required to "serve both residential and economic development activities". Water and sewer capacities are to be regularly reviewed to ensure "the size and density" of future development can be serviced, with "an appropriate amount of excess capacity".

The County is currently in the process of completing a technical analysis (i.e., five-year review) of the current Official Plan, which includes the municipal comprehensive review to implement PPS and the Growth Plan. In the course of the comprehensive review, some background studies and technical documents were available for consideration in this Servicing Strategy.

2.3.1 North Clifford Secondary Plan

The planning area for the Secondary Plan includes 47 hectares of land in the north end of Clifford comprised of large under-developed parcels, vacant lands used for agricultural purposes, and several smaller commercial and residential lots. Projections in the Secondary Plan noted the County's growth forecasts to 2041 as per the current Official Plan can be met in the North Clifford planning area. Because North Clifford can accommodate the projected growth, 61 ha of land in the south end of Clifford within the urban boundary were "potentially surplus" and possibly not developable for some time due to servicing and other constraints.

To implement policies for North Clifford, the Town initiated an amendment to the County Official Plan, and Amendment 113 was adopted October 29, 2020. While the in-house version of the North Clifford Secondary Plan contains many more detailed policies, the County adopted some of the provisions in Amendment 113 as follows:

- Re-designated lands southwest of Elora St N from Highway Commercial to Residential
- Re-designated lands north east of Elora St N from Highway Commercial to Industrial
- Established *Special Policy Area* PA5-11 for North Clifford promoting efficient use of infrastructure, growth of a mixed-use complete community and compact development form
- Outlined a road and trail network to implement efficient servicing and land use
- Established policies requiring full municipal sewer and water, cost sharing agreement to recover Town infrastructure investment on Elora Street and policies for extensions beyond boundaries, if permitted

- In PA5-12 set out design policies to establish a “Village Feel” along Elora St N including building setback and parking requirements to be implemented in the zoning bylaw, promoting attractive streetscapes, social interaction.

These land use changes are reflected on Figure C-D.

2.3.2 West Palmerston Secondary Plan

The planning area for West Palmerston includes approximately 145 hectares of land, of which approximately 85.5 ha are located outside of the urban boundary (classified as Prime Agriculture and Core Greenlands). The planning area is west and north of the developed area of Palmerston. It consists mainly of three large farm parcels, land within the Palmerston Industrial Park, smaller mixed-use development or vacant serviced lots and 6.5 ha of storm ponds and woodlots.

The 85.5 ha of land outside of the urban boundary was included in the planning area because there is insufficient land inside the urban boundary to support the County’s (household) growth projection through to 2041 (as per the current County Official Plan). Expansion of the urban boundary in Palmerston’s also created a more contiguous north boundary for Palmerston and potentially addressed servicing issues in the Palmerston Industrial Park. The Secondary Plan also proposed policies on future roads, trails, land use, servicing and reducing the 500 m setback to 30 m from a closed landfill located east of the planning area, based on the results of a Landfill Impact Assessment, by Terraprobe in 2020, that confirmed the land use change.

The in-house version of the West Palmerston Secondary Plan contains many more detailed policies than those adopted in the Official Plan Amendment initiated by the Town in October 2020. In March 2021, the County approved Official Plan Amendment 117 to complete the process to reduce settlement boundaries for Clifford and Harriston by 75 hectares (combined) in order to expand the Palmerston urban area by 81.5 hectares. Some of the policies in the original secondary plan are included in Amendment 117, while others are deferred for future development.
Amendments 113 and 117 result in the need for the Town to plan for future infrastructure within its various urban communities, all of which are discussed in the following sections of this Report. The boundary adjustments as per the Official Plan Amendments are depicted on Figures P-D, H-D, and C-D.

2.3.3 County Comprehensive Review

As required by the PPS and Growth Plan, the County is conducting a comprehensive review of its Official Plan. The comprehensive review provides population and employment projections to calendar year 2051, which is an additional ten years beyond the planning period in the current County Official Plan. These growth projections form the basis of the Official Plan review, during which a hierarchy of settlement areas will be developed and growth allocated accordingly.

Within urban areas, County targets set in the Official Plan include one full time job per three residents and a greenfield density of 40 residents and jobs per hectare of land. A summary of the population and housing projections for the Town, as per the comprehensive review, are provided in Table 2.1. Detailed growth projections as per the County’s Allocation of Population and Housing Growth for Minto in the Municipal Comprehensive Review (Growth Allocations Memo, of December 14, 2020 by Watson & Associates Economists Ltd.) is set in Appendix B.

Table 2.1 - Summary of Population and Housing Projections for the Town as per the Growth Allocations Memo (Watson & Associates, Dec. 14, 2020)

Year	Total Population	Total Residential Units	Total Urban Settlement Population	Total Urban Settlement Area Residential Units
2016	8,930	3,230	5,800	2,220
2021	9,280	3,390	6,120	2,360
2041	13,410	4,800	9,500	3,520
2051	15,200	5,440	11,000	4,060
2016-2051	6,270	2,210	5,200	1,840

In accordance with Table 2.1, the projected growth within the Town's urban areas between 2016 and 2051 is 5,200 people and 1,840 residential units. This equates to approximately 72% of the Town's total population within the urban areas by 2051, which is a 7% increase from 2016. The percentage of residential units in the urban area increases from 69% in 2016 to 75% in 2051. A summary of the changes in population and housing units in each of the Town's urban areas between 2016 and 2051 as per the Growth Allocations Memo is provided in Table 2.2.

Table 2.2 - Summary of Population and Housing Units Changes between 2016 and 2051 as per as per the Growth Allocations Memo (Watson & Associates, Dec. 14, 2020)

Urban Area	2016 Population	2051 Population	Population % Change	2016 Housing Units	2051 Housing Units	Unit % Change
Palmerston	2,810	6,100	117%	1,100	2,220	102%
Harriston	2,130	3,500	64%	780	1,280	64%
Clifford	860	1,400	63%	340	560	66%

The projected population growth in Table 2.2 has been assumed for this Servicing Strategy.

2.4 Harriston Industrial Park Class Environmental Assessment (B.M. Ross, 2017)

A Schedule B Class Environmental Assessment (Class EA) was prepared by B.M. Ross and Associates Limited (B.M. Ross) for the Town to evaluate servicing options for the 27 hectares of Town owned land within the Harriston Industrial Park. For the purpose of the evaluation, the 27 ha of land was divided into a 4.4 ha parcel located west of Hutchison Street and a 22.6 ha parcel located to the southwest of the 4.4 ha parcel, south of the former rail lands. The review period for the Class EA ended August 11, 2017; therefore, construction of the project must commence within ten years of this date. Otherwise, the planning and design process described in the Class EA must be reviewed based on the current environmental setting and planning context to ensure the mitigation measures and project continue to be valid. The outcome of the review is posted as a Notice of Filing of Addendum. The project can or cannot proceed following Addendum review period based on the Minister's decision for the project.

In addition to the "do nothing" alternative, the Class EA considered expanding the Harriston Industrial Park to service the 4.4 ha parcel only or expand it to service the entire 27 ha. Both alternatives included full municipal servicing (stormwater, sanitary and water). Through the evaluation, it was realized that there would be challenges in servicing the western portion of the lands (i.e., within the 22.6 ha parcel) due to the topography.

The recommended alternative, to expand the Industrial Park to service the entire 27 ha, includes the following:

- upgrading the existing 200 mm diameter watermain on John Street to a 300 mm diameter (minimum) watermain to achieve a (higher) target fire flow of 150 L/s for firefighting purposes (refer to Figure 5.1 in Appendix C).
- replacing the existing John Street gravity sanitary sewer with a deeper gravity sanitary sewer and extending it through to a portion of the 22.6 ha parcel for discharge to the sewage lagoons via the existing John Street sewage pumping station (SPS) (refer to Figure 5.2 in Appendix C). This would allow all of the 4.4 hectares parcel and approximately 10 hectares of the 22.6 ha parcel to be serviced with gravity flow sewer.
- lot level stormwater management will be required instead of a central stormwater facility.
- John Street will be widened, which will improve access to industries in the area.

2.5 Draft Town of Minto Urban Boundary Rationalization Study (Triton)

The Draft Town of Minto Urban Boundary Rationalization Study (Draft Rationalization Study) is a combined office consolidation of the following documents:

- North Clifford Secondary Plan
- West Palmerston Secondary Plan
- Harriston Industrial Park Class Environmental Assessment (B.M. Ross, 2017)

The Draft Town of Minto Urban Boundary Rationalization has not been finalized, but was provided as support documentation with the Town's application to the County for Official Plan Amendment and policy review process of the Palmerston urban boundary expansion.

It provides additional detailed land use and servicing policies/strategies for North Clifford and West Palmerston than was approved in the Amendments. When finalized the Draft Rationalization Study, will be used as a companion document to this Servicing Strategy.

3 FUTURE DEVELOPMENT PROJECTIONS

3.1 General

The projected growth for population and Household/Equivalent Residential Units (ERU) to 2051 for each of the Town's urban communities, consistent with the County's Growth Allocations Memo for the Town is summarized in Table 3.1.

Table 3.1 – Town of Minto Urban Growth (as per the Growth Allocations Memo)

Projected Growth Category	Urban Community	Year							
		2016	2021	2026	2031	2036	2041	2046	2051
Serviced Population	Palmerston	2,732	2,863	3,318	4,247	4,784	4,986	5,433	5,928
	Harriston	2,070	2,165	2,497	2,671	2,895	3,027	3,185	3,401
	Clifford	832	912	985	1,057	1,133	1,211	1,284	1,359
Household (ERU)	Palmerston	1,100	1,163	1,315	1,624	1,805	1,878	2,044	2,221
	Harriston	780	826	941	1,008	1,090	1,141	1,200	1,283
	Clifford	340	372	404	436	468	500	532	564

Interpolation of the household values for year 2020 are not consistent with the Town's records for existing serviced households (household connections, based on 2020 Reserve Capacity Calculations) for each urban area; therefore, for the purposes of this Servicing Strategy, the 2020

serviced households based on Town records is used as the existing population and the growth projections as per the County's Growth Allocations Memo will be adjusted accordingly. The existing population is calculated using the Town's records for serviced households, multiplied by the interpolated capita per household as per the Growth Allocations Memo, which is based on 2016 Statistics Canada Census data. It is important to note that the adjusted growth allocations are considered a conservative approach from an engineering design perspective and is limited by the County of Wellington's allocated growth to 2051. Based on this discrepancy, it is recommended the Town and County continue to evaluate the growth rate of the Town's urban communities and make any necessary adjustments accordingly.

It is anticipated that all of the future urban population will be connected to both water and sanitary systems, consistent with the County Official Plan with respect to development within urban boundaries. It should be noted that the serviced population/serviced equivalent residential units for the water and sanitary system in each community are not equal based on the Town's records for existing conditions (2020); however, this Serving Strategy assumes that both of the community's water and sanitary systems will serve the same number of residential units in the future by assuming that the larger of the existing number of municipal connections in each urban area represents the existing population.

Therefore, as per the Town's existing serviced population in 2020 and the projections in the Growth Allocations Memo, the adjusted projected growth to 2051 for each of the Town's urban areas is summarized in Table 3.2. Refer to Appendix D for additional information regarding the calculations for the adjusted growth projections.

Table 3.2 – Adjusted Town of Minto Urban Growth (as per County's Growth Allocation Memo)

Urban Community	Year	Serviced Population (Capita)	Serviced Households (ERU)
Palmerston	2020 (ex.)	3,123	1,266
	2021	3,148	1,279
	2026	3,610	1,431
	2031	4,550	1,740
	2036	5,091	1,921
	2041	5,293	1,994
	2046	5,741	2,160
	2051	6,237	2,337
Harriston	2020 (ex.)	2,405	915
	2021	2,423	924
	2026	2,758	1,039
	2031	2,932	1,106
	2036	3,156	1,188
	2041	3,288	1,239
	2046	3,446	1,298
	2051	3,662	1,381
Clifford	2020 (ex.)	1,026	406
	2021	1,043	412
	2026	1,117	444
	2031	1,190	476
	2036	1,267	508
	2041	1,348	540
	2046	1,423	572
	2051	1,501	604

3.2 2031, 2041 and 2051 Development Scenarios

Scenarios are divided into three 10-year planning periods based on the Town's anticipated timing for each development (Development Scenarios). Development potential for each 10-year scenario was assessed based on land availability and an estimated 16 households (ERU) per hectare for residential uses, consistent with the County's Official Plan density target for greenfield housing. Growth per 10-year scenario also considered information in the Draft Minto Boundary Rationalization Study, Official Plan Amendment 113 for North Clifford, Official Plan Amendment 117 for West Palmerston, employment, population and housing unit projections in the County Growth Allocation Memo set in the Comprehensive Review, as well as the full build-out potential of the development lands.

Industrial, commercial and institutional (ICI) developments were converted to ERU based on sewage loading/water demand allowances as per MECP Design Guidelines for Sewage Works (2008) and Drinking Water Systems (2008).

Figures P-D, H-D and C-D present the development scenarios for Palmerston, Harriston and Clifford, respectively.

The expectation is not all areas identified within each 10-year scenario will fully develop, but when assessing whether horizontal infrastructure is adequate to service the lands within a scenario, full development of viable lands will be assumed, regardless of whether the subject lands have an associated committed number of households allocated to them. The expectation is that modelling the future serviceability this way will flag certain infrastructure as having insufficient capacity to service the full build-out of that stage, or a specific development within that stage. This information will inform the Town's decisions regarding 10-year development scenarios based on infrastructure expansion/remediation, and can be used to size future infrastructure upgrades needed to support long-term development.

Vertical infrastructure, such as area wide water supply/storage and sewage treatment, is assessed based on the overall growth targets as described in Table 3.2, not specific Development Scenarios. Detailed calculations for growth projections are presented in Appendix D.

4 WATER SUPPLY

4.1 Palmerston

4.1.1 Existing System

The Palmerston water system is a single pressure zone watermain distribution network that is pressurized by one elevated steel water tower. Water is supplied to the system by four drilled bedrock wells, which are housed by the two wellhouses. The system currently provides service to 1,266 residences and 106 Industrial/Commercial/Institutional (ICI) properties, according to Town 2020 records. The system also provides fire protection to the entire service area. In the event of a prolonged power outage, a portable generator is available to either of the two wellhouses to supply back-up power.

Operation of the system is controlled by a Supervisory Control and Data Acquisition (SCADA) system. Generally, well pumps are operated based on the water level in the water tower, which controls pressure in the distribution network. These levels are set by the Town's operator based on

storage requirements, volume turnover needs and well pumping constraints. The SCADA system also provides real-time monitoring and record keeping.

4.1.2 Source Capacity

Water supply is provided by four bedrock drilled wells, identified as Wells #1, #2, #3, and #4, and their associated wellhouses, identified as the William Street Wellhouse and the Whites Road Wellhouse. The locations of the wellhouses are presented on Figure P-W.1. A summary of the details for each well and wellhouse is as follows:

William Street Wellhouse

- Houses Wells #1 and #2, which alternate duties as primary supply.
- Disinfection using 12% sodium hypochlorite.
- Iron sequestering treatment is provided.
- Continuous monitoring analyzers at the “Point of Entry” into the distribution network for free chlorine residual measurements.
- Contact time is provided in the underground contact pipe prior to entering the distribution network.
- Standby power by portable generator.

Wells #1 and #2

- Well #1 drilled in 1928 to 28.3 m depth below ground surface (bgs).
- Well #2 drilled in 1956 to 31.1 m depth bgs.
- Well pumps are submersible type complete with a 30 kW (40 hp) motor which discharges directly into the William Street Wellhouse.
- Rated capacities are 22.8 l/s (1,964 m^3/day) each; however, the Permit to Take Water (PTTW) allows for the operator to pump either Well #1 or Well #2, but not both wells concurrently. Therefore, total production from these wells is limited to 1,964 m^3/day.

Whites Road Wellhouse

- Houses Wells #3 and #4, which alternate duties as primary supply.
- Disinfection using 12% sodium hypochlorite.
- Iron sequestering treatment is provided.
- Continuous monitoring analyzers at the “Point of Entry” into the distribution network for free chlorine residual measurements.
- Contact time is provided in the underground contact pipe prior to entering the distribution network.
- Standby power by portable generator.

Wells #3 and #4

- Well #3 drilled in 1956 to 41.8 m depth bgs.
- Well #4 drilled in 2010 to 43 m depth bgs.
- Well pumps are submersible type complete with a 30 kW (40 hp) motor which discharges directly into the William Street Wellhouse.
- Rated capacities are 26.7 l/s (2,291 m^3/day) each; however, the Permit to Take Water (PTTW) allows for the operator to pump either Well #3 or Well #4, but not both wells concurrently. Therefore, total production from these wells is limited to 2,291 m^3/day.

Based on these details, the total production capability (i.e., Source Capacity) of the Palmerston water system is 4,255 m^3/day. It is our understanding that the Town operates this system to achieve balanced production from each of the wells.

4.1.3 Future Water Demands (To 2051)

A review of the water usage rates within Palmerston for the period of 2018 through 2020 indicates that the average maximum day demand (MDD) is 423 L/day/capita as presented in the water Reserve Capacity Calculation (RCC) in Appendix E. This per person MDD value includes Palmerston's ICI demands, which inflates this value as compared to actual per person domestic use. Based on our experience, in communities of similar size and configuration, the MDD is typically between 300 and 500 L/day/capita; therefore, Palmerston's MDD is within the expected range and will be applied for future water demand calculations.

A summary of the resultant demands (i.e., MDD) for future growth, for the adjusted Growth Allocations Memo allocations are summarized in Table 4.1.

Table 4.1 – Palmerston Water Usage Projections

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Equivalent Population (Capita)	3,123	3,148	3,610	4,550	5,091	5,293	5,741	6,237
Households (ERU)	1,266	1,279	1,431	1,740	1,921	1,994	2,160	2,337
MDD (m^3/day/capita)	0.423	0.423	0.423	0.423	0.423	0.423	0.423	0.423
MDD (m^3/day/ERU)	1.044	1.042	1.068	1.107	1.122	1.124	1.126	1.130
Total MDD (m^3/day)	1,322	1,333	1,528	1,927	2,156	2,241	2,431	2,641

Detailed demand calculations are provided in Appendix D.

4.1.4 Water Supply Reserve Capacity

Triton completed a review of the RCC for the Palmerston water system based on existing information at the end of the 2020 calendar year. The RCC were completed in accordance with the requirements outlined in the Ministry of Environment, Conservation and Parks (MECP) Procedure D-5-1 Calculating and Reporting Uncommitted Reserve Capacity at Sewage and Water Treatment Plants dated March 1995 (MECP guidelines). The hydraulic reserve capacity for a water system is based on the system's Firm Capacity, which is defined as the capacity of the system (i.e., Source Capacity) with the largest pump or well/source out of service. Using the Firm Capacity to determine the hydraulic reserve capacity ensures sufficient redundancy in the system for water supply and treatment in case of an equipment/facility failure. For the Palmerston water system, the largest source of water are Wells #3 and #4, each with rated capacities of 2,291 m^3/day each. Since Wells #3 and #4 cannot operate concurrently, they have a total production limited to 2,291 m^3/day. Therefore, with Wells #3 and #4 out of service, the Firm Capacity of the Palmerston water system is 1,964 m^3/day. Based on recent water demands for calendar years 2018 through 2020, the average MDD of 1,322 m^3/day in Palmerston has not exceeded the Firm Capacity of its water system and results in a 642

$m^{3/}$day reserve hydraulic capacity, which corresponds to an additional 614 equivalent residential units that can be serviced. Detailed calculations for Palmerston's existing water supply RCC are provided in Appendix E.

MECP 2008 Design Guidelines for Drinking Water Systems (Water System Design Guidelines) recommends that the Source Capacity of water supply system should be greater than the MDD so that daily demand can be met if storage is offline. A summary of the water usage projections, source reserve capacity and firm reserve capacity for the future population growth scenarios are provided in Table 4.2.

Table 4.2 – Summary of Water Use Projections and Reserve Capacity for Palmerston

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Equivalent Population (Capita)	3,123	3,148	3,610	4,550	5,091	5,293	5,741	6,237
Households (ERU)	1,266	1,279	1,431	1,740	1,921	1,994	2,160	2,337
MDD (m^3/day)	1,322	1,333	1,528	1,927	2,156	2,241	2,431	2,641
Source Capacity (m^3/day)	4,255							
Source Reserve Capacity (m^3/day)	2,933	2,922	2,727	2,328	2,099	2,014	1,824	1,614
Firm Capacity (m^3/day)	1,964							
Firm Reserve Capacity (m^3/day)	642	631	436	37	-192	-277	-467	-677

As presented in Table 4.2, it is apparent that the current Source Capacity of 4,255 m^3/day is sufficient to meet the needs of the projected population to 2051. However, the projected MDD will exceed the Firm Capacity of the existing water supply between 2031 and 2036, indicating the need for additional Source Capacity to provide adequate system redundancy to accommodate future growth. Therefore, the Town should be proactive in securing additional water sources to increase Firm Capacity to satisfy the estimated MDD of the projected future population. The addition of new water sources may also affect the configuration and sizing of future watermain upgrades and extensions of the existing municipal system, and could impact the configuration of proposed future developments. Therefore, it is recommended that the Town make it a priority to develop a well exploration program within Palmerston to ensure that potential future sources of drinking water are identified; noting that a Class EA will also be required to evaluate alternatives to provide additional capacity for the system. The associated financial budget/planning should also be considered by the Town.

Since preliminary studies, design and approvals related to system upgrades typically require at least three to five years, it is recommended that the well exploration program is initiated within the next year to support a Class EA. The annual water supply RCC should also be completed on an annual basis, as a measure to monitor the system's ability to meet future MDD requirements and regularly monitor current usage and future needs and to ensure the Class EA project is initiated at a suitable

time to ensure that additional firm reserve capacity, which is expected to also improve operational performance during peak demands, is in place at least two (2) years in advance of the need to meet the demands of future growth, and as a contingency to deal with any unforeseen issues.

4.2 Harriston

4.2.1 Existing System

The Harriston water system is a single pressure zone watermain distribution network that is pressurized by one water tower. Water is supplied to the system by three drilled bedrock wells (Wells #1, #2 and #3) and their associated pumphouses (Pumphouses #2 and #3). The system currently provides service to 914 residences and 99 ICI properties, according to Town records at the end of calendar year 2020. The system also provides fire protection to the entire service area. In the event of a prolonged power outage, Pumphouse #3 is equipped with an automatic back-up power supply and a portable generator is available to Pumphouse #2.

Similar to Palmerston's water system, operation of the Harriston water system is controlled by a SCADA system. Generally, well pumps are called on and turned off based on the water level in the water tower and pressure in the distribution network. These levels are set by the Town's operator based on storage requirements, volume turnover needs and well pumping constraints. The SCADA system also provides real-time monitoring and record keeping.

4.2.2 Source Capacity

Water supply is provided to the system by the three bedrock drilled wells, named Wells #1, #2 and #3 and their associated wellhouses. The locations of the wellhouses are presented on Figure H-W.1. A summary of details for each well and pumphouse in the system is as follows:

Young Street Wellhouse

- Houses Well#1
- Standby power by automatic back-up power supply.

Well #1

- Well #1 drilled circa 1930 to 61 m depth bgs.
- Housed in the Young Street Wellhouse, with raw water directed to the King Street Wellhouse for treatment.
- Well pumps are submersible type complete with a 22.4 kW (30 hp) motor which discharges directly into the King Street Wellhouse for flow measurement and treatment.
- As per the PTTW, the rated capacity for Well 1 is 11.3 l/s; however, the rated flow capacity as per the Municipal Drinking Water License (MDWL) is 979 m^3/day; however, cascading water conditions affects flow control equipment after prolonged combined pumping at high rates longer than a 24-hour period with Well #3. Refer to Well #3 for details.

King Street Wellhouse

- Houses Wells #3, and receives raw water from Well #1 for measurement and treatment.
- Disinfection using 12% sodium hypochlorite.
- Iron sequestering treatment is provided.
- Continuous monitoring analyzers at the "Point of Entry" into the distribution network for free chlorine residual measurements.

- Contact time is provided in the underground contact pipe prior to entering the distribution network.
- Standby power by automatic back-up power supply.

Well #3

- Well #3 drilled in 1998 to 56 m depth bgs.
- Well pump is submersible type complete with a 22.4 kW (30 hp) motor which discharges directly into the King Street Wellhouse for flow measurement and treatment.
- As per the PTTW, rated capacities for Well 1 and 3 are 11.3 l/s and 18.9 l/s, respectively; however, the rated flow capacities as per the Municipal Drinking Water License (MDWL) are 979 m^3/day and 1,634 m^3/day, respectively. Therefore, total production from these wells is theoretically limited to 2,613 m^3/day; however, pumping tests indicate that the combined pumping rate capacity of these wells is limited to approximately 20 l/s (1,728 m^3/day) due to the production of sediment through cascading water conditions that affects flow control equipment after prolonged combined pumping at high rates longer than a 24-hour period.

John Street Wellhouse

- Houses Well #2.
- Disinfection using 12% sodium hypochlorite.
- Iron sequestering treatment is provided.
- Continuous monitoring analyzers at the “Point of Entry” into the distribution network for free chlorine residual measurements.
- Contact time is provided in the underground contact pipe prior to entering the distribution network.
- Standby power by portable generator.

Well #2

- Drilled in 1961 to 53.17 m depth bgs.
- Well pump is a submersible type complete with a 40 hp motor which discharges directly into Pumphouse #2 for flow measurement and treatment.
- Rated (as per the MDWL) and permitted (as per the PTTW) capacity is 23.9 l/s (2,065 m^3/day).
- Upgrades completed in 2016 to improve water quality.

It is our understanding that the Town operates this system such that Well #3 acts as the primary supply, Well #1 is the offset standby supply, which provides standby capacity and to obtain additional short term peaking capacity for the system. Well #2 is considered the backup supply due to quality issues. Based on these details (pumping test results for Wells #1 and #3 and rated flow capacity for Well #2), the total production capability (i.e., Source Capacity) of the Harriston water system is 3,793 m^3/day. Refer to Appendix F for a detailed letter report regarding the Well 1 and Well 3 Pumping Test completed by R.J. Burnside & Associates Limited in June 2021.

4.2.3 Future Water Demands (To 2051)

A review of the water usage rates within Harriston for the period of 2018 through 2020 indicates that the average MDD is 608 L/day/capita, as presented in the water RCC for Harriston in Appendix G. As noted for Palmerston, based on our experience, communities of similar size and configuration typically have an MDD between 300 and 500 L/day/capita; therefore, Harriston’s MDD is well above the typically expected rate for domestic use, noting that this per person water demand values includes the demands of Harriston’s ICI users, which inflates this value as compared to actual per person use.

Based on an average of the Town's water meter records for calendar years 2018 through 2020, approximately 51% of Harriston's total water consumption is for ICI usage. The remainder of the water usage is residential/domestic (34%) or unaccounted consumption such as leakages, flushing, water tower or well maintenance, etc. (15%). Refer to Appendix D for a summary of the Town's metered water consumption and volume of water pumped from each source. Therefore, it is also assumed that approximately 51% of the average MDD is from ICI users, with the remainder for residential/domestic use and unaccounted consumption. As such, the 608 L/day/capita MDD is an over-estimate of Equivalent Residential usage, with ICI demands excluded an MDD of 298 L/day/capita would be a better representation. This low usage is likely due to Harriston currently having a metering program in place for their water users, which is assumed to regulate (i.e., reduce) the usage. To be conservative, an average per person MDD of 450 L/day will be applied for future demand calculations. For comparison purposes, a weighted MDD, based on per capita demands for the existing and future population has been provided to illustrate the impact on future water demands. The MDD per person used for future planning should be reviewed and adjusted accordingly if it is determined that actual consumption changes significantly in the future.

It is recommended that any future ICI users with moderate/heavy water consumption to receive an allocated reserve capacity in terms of equivalent residential units (ERU) which would be considered in future water supply RCC. This can be completed through the process of site plan approval and can be outlined within the site plan agreement. Based on Section 3.4.3 of MECP Water System Design Guidelines, a demand of 28 m^3/ha/day is appropriate for estimating demand when actual demand is unknown. This equates to approximately 23 ERU per hectare of ICI, given a future MDD of 450 L/day/capita.

The MDD projections for future growth are summarized in Table 4.3. Detailed demand calculations are provided in Appendix D.

Table 4.3 – Harriston Water Usage Projections

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Equivalent Population (Capita)	2,402	2,423	2,758	2,932	3,156	3,288	3,446	3,662
Households (ERU)	914	924	1,039	1,106	1,188	1,239	1,298	1,381
MDD (m^3/day/capita)	0.608	0.607	0.588	0.580	0.570	0.565	0.560	0.554
MDD (m^3/day/ERU)	1.598	1.590	1.563	1.539	1.518	1.503	1.490	1.470
Total MDD (m^3/day)	1,461	1,470	1,621	1,699	1,800	1,859	1,930	2,028

4.2.4 Water Supply Reserve Capacity

Triton completed a review of the RCC for the Harriston water system based on the Town's billing records at the end of the 2020 calendar. The RCC were completed in accordance with the requirements outlined in MECP Guidelines and is based on the system's Firm Capacity. For the Harriston water system, based on current operations, the largest source of water is Well #2, which has a rated capacity of 2,065 m^3/day. Therefore, with Well #2 out of service, the Firm Capacity of the

Harriston water system is 1,728 m^3/day. Based on recent water demands (i.e., calendar years 2018 through 2020), the average MDD in Harriston of 1,461 m^3/day has not exceeded the Firm Capacity of its water system and results in a 267 m^3/day reserve hydraulic capacity, which corresponds to an additional 203 equivalent residential units that can be served, assuming that future MDD is reduced to 450 L/d/capita. Detailed calculations for Harriston's existing water supply RCC are provided in Appendix G.

Consistent with the MECP Water System Design Guidelines recommendation that Source Capacity should be greater than MDD so that daily demand can be met if storage is offline. A summary of the projected source and firm reserve capacity for the future population growth scenarios is provided in Table 4.4.

Table 4.4 – Summary of Water Usage Projections and Reserve Capacity for Harriston

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Equivalent Population (Capita)	2,402	2,423	2,758	2,932	3,156	3,288	3,446	3,662
Households (ERU)	914	924	1,039	1,106	1,188	1,239	1,298	1,381
MDD (m^3/day)	1,461	1,470	1,621	1,699	1,800	1,859	1,930	2,028
Source Capacity (m^3/day)	3,793							
Source Reserve Capacity (m^3/day)	2,332	2,323	2,172	2,094	1,993	1,934	1,863	1,765
Firm Capacity (m^3/day)	1,728							
Firm Reserve Capacity (m^3/day)	267	258	107	29	-72	-131	-202	-300

As presented in Table 4.4, it is apparent that the current Source Capacity 3,793 m^3/day is sufficient to meet the needs of the projected population to at least 2051; however, it is expected that the water demands in Harriston will reach the system's Firm Capacity between 2031 and 2036. Further, it has been identified through discussions with Town staff that there are concerns with the system's ability to sustain pumping rates to meet the needs of the existing and future population given the high peak demands required by current ICI users in the Town.

Therefore, the Town should be proactive in securing additional water sources to increase Firm Capacity to satisfy the estimated MDD of the projected future population. The addition of new water sources may also affect the configuration and sizing of future watermain upgrades and extensions of the existing municipal system, and could impact the configuration of proposed future developments. Therefore, it is recommended that the Town make it a priority to develop a well exploration program within Harriston to ensure that potential future sources of drinking water are identified; noting that a Class EA will also be required to evaluate alternatives to provide additional capacity for the system. The associated financial budget/planning should also be considered by the Town.

Since preliminary studies, design and approvals related to system upgrades typically require at least three to five years, it is recommended that the well exploration program is initiated within the next year to support a Class EA. The annual water supply RCC should also be completed on an annual basis, as a measure to monitor the system's ability to meet future MDD requirements and regularly monitor current usage and future needs and to ensure the Class EA project is initiated at a suitable time to ensure that additional firm reserve capacity, which is expected to also improve operational performance during peak demands, is in place at least two (2) years in advance of the need to meet the demands of future growth, and as a contingency to deal with any unforeseen issues.

4.3 Clifford

4.3.1 Existing System

The Clifford water system is a single pressure zone watermain distribution network that is pressurized by one water tower. Water is supplied to the system by three drilled bedrock wells (Wells #1, #3 and #4) and two associated pumphouses. The system currently provides service to 406 residences and 34 ICI properties, according to Town records at the end of calendar year 2020. The system also provides fire protection to the entire service area. In the event of a prolonged power outage, a portable generator is available to provide power to one of the wells.

The Clifford water system is controlled by a SCADA system. Generally, well pumps are called on and turned off based on the water level in the water tower and pressure in the distribution network. These levels are set by the Town's operator based on storage requirements, volume turnover needs and well pumping constraints. The SCADA system also provides real-time monitoring and record keeping.

4.3.2 Source Capacity

Water supply is provided to the system by three drilled wells, named Wells #1, #3 and #4 and associated pumphouses. The locations of these wells and pumphouses are presented on Figure C-W.1. A summary of details for each well and pumphouse is as follows:

Allan Street East Pumphouse

- Houses Wells #1.
- Disinfection using sodium hypochlorite.
- Iron sequestering treatment is provided.
- Continuous monitoring analyzers at the "Point of Entry" into the distribution network for free chlorine residual measurements.
- Contact time is provided in the underground contact pipe prior to entering the distribution network.
- Standby power by automatic back-up power supply.

Well #1

- A bedrock well drilled in 1964 to 54.6 m depth bgs.
- Provides peak flow and redundancy to the system
- Well pump is a submersible type complete with a 25 hp motor which discharges directly into the Allan St. Pumphouse for flow measurement and treatment.
- As per the PTTW, rated capacity is 15.15 l/s (1,310 m^3/day).

Nelson Street West Pumphouse

- Located on Nelson Street at the base of the water tower.
- Houses Wells #3 and #4, which are a combined supply and are not allowed to operate together.

- Disinfection using sodium hypochlorite.
- Iron sequestering treatment is provided.
- Continuous monitoring analyzers at the “Point of Entry” into the distribution network for free chlorine residual measurements.
- Contact time is provided in the underground contact pipe prior to entering the water tower.
- Standby power by portable generator.

Wells #3 and #4

- Well #3 is a deep overburden well drilled in 2004 to 35.7 m depth bgs.
- Well #4 is a bedrock well drilled in 2005 to 43.3 m depth bgs.
- Well #3 is the primary production well for the Clifford water system.
- Well #4 provides peak flow and redundancy to the system.
- Well #3 pump is a variable speed submersible pump and Well #4 is also submersible type complete with 15 hp and 25 hp motors, respectively, which discharges directly into the Nelson Street Pumphouse.
- Rated capacities are 7.6 l/s (655 m^3/day) and 15.15 l/s (1,309 m^3/day), respectively; however, the Permit to Take Water (PTTW) allows for the operator to pump either Well #3 or Well #4, but not both wells concurrently. Total production from these wells is limited to 1,309 m^3/day.

Based on these details, the total production capability (i.e., Source Capacity) of the Clifford water system is 2,619 m^3/day. It is our understanding that the Town operates this system to achieve balanced production from each of the wells.

4.3.3 Future Water Demands (To 2051)

A review of the water usage rates within Clifford for the period of 2018 through 2020 indicates that the average maximum day demand (MDD) is 433 L/day/capita, as presented in the water RCC for Clifford in Appendix H. This per person RCC value includes Clifford’s ICI demands, which inflates this value as compared to actual per person use. As noted for Palmerston and Harriston, the MDD for communities of similar size is typically between 300 and 500 L/day/capita. Therefore, Clifford’s MDD is within the expected range and will be applied for future demand calculations.

MDD projections for future growth calculated are summarized in Table 4.5. Detailed demand calculations are provided in Appendix D.

Table 4.5 – Clifford Water Usage Projections

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Equivalent Population (Capita)	995	1,043	1,117	1,190	1,267	1,348	1,423	1,501
Households (ERU)	406	412	444	476	508	540	572	604
MDD (m^3/day/capita)	0.433	0.433	0.433	0.433	0.433	0.433	0.433	0.433
MDD (m^3/day/ERU)	1.062	1.096	1.089	1.082	1.080	1.081	1.077	1.076
Total MDD (m^3/day)	431	452	484	516	549	584	617	650

4.3.4 Water Supply Reserve Capacity

Triton completed a review of the reserve capacity for the Clifford water system based on information at the end of the 2020 calendar year. The RCC were completed in accordance with the requirements outlined in the MECP Guidelines and are based on the system's Firm Capacity. For the Clifford water system, the largest source of water is Well #1, which has a rated capacity of 1,310 m^3/day. Therefore, with Well #1 out of service, the Firm Capacity of the Clifford water system is 1,309 m^3/day. Based on recent water demands in Clifford for calendar years 2018 through 2020, the average MDD of 431 m^3/day has not exceeded the Firm Capacity of its water system and results in an 878 m^3/day reserve hydraulic capacity, which corresponds to an additional 827 ERU that can be served. Detailed calculations for Clifford's existing water supply RCC are provided in Appendix H.

The MECP Water System Design Guidelines recommends that the Source Capacity should be greater than MDD so that daily demand can be met if storage is offline. A summary of the water usage projections, source reserve capacity and firm reserve capacity for the future population growth scenarios are provided in Table 4.6.

Table 4.6 – Summary of Water Usage Projections and Reserve Capacity for Clifford

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Equivalent Population (Capita)	995	1,043	1,117	1,190	1,267	1,348	1,423	1,501
Households (ERU)	406	412	444	476	508	540	572	604
MDD (m^3/day)	431	452	484	516	549	584	617	650
Source Capacity (m^3/day)	2,619							
Source Reserve Capacity (m^3/day)	2,188	2,167	2,135	2,103	2,070	2,035	2,002	1,969
Firm Capacity (m^3/day)	1,309							
Firm Reserve Capacity (m^3/day)	878	857	825	793	760	725	692	659

As per Table 4.6, it is apparent that the current Source Capacity of 2,619 m^3/day is sufficient to meet the needs of the projected population for Clifford to at least 2051 as per the County's Growth Allocations Memo. Additionally, the Firm Capacity of Clifford's water system is also sufficient to meet the needs of the projected population for Clifford to at least 2051. This indicates that the existing water system is sufficient to allow for future growth and system redundancy.

It is recommended that long-term development needs are confirmed periodically (i.e., every five years) as actual development/usage progresses, and that annual water supply RCC be completed, as a measure to monitor the system's ability to meet future MDD requirements and regularly monitor current usage and future needs.

5 WATER STORAGE

Storage requirements for a water system are based on the MECP Water System Design Guidelines (2008) and require municipal storage facilities to be designed to allow maintenance of adequate flows and pressures in the distribution network during peak hour water demand and to meet MDD during fire and emergency events. The calculation for the storage requirement of a water system is as follows:

Total Treated Water Storage Requirement = A + B+ C

Where: A = Fire Storage (MECP suggested flow/duration based on population)
B = Equalization Storage (25% of MDD)
C = Emergency Storage (25% of A+B)

Fire storage allows the system to achieve flow rates and volume necessary to effectively fight fires and is based on a population specific fire flow rate and duration, as indicated in Table 8-1 of the MECP's Drinking Water Systems Design Guidelines (2008). Equalization storage provides water to the system during peak demand periods. Emergency storage is intended to provide a safety factor for the water storage.

5.1 Palmerston

5.1.1 Existing

Storage for the Palmerston water system is provided by an elevated tower with details as follows:

- Located at 215 William Street
- Commissioned in 2002
- Water Tower
- Volume is 2,080 m^3
- Operational range between 445.99 m above mean sea level (amsl) and 435.35 m amsl

Based on discussions with Town staff, the water tower in Palmerston has recently been inspected and no significant deficiencies were noted.

5.1.2 Future Storage Requirements (To 2051)

The calculated storage requirements for the current and future development scenarios in Palmerston are summarized in Table 5.1. Detailed calculations are provided in Appendix D.

Table 5.1 – Summary of Palmerston Water Storage Assessment

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Serviced Population (Capita)	3,123	3,148	3,610	4,550	5,091	5,293	5,741	6,237
Duration (hours)	2	2	2	2	2	2	2	3
Fire Flow (L/s)	110	110	119	134	141	144	150	156
Fire Storage - A (m^3)	792	792	857	965	1,015	1,037	1,080	1,685
Equalization Storage - B (m^3)	331	333	382	482	539	560	608	660
Emergency Storage - C (m^3)	281	281	310	362	389	399	422	586
Required Total (m^3)	1,403	1,407	1,549	1,808	1,943	1,996	2,110	2,931
Existing Total (m^3)	2,080							
Difference (Required – Existing) (m^3)	677	673	531	272	137	84	-30	-851

As per Table 5.1, the storage volume requirements to support the future growth indicate that the existing available storage is insufficient to meet the projected needs of the future population to 2051. More specifically, the required storage will be exceeded between 2041 and 2046. It is recommended that the Town complete an annual assessment of storage availability/requirement in order to predict storage needs well in advance of a forecasted deficit.

Additional storage capacity should be in place at least two years in advance of the need to meet the projected needs of future growth, and as a contingency to deal with any unforeseen issues. Since preliminary studies, design and approvals related to system upgrades typically require at least three to five years, it is recommended that a Municipal Class EA should be initiated at least ten years in advance of the forecasted deficit to evaluate alternatives to increase the total available storage.

5.2 Harriston

5.2.1 Existing

Storage for the Harriston water system is provided by an elevated tower, with tower details summarized as follows:

- Located at the corner of Robertson Street and Raglan Street West
- Water Tower
- Commissioned in 2011
- Volume is 1,915 m^3
- Operation range between 425.82 m amsl and 415.19 m amsl

Based on discussion with Town staff, the water tower in Harriston has recently been inspected and no significant deficiencies were noted.

5.2.2 Future Storage Requirements (To 2051)

The calculated storage requirements for the current and future development scenarios in Harriston are summarized in Table 5.2. Detailed calculations are provided in Appendix D.

Table 5.2 – Summary of Harriston Water Storage Assessment

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Serviced Population (Capita)	2,405	2,423	2,758	2,932	3,156	3,288	3,446	3,662
Duration (hours)	2	2	2	2	2	2	2	2
Fire Flow (L/s)	96	97	103	106	111	113	116	119
Fire Storage - A (m^3)	691	698	742	763	799	814	835	857
Equalization Storage - B (m^3)	365	368	405	425	450	465	483	507
Emergency Storage - C (m^3)	264	266	287	297	312	320	329	341
Required Total (m^3)	1,320	1,332	1,434	1,485	1,561	1,598	1,647	1,705
Existing Total (m^3)	1,915							
Difference (Required – Existing) (m^3)	595	583	482	430	354	317	268	210

As outlined in Table 5.2, the existing available storage is sufficient to meet the projected water storage needs of the future population to beyond 2051. It is recommended that the Town complete an assessment of storage availability/requirement on a regular basis (i.e., at least every 5 years) to predict storage needs well in advance of a forecasted deficit. Should a deficit be forecasted, a Municipal Class EA should be initiated at least ten years in advance of a deficit to evaluate alternatives to increase the total available storage.

5.3 Clifford

5.3.1 Existing

Storage for the Clifford water system is provided by an elevated tower, with tower details summarized as follows:

- Located on Nelson Street
- Commissioned in 2005.
- Water Tower
- Volume is 1,140 m^3.
- Operation range between 423.58 m amsl and 415.99 m amsl

Based on discussion with Town staff, the water tower in Clifford has recently been inspected and no significant deficiencies were noted.

5.3.2 Future Storage Requirements (To 2051)

The calculated storage requirements for the current and future development scenarios in Clifford are summarized in Table 5.3. Detailed calculations are provided in Appendix D.

Table 5.3 – Summary of Clifford Water Storage Assessment

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Serviced Population (Capita)	995	1,043	1,117	1,190	1,267	1,348	1,423	1,501
Duration (hours)	2	2	2	2	2	2	2	2
Fire Flow (L/s)	65	66	68	69	71	73	75	77
Fire Storage - A (m^3)	468	475	490	497	511	526	540	554
Equalization Storage - B (m^3)	108	113	121	129	137	146	154	163
Emergency Storage - C (m^3)	144	147	153	156	162	168	174	179
Required Total (m^3)	720	735	763	782	811	840	868	896
Existing Total (m^3)	1,140							
Difference (Required – Existing) (m^3)	420	405	377	358	329	300	272	244

As outlined in Table 5.3, the existing available storage is sufficient to meet the projected water storage needs of the future population to beyond 2051. It is recommended that the Town complete an assessment of storage availability/requirement on a regular basis (i.e., at least every 5 years) to predict storage needs well in advance of a forecasted deficit. Should a deficit be forecasted, a Municipal Class EA should be initiated at least ten years in advance of a deficit to evaluate alternatives to increase the total available storage.

6 WATER DISTRIBUTION NETWORK

Growth information presented in Table 3.2 is used to determine the expected demands of the water system's vertical infrastructure (i.e., wells and water towers); however, the expected demand on horizontal infrastructure (i.e., watermains) and the associated capacities needs to consider the expected demand as a result of complete build out of the development scenarios (i.e., 2031, 2041 and 2051).

Computer simulation models (i.e., WaterCAD v8i) have been created for each of the Town's water systems to support this Servicing Strategy. The computer simulation models (models) are used to review the typical pressure throughout the distribution networks based on the current tower operating ranges. The model is also used to review various operating conditions for the current and long-term development scenarios. In all cases, the future models are based on full occupancy of the development lands within each scenario. These models are used to identify infrastructure requirements of the system to support development scenarios. Therefore, before new or reconstruction projects are undertaken in any of the Town's urban areas, it is imperative that the

future needs of water system be considered and investigated.

Consistent with the MECP Design Guidelines (2008), the normal pressure in water distribution networks is to be between 40 psi and 100 psi during normal demand periods, with typical operating pressure between 50 psi and 70 psi. Each of the Town's water distribution networks were reviewed and compared to the accepted normal pressures for both the current service area and for each of the development scenarios using existing topography within these development areas.

Additionally, available fire flows within the networks were estimated using the models. These estimates were based on maintaining a minimum residual pressure of 20 psi in the distribution network under MDD conditions with the municipal wells running at the rated capacity, which represents the maximum water taking capability of the system, consistent with the normal accepted industry standard for firefighting (MECP, 2008). The results of this analysis reflect the available flow from the watermains at a location in the system rather than a specific hydrant and are provided for each of the development scenario.

Generally, higher fire flows are required in industrial and high-density commercial areas (i.e., downtown core), with actual fire flow requirements being site specific. However, the Fire Underwriters Survey document "Water Supply for Public Fire Protection" recommends a minimum capability of 33.3 L/s, based on an assumed hydrant coverage area of 16,000 m^2 throughout a system that provides firefighting service. This level of service has been used to review the available fire flow throughout each of the Town's water distribution networks.

6.1 Palmerston

6.1.1 Existing

At the end of the 2020 calendar year, the distribution network serviced 1,372 service connections (1266 residential and 106 ICI) within Palmerston's developed boundary. The network includes watermain ranging in size (i.e., diameter) from 100 mm to 350 mm. The type of watermain used to construct the network has varied throughout the years and includes copper, cast iron, ductile iron, asbestos cement and PVC. Within the last 15-20 years, any upgrades and extensions to the existing distribution network have been with PVC watermain. The existing distribution network by watermain size and expected fire flow capabilities is illustrated on Figure P-W.1. The existing distribution network by existing watermain material and typical system pressure is presented on Figure P-W.2. A complete infrastructure reference plan of Palmerston's water system is provided in Appendix I.

It is expected that some of the existing copper, cast iron, ductile iron and asbestos cement watermain are approaching the end of their estimated service life, which can become high maintenance items. Corrosion and scale build-up can be excessive and result in poor hydraulic performance. Watermains of these materials should be replaced as streets are reconstructed (road upgrades or sewer replacements), particularly if the watermain has been experiencing breaks and/or other servicing constraints such as watermain quality concerns or reduced flows and pressures noted by the nearby users. Existing PVC watermain may also need to be replaced if the watermain has been experiencing breaks and/or other servicing constraints. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

6.1.2 Future Development Scenarios

The ability of Palmerston's water distribution network to service the 2031, 2041 and 2051 development scenarios is summarized in Tables 6.1, 6.2 and 6.3, respectively. The development scenarios are presented on Figure P-D.

Table 6.1 – Palmerston 2031 Development Scenario Water Serviceability

Development ID (Refer to Figure P-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
C1-1	Commercial Lands	1.0	24	92	54
I1-1	Industrial/Commercial/Institutional	23.0	548	81	63
INST-1	Institutional	1.4	33	79	55
R1-1	Residential	6.7	107	92	56
R2-1	Residential	2.2	35	88	61
R3-1	Residential	1.2	19	137	58
R4-1	Residential	2.7	43	111	50
R5-1	Residential	1.2	11	125	60

*Expected pressure and fire flow based on existing topographical information (mapping).

Table 6.2 – Palmerston 2041 Development Scenario Water Serviceability

Development ID (Refer to Figure P-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
C1-1	Commercial Lands	1.0	24	92	54
I1-1	Industrial/Commercial/Institutional	23.0	548	82	62
I2-2	Industrial	15.9	373	72	54
INST-1	Institutional	1.4	33	83	55
R1-1	Residential	6.7	107	81	55
R2-1	Residential	2.2	35	87	61
R3-1	Residential	1.2	19	136	58
R4-1	Residential	2.7	43	152	50
R5-1	Residential	1.2	11	124	60
R6-2	Residential	7.2	115	75	48
R7-2	Residential	3.9	63	118	54
R8-2	Residential	5.1	82	150	51

*Expected pressure and fire flow based on existing topographical information (mapping).

Table 6.3 – Palmerston 2051 Development Scenario Water Serviceability

Development ID (Refer to Figure P-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
C1-1	Commercial Lands	1.0	24	91	54
FD1-3	Future Development	48.6	1133	119	47
FD2-3	Future Development	4	93	50	46
FD3-3	Future Development	1.5	35	107	57
I1-1	Industrial/Commercial/Institutional	23.0	548	143	62
I2-2	Industrial	15.9	373	108	54
INST-1	Institutional	1.4	33	82	55
R1-1	Residential	6.7	107	148	55
R2-1	Residential	2.2	35	129	60
R3-1	Residential	1.2	19	134	58
R4-1	Residential	2.7	43	139	50
R5-1	Residential	1.2	11	133	60
R6-2	Residential	7.2	115	127	47
R7-2	Residential	3.9	63	116	53
R8-2	Residential	5.1	82	147	50
R9-3	Residential	2	32	108	55
R10-3	Residential	5.9	94	102	53

*Expected pressure and fire flow based on existing topographical information (mapping).

Based on the results in the tables above, there are no distribution network improvements/upgrades to the existing network required to service areas within the 2031, 2041 and 2051 Development Scenarios as the expected typical network pressure and fire flow capabilities are within the accepted range. Further, based on a review of the topography within the development areas (refer to Figure P-D) and current operating range, additional pressure zones will not be required to service the future development areas.

With respect to fire flow capabilities, the required fire flow of a future development should be reviewed and confirmed during the site plan application process to ensure capabilities are sufficient to meet the specific requirements of the development. The Town should take the opportunity as part of their reconstruction program to increase the available fire flow throughout the existing and future system by replacing any existing undersized watermain and eliminate dead-ends wherever possible. The expectation is that the extensions and watermain constructed within a development will offer interconnection and looping for the network. Sizing of future watermain will need to be confirmed at the preliminary design stage of any future development. These expectations are also applicable to servicing the Town owned land within the Palmerston Industrial Park (development area I1-1 on Figure P-D). The recommended water system upgrades, extensions to improve the existing network, and probable extensions to service future development lands are presented on Figure P-W.3. It is expected that development areas identified as R1-1, I2-2, R6-2, R7-2 and FD1-3 will require extensions and that the remaining developments can be serviced without extending the existing distribution network. Refer to Figure P-D for anticipated development areas.

6.2 Harriston

6.2.1 Existing

At the end of the 2020 calendar year, the distribution network serviced 1,013 service connections (914 total residential and 99 ICI) within Harriston's developed boundary. The network includes watermain ranging in size (i.e., diameter) from 100 mm to 300 mm. The type of watermain used to construct the network has varied throughout the years and includes copper, cast iron, ductile iron and PVC. Within the last 15-20 years, any upgrades and extensions to the existing distribution network have been with PVC watermain. The existing distribution network by size and expected fire flow capabilities is illustrated on Figure H-W.1. The existing distribution network by watermain material and typical network pressure is presented on Figure H-W.2. A complete infrastructure reference plan of Harriston's existing water system is provided in Appendix I.

It is expected that some of the existing copper, cast iron and ductile iron watermain are approaching the end of their estimated service life, which can become high maintenance items. Corrosion and scale build-up can be excessive and result in poor hydraulic performance. Watermains of these materials should be replaced as streets are reconstructed (road upgrades or sewer replacement), particularly if the watermain has been experiencing breaks and/or other servicing constraints such as watermain quality concerns or reduced flows and pressures noted by the nearby users. Existing PVC watermain may also need to be replaced if the watermain has been experiencing breaks and/or other servicing constraints. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

6.2.2 Future Development Scenarios

The ability of Harriston's water distribution network to service the 2031, 2041 and 2051 development scenarios are summarized in Tables 6.4, 6.5 and 6.6, respectively. The development scenarios are presented on Figure H-D.

Table 6.4 – Harriston 2031 Development Scenario Water Serviceability

Development ID (Refer to Figure H-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
FD1-1	Future Development	2	47	88	51
I1-1	Industrial	1.8	42	73	51
R1-1	Residential	15.2	243	99	52
R2-1	Residential	0.7	11	142	54
R3-1	Residential	1	16	99	51
R4-1	Residential	8.4	134	86	53

*Expected pressure and fire flow based on existing topographical information (mapping).

Table 6.5 – Harriston 2041 Development Scenario Water Serviceability

Development ID (Refer to Figure H-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
FD1-1	Future Development	2	47	88	51
I1-1	Industrial	1.8	42	72	51
R1-1	Residential	15.2	243	98	53
R2-1	Residential	0.7	11	141	54
R3-1	Residential	1	16	99	51
R4-1	Residential	8.4	134	86	53
I2-2	Industrial	4.8	113	72	52

*Expected pressure and fire flow based on existing topographical information (mapping).

Table 6.6 – Harriston 2051 Development Scenario Water Serviceability

Development ID (Refer to Figure H-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
FD1-1	Future Development	2	47	94	51
I1-1	Industrial	1.8	42	74	51
R1-1	Residential	15.2	243	100	52
R2-1	Residential	0.7	11	142	54
R3-1	Residential	1	16	112	51
R4-1	Residential	8.4	134	87	53
I2-2	Industrial	4.8	113	74	52
FD2-3	Future Development	4	94	146	47
FD3-3	Future Development	0.5	12	98	57
FD4-3	Future Development	0.9	21	92	53
FD5-3	Future Development	1.2	28	88	48
FD6-3	Future Development	1.2	28	85	48
FD7-3	Future Development	1.2	28	79	48
FD8-3	Future Development	0.4	9	91	47
FD9-3	Future Development	0.3	7	83	47
FD10-3	Future Development	0.2	5	56	49
FD11-3	Future Development	2.4	56	388	52
I3-3	Industrial	5.5	129	66	53
R5-3	Residential	0.5	8	142	47
R6-3	Residential	1	16	55	47

*Expected pressure and fire flow based on existing topographical information (mapping).

Based on the results in the tables above, there are no distribution network improvements/upgrades to the existing system required to service areas within the 2031, 2041 and 2051 Development Scenarios as the expected typical network pressure and fire flow capabilities are within the acceptable ranges. Based on a review of the topography within the development areas (refer to Figure H-D) and the expected network pressure, it is anticipated that additional pressure zones are not required.

With respect to fire flow capabilities, the required fire flow of a future development should be reviewed and confirmed during the site or subdivision plan application process to ensure fire flow capabilities are sufficient to meet the specific requirements of the development. There is significant opportunity to increase the available fire flow throughout the existing and future system by replacing any existing watermain that is less than 150 mm in diameter and removing dead-ends wherever possible. These replacements should be completed in conjunction with any road reconstruction projects, or watermain extensions required to service development areas. The expectation is that the extensions and watermain constructed within a development will offer interconnection and looping for the system, however will not be trunk mains. Sizing of future watermain will need to be confirmed at the preliminary design stage of any future development. The recommended water system upgrades, extensions to improve the existing system, and probable extensions to service future development lands are presented on Figure H-W.3. It is expected that development areas identified as I1-1, FD1-1, I2-2, I3-3, FD5-3, FD6-3, FD7-3, FD8-3, FD9-3, FD10-3 and FD11-3 will require extensions and that the remaining developments can be serviced without extending the existing distribution network. Refer to Figure H-D for anticipated development areas.

As per the Harriston Industrial Park Class EA Screening Report (Screening Report) (B.M. Ross, 2017) the preferred alternative to service the Harriston Industrial Park involves upsizing the watermain between the existing water tower through to the intersection of Adelaide Street and John Street, followed by “installation of a larger [i.e., 350 mm dia. or 400 mm dia.] watermain … within the existing John Street road allowance” to replace the existing 200 mm dia. watermain on John Street beyond Adelaide Street (i.e., in the Harriston Industrial Park, extending to Hutchison Street). The ≥ 300 mm dia. watermain was recommended to “transmit higher fire flows through a long dead-end watermain [through the Harriston Industrial Park] without a booster pump”, since constructing ground level storage and pumping would be “cost prohibitive and would increase annual O&M costs.” The higher fire flow is based on a suggested target flow rate of 150 L/s, which was confirmed by the Town during the Class EA. It is recommended that alternatives to looping the existing system and upgrading the trunk mains to achieve a target fire flow rate of 150L/s be investigated, noting that, since the Class EA was completed, the full development potential (land area) of the Harriston Industrial Park has reduced significantly per the Official Plan Amendment OP-2020-09 therefore, it is anticipated that the expected demand within the Industrial Park would not be sufficient to necessitate the extensive reconstruction of existing roads previously proposed in order to achieve the target fire flow of 150 L/s.

As an alternative to the outcome of the Class EA, the Town could opt to restrict the type of development (i.e., no high flow requirement) within the Harriston Industrial Park; therefore, eliminating the need to provide a higher flow rate (i.e., >60 L/s). In a situation where a prospective developer requires higher flow rates, costs associated with on-site storage, or, booster pumping to achieve sufficient higher flows would be at the developer’s expense. It should be noted that the dead end extension of the existing 200 mm watermain through the Harriston Industrial Park beyond Hutchison Street (based on wet industry restrictions) will still require operation and maintenance efforts, consistent with the recommendations in the Screening Report as follows: “There will be additional operation and maintenance efforts required by the Town’s drinking water system Operator to help prevent issues (e.g. low chlorine residual) associated with low water use for such a long [larger] diameter dead-end line (e.g. regular flushing of the watermain).”The required fire flow of a development, including the Harriston Industrial Park, should be reviewed and confirmed during the site plan application process.

6.3 Clifford

6.3.1 Existing

The distribution network presently (at the end of calendar year 2020) provides water to 440 service connections (406 total residential and 34 ICI) within Clifford's developed boundary. The network includes watermain ranging in size (i.e., diameter) from 100 mm to 300 mm. The type of watermain used to construct the network has varied throughout the years and includes copper, cast iron, ductile iron and PVC. Within the last 10-15 years, any upgrades and extensions to the existing distribution network have been with PVC watermain. The existing distribution network by size and expected fire flow capabilities is illustrated on Figure C-W.1. The existing distribution network by watermain material and typical system pressure is presented on Figure C-W.2. A complete infrastructure reference plan of Clifford's water system is provided in Appendix I.

It is expected that some of the existing copper, cast iron and ductile iron watermain are approaching the end of their estimated service life, which can become high maintenance items. Corrosion and scale build-up can be excessive and result in poor hydraulic performance. Watermains of these materials should be replaced as streets are reconstructed (road upgrades or sewer replacement), particularly if the watermain has been experiencing breaks and/or other servicing constraints such as watermain quality concerns or reduced flows and pressures noted by the nearby users. Existing PVC watermain may also need to be replaced if the watermain has been experiencing breaks and/or other servicing constraints. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

6.3.2 Future Development Scenarios

The ability of Clifford's water distribution network to service the 2031, 2041 and 2051 development scenarios are summarized in Tables 6.7, 6.8 and 6.9, respectively. The development scenarios are presented on Figure C-D.

Table 6.7 – Clifford 2031 Development Water Serviceability

Development ID (Refer to Figure C-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
C1-1	Commercial	6.3	157	91	63
C2-1	Commercial	5.9	147	114	68
R1-1	Residential	0.4	6	179	71

*Expected pressure and fire flow based on existing topographical information (mapping).

Table 6.8 – Clifford 2041 Development Water Serviceability

Development ID (Refer to Figure C-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
C1-1	Commercial	6.3	157	100	63
C2-1	Commercial	5.9	147	127	68
FD1-2	Future Development	6.6	165	138	68
R1-1	Residential	0.4	6	182	71
R2-2	Residential	1.7	27	94	56
R3-2	Residential	2.1	34	158	70

*Expected pressure and fire flow based on existing topographical information (mapping).

Table 6.9 – Clifford 2051 Development Water Serviceability

Development ID (Refer to Figure C-D)	Development Name/Description	Area (ha)	Units (ERU)	Fire Flow* (L/s)	Pressure* (psi)
C1-1	Commercial	6.3	157	100	63
C2-1	Commercial	5.9	147	127	67
FD1-2	Future Development	6.6	165	1347	67
FD2-3	Future Development	0.5	13	158	71
FD3-3	Future Development	6.1	158	192	60
FD4-3	Future Development	1.0	25	174	67
FD5-3	Future Development	3.0	75	221	75
FD6-3	Future Development	2.0	50	157	72
R1-1	Residential	0.4	6	204	71
R2-2	Residential	1.7	27	106	56
R3-2	Residential	2.1	34	177	70
R4-3	Residential	3.1	50	179	70
R5-3	Residential	1.5	24	90	61

*Expected pressure and fire flow based on existing topographical information (mapping).

Based on the results in the tables above, there are no distribution network improvements/upgrades required to service areas within the 2031, 2041 and 2051 Development Scenarios as the expected typical system pressure and fire flow capabilities are within the accepted range. Based on a review of the topography within the development areas (refer to Figure C-D) and the expected system pressure, it is anticipated that additional pressure zones are not required.

With respect to fire flow capabilities, the required fire flow of a future development should be reviewed and confirmed during the site plan application process to ensure fire flow capabilities are sufficient to meet the specific requirements of the development. There is significant opportunity to increase the available fire flow throughout the existing and future distribution network by replacing any existing watermain that is less than 150 mm in diameter and removing dead-ends wherever possible. These replacements should be completed in conjunction with any road reconstruction projects, or watermain extensions required to service development areas. The expectation is that the extension network, however will not be trunk mains. Sizing of future watermain will need to be confirmed at preliminary

design stage of any future development. The recommended water system upgrades, extensions to improve the existing network, and probable extensions to service future development lands are presented on Figure C-W.3. It is expected that development areas identified as R1-1, R3-2, FD2-3, R4-3 and R5-3 will require extensions and that the remaining developments can be serviced without extending the existing distribution network. Refer to Figure C-D for anticipated development areas.

7 WASTEWATER COLLECTION AND TREATMENT

The expected population growth presented in Table 3.2 have been used to determine the impact on the sanitary systems vertical infrastructure (i.e., treatment facilities) through projected average day flow (ADF) values. A SewerCAD model was created for each of the Town's municipal sanitary systems to simulate sewage flows through the collection network to assess the capacity of the existing sanitary sewers to service the existing population and the projected sewage flows of the future population for each of the development scenarios.

Given that the model is a "worst case" scenario, a maximum capacity based on a pipe at 110% capacity is used to establish the capacity within the system. A minor surcharge of the pipes is considered acceptable and unlikely to result in any operational issues. The result of this assessment is based on existing information at the end of calendar year 2020 and is detailed in the proceeding sections.

In all cases, the future modelling is based on full occupancy of the development lands. Therefore, before any reconstruction project is undertaken in any of the Town's urban areas, it is imperative that the future development servicing scenarios be considered to ensure the existing/replacement/new sewers are adequate for long-term servicing requirements

7.1 Palmerston

7.1.1 Existing Infrastructure

The Palmerston wastewater system includes a dedicated sanitary sewer/forcemain collection network, a sewage pumping station (SPS) and a wastewater treatment plant (WWTP). The Palmerston WWTP discharges to the Wallace Drain, a tributary of the Little Maitland River.

7.1.2 Collection Network

The network services the entire developed area of Palmerston (i.e., within the existing urban boundary) and currently provides 1,347 service connections (1,244 residential and 103 ICI), according to Town records at the end of calendar year 2020. The type of sanitary sewer pipe material varies within the network and includes; asbestos cement, concrete, PVC and vitrified clay. Upgrades and extensions to the sanitary sewer network within the last 20-25 years have been PVC pipe. The existing sanitary sewer collection network and associated sewer sizes are presented on Figure P-S.1. The sewer material for the existing sanitary sewer collection network is presented on Figure P-S.2. A complete infrastructure reference plan of Palmerston's sanitary wastewater system is provided in Appendix J.

Regarding the physical condition of the sewers, it is recommended that all sewers be videoed prior to the reconstruction of a street in order to assess the condition of the pipe and identify any I&I flow sources and whether rehabilitation or replacement is required. It should be noted that it is expected that asbestos cement and vitrified clay sewers will be approaching the end of its estimated service

life and should be replaced as road upgrades are undertaken or watermains are being replaced. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

7.1.3 Treatment and Effluent Storage

The Palmerston WWTP is located at 605 Mill Lane, at the southwest corner of Mill Lane and Walker Street. The plant is a conventional mechanical plant with an extended aeriation oxidation ditch facility that includes a bar screen for grit removal and preliminary treatment, an oxidation ditch for secondary treatment, followed by ultra-violet disinfection as tertiary treatment. The plant also includes the necessary biosolids management associated with a mechanical plant, including aerobic digestion and storage.

The rated average day flow capacity of the WWTP is 2,010 m^3/day.

In the summer of 2019, the Town began design works to upgrade to the Palmerston WWTP. The project includes a new secondary clarifier that will ultimately become a component of a future full plant expansion. The existing clarifier and its associated return/waste pumping/piping systems will be left in place to handle any flows above the new clarifier's peak capacity; however, the project will not result in an increase to the current rated capacity of the WWTP.

7.1.4 Reserve Capacity

Triton completed a review of the reserve capacity for the Palmerston WWTP based on information to the end of calendar year 2020. The RCC were completed in accordance with the requirements outlined in the MECP guidelines. The total hydraulic reserve capacity of the WWTP is calculated as the design capacity of the facility minus the average daily sewage flow (ADF) for the record period, typically the previous three years.

The ADF based on flows recorded at the WWTP in calendar years 2018, 2019 and 2020 is 1,243 m^3/day, which is in compliance with the Certificate of Approval for the WWTP. The WWTP hydraulic reserve capacity of 767 m^3/day corresponds to an additional 768 equivalent residential units that can be serviced. Detailed RCC for Palmerston's sanitary system is provided in Appendix E.

The existing average per person sewage flow rate in Palmerston is 405 L/day. This value includes ICI flows and results in an average per person sewage flow rate that is within the expected typical values of 250 to 450 L/capita/day, as outlined in the MECP Guidelines (2008). Therefore, this per capita flow rate will be applied for future per capita sewage flow rates. This sewage flow rate should be reviewed on an annual basis and adjusted accordingly to reflect changes in the actual flows and to project future sewage flow and evaluate the capacity of the system.

A summary of the projected sewage flow, design capacity and treatment reserve capacity for the future growth scenarios are provided in Table 7.1. Detailed calculations are provided in Appendix D.

Table 7.1 – Summary of Palmerston Sewage Flow Projections and Sanitary Reserve Capacity

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Serviced Population (Capita)	3,068	3,148	3,610	4,550	5,019	5,293	5,741	6,237
Households (ERU)	1,244	1,279	1,431	1,740	1,921	1,994	2,160	2,337
ADF (m^3/day)	1,243	1,275	1,463	1,844	2,063	2,145	2,326	2,527
Design Capacity (m^3/day)	2,010							
Reserve Capacity (m^3/day)	767	735	547	166	-53	-135	-316	-517

Based on the population growth projections described for Palmerston and the associated projected sewage flow summarized in Table 7.1, the existing WWTP will have sufficient reserve capacity to treat the projected sewage flow until the year 2031. Hydraulic reserve capacity of the existing WWTP is expected to be exceeded between 2031 and 2036, indicating the need for additional treatment capacity to permit future growth.

As a contingency to deal with any unforeseen issues, additional treatment capacity should be in place at least two years in advance of the projected deficit. Therefore, it is recommended that the Town initiate technical studies, including associated financial budget/planning, to support a Municipal Class EA to review viable options to increase reserve sewage treatment capacity in Palmerston. Options to be considered in the Class EA may include: water conservation measures, infiltration and inflow control and re-rating of the WWTP. Other options may be identified during the Class EA process.

It is also recommended that the Town continue to actively pursue sewer inflow and infiltration (I&I) monitoring and replace or repair any sanitary sewers experiencing high I&I to aid in reducing wastewater flows at the WWTP and to address short-term capacity concerns. Of additional importance is the consideration of the types of future industries that propose development within the serviced area. If “wet” industries are permitted to connect to the municipal wastewater system, the available reserve capacity of the system will decrease at an accelerated rate.

The annual sewage RCC should be completed on an annual basis, as a measure to monitor the system’s ability to meet future ADF requirements and regularly monitor current sewage flow and future projections to ensure that Class EA projects are initiated at a suitable time to ensure that additional treatment capacity is in place at least two years in advance of the need. Further, it is recommended that any proposed/future ICI users receive an allocated reserve capacity in terms of ERU which would be considered in future sewage RCC. This can be completed through the process of site plan approval and outlined within the site plan agreement.

7.1.5 Future Development (to 2051)

A summary of the peak sewage flows for existing conditions and the 2031, 2041 and 2051 development scenarios (based on full build-out potential) are presented on Figures P-S.3 through P-S.6, respectively. To service the developments within the future Development Scenarios up to the year 2041, there are no sanitary sewer extensions or upgrades required.

For the 2051 Development Scenario, there are two sanitary sewers that are nearing capacity, as summarized in Table 7.2. Therefore, prior to these proposed developments coming on-line it is recommended that these sewers are monitored to confirm actual flows, and if warranted, these sewers are to be upgraded.

Table 7.2 –Summary of Sanitary Sewers Nearing Capacity Limits for the Palmerston 2051 Development Scenario

Start MH	End MH	Street	Length (m)	Diameter (mm)	Slope (%)	Percent Full (%)
SANMH P112C	SANMH P112B	Sewer Easement (A & B Dobson Sales)	54.7	300	0.13	109.2
SANMH P112B	SANMH P112A	Sewer Easement (A & B Dobson Sales)	94.0	375	0.10	110

For all future developments, the expectation is that, in the event an area is not serviceable by gravity, a sewage pumping station or low-pressure sanitary system will be installed to provide connection to the nearest sewer. The configuration of such infrastructure would need to be reviewed based on the specific development needs. The recommended sanitary system upgrades and probable extensions to service future development lands extensions for Palmerston are presented on Figure P-S.7. It is expected that development areas identified as C1-1, INST1-1, I1-1, I2-2, R7-2, R9-3 and R10-3 will require extensions and that the remaining developments can be serviced without extending the existing collection network. Refer to Figure P-D for anticipated development areas.

7.2 Harriston

7.2.1 Existing Infrastructure

The Harriston wastewater system includes a dedicated sanitary sewer/forcemain collection network, sewage pumping stations and a sewage treatment works with effluent storage lagoons. The Harriston sewage treatment works discharges to the Maitland River during the permitted discharge season which is the period from October 1 through April 30. Effluent from the sewage treatment works is held in the aerated lagoons during May 1 through September 30 due to assimilative capacity limitations of the Maitland River.

7.2.2 Collection Network

The sanitary sewage collection network services all of Harriston's developed areas within the urban boundaries and provides a total of 996 service connections (904 residential and 92 ICI) based on Town records at the end of calendar year 2020. The type of sewers used to construct the network has varied over the years. The types of sewer material that is present in the existing network included asbestos cement, concrete and PVC. Recent upgrades and extensions (within the last 20-25 years) have been PVC. The existing sanitary sewer network is presented on Figure H-S.1. The sewer material for the existing sanitary sewer collection network is presented on Figure H-S.2. A complete infrastructure reference plan of Harriston's sanitary system is provided in Appendix J.

Regarding the physical condition of the sewers, it is recommended that all sewers be videoed prior to the reconstruction of a street in order to assess the condition of the pipe and identify any I&I flow sources and whether rehabilitation or replacement is required. It should be noted that it is expected

that asbestos cement sewers will be approaching the end of its estimated service life and should be replaced as road upgrades are undertaken or watermains are being replaced. Prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

7.2.3 Treatment and Effluent Storage

The Harriston sewage treatment works are located in the northwest portion of Harriston's urban boundary, to the north of the Harriston Greenway Trail, in Part of Lots 83 and 84, Concession D. The sewage treatment works consist of an influent pumping station to transfer influent to the aerated lagoon system. The aerated lagoon system consists of three cells/lagoons, each equipped with fine bubble aeration systems.

The rated ADF capacity of the Harriston sewage treatment works is 2,378 m^3/day.

7.2.4 Reserve Capacity

Triton completed a review of the reserve capacity for the Harriston sewage treatment works based on information to the end of calendar year 2020. The RCC were completed in accordance with the requirements outlined in the MECP guidelines.

The ADF based on flows recorded at the sewage in calendar years 2018, 2019 and 2020 is 1,500 m^3/day, which is in compliance with the Amended Certificate of Approval for the sewage treatment works. This results in a surplus hydraulic reserve capacity of 878 m^3/day. Detailed RCC for Harriston's sanitary system are provided in Appendix G.

The existing average per person sewage flow rate is 631 L/day. This value includes ICI flows and results in an average per person sewage flow rate that is above the expected typical values of 250 to 450 L/capita/day. It is assumed that this per person ADF is inflated in comparison to actual domestic sewage flow as a result of the sewage generation from the Town's ICI connections. Therefore, to be conservative for future planning purposes, the MECP recommended per person flow rate of 450 L/day will be applied for future per person sewage flow rates. This sewage flow rate should be reviewed and adjusted accordingly if it is determined that actual per person flows decrease significantly in the future.

Based on Section 3.4.3 of MECP Water System Design Guidelines, a demand of 28 m^3/ha/day is appropriate for estimating sewage flow when actual flows are unknown. This equates to 17 ERU per hectare of ICI, given an ADF per existing ERU of approximately 1.66 m^3/day (refer to Appendix D, Table 2.3) and based on a conservative future growth ADF of 450 L/day/capita. It should be noted this reflects current reserve capacity calculations. The ADF per existing ERU will change with the change in annual ADF. Therefore, during the site plan approval process of a proposed ICI development, it should be allocated reserve capacity in terms of ERUs, similarly to how allocations are committed to residential developments. An allocations policy would need to be developed and adopted to allow the Town to control allocations through the development process.

A summary of the projected sewage flow, design capacity and sanitary reserve capacity for the future population growth scenarios are provided in Table 7.3. Detailed calculations are provided in Appendix D.

Table 7.3 – Harriston Future Sanitary Reserve Capacity

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Serviced Population (Capita)	2,376	2,423	2,758	2,932	3,156	3,288	3,446	3,662
Households (ERU)	904	924	1,039	1,106	1,188	1,239	1,298	1,381
ADF (m^3/day)	1,500	1,521	1,672	1,750	1,851	1,910	1,982	2,079
Design Capacity (m^3/day)	2,378							
Reserve Capacity (m^3/day)	878	857	706	628	527	468	397	299

Based on the population growth projections described for Harriston in Table 3.2, and the projected sewage flow summarized in Table 7.3, the existing sewage treatment works will have sufficient capacity to treat the projected sewage flow to year 2051.

The Town should continue to monitor and allocate reserve capacity on an annual basis to determine when an expansion or upgrade to the existing sewage treatment works is required and so that the required technical studies and monitoring can be initiated, including associated financial/budget planning, well in advance of the anticipated capacity deficit. It is recommended that any proposed/future ICI users receive an allocated reserve capacity in terms of ERU which would be considered in future sewage RCC. This can be completed through the process of site plan approval and outlined within the site plan agreement. An allocations policy would need to be developed and adopted to allow the Town to control allocations through the development process.

A summary of the peak sewage flows for existing conditions and the 2031, 2041 and 2051 development scenarios are presented on Figures H-S.3 through H-S.6, respectively.

7.2.5 Future Development (To 2051)

To service the developments within the future Development Scenarios up to the year 2051, there are no sanitary sewer upgrades required based on theoretical flows in the model. As proposed developments are brought forward, the sanitary system model should be updated to confirm there is sufficient capacity within the sewers.

For future developments the expectation is that in the event that the land area is not serviceable by gravity sewer, a sewage pumping station or low-pressure sanitary system will be installed on site to provide connection to the nearest municipal infrastructure serviced by gravity. These expectations are also applicable to servicing the Town owned land within the Harriston Industrial Park and the parcel located on Elora Street North (R2-1, refer to Figure H-D).

The configuration of such infrastructure would need to be reviewed based on the specific development needs. The probable extensions to service future development lands extensions for Harriston are presented on Figure H-S.7, including through the Harriston Industrial Park to a portion of the 22.6 ha parcel for discharge to the sewage lagoons via the existing Industrial Park sewage pumping station (SPS) (refer to Figure 5.2 in Appendix C) to allow all of the 4.4 hectares parcel and approximately 10 hectares of the 22.6 ha parcel to be serviced with gravity flow sewer (assuming the

existing sanitary sewer on John Street is to be replaced with a deeper sewer). Further, the capacity of the John Street SPS wet well will also need to be reviewed based on specific development needs of the contributing sewage catchment areas.

Development areas identified as I1-1, FD1-1, I2-2, I3-3, FD3-3, FD4-3, FD5-3, FD6-3, FD7-3, FD8-3, FD9-3, FD10-3 and FD11-3 will require extensions to the existing collection network while that the remaining developments will not. Refer to Figure H-D for anticipated development areas.

7.3 Clifford

7.3.1 Existing Infrastructure

The Clifford wastewater system includes a dedicated sanitary sewer/forcemain collection network, a wastewater treatment plant and an effluent storage lagoon facility. The Clifford WWTP discharges to Coon Creek via the Minto Municipal Drain No. 93.

7.3.2 Collection Network

The sanitary sewage collection network services all of Clifford's developed areas within the urban boundaries and provides a total of 407 service connections (406 residential and 34 ICI). The majority of the existing sewer network is ultra-rib PVC and the remainder is PVC. More recent upgrades and extensions (within the last 10-15 years) have been PVC. The existing sanitary sewer network is presented on Figure C-S.1. The sewer material for the existing sanitary sewer collection network is presented on Figure C-S.2. A complete infrastructure reference plan of Clifford's sanitary system is provided in Appendix J.

Regarding the physical condition of the sewers, it is recommended that all sewers be videoed prior to the reconstruction of a street in order to assess the condition of the pipe and identify any I&I flow sources and whether rehabilitation or replacement is required. As per the Town's Service Extension and Connection Policy 4.17 (effective March 9, 2005 and revised January 23, 2019), specific to Clifford, existing ultra-rib sewer mains may need to be replaced, potentially at the cost of the developer, where multiple new service connections are required. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

7.3.3 Treatment and Effluent Storage

The Clifford WWTP is located at the end of James St. E, on Part of Lots 57 and 58, Concession C, in the north end of Clifford. The treatment plant provides tertiary treatment utilizing an extended aeration process that includes the following process components: Preliminary Treatment consisting of an influent pumping station with screening basket and two submersible pumps to transfer influent to the aerated facultative lagoon via two forcemains; sand filtration and disinfection; Biosolids Management consisting of aerobic digestion, biosolids storage; Effluent Pumping Station consisting of four effluent pumps to transfer treated effluent from the WWTP to the lagoons during the non-discharge period (May to October); and Discharge to Coon Creek via Minto Municipal Drain No. 93 (from open outfall ditch) during the discharge period (November to April). Effluent is stored in the lagoons during the non-discharge period (May to October).

The rated average day flow capacity of the WWTP is 500 m^3/day.

7.3.4 Reserve Capacity

Triton completed a review of the reserve capacity for the Clifford WWTP based on information to the end of calendar year 2020. The RCC were completed in accordance with the requirements outlined in the MECP guidelines.

The ADF based on flows recorded at the WWTP in calendar years 2018, 2019 and 2020 is 244 m^3/day, which is in compliance with the Amended Certificate of Approval for the WWTP. The WWTP hydraulic reserve capacity of 256 m^3/day corresponds to an additional 404 equivalent residential units that can be served. Detailed RCC for Clifford's sanitary system for 2020 are provided in Appendix H.

The existing average per person sewage flow rate is 259 L/day. This value includes ICI flows and results in an average per person sewage flow rate that is within the expected typical values (250 – 450 L/capita/day). Therefore, this per person flow rate will be applied for future per person sewage flow rates. This sewage flow rate should be reviewed and adjusted accordingly if it is determined that actual per person flows increase significantly in the future.

A summary of the projected sewage flow, design capacity and sanitary reserve capacity for the future population growth scenarios are provided in Table 7.4. Detailed calculations are provided in Appendix D.

Table 7.4 – Clifford Future Sanitary Reserve Capacity

	Year							
	2020 Existing	2021	2026	2031	2036	2041	2046	2051
Serviced Population (Capita)	944	1,043	1,117	1,190	1,267	1,348	1,423	1,501
Households (ERU)	385	412	444	476	508	540	572	604
ADF (m^3/day)	244	270	289	308	327	348	368	388
Design Capacity (m^3/day)	500							
Reserve Capacity (m^3/day)	256	230	211	192	173	152	132	112

Based on the population growth projections described for Clifford in Table 3.2, and the projected sewage flow summarized in Table 7.4, the existing sewage treatment works will have sufficient capacity to treat the projected sewage flow to year 2051.

The Town should continue to monitor and allocate reserve capacity on an annual basis to determine when an expansion or upgrade to the existing sewage treatment works is required and so that the required technical studies and monitoring can be initiated, including associated financial/budget planning, well in advance of the anticipated capacity deficit. It is recommended that any proposed/future ICI users receive an allocated reserve capacity in terms of ERU which would be considered in future sewage RCC. This can be completed through the process of site plan approval and outlined within the site plan agreement. An allocations policy would need to be developed and adopted to allow the Town to control allocations through the development process.

A summary of the peak sewage flows for existing conditions and the 2031, 2041 and 2051 development scenarios are presented on Figures C-S.3 through C-S.6, respectively.

7.3.5 Future Development (To 2051)

To service future Development Scenarios up to the year 2051, there are no sanitary sewer upgrades required based on theoretical flows in the model. As proposed developments are brought forward, the sanitary system model should be updated to confirm there is sufficient capacity within the sewers.

The probable extensions to service future development lands within Clifford are presented on Figure C-S.7. It is expected that development areas identified as R1-1, R3-2, R4-3, R5-3, FD2-3 and FD3-3 will require extensions and that the remaining developments can be serviced without extending the existing collection network. Refer to Figure C-D for anticipated development areas.

The expectation is that in the event that if a land area is not serviceable by gravity sewer, a sewage pumping station or low-pressure sanitary system will be installed on site to provide connection to the nearest municipal infrastructure serviced by gravity. The configuration of such infrastructure would need to be reviewed based on the specific development needs.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 General

This Servicing Strategy provides current (based on available information) computer simulation models of the Town's water and sanitary systems in Palmerston, Harriston and Clifford. These models were used to evaluate the adequacy of the horizontal infrastructure for the municipal water and sanitary systems to meet the needs of the existing population and future development scenarios to calendar year 2051. In addition to the evaluation of the horizontal infrastructure, the vertical infrastructure of the municipal water and sanitary systems were assessed on their ability to meet the needs of the existing population and future population growth.

The assessments made in this document reflect the information available at the time of preparation; therefore, the findings and recommendations documented in this Servicing Strategy should be reviewed at least every five (5) years, or as needed as growth progresses and as developments are proposed throughout the Town's urban areas. This Report should be considered a living document that needs to be amended/updated, as required, to ensure that strategies for municipal water and sanitary infrastructure servicing is appropriate for the development proposed, as well as updating timelines for the initiation of specific Class EA projects.

8.2 Water System

Source Capacity is a measure of the municipal water system's ability to supply water. The 2008 MECP 2008 Water System Design Guidelines recommend that the Source Capacity of water supply system should be greater than the MDD so that daily demand can be met if storage is offline.

Redundancy within a municipal water supply system is crucial to ensure water is available for users in the event of a significant issue with a production well such as contamination or production decline. In order to identify a system's redundancy, it is recommended that the Town continue to calculate available Reserve Capacity based on the Firm Capacity of the system on an annual basis, and estimate the Uncommitted Reserve Capacity using current committed developments.

If a deficit Reserve Capacity is forecasted based on potential uncommitted development, the Town must be proactive in identifying and securing future water sources since establishing these new sources and the infrastructure required to deliver water to the system can be a lengthy process and may affect the configuration and sizing of future watermain upgrades and extensions.

The specific design and operation of water storage facilities (water towers) is dictated by MECP guidelines. These facilities are sized to accommodate three purposes:

- Fire storage to allow the system to achieve flow rates and volumes necessary to effectively fight fires;
- Equalization storage, which provides water to the system during peak demand periods; and
- Emergency storage intended to provide a safety factor for water supply and address other events (i.e., watermain breaks, power outages).

The existing water tower facilities within each of the Town's urban communities have been reviewed to assess their ability to satisfy these three purposes. Additionally, the expected pressures and available fire flow within the existing and future development areas has been estimated to determine the ability of the water system to provide sufficient service for the anticipated usage.

The anticipated ability of Town's three water supply and distribution networks to service the current and projected population to year 2051 is summarized in Tables 8.1.

Table 8.1 – Summary of Water Systems' Anticipated Ability to Service Projected Population to 2051

	Palmerston	**Harriston**	**Clifford**
Firm Capacity	Exceeded between 2031 and 2036. Additional Source Capacity required to provide adequate system redundancy.	Exceeded between 2031 and 2036. Additional Source Capacity required to provide adequate system redundancy.	Sufficient beyond 2051
System Storage	Exceeded between 2041 and 2046.	Sufficient beyond 2051.	Sufficient beyond 2051
System Pressure	Within the accepted range based on theoretical demands to 2051.	Within the accepted range based on theoretical demands to 2051.	Within the accepted range based on theoretical demands to 2051.
Fire Flow Capability	Within the accepted range based on theoretical demands to 2051.	Within the accepted range based on theoretical demands to 2051.	Within the accepted range based on theoretical demands to 2051.
Distribution Network Upgrades (To increase system pressure and available fire flow)	Replace existing <150 mm diameter watermain and remove dead-ends where possible. Refer to Figure P-W.3 for suggested upgrades.	Replace existing <150 mm diameter and remove dead-ends where possible Refer to Figure H-W.3 for suggested upgrades and extensions (to remove dead-ends). (Potentially) upsize watermain and provide looping to achieve target flow rate of 150 L/s in the Harriston Industrial Park	Replace existing <150 mm diameter watermain and remove dead-ends where possible. Refer to Figure C-W.3 for suggested upgrades and extensions (to remove

	Palmerston	Harriston	Clifford
Distribution Network Extensions	Extensions are required to service future developments and are to be designed to provide interconnection and looping for the existing system. Refer to Figure P-W.3 for suggested watermain extensions, that are required to service future developments anticipated through to 2051, as follows: 2020 to 2031: R1-1 2031 to 2041: I2-2, R6-2 and R7-2 2041 to 2051: FD1-3 Watermain size to be determined at the preliminary stage of future developments.	Extensions are required to service future developments and are to be designed to provide interconnection and looping for the existing system. Refer to Figure H-W.3 for suggested watermain extensions, that are required to service future developments anticipated through to 2051, as follows: 2020 to 2031: I1-1, FD1-1 2031 to 2041: I2-2. 2041 to 2051: I3-3, FD5-3, FD6-3, FD7-3, FD8-3, FD9-3, FD10-3 and FD11-3. Watermain size to be determined at the preliminary stage of future developments.	Extensions are required to service future developments and are to be designed to provide interconnection and looping for the existing system. Refer to Figure C-W.3 for suggested watermain extensions, that are required to service future developments anticipated through to 2051, as follows: 2020 to 2031: R1-1 2031 to 2041: R3-2 and FD2-3 2041 to 2051: R4-3 and R5-3. Watermain size to be determined at the preliminary stage of future developments.

8.3 Wastewater System

Municipal wastewater treatment plants/facilities have rated flow capacities dictated by their ECA or Certificate of Approval, as approved by the MECP, that are not only based on the design of the plant, but also the ability of the watercourse receiving the effluent to assimilate the flows without causing significant damage or harm to the environment. Without completing significant studies, and/or plant improvements, a municipality has a set capacity (Reserve Capacity) to treat municipal sewage, and a maximum amount of development that can be serviced. It is recommended the Town continue to determine the available sanitary Reserve Capacity on an annual basis and estimate the future developments that can be accommodated with this available Reserve Capacity. If a deficit Reserve Capacity is forecasted, the Town must be proactive in initiating the required studies and designs to increase the rated capacity of the corresponding sewage treatment facility.

Horizontal municipal infrastructure (sewers) must also have sufficient capacity to convey the sewage to the plant or lagoon. A computer simulation model of each of the Town's sanitary collection networks has been prepared to assess their capability. The expected loading from existing and future development areas has been estimated and input to the model to calculate flows throughout the system piping. These flows are compared to the hydraulic capacity of the various sewers to determine the ability of the existing sanitary system to provide sufficient service for the anticipated loading. In addition, this model can be used to size future extensions to the system.

In all cases, the future modelling is based on full occupancy of the development lands considered. Before any reconstruction project is undertaken in any of the Town's urban areas, it is imperative that the potential future development upstream of the sewers be thoroughly investigated to confirm the best servicing strategy for the area and the existing system.

The ability of Town's three wastewater treatment facilities and sewage collection networks to service the current and projected population to year 2051 is summarized in Tables 8.2.

Table 8.2 - Summary of Sanitary Systems' Anticipated Ability to Service Projected Population to 2051

	Palmerston	Harriston	Clifford
Design Capacity	Expected to be exceeded between 2031 and 2036.	Sufficient beyond 2051.	Sufficient beyond 2051.
Collection Network Upgrades (Based on Capacity)	Sewers between SANMH P112A and SANMH P112C approaching the accepted surcharge/capacity limits (i.e., >110% full). Refer to Figure P.S.7 for location of suggested upgrades.	Sufficient to 2051. Replace, extend, and deepen existing sanitary sewer on John Street, consistent with Harriston Industrial Park Class EA.	Sufficient to 2051. As per the Town's Service Extension and Connection Policy 4.17 (effective March 9, 2005 and revised January 23, 2019), specific to Clifford, existing ultra-rib sewer mains may need to be replaced, potentially at the cost of the developer, where multiple new service connections are required.
Collection Network Extensions	Extensions are required to service anticipated future developments. Refer to Figure P-S.7 for suggested extensions that are required service future developments anticipated through to 2051, as follows: 2020 to 2031: C1-1, INST1-1, I1-1 2031 to 2041: I2-2, R7-2, 2041 and 2051: R9-3 and R10-3. It is expected that the remaining developments can be serviced from the existing collection network.	Extensions are required to service anticipated future developments. Refer to Figure H-S.7 for suggested extensions that are required to service future developments anticipated through to 2051, as follows: 2020 to 2031: I1-1, FD1-1, 2031 to 2041: I2-2 2041 to 2051: I3-3, FD3-3, FD4-3, FD5-3, FD6-3, FD7-3, FD8-3, FD9-3, FD10-3 and FD11-3. It is expected that the remaining developments can be serviced from the existing collection network.	Extensions are required to service anticipated future developments. Refer to Figure C-S.7 for suggested extensions that are required to service future developments anticipated through to 2051, as follows: 2020 to 2031: R1-1 2031 to 2041: R3-2 2041 to 2051: R4-3, R5-3, FD2-3 and FD3-3. It is expected that the remaining developments can be serviced from the existing collection network.

8.4 Summary of Recommendations

It is expected that the Town's water and wastewater vertical and horizontal infrastructure is adequate to meet projected development needs for the next five-year period based on the growth projection, as mandated by the 2020 Provincial Policy Statement; however, some Class EAs should be started during this five-year period to ensure that the needs of the future population will be met. Tables 8.3 and 8.4 summarizes the next steps for the municipal water and wastewater systems that are recommended to meet projected development needs as projected through to 2051 in the County's Growth Allocation Memo.

Detailed lists of recommended water and wastewater system capital projects and forecasted timing for implementation for each of the municipal systems are provided in Appendix K. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).

Given that development and the progression of growth may not occur as anticipated, the recommendations and conclusions in this document must be confirmed as growth progresses and

developments are proposed. This report should be considered a living document that needs to be amended/updated, as required, to ensure that strategies for municipal water and sanitary infrastructure servicing is appropriate for the development proposed, as well as updating timelines for the initiation of specific Class EA projects. Further, it is recommended that this report and recommendations within be adopted by Town Council.

Table 8.3 – Summary of Next Steps for Municipal Water Systems

Action Item	Palmerston	Harriston	Clifford
Well Exploration Program	Initiate by 2022.	Initiate by 2022.	Not anticipated to be required through to year 2051.
Municipal Class EA to Increase Firm Capacity	Initiate within 10 years of anticipated deficit in Firm Capacity, which is expected between 2031 and 2036. Therefore, a Class EA should begin by 2022.	Initiate within 10 years of anticipated deficit in Firm Capacity, which is expected between 2031 and 2036. Therefore, a Class EA should begin by 2022.	Initiate within 10 years of anticipated deficit in system storage; noting that a deficit is not anticipated by 2051.
Reserve Capacity Calculations	Update annually. Note: any future ICI users with moderate/heavy water consumption should receive an allocated reserve capacity in terms of ERU to be considered in future RCC. Develop and adopt an Allocations Policy to allow the Town to control allocations through the development process.	Update annually. Note: any future ICI users with moderate/heavy water consumption should receive an allocated reserve capacity in terms of ERU to be considered in future RCC. Develop and adopt an Allocations Policy to allow the Town to control allocations through the development process.	Update annually. Note: any future ICI users with moderate/heavy water consumption should receive an allocated reserve capacity in terms of ERU to be considered in future RCC. Develop and adopt an Allocations Policy to allow the Town to control allocations through the development process.
System Storage Assessment	Update annually.	Update annually.	Update annually.
Municipal Class EA to Increase System Storage (1)	Initiate within 10 years of anticipated deficit in system storage, which is expected between 2041 and 2046. Therefore, a Class EA should begin by 2031.	Initiate within 10 years of anticipated deficit in system storage; noting that a deficit is not anticipated by2051.	Initiate within 10 years of anticipated deficit in system storage; noting that a deficit is not anticipated by 2051.

Action Item	Palmerston	Harriston	Clifford
Distribution Network Upgrades	Replacement of undersized watermain or existing asbestos cement, copper, ductile iron and cast iron watermain, where it is approaching the end of its estimated service life or there have been concerns regarding performance, as part of road reconstruction projects. PVC watermain may need to be replaced or rehabilitated if there is a history of watermain breaks or servicing issues. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).	Replacement of undersized watermain or existing copper, ductile iron and cast iron watermain, where it is approaching the end of its estimated service life or there have been concerns regarding performance, as part of road reconstruction projects. PVC watermain may need to be replaced or rehabilitated if there is a history of watermain breaks or servicing issues. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019). Investigate the need to upgrade existing watermain to achieve a target fire flow rate of 150L/s within the Harriston Industrial Park.	Replacement of undersized existing cast iron, ductile iron and copper watermain, where it is approaching the end of its estimated service life or there have been concerns regarding performance, as part of road reconstruction projects. PVC watermain may need to be replaced or rehabilitated if there is a history of watermain breaks or servicing issues. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).
Distribution Network Extensions	To be determined at the preliminary stage of future developments.	To be determined at the preliminary stage of future developments.	To be determined at the preliminary stage of future developments.

Note: (1) – The Municipal Class EA schedule is to be confirmed at the time of project initiation.

Table 8.4 – Summary of Next Steps for Municipal Wastewater Systems

Action Item	Palmerston	Harriston	Clifford
Technical Studies and Municipal Class EA (1) to increase treatment capacity.	Initiate technical studies and a Municipal Class EA by 2022.	Not anticipated to be required through to year 2051.	Not anticipated to be required through to year 2051.
Reserve Capacity Calculations	Update annually. Note: Any future ICI users with moderate/heavy sewage output should receive an allocated reserve capacity in terms of ERU to be considered in future RCC. Develop and adopt an Allocations Policy to allow the Town to control allocations through the development process.	Update annually. Note: Any future ICI users with moderate/heavy sewage output should receive an allocated reserve capacity in terms of ERU to be considered in future RCC. Develop and adopt an Allocations Policy to allow the Town to control allocations through the development process.	Update annually. Note: Any future ICI users with moderate/heavy sewage output should receive an allocated reserve capacity in terms of ERU to be considered in future RCC. Develop and adopt an Allocations Policy to allow the Town to control allocations through the development process.

Action Item	Palmerston	Harriston	Clifford
Collection Network Upgrades	Upgrades for capacity concerns are to be completed in conjunction with road reconstruction projects, prior to 2051. Video sewers prior to reconstruction of streets in order to assess the condition of sewers. It is expected that asbestos cement and vitrified clay sewers will be replaced as part of road reconstruction projects; however, depends on budget constraints and condition of sewers. Rehabilitation of sewers should be considered in determining the scope of reconstruction projects. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).	None anticipated to result from capacity concerns through to 2051. Video sewers prior to reconstruction of streets in order to assess the condition of sewers. It is expected that asbestos cement sewers will be replaced as part of road reconstruction projects; however, depends on budget constraints and condition of sewers. Rehabilitation of sewers should be considered in determining the scope of reconstruction projects. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).	None anticipated to result from capacity concerns through to 2051. Video sewers prior to reconstruction of streets in order to assess the condition of sewers and replace or rehabilitate as needed, with consideration of budget constraints. As per the Town's Service Extension and Connection Policy 4.17 (effective March 9, 2005 and revised January 23, 2019), specific to Clifford, existing ultra-rib sewer mains may need to be replaced, potentially at the cost of the developer, where multiple new service connections are required. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019).
Collection Network Extensions	To be determined at the preliminary stage of future developments.	To be determined at the preliminary stage of future developments.	To be determined at the preliminary stage of future developments.

Note: (1) – The Municipal Class EA schedule is to be confirmed at the time of project initiation; however, for Palmerston, expected project schedules will correspond to a Schedule B if the capacity increase is to be achieved through improved operations and maintenance or Schedule C if achieved through construction of works to build new, expand or retrofit the existing works.

8.4.1 Planning for Horizontal Infrastructure Upgrades

It is recommended the Town consider its water and sanitary sewer replacement strategy in context with its road condition reporting and storm drainage needs. Road and storm infrastructure replacement can advance or delay progress on water and sewer replacement and upgrades. The Town should undertake a ten-year capital planning process during its annual budget to identify water, sanitary sewer, storm drainage and road related projects that are required to meet growth-related needs. The prioritization of capital projects should be calculated as per the Town's Asset Management Plan (PSD, November 2019). Funding availability and health and safety needs are considerations of the process.

The Town should continue to complete inflow and infiltration mitigation projects to reduce the impact of extraneous flows within its wastewater collection networks and treatment systems.

8.4.2 Water and Sewer Funding

The Town shall continue to operate on the basis that it is responsible for maintaining and repairing existing water and sanitary sewer infrastructure used by current residents and businesses. As a general principle, the Town supports developers paying the full cost of providing appropriate water, sanitary sewer and all other services for future residents and businesses in Minto. Where private development interests are consistent with Town land development needs, such as in the Palmerston or Harriston Industrial Parks (or other Town owned lots), cost sharing may be considered that is fair and equable to both parties. In all cases the Town will undertake to ensure that such partnerships do not place an unreasonable burden on municipal ratepayers and water and sewer system users.

Figures

TOWN OF MINTO

Town of Minto
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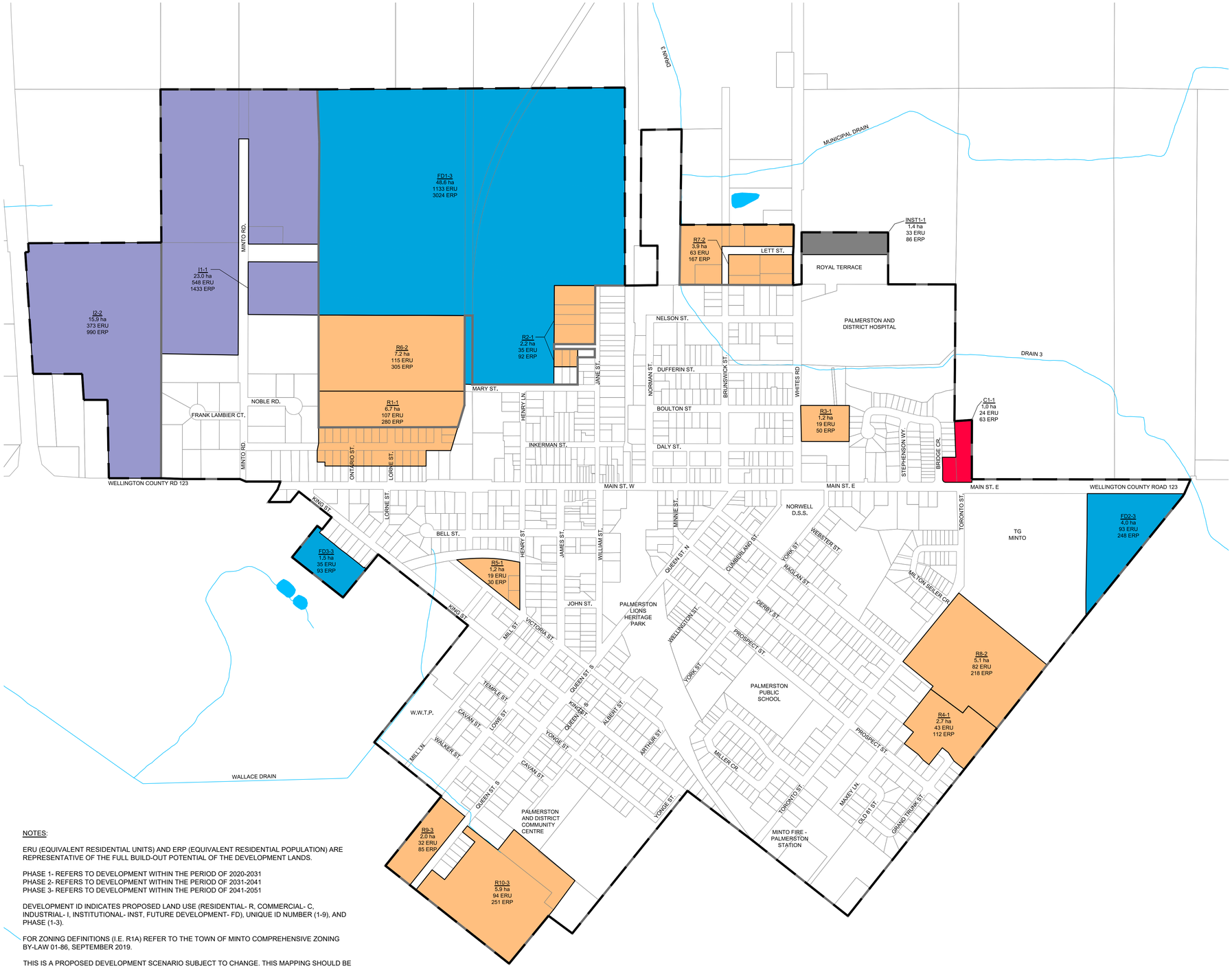
WATER AND SANITARY SERVICING STRATEGY



LEGEND

- EXISTING URBAN CENTRE BOUNDARY
- URBAN CENTRE BOUNDARY AS PER PROPOSED OFFICIAL PLAN AMENDMENT OP-2020-09
- RESIDENTIAL
- INDUSTRIAL
- COMMERCIAL
- INSTITUTIONAL
- FUTURE DEVELOPMENT

NOTES:

ERU (EQUIVALENT RESIDENTIAL UNITS) AND ERP (EQUIVALENT RESIDENTIAL POPULATION) ARE REPRESENTATIVE OF THE FULL BUILD-OUT POTENTIAL OF THE DEVELOPMENT LANDS.

PHASE 1- REFERS TO DEVELOPMENT WITHIN THE PERIOD OF 2020-2031
PHASE 2- REFERS TO DEVELOPMENT WITHIN THE PERIOD OF 2031-2041
PHASE 3- REFERS TO DEVELOPMENT WITHIN THE PERIOD OF 2041-2051

DEVELOPMENT ID INDICATES PROPOSED LAND USE (RESIDENTIAL- R, COMMERCIAL- C, INDUSTRIAL- I, INSTITUTIONAL- INST, FUTURE DEVELOPMENT- FD), UNIQUE ID NUMBER (1-9), AND PHASE (1-3).

FOR ZONING DEFINITIONS (I.E. R1A) REFER TO THE TOWN OF MINTO COMPREHENSIVE ZONING BY-LAW 01-86, SEPTEMBER 2019.

THIS IS A PROPOSED DEVELOPMENT SCENARIO SUBJECT TO CHANGE. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-D

PALMERSTON DEVELOPMENT SCENARIO

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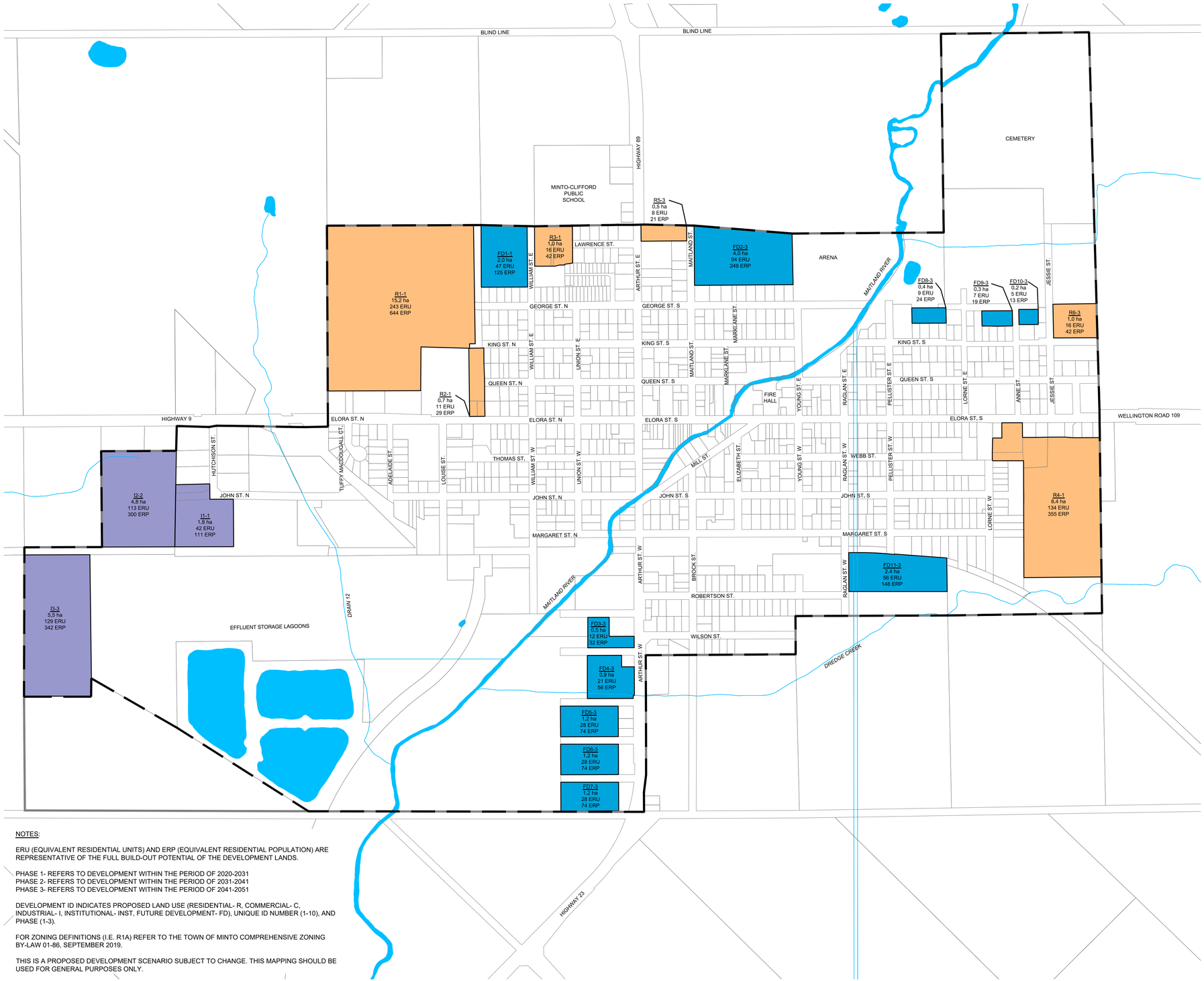
MINTO WATER AND SANITARY SERVICING STRATEGY



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PHASE 2- REFERS TO DEVELOPMENT WITHIN THE PERIOD OF 2031-2041
PHASE 3- REFERS TO DEVELOPMENT WITHIN THE PERIOD OF 2041-2051

DEVELOPMENT ID INDICATES PROPOSED LAND USE (RESIDENTIAL- R, COMMERCIAL- C, INDUSTRIAL- I, INSTITUTIONAL- INST, FUTURE DEVELOPMENT- FD), UNIQUE ID NUMBER (1-10), AND PHASE (1-3).

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LEGEND

- EXISTING URBAN CENTRE BOUNDARY
- URBAN CENTRE BOUNDARY AS PER PROPOSED OFFICIAL PLAN AMENDMENT OP-2020-09
- RESIDENTIAL
- INDUSTRIAL
- COMMERCIAL
- INSTITUTIONAL
- FUTURE DEVELOPMENT

FIGURE H-D

HARRISTON DEVELOPMENT SCENARIO

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EFFLUENT STORAGE LAGOONS

WELLINGTON ROAD 1

WELLINGTON ROAD 2

COON CREEK

C1-1
6.3 ha
157 ERU
392 ERP

C2-1
5.9 ha
147 ERU
367 ERP

WIGHTMAN TELECOM

FD6-3
2.0 ha
50 ERU
124 ERP

BROWN ST. N

BROWN ST. S

MINTO FIRE - CLIFFORD STATION

ARENA

MILL ST. E

WILLIAM ST. N

WILLIAM ST. S

JAMES ST. E

QUEEN ST. E

GEDDES ST. E

ALLAN ST. E

JOHN ST. E

NELSON ST. E

ELORA ST. N

ELORA ST. S

HIGHWAY 9

W.C. SMITH

FD1-2
6.6 ha
165 ERU
412 ERP

JAMES ST. W

QUEEN ST. W

GEDDES ST. W

ALLAN ST. W

JOHN ST. W

NELSON ST. W

PARK ST. W

CLARKE ST. N

CLARKE ST. S

B.E. GREIN LUMBER LTD.

FD5-3
3.0 ha
75 ERU
186 ERP

FD4-3
1.0 ha
25 ERU
62 ERP

W HERITAGE ST.

ANN ST. N

ANN ST. S

R1-1
0.4 ha
6 ERU
15 ERP

R4-3
3.1 ha
50 ERU
124 ERP

R3-2
2.1 ha
34 ERU
85 ERP

COON CREEK

FD3-3
6.1 ha
153 ERU
380 ERP

MINTO ST. N

MINTO ST. S

FD2-3
0.5 ha
13 ERU
32 ERP

R5-3
1.5 ha
24 ERU
60 ERP

CECILIA ST. N

R2-2
1.7 ha
27 ERU
67 ERP

UNDER WAY RD

HOWICK-MINTO TL

LEGEND

- EXISTING URBAN CENTRE BOUNDARY
- URBAN CENTRE BOUNDARY AS PER PROPOSED OFFICIAL PLAN AMENDMENT OP-2020-09
- RESIDENTIAL
- INDUSTRIAL
- COMMERCIAL
- INSTITUTIONAL
- FUTURE DEVELOPMENT

NOTES:

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PHASE 2- REFERS TO DEVELOPMENT WITHIN THE PERIOD OF 2031-2041
PHASE 3- REFERS TO DEVELOPMENT WITHIN THE PERIOD OF 2041-2051

DEVELOPMENT ID INDICATES PROPOSED LAND USE (RESIDENTIAL- R, COMMERCIAL- C, INDUSTRIAL- I, FUTURE DEVELOPMENT- FD), UNIQUE ID NUMBER (1-6), AND PHASE (1-3).

FOR ZONING DEFINITIONS (I.E. R1A) REFER TO THE TOWN OF MINTO COMPREHENSIVE ZONING BY-LAW 01-86, SEPTEMBER 2019.

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FIGURE C-D

CLIFFORD DEVELOPMENT SCENARIO

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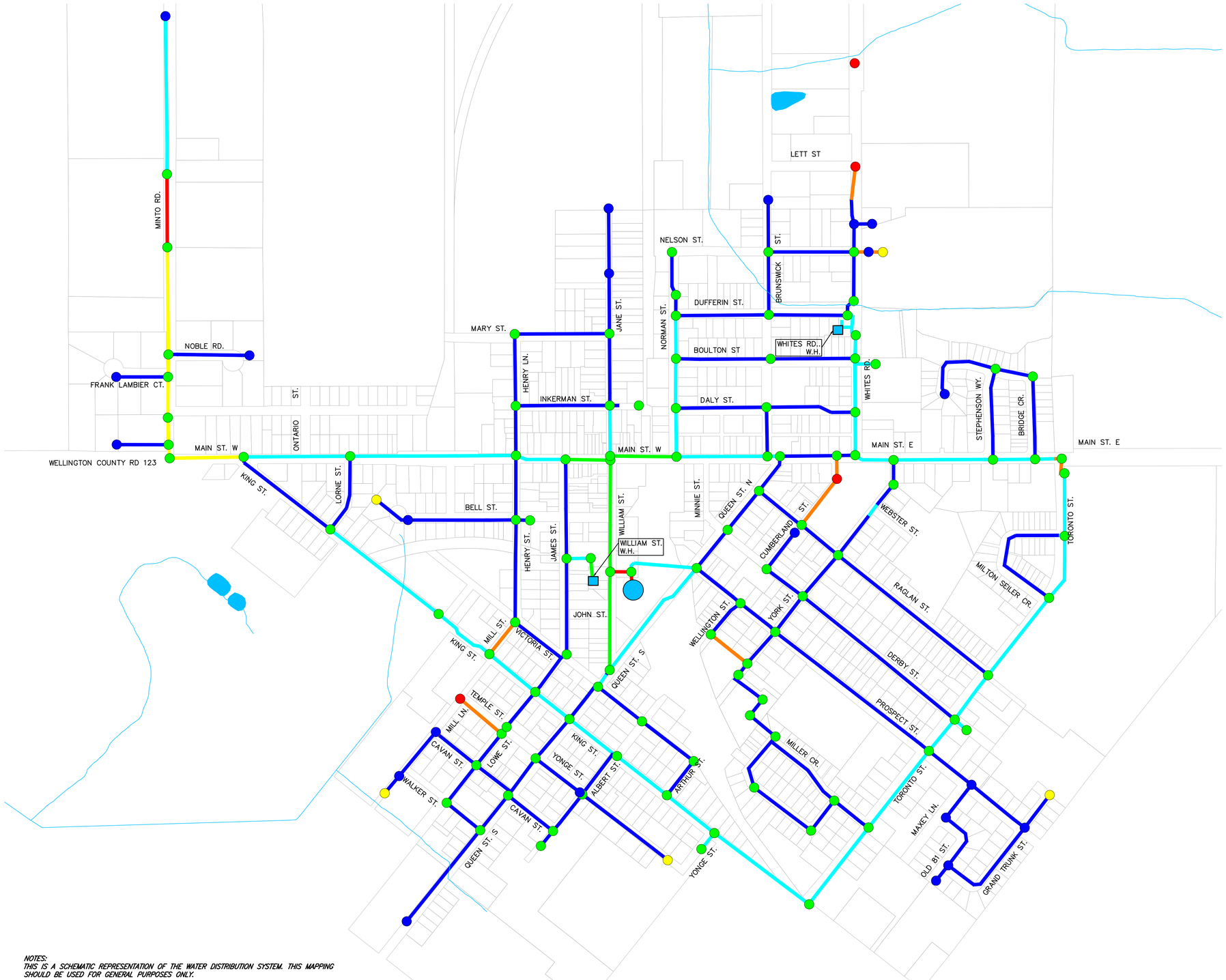

WATERMAIN DIAMETER

- 350mm
- 300mm
- 250mm
- 200mm
- 150mm
- ≤ 100mm

JUNCTION FIRE FLOW

- < 40 L/s
- 40 - 65 L/s
- 65 - 100 L/s
- > 100 L/s

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-W.1

PALMERSTON WATER SYSTEM

EXISTING WATERMAIN SIZE & EXPECTED FIRE FLOW CAPABILITIES

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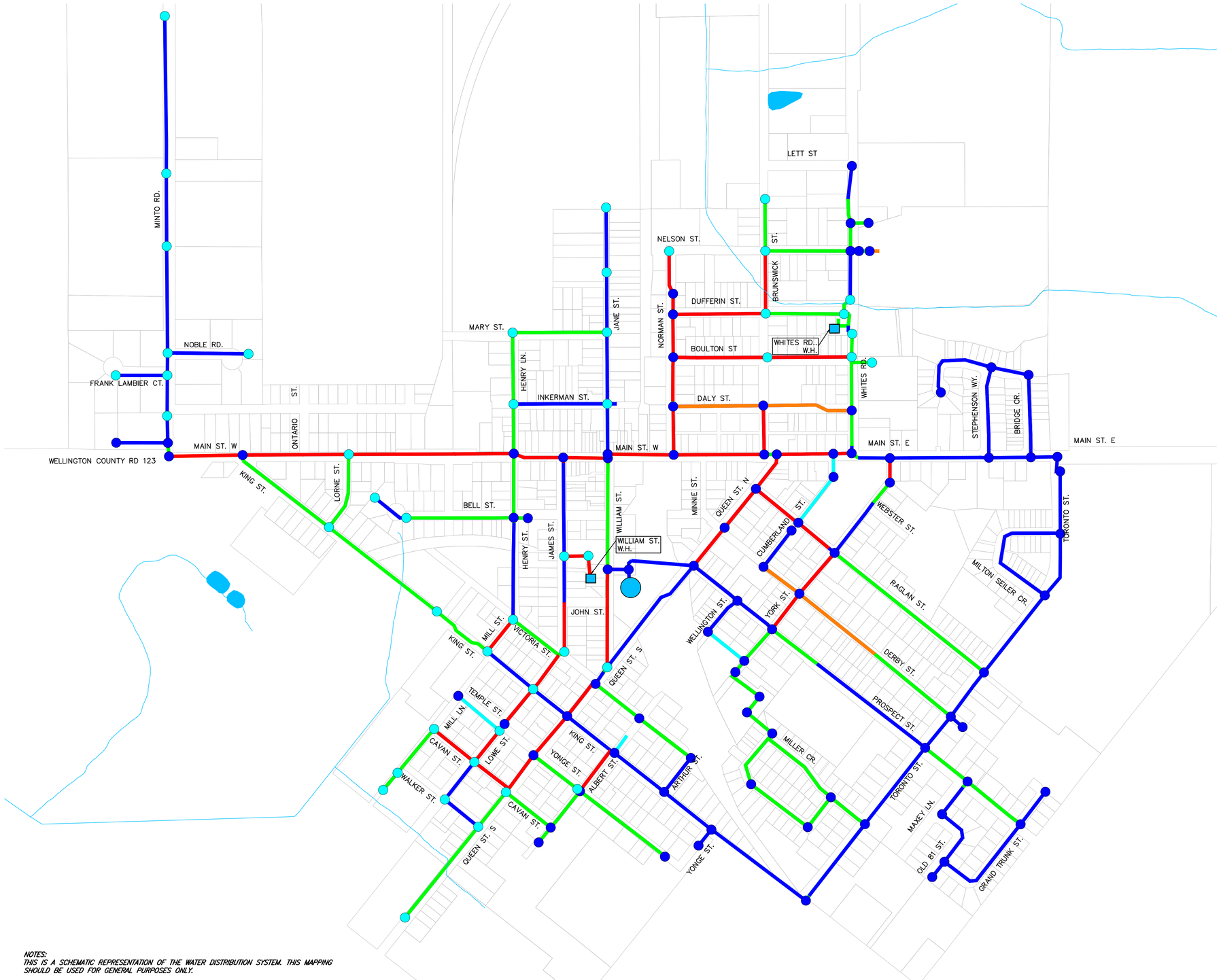

WATERMAIN MATERIAL

- PVC
- CAST IRON
- DUCTILE IRON
- ASBESTOS CEMENT
- COPPER

JUNCTION PRESSURE

- < 40 PSI
- 40 - 50 PSI
- 50 - 60 PSI
- 60 - 70 PSI
- > 70 PSI

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-W.2

PALMERSTON WATER SYSTEM

EXISTING WATERMAIN MATERIAL & TYPICAL SYSTEM PRESSURE

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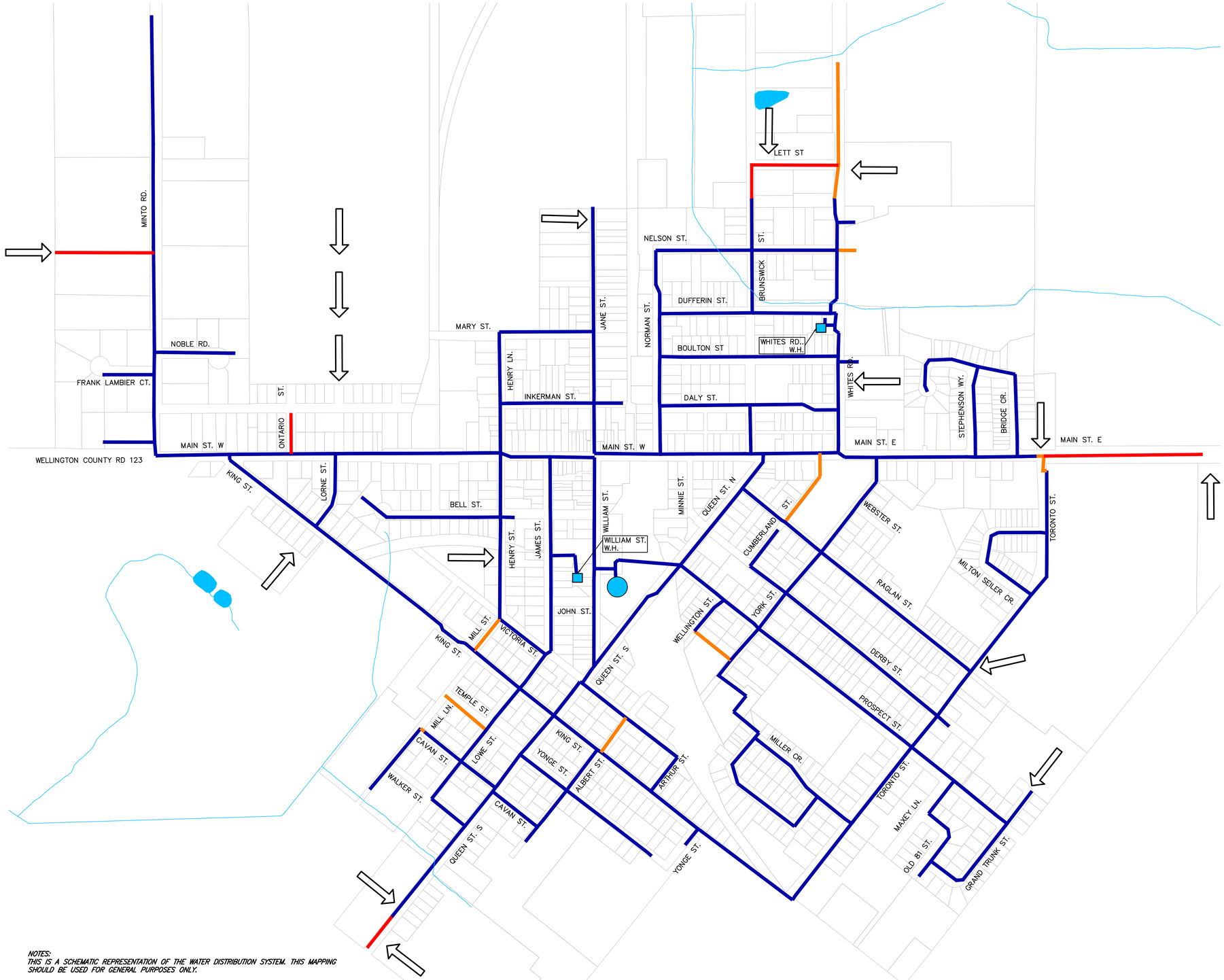
WATER AND SANITARY SERVICING STRATEGY



LEGEND

- EXISTING WATER SYSTEM
- REPLACEMENT OF ≤ 100mm PIPE
- EXTENSIONS
- WATER TOWER
- WELL HOUSE (W.H.)
- FUTURE DEVELOPMENT CONTRIBUTIONS

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-W.3

PALMERSTON WATER SYSTEM

RECOMMENDED UPGRADES & EXTENSIONS

NOT TO SCALE
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Town of Minto
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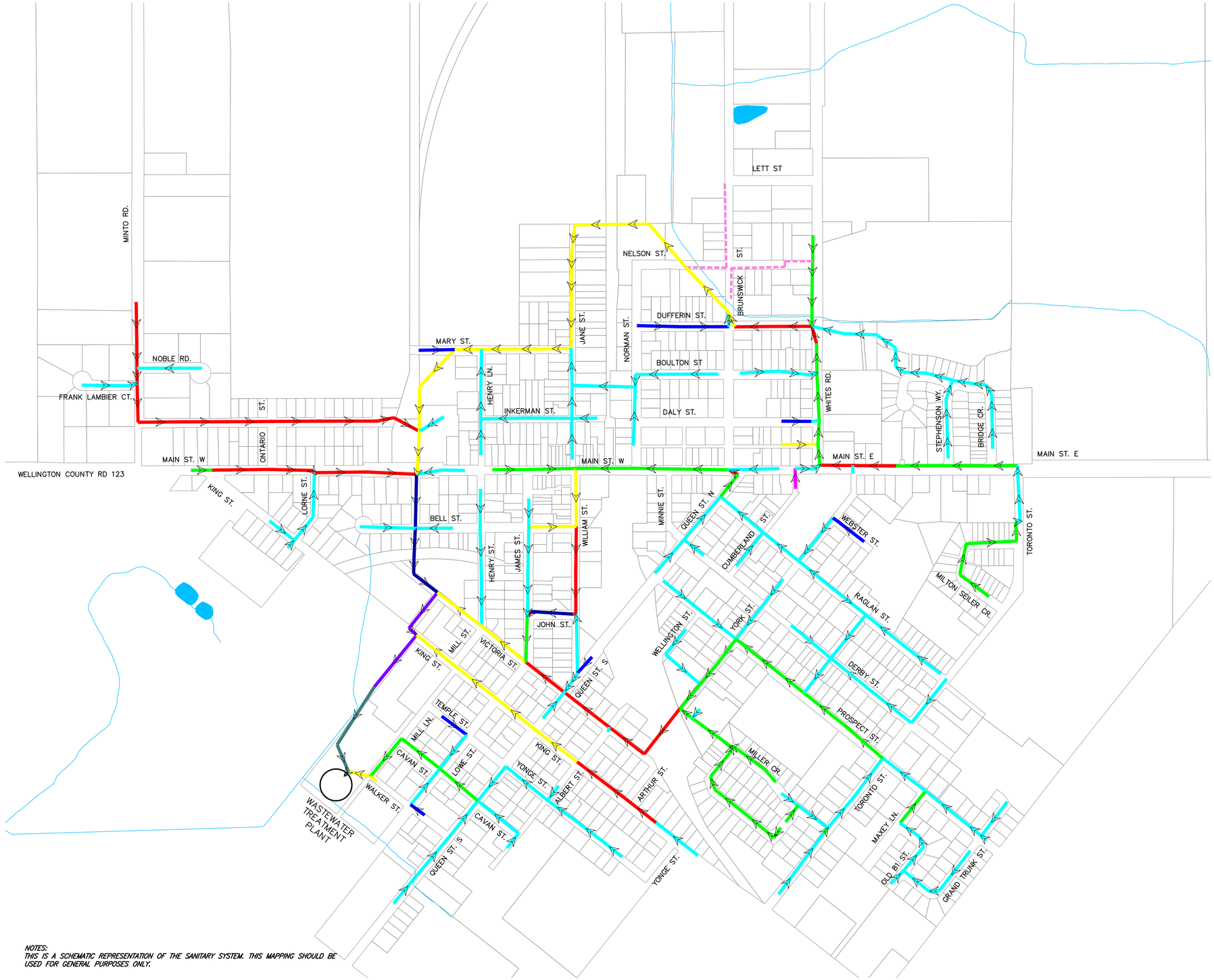
WATER AND SANITARY SERVICING STRATEGY



SEWER SIZING

600mm	75mm FORCEMAIN
525mm	
450mm	
375mm	
300mm	
250mm	
200mm	
150mm	
≤100mm	

LEGEND

DIRECTION OF FLOW

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-S.1

PALMERSTON SANITARY SYSTEM EXISTING SEWER SIZES

NOT TO SCALE
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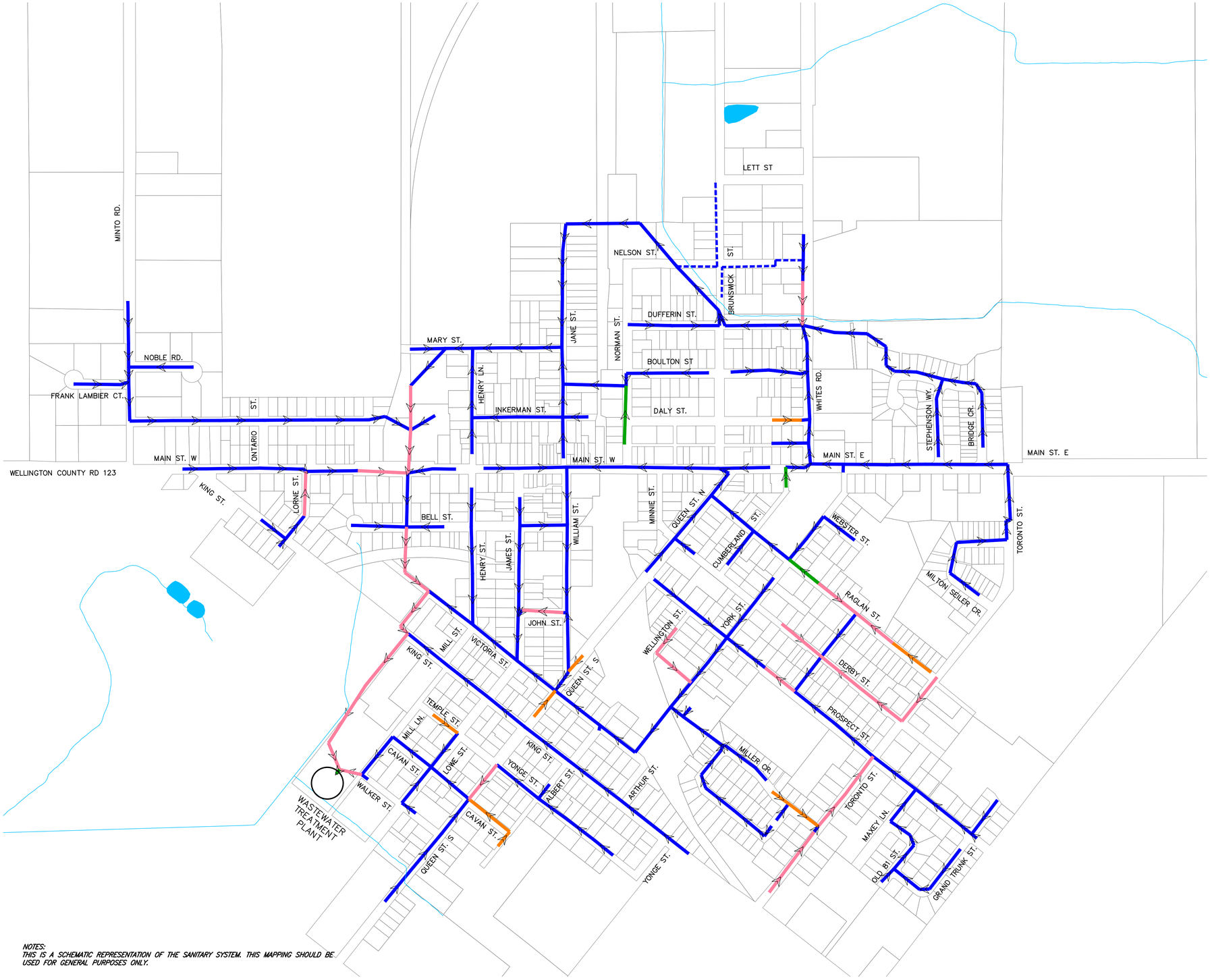
WATER AND SANITARY SERVICING STRATEGY



SEWER MATERIAL

- CONCRETE
- PVC
- ASBESTOS CEMENT
- VITRIFIED CLAY

LEGEND

- DIRECTION OF FLOW

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-S.2

PALMERSTON SANITARY SYSTEM EXISTING SEWER MATERIAL

NOT TO SCALE
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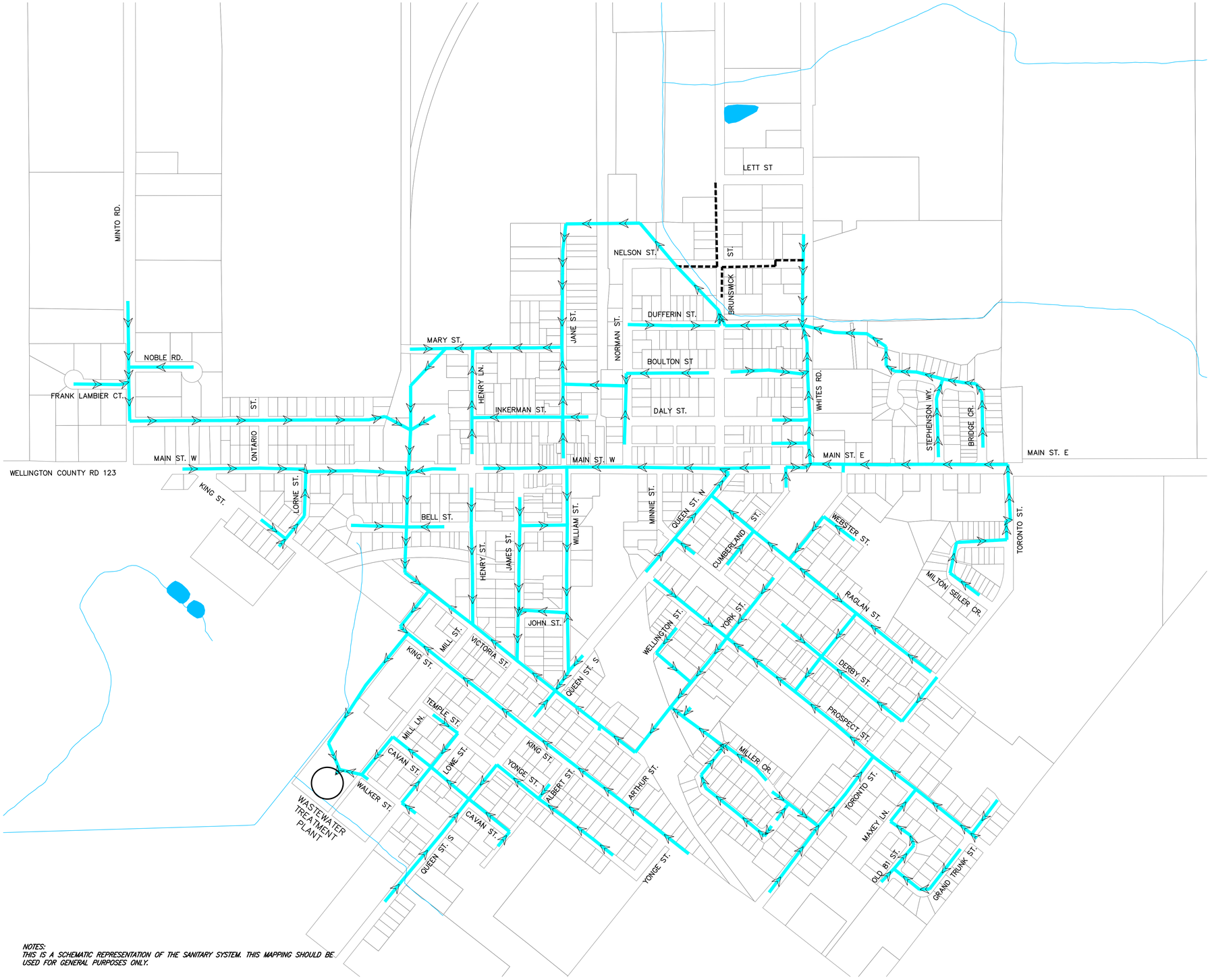
Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY



PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- FORCEMAIN

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-S.3

PALMERSTON SANITARY SYSTEM

PEAK SEWAGE FLOWS (EXISTING CONDITIONS)

NOT TO SCALE
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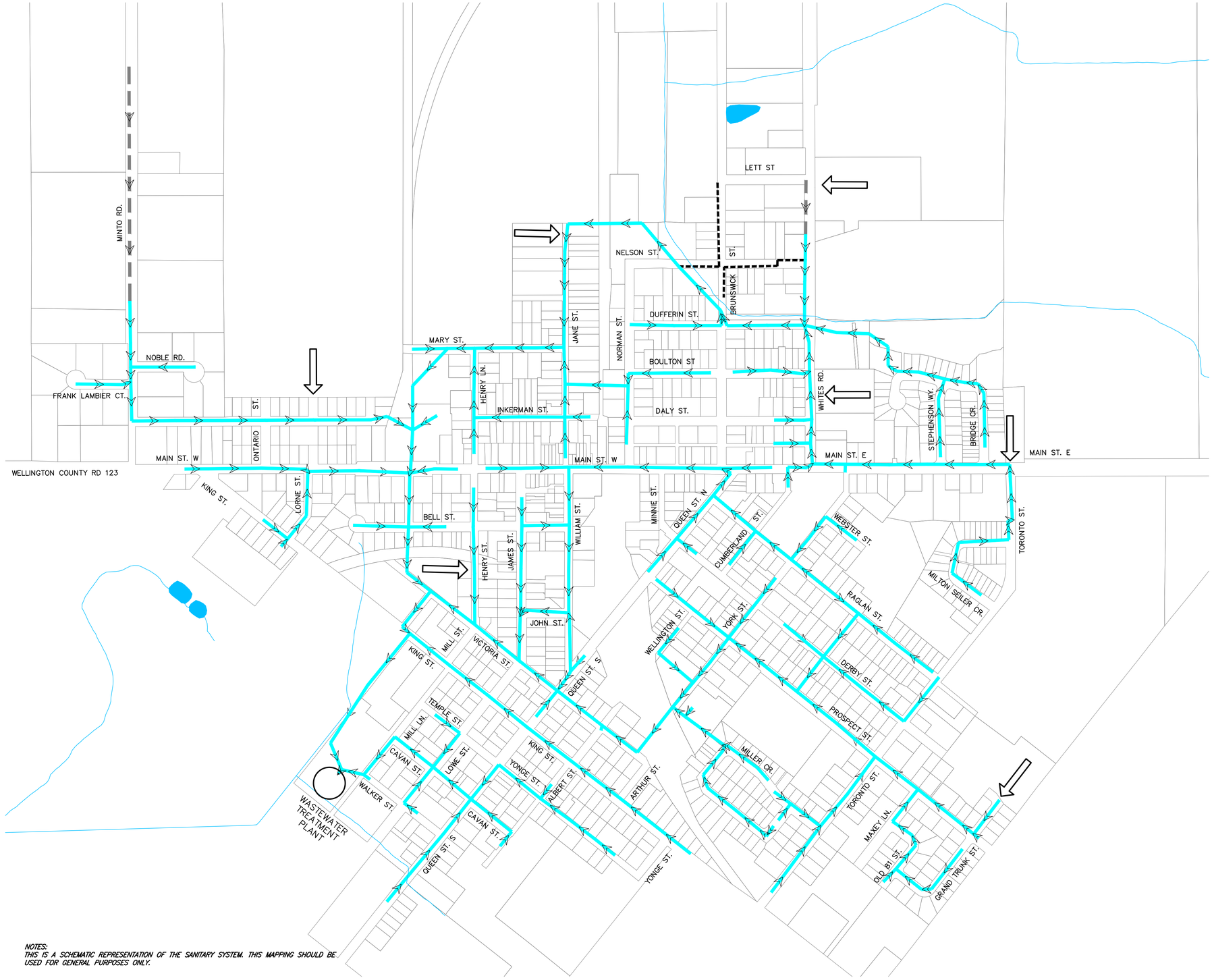

PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- FORCEMAIN
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE P-S.4

PALMERSTON SANITARY SYSTEM

PEAK SEWAGE FLOWS (2031 DEVELOPMENT)

NOT TO SCALE
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NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

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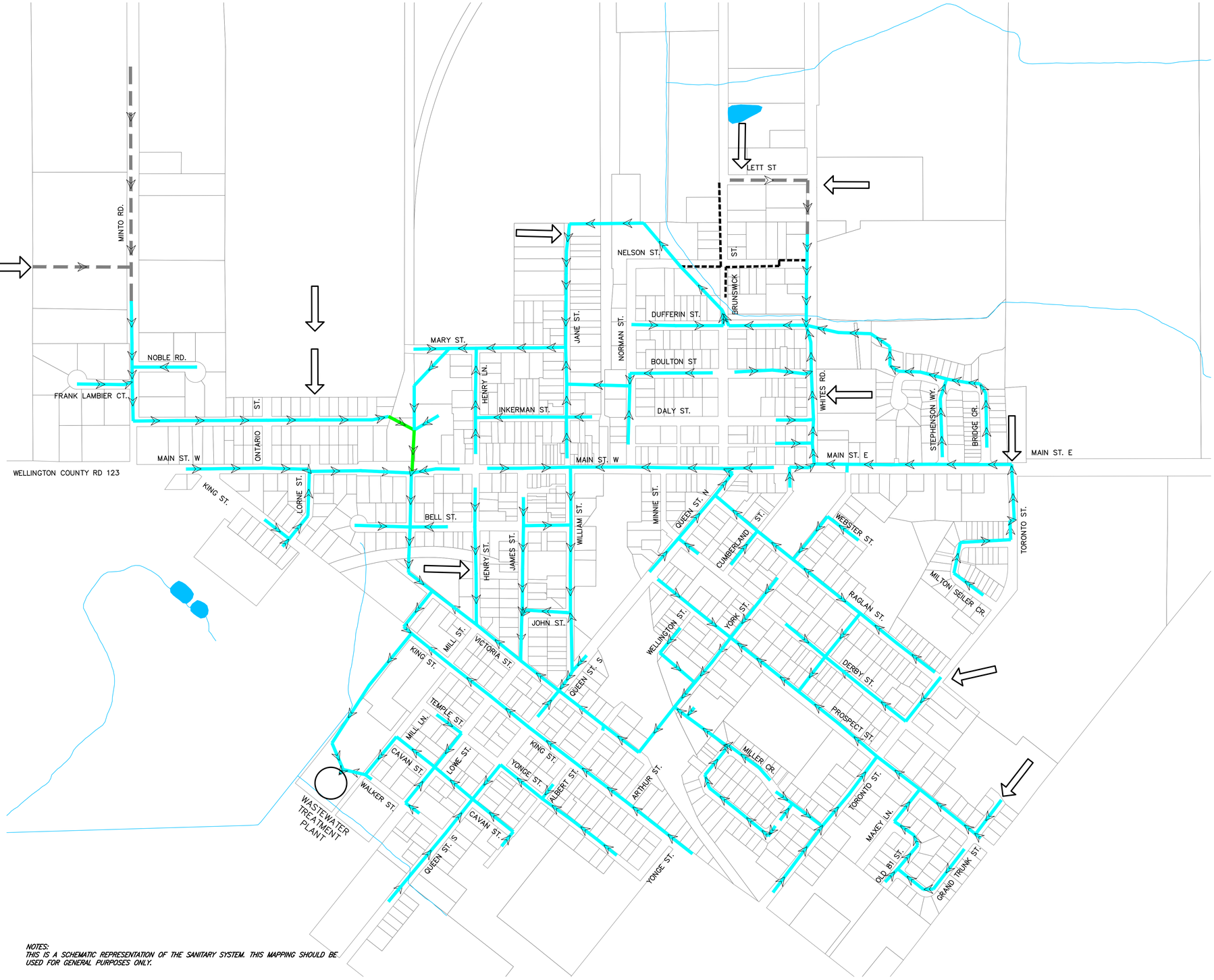
WATER AND SANITARY SERVICING STRATEGY



PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- FORCEMAIN
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE P-S.5

PALMERSTON SANITARY SYSTEM

PEAK SEWAGE FLOWS (2041 DEVELOPMENT)

NOT TO SCALE
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NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

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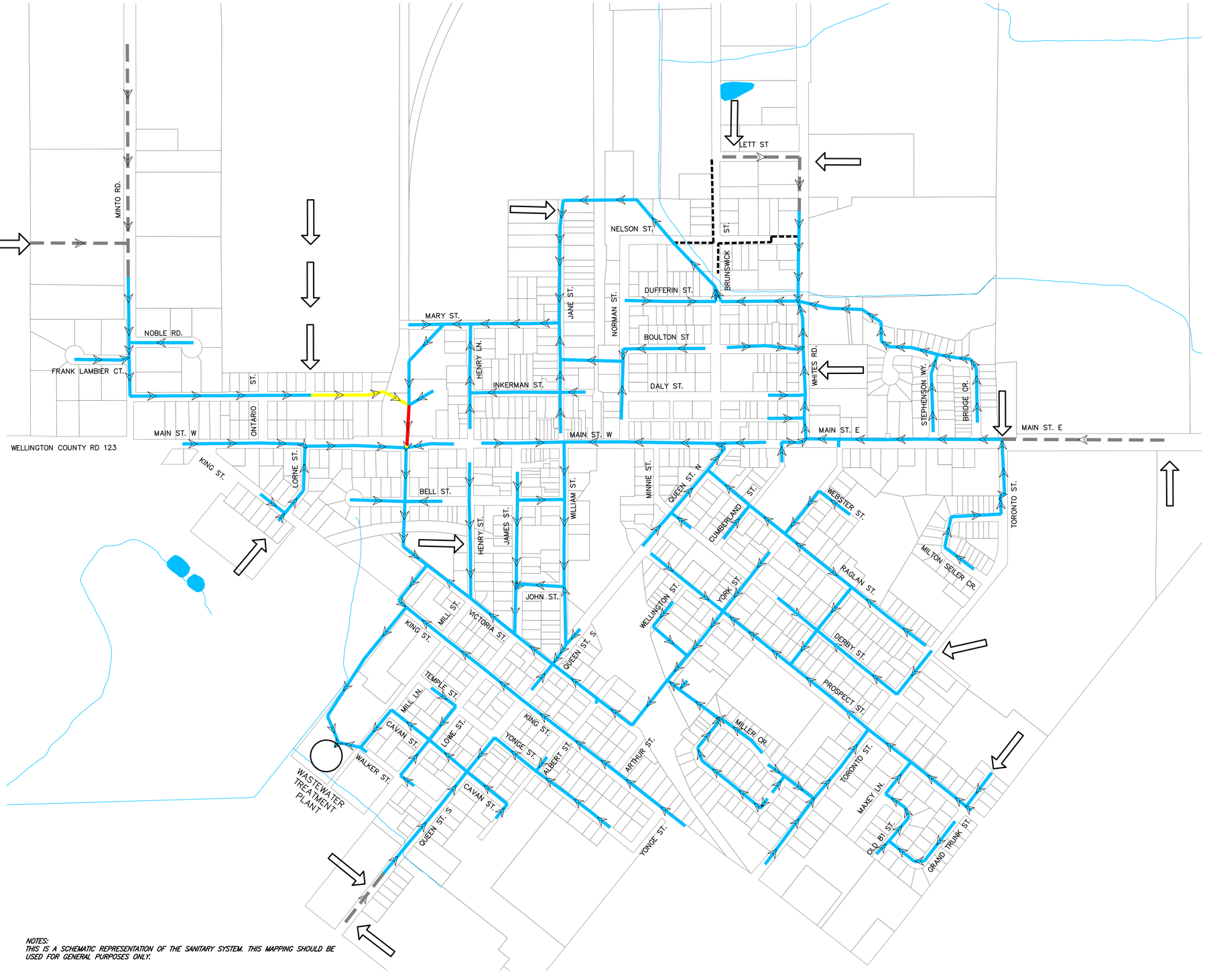

PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- FORCEMAIN
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-S.6

PALMERSTON SANITARY SYSTEM

PEAK SEWAGE FLOWS (2051 DEVELOPMENT)

NOT TO SCALE
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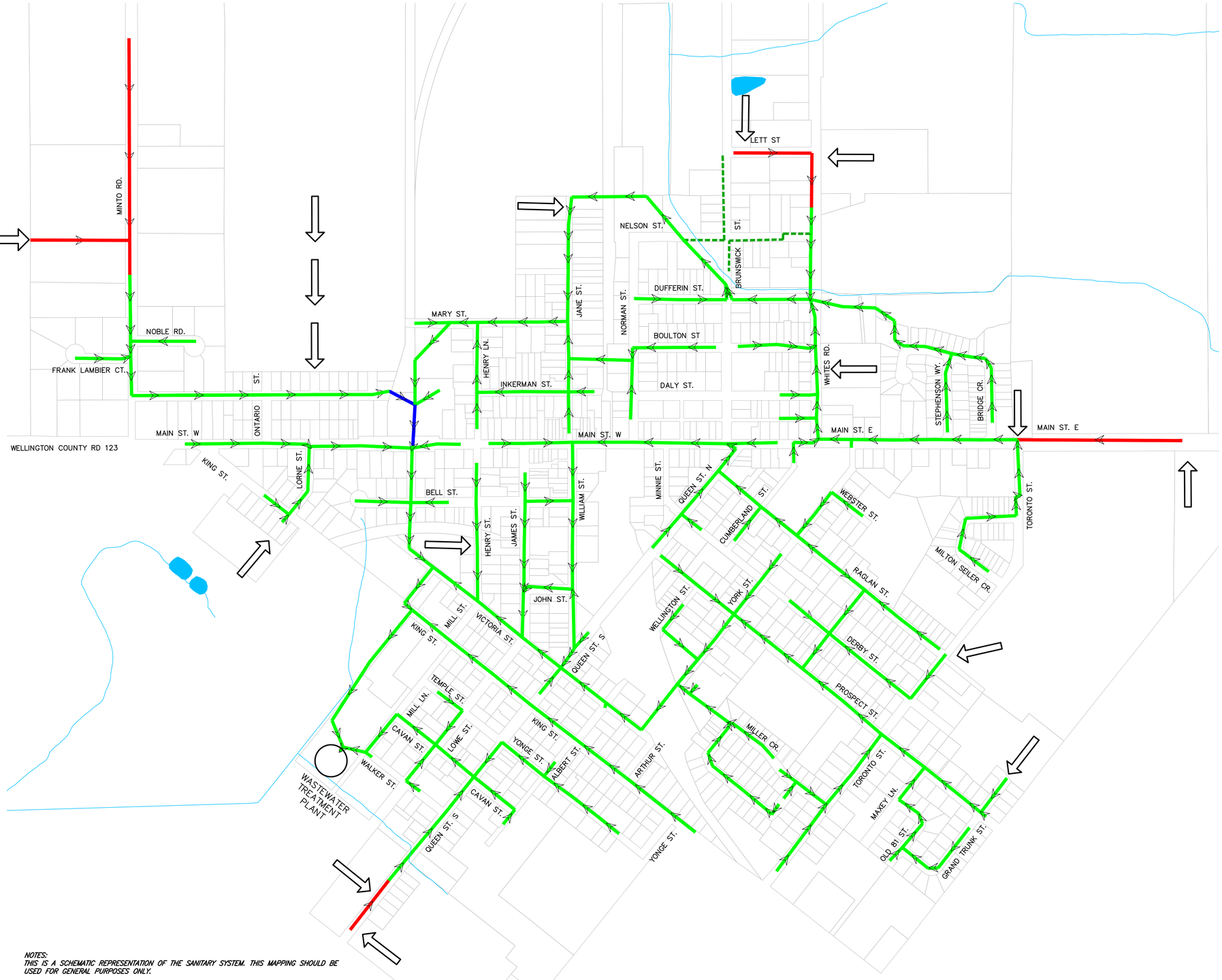

LEGEND

- EXISTING SEWER TO REMAIN
- EXISTING FORCEMAIN TO REMAIN
- UPGRADES
- EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS
- DIRECTION OF FLOW

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE P-S.7

PALMERSTON SANITARY SYSTEM
RECOMMENDED UPGRADES AND EXTENSIONS

NOT TO SCALE
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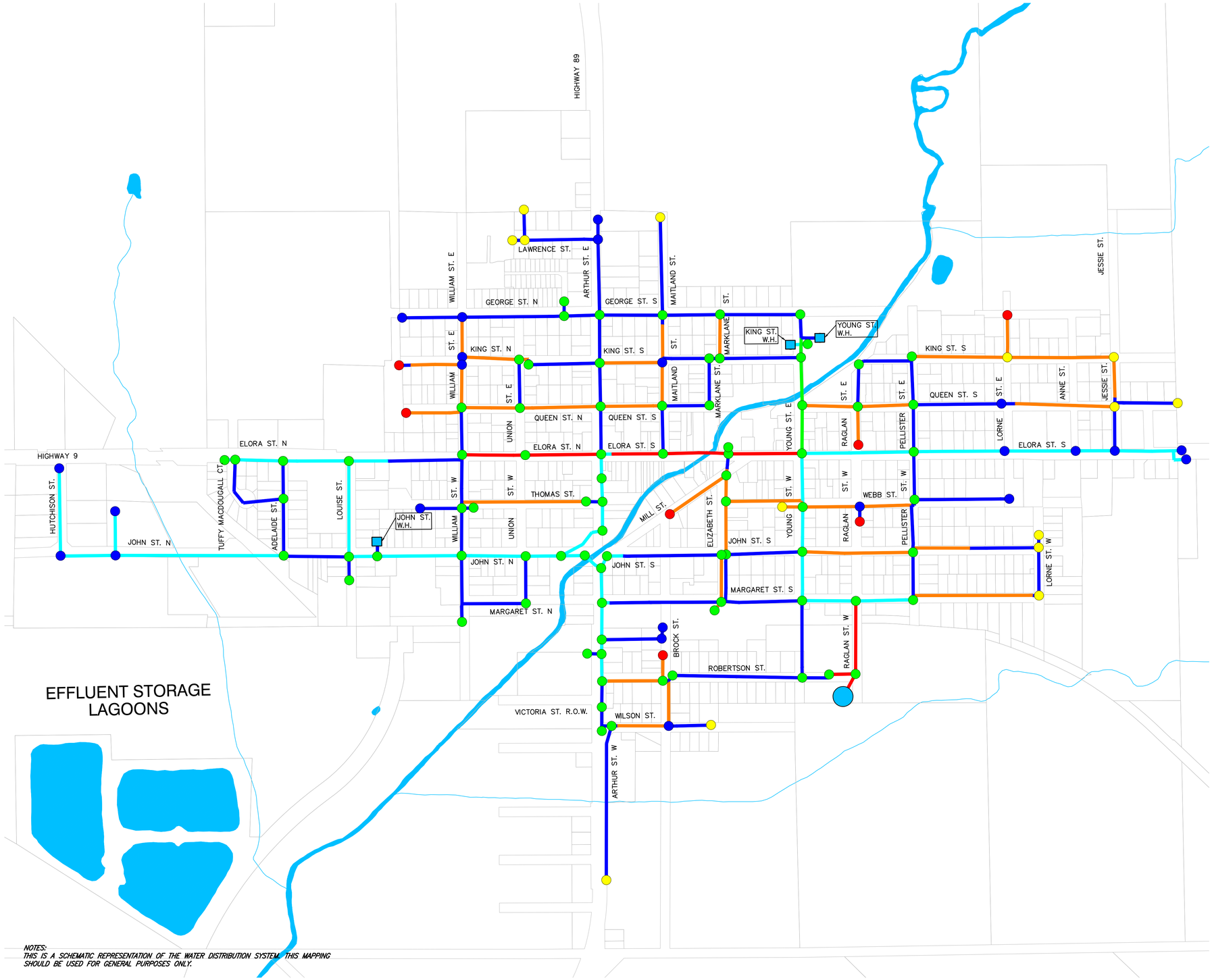

WATERMAIN DIAMETER

- 300mm
- 250mm
- 200mm
- 150mm
- ≤ 100mm

JUNCTION FIRE FLOW

- < 40 L/s
- 40 - 65 L/s
- 65 - 100 L/s
- > 100 L/s

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE H-W.1

HARRISTON WATER SYSTEM

EXISTING WATERMAIN SIZE & EXPECTED FIRE FLOW CAPABILITIES

NOT TO SCALE
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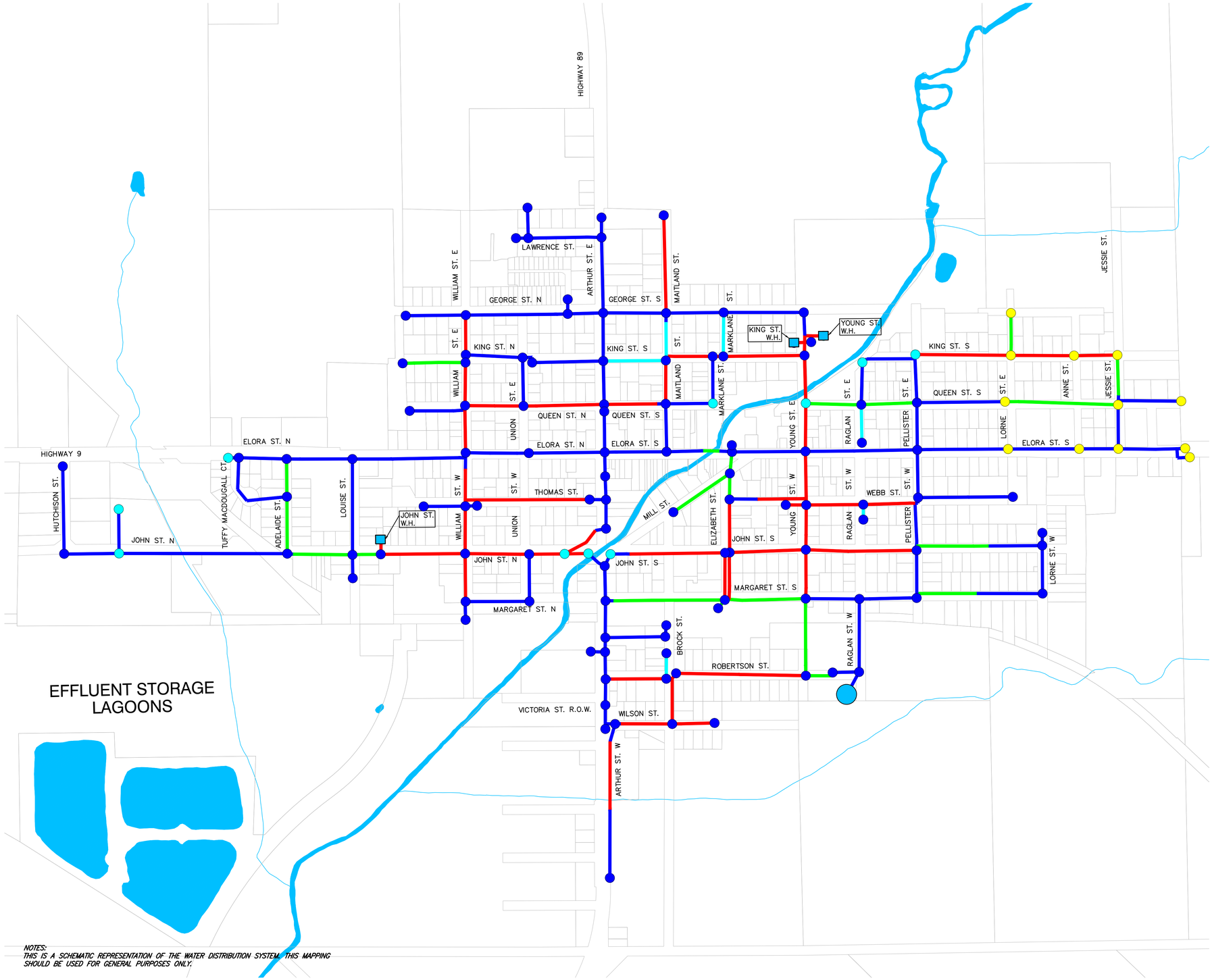

WATERMAIN MATERIAL

- PVC
- CAST IRON
- DUCTILE IRON
- ASBESTOS CEMENT
- COPPER

JUNCTION PRESSURE

- < 40 PSI
- 40 - 50 PSI
- 50 - 60 PSI
- 60 - 70 PSI
- > 70 PSI

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE H-W.2

HARRISTON WATER SYSTEM
EXISTING WATERMAIN MATERIAL & TYPICAL SYSTEM PRESSURE

NOT TO SCALE
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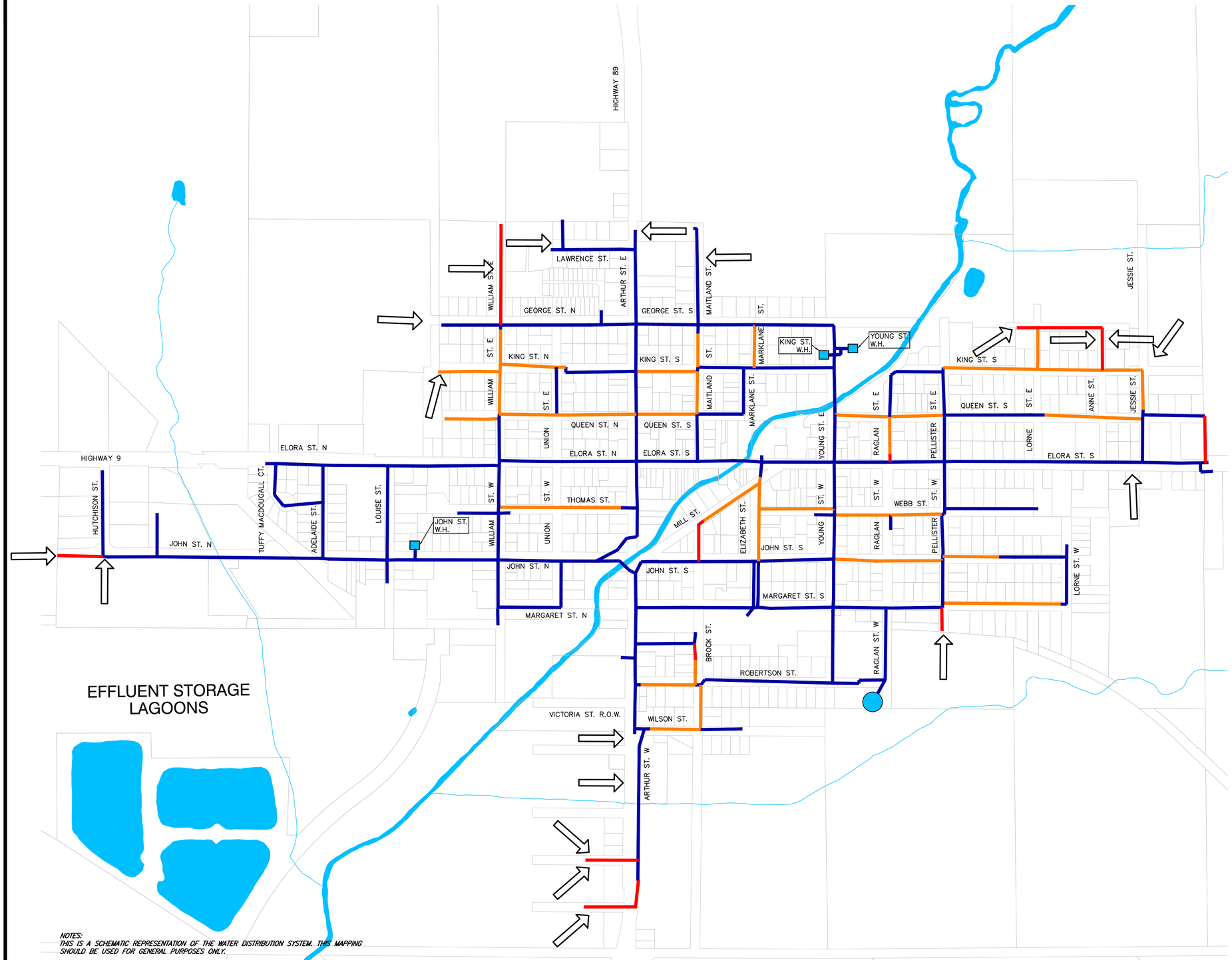

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

LEGEND

- EXISTING WATER SYSTEM
- REPLACEMENT OF ≤ 100mm PIPE
- EXTENSIONS
- WATER TOWER
- WELL HOUSE (W.H.)
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE H-W.3

HARRISTON WATER SYSTEM

RECOMMENDED UPGRADES & EXTENSIONS

NOT TO SCALE
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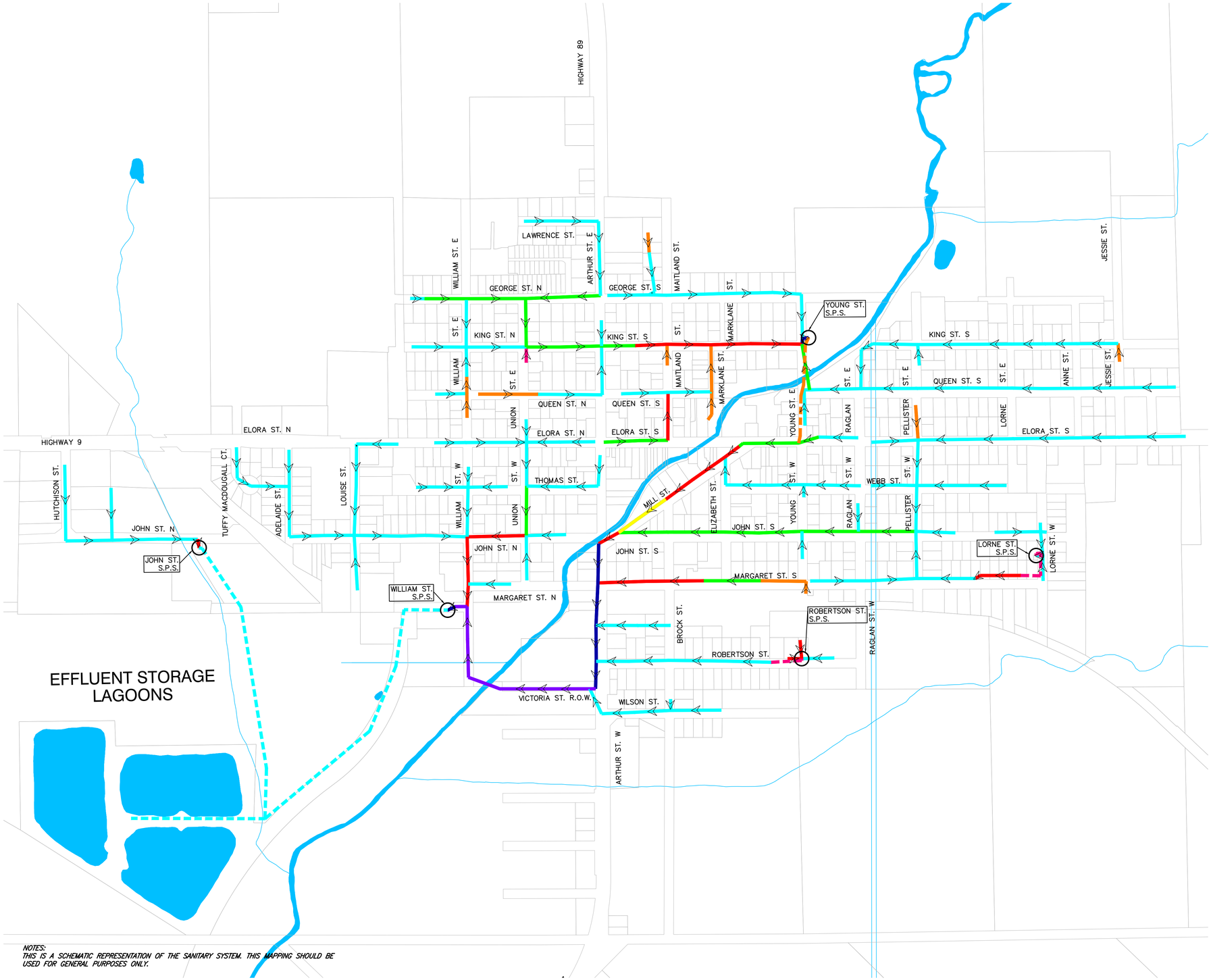

SEWER SIZING

525mm	200mm FORCEMAIN
450mm	150mm FORCEMAIN
375mm	100mm FORCEMAIN
300mm	
250mm	
200mm	
150mm	
100mm	

LEGEND

- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE H-S.1

HARRISTON SANITARY SYSTEM EXISTING SEWER SIZES

NOT TO SCALE
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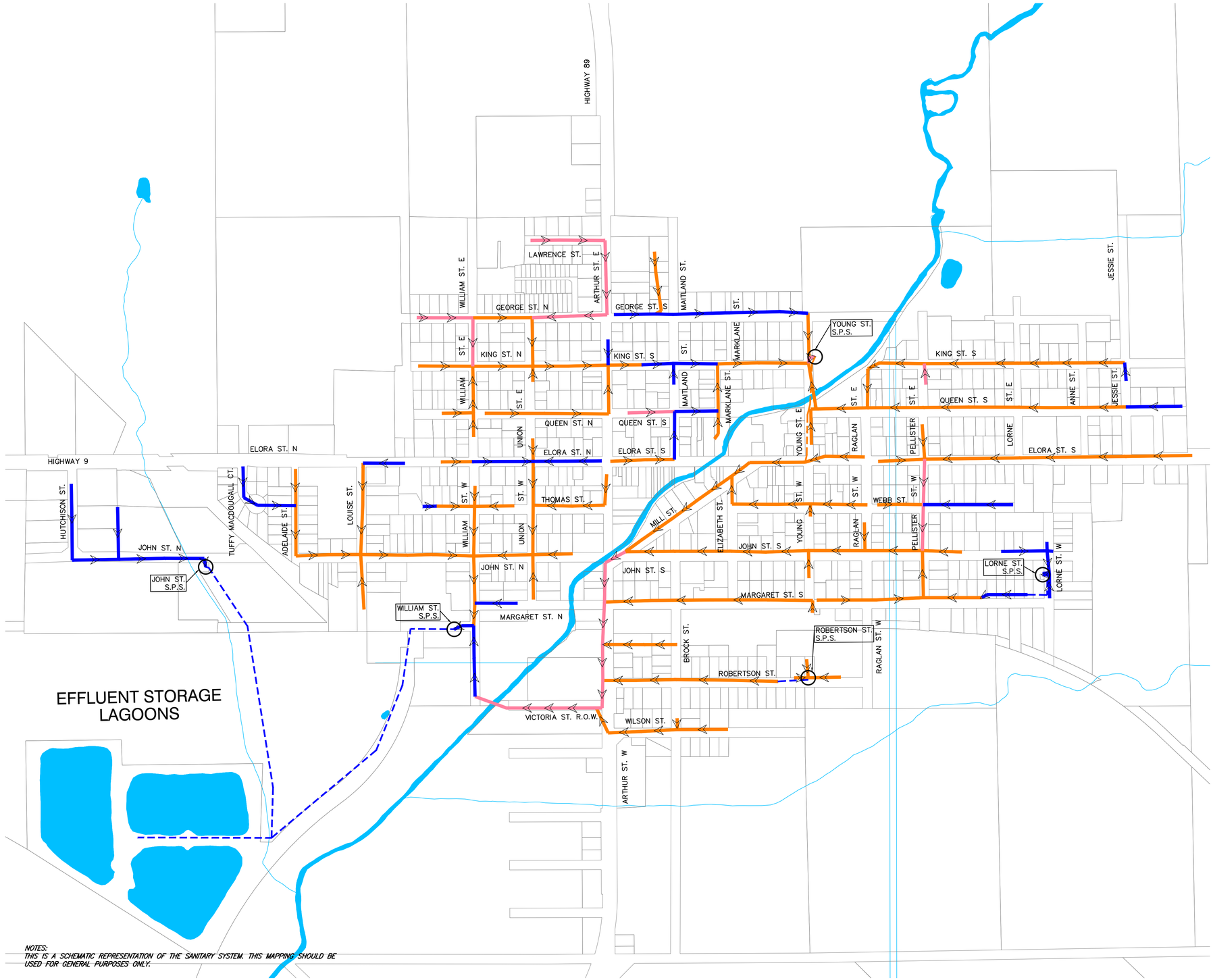
WATER AND SANITARY SERVICING STRATEGY



SEWER MATERIAL

- CONCRETE
- PVC
- ASBESTOS CEMENT

LEGEND

- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)

FIGURE H-S.2

HARRISTON SANITARY SYSTEM EXISTING SEWER MATERIAL

NOT TO SCALE
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NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

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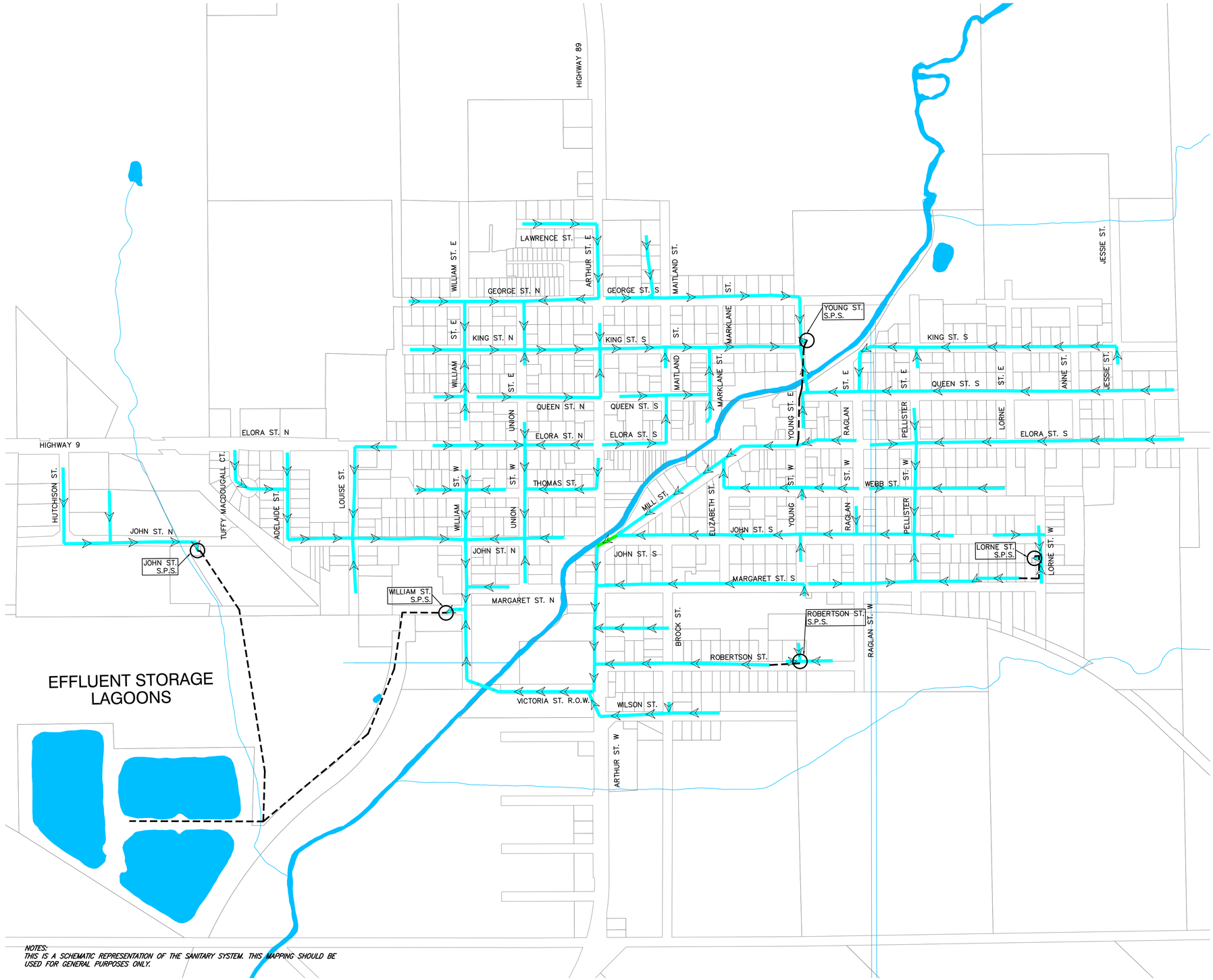
WATER AND SANITARY SERVICING STRATEGY



PEAK FLOW / CAPACITY (%)

- = OR < 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)
- FORCEMAIN

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE H-S.3

HARRISTON SANITARY SYSTEM
PEAK SEWAGE FLOWS (EXISTING CONDITIONS)

NOT TO SCALE
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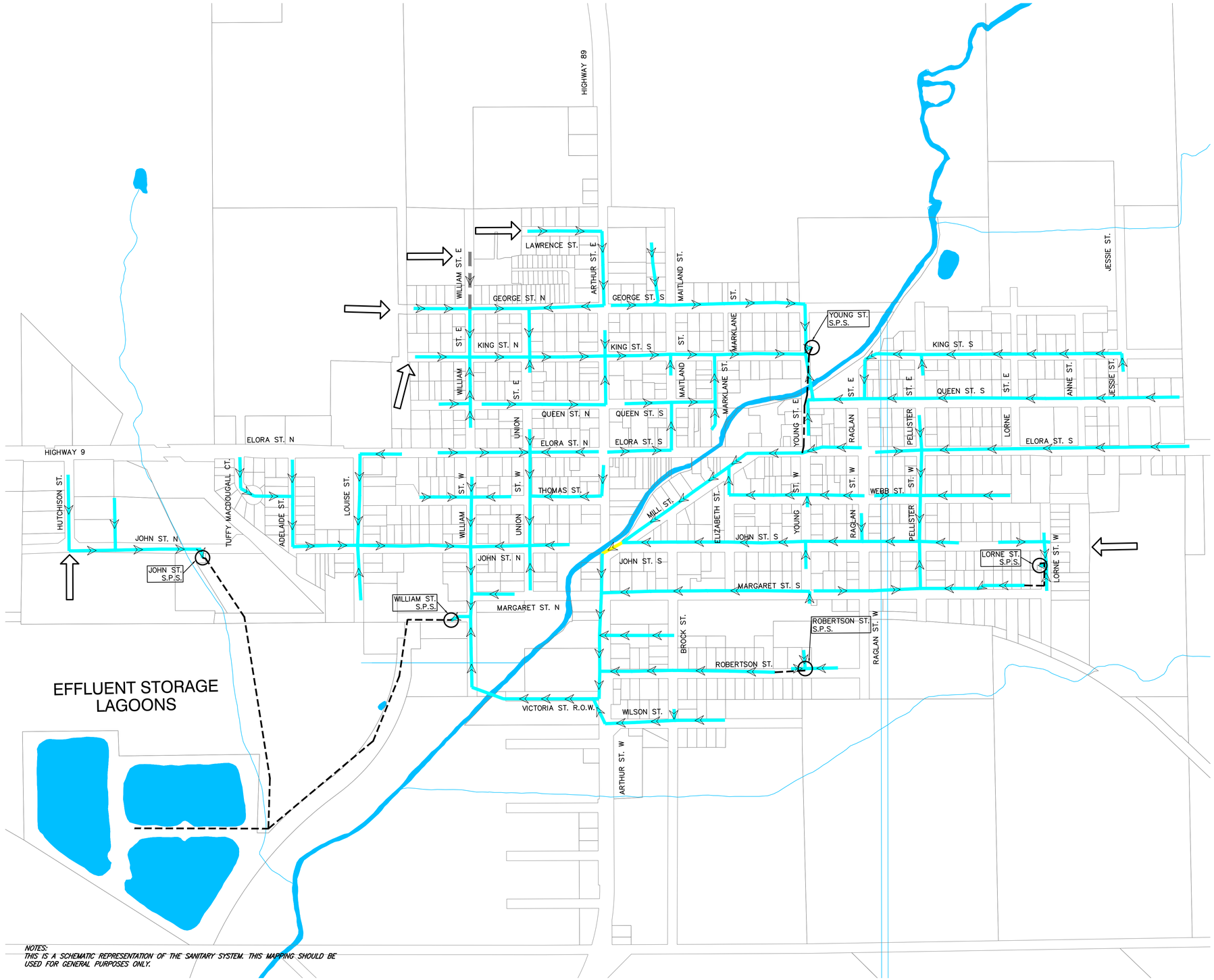
WATER AND SANITARY SERVICING STRATEGY



NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

PEAK FLOW / CAPACITY (%)

- = OR < 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)
- FORCEMAIN
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE H-S.4

HARRISTON SANITARY SYSTEM
PEAK SEWAGE FLOWS (2031 DEVELOPMENT)

NOT TO SCALE
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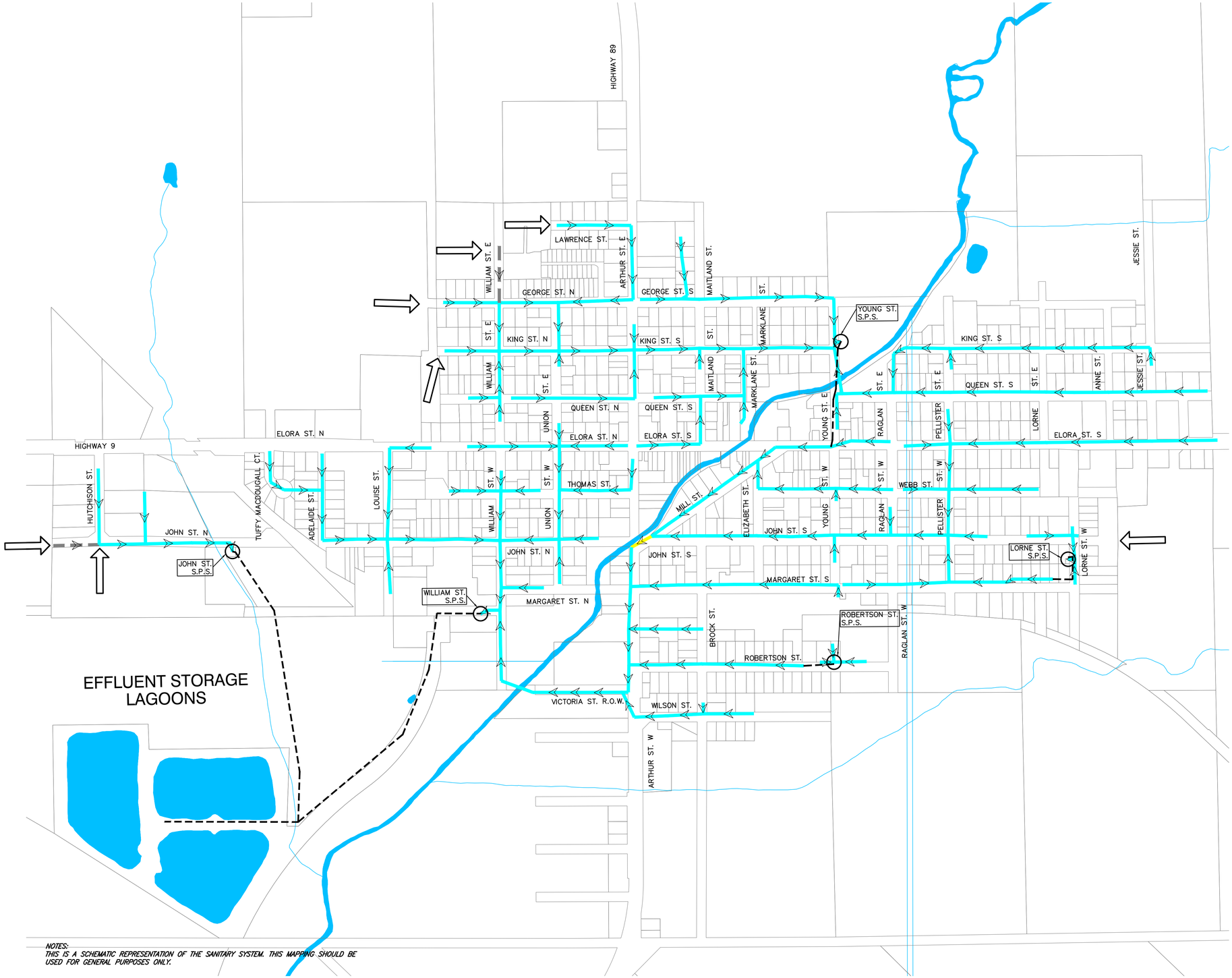

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

PEAK FLOW / CAPACITY (%)

- = OR < 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)
- FORCEMAIN
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE H-S.5

HARRISTON SANITARY SYSTEM
PEAK SEWAGE FLOWS (2041 DEVELOPMENT)

NOT TO SCALE
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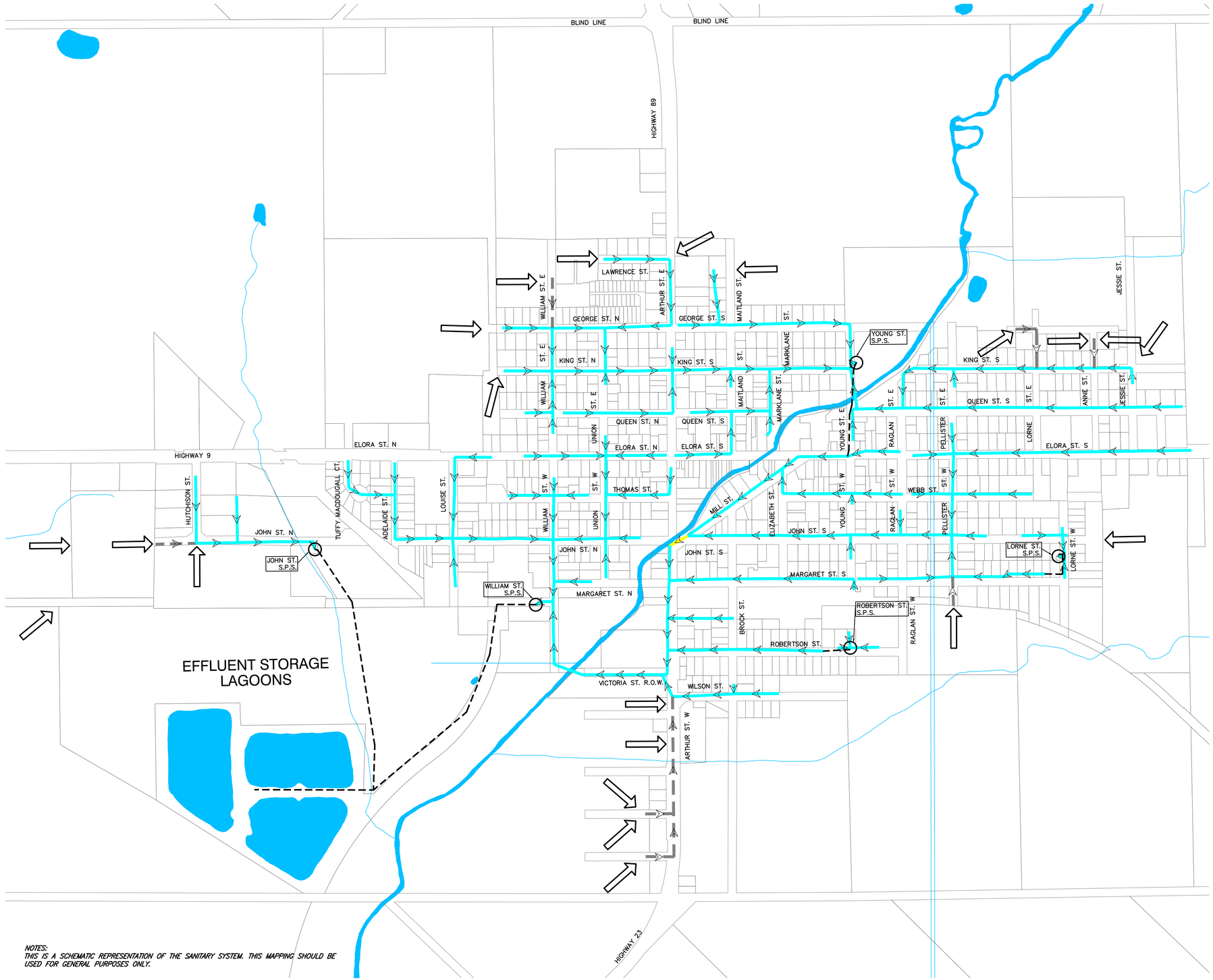

PEAK FLOW / CAPACITY (%)

- = OR < 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)
- FORCEMAIN
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE H-S.6

HARRISTON SANITARY SYSTEM
PEAK SEWAGE FLOWS (2051 DEVELOPMENT)

NOT TO SCALE
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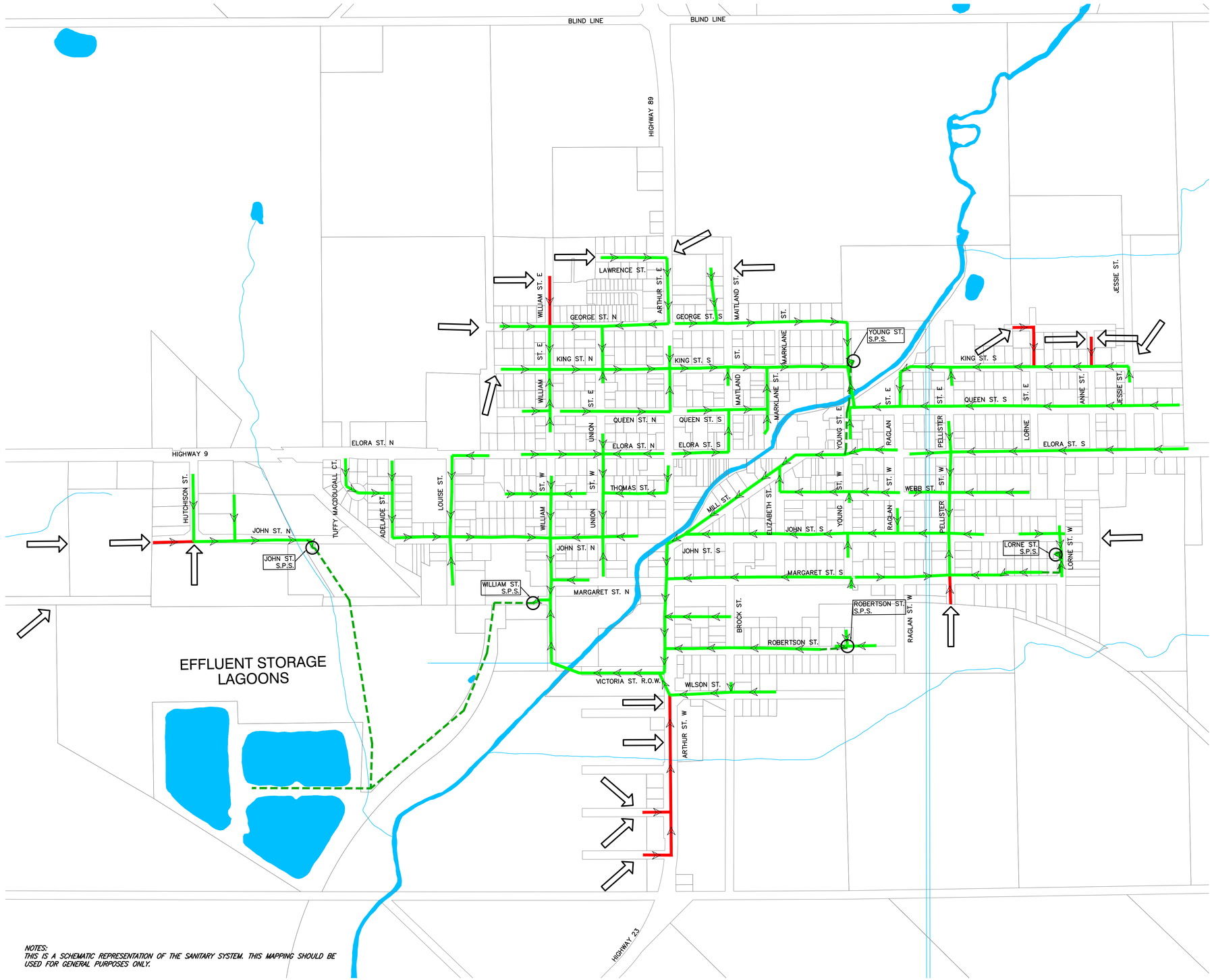

LEGEND

- EXISTING SEWER TO REMAIN
- EXISTING FORCEMAIN TO REMAIN
- UPGRADES
- EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS
- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE H-S.7

HARRISTON SANITARY SYSTEM
RECOMMENDED UPGRADES AND EXTENSIONS

NOT TO SCALE
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TOWN OF MINTO

EFFLUENT STORAGE LAGOONS

JAMES ST. E
MILL ST. E
BROWN ST. N
BROWN ST. S
ALLAN ST. W.H.
WILLIAM ST. N
WILLIAM ST. S
QUEEN ST. E
GEDDES ST. E
ALLAN ST. E
JOHN ST. E
NELSON ST. E
MILL ST. E
WELLINGTON ROAD 1
ELORA ST. N
ELORA ST. N
ELORA ST. S
ELORA ST. S
JAMES ST. W
QUEEN ST. W
GEDDES ST. W
ALLAN ST. W
JOHN ST. W
NELSON ST. W
PARK ST. W
W HERITAGE ST
CLARKE ST. N
CLARKE ST. S
ANN ST. N
ANN ST. S
NELSON ST. W.H.
QUEEN ST. W
GEDDES ST. W
ALLAN ST. W
JOHN ST. W
NELSON ST. W
PARK ST. W
W HERITAGE ST
MINTO ST. N
MINTO ST. S
CECILIA ST. N
GEDDES ST. W
ALLAN ST. W

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WATER AND SANITARY SERVICING STRATEGY

WATERMAIN DIAMETER

- 300mm
- 250mm
- 200mm
- 150mm
- ≤ 100mm

JUNCTION FIRE FLOW

- < 40 L/s
- 40 - 65 L/s
- 65 - 100 L/s
- > 100 L/s

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

FIGURE C-W.1

CLIFFORD WATER SYSTEM

EXISTING WATERMAIN SIZE & EXPECTED FIRE FLOW CAPABILITIES

NOT TO SCALE
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EFFLUENT STORAGE LAGOONS

JAMES ST. E
MILL ST. E
BROWN ST. N
BROWN ST. S
ALLAN ST. W.H.
WILLIAM ST. N
WILLIAM ST. S
QUEEN ST. E
GEDDES ST. E
ALLAN ST. E
JOHN ST. E
NELSON ST. E
WELLINGTON ROAD 1
ELORA ST. N
ELORA ST. N
ELORA ST. S
JAMES ST. W
QUEEN ST. W
GEDDES ST. W
ALLAN ST. W
JOHN ST. W
NELSON ST. W
PARK ST. W
W HERITAGE ST
CLARKE ST. N
CLARKE ST. S
ANN ST. N
ANN ST. S
NELSON ST. W.H.
MINTO ST. N
MINTO ST. S
CECILIA ST. N

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WATER AND SANITARY SERVICING STRATEGY

WATERMAIN MATERIAL

- PVC
- CAST IRON
- DUCTILE IRON
- ASBESTOS CEMENT
- COPPER

JUNCTION PRESSURE

- < 40 PSI
- 40 - 50 PSI
- 50 - 60 PSI
- 60 - 70 PSI
- > 70 PSI

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)

FIGURE C-W.2

CLIFFORD WATER SYSTEM

EXISTING WATERMAIN MATERIAL & TYPICAL SYSTEM PRESSURE

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NOTES:
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WATER AND SANITARY SERVICING STRATEGY

EFFLUENT STORAGE LAGOONS

WELLINGTON ROAD 1
W HERITAGE ST
ELORA ST. N
ELORA ST. S
JAMES ST. E
JAMES ST. W
MILL ST. E
BROWN ST. N
BROWN ST. S
ALLAN ST. W.H.
WILLIAM ST. N
WILLIAM ST. S
QUEEN ST. E
GEDDES ST. E
ALLAN ST. E
JOHN ST. E
NELSON ST. E
PARK ST. W
QUEEN ST. W
GEDDES ST. W
ALLAN ST. W
JOHN ST. W
NELSON ST. W
CLARKE ST. N
CLARKE ST. S
ANN ST. N
ANN ST. S
NELSON ST. W.H.
MINTO ST. N
MINTO ST. S
CECILIA ST. N

LEGEND

- EXISTING WATER SYSTEM
- REPLACEMENT OF ≤ 100mm PIPE
- EXTENSIONS
- WATER TOWER
- WELL HOUSE (W.H.)
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE C-W.3

CLIFFORD WATER SYSTEM

RECOMMENDED UPGRADES & EXTENSIONS

NOT TO SCALE
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NOTES:
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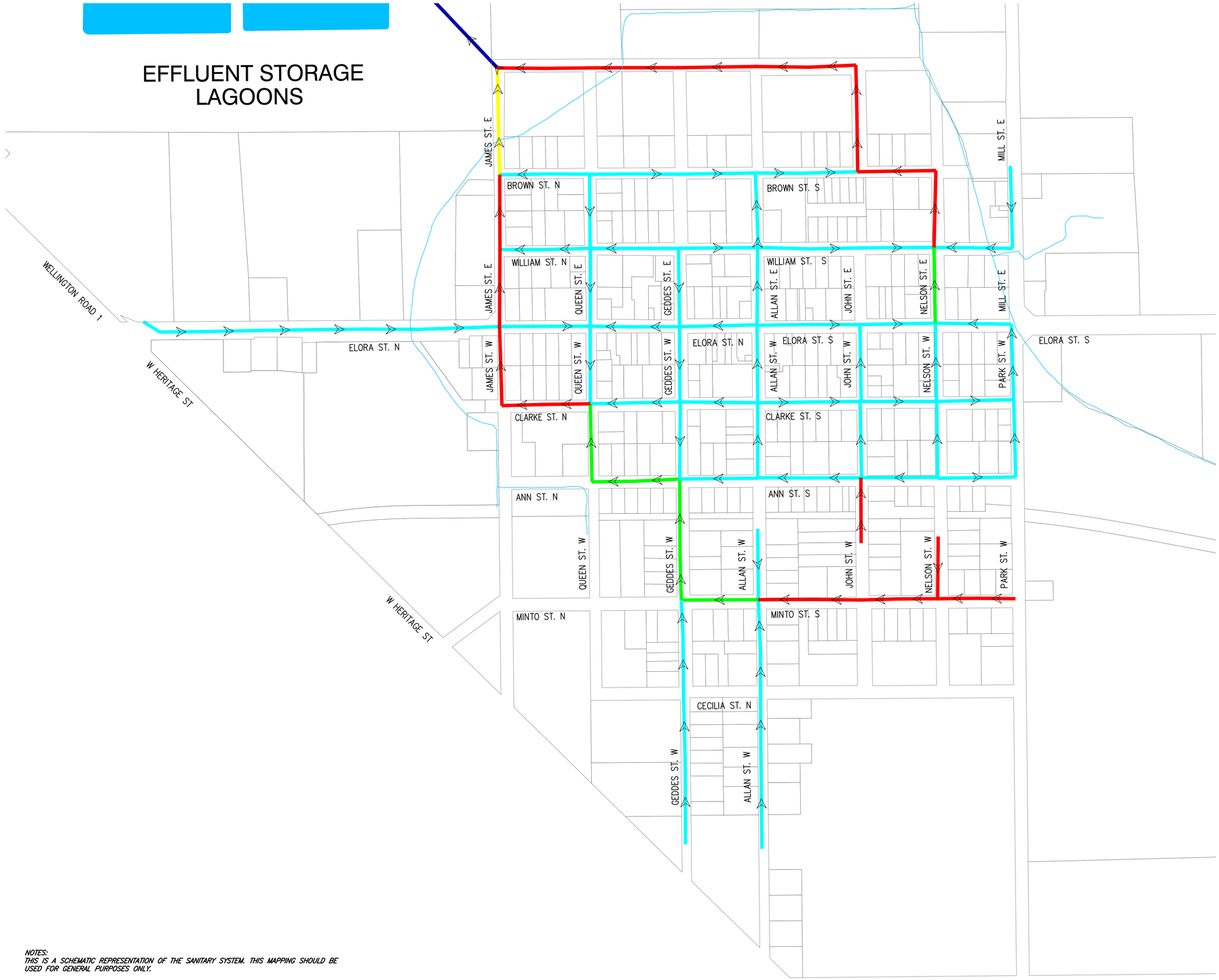
EFFLUENT STORAGE LAGOONS



SEWER SIZING

- 450mm
- 375mm
- 300mm
- 250mm
- 200mm

LEGEND

- DIRECTION OF FLOW

FIGURE C-S.1

CLIFFORD SANITARY SYSTEM EXISTING SEWER SIZES

NOT TO SCALE
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NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

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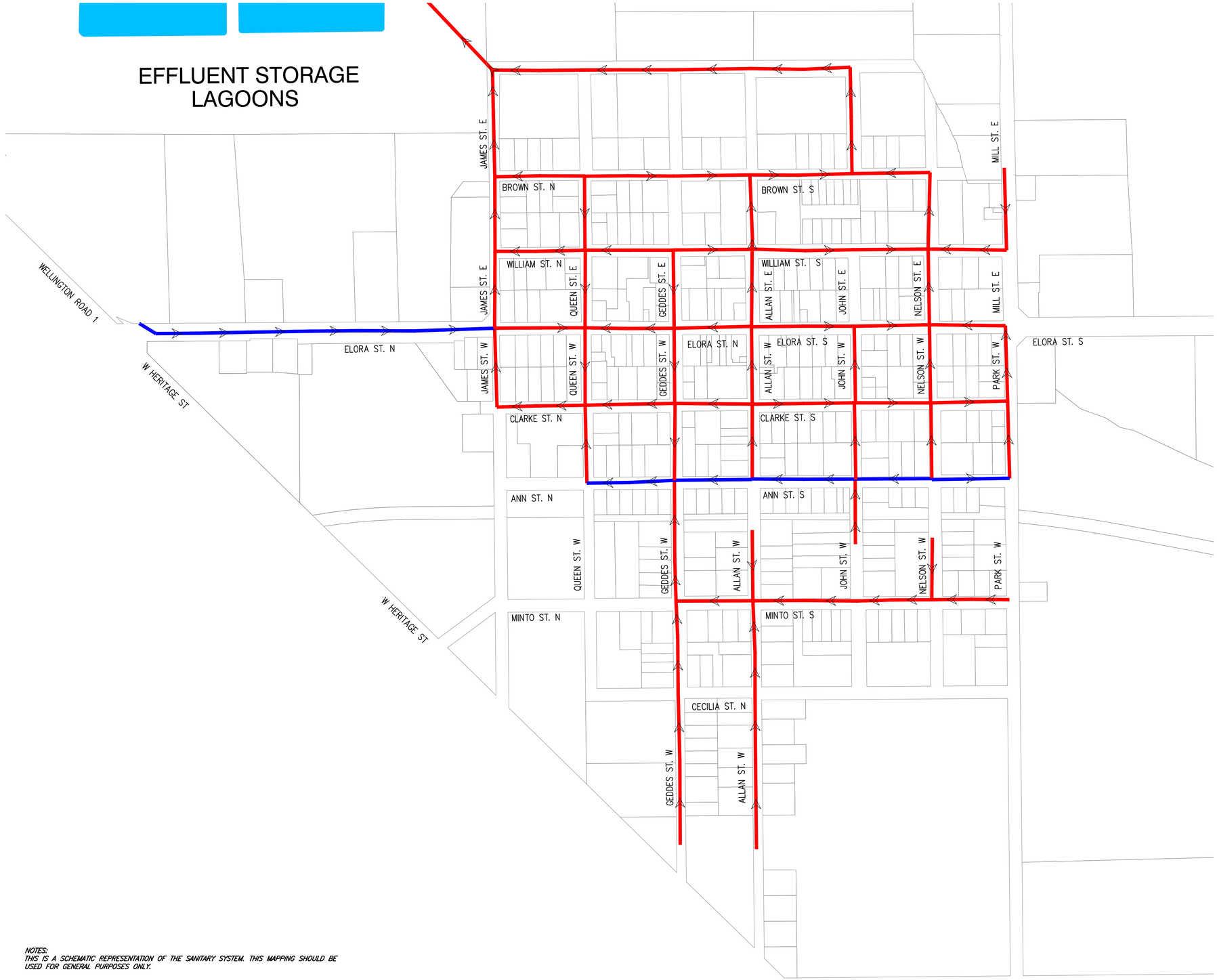
WATER AND SANITARY SERVICING STRATEGY

EFFLUENT STORAGE LAGOONS



SEWER MATERIAL

- PVC
- ULTRA-RIB PVC

LEGEND

- DIRECTION OF FLOW

FIGURE C-S.2

CLIFFORD SANITARY SYSTEM EXISTING SEWER MATERIAL

NOT TO SCALE
A3198

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

TOWN OF MINTO

EFFLUENT STORAGE LAGOONS

WATER AND SANITARY SERVICING STRATEGY

PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW

FIGURE C-S.3

CLIFFORD SANITARY SYSTEM

PEAK SEWAGE FLOWS (EXISTING CONDITIONS)

NOT TO SCALE
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NOTES:
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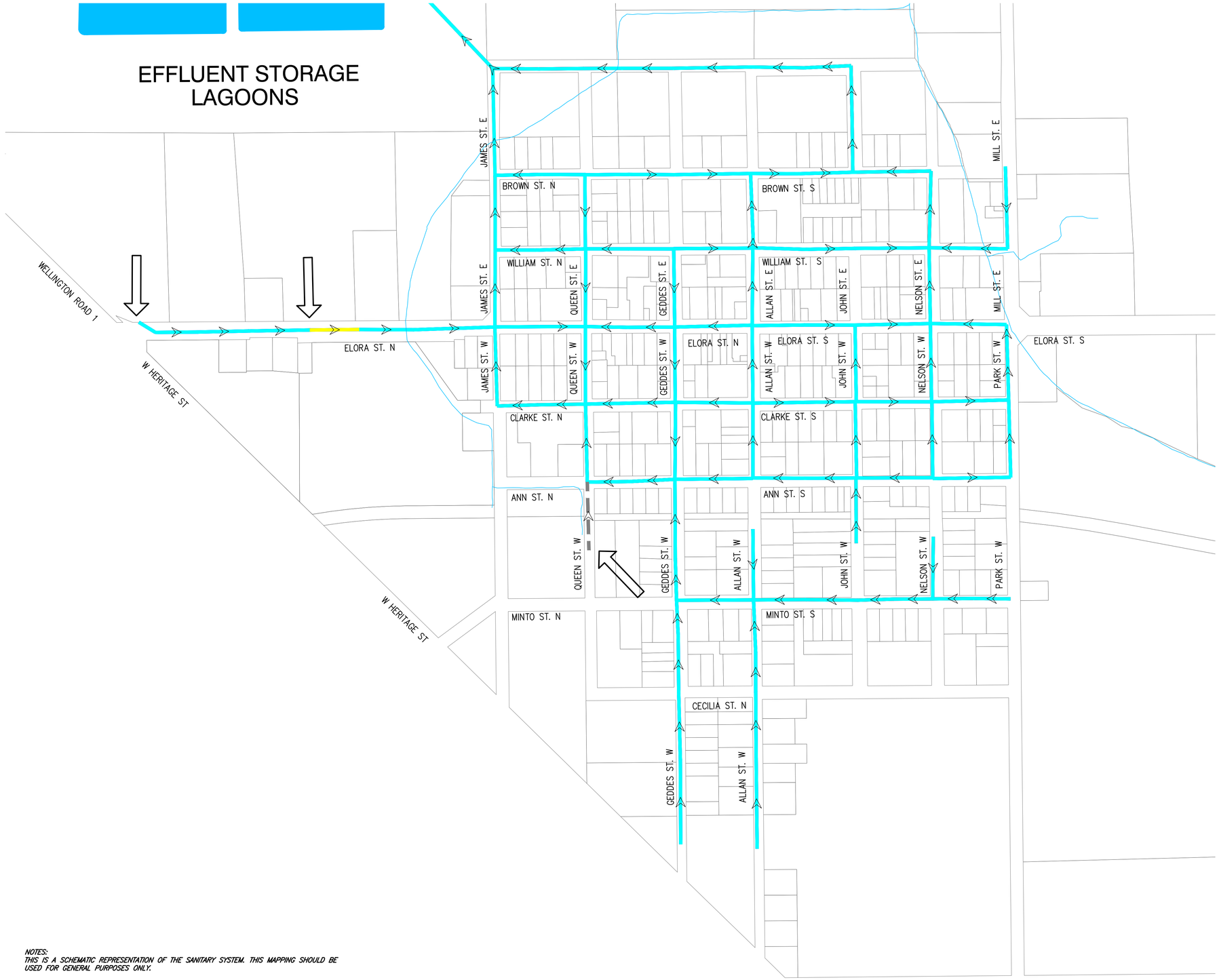
TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY

EFFLUENT STORAGE LAGOONS



PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE C-S.4

CLIFFORD SANITARY SYSTEM PEAK SEWAGE FLOWS (2031 DEVELOPMENT)

NOT TO SCALE
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NOTES:
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TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY

EFFLUENT STORAGE LAGOONS

WELLINGTON ROAD 1
W HERITAGE ST
ELORA ST. N
ELORA ST. S
ELORA ST. N
ELORA ST. S
CLARKE ST. N
CLARKE ST. S
ANN ST. N
ANN ST. S
MINTO ST. N
MINTO ST. S
CECILIA ST. N
BROWN ST. N
BROWN ST. S
WILLIAM ST. N
WILLIAM ST. S
JAMES ST. E
JAMES ST. W
QUEEN ST. E
QUEEN ST. W
GEDDES ST. E
GEDDES ST. W
ALLAN ST. E
ALLAN ST. W
JOHN ST. E
JOHN ST. W
NELSON ST. E
NELSON ST. W
MILL ST. E
PARK ST. W

PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE C-S.5

CLIFFORD SANITARY SYSTEM

PEAK SEWAGE FLOWS (2041 DEVELOPMENT)

NOT TO SCALE
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NOTES:
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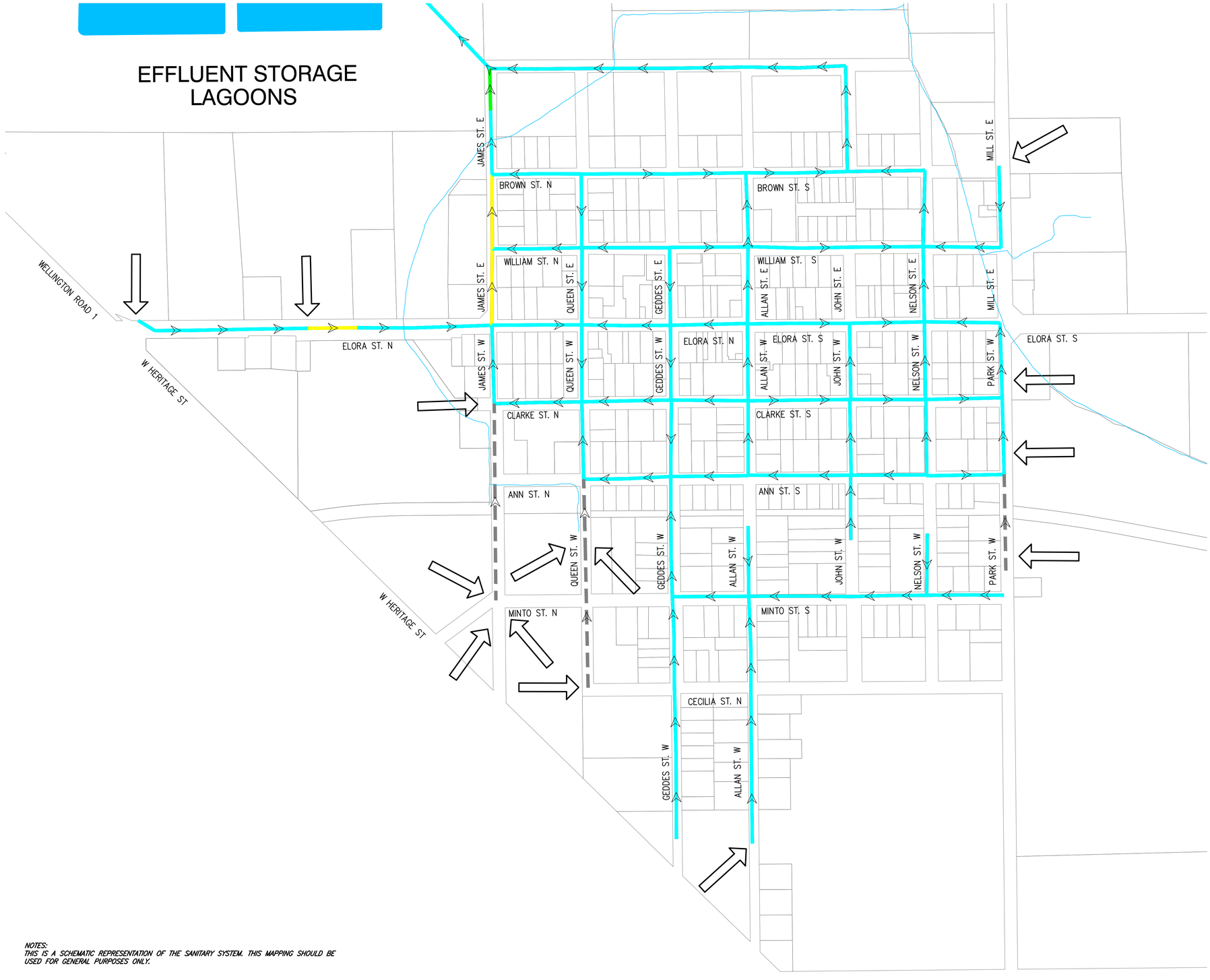
TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY

EFFLUENT STORAGE LAGOONS



PEAK FLOW / CAPACITY (%)

- ≤ 50%
- 50 - 75%
- 75 - 110%
- > 110%

LEGEND

- DIRECTION OF FLOW
- FUTURE SEWER EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS

FIGURE C-S.6

CLIFFORD SANITARY SYSTEM

PEAK SEWAGE FLOWS (2051 DEVELOPMENT)

NOT TO SCALE
A3198

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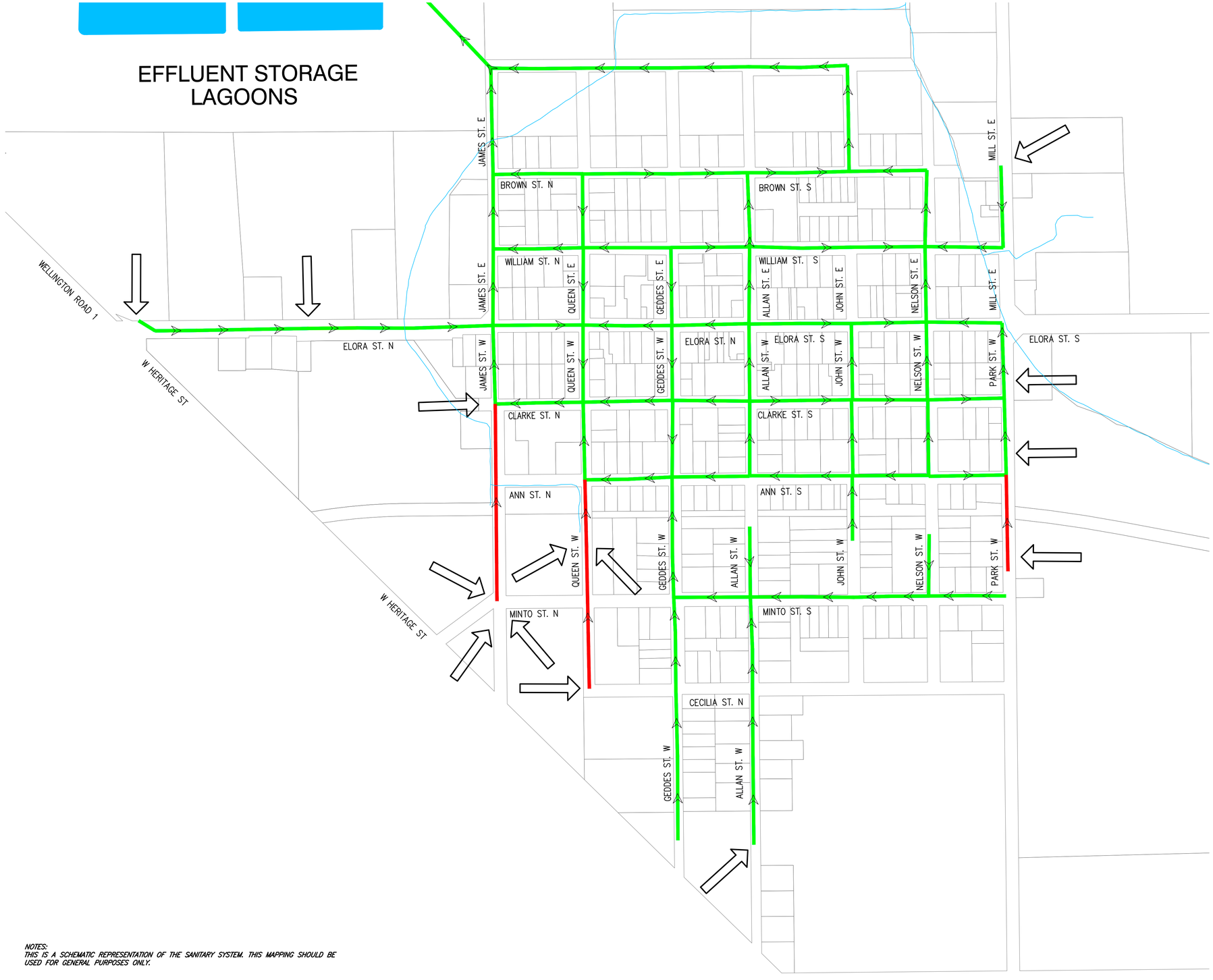
NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY

EFFLUENT STORAGE LAGOONS



LEGEND

- EXISTING SEWER TO REMAIN
- UPGRADES
- EXTENSIONS
- FUTURE DEVELOPMENT CONTRIBUTIONS
- DIRECTION OF FLOW

FIGURE C-S.7

CLIFFORD SANITARY SYSTEM RECOMMENDED UPGRADES AND EXTENSIONS

NOT TO SCALE
A3198

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NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

Appendices

Appendix A

Schedule A5 – Minto, County of Wellington Official Plan

SCHEDULE A5

MINTO

GREY

HURON

PERTH

PERTH

TOWNSHIP OF WELLINGTON NORTH SCHEDULE A6

Drew
H.

Clifford
Schedule A5-1
U.C.

Harriston
Schedule A5-2
U.C.

Palmerston
Schedule A5-3
U.C.

Teviotdale
H.

PA5-1
PA5-2
PA5-3
PA5-10

Pike Lake

C.R.

XVIII XVII XVI XV XIV XIII XII XI X IX VIII VII VI V IV III II I A

VII VI V VI III II I

Legend

The Greenlands System
- Core Greenlands
- Greenlands
- Earth Science ANSI

The Rural System
- Prime Agricultural
- Secondary Agricultural
- Recreational
- Rural Employment Area
- C.R. Country Residential
- PA Policy Area

The Urban System
- H. Hamlet Area
- U.C. Urban Centre

Other
- Trail
- Landfill Site
- Airfield
- County Roads
- Provincial Highways

Mineral Aggregate Resources are identified on Schedule C of the Official Plan. Licensed Aggregate Operations are identified on Appendix 2 of the Official Plan.

N

0 0.5 1 2
Kilometres

May 6, 1999

Updated: March 9, 2015.

Date Printed: March 9, 2015.

Sources:
County of Wellington, Planning and Development Department, Ministry of Natural Resources, Grand River Conservation Authority, Hamilton Region Conservation Authority, and Conservation Halton, Upper Grand District School Board.

Produced using natural resource information provided by local Conservation Authorities and the Ministry of Natural Resources (Copyright Queen's Printer, 1997).

Document Path: F:\Land Information System\Official Plan 2012\OPA 81 - New Official Schedules\Rural\Minto\Minto - Schedule A5.mxd

Appendix B

Memorandum Re: County of Wellington MCR: Town of Minto – Revision to Allocation of Population and Housing Growth by Urban Settlement Area (Watson & Associates, Dec. 14, 2020)

Memorandum

To	Sarah Wilhelm, Manager of Policy Planning, County of Wellington
From	Jamie Cook, Director; Brad Post, Senior Consultant, Watson & Associates Economists Ltd.
Date	December 14, 2020
Re:	County of Wellington MCR: Town of Minto – Revision to Allocation of Population and Housing Growth by Urban Settlement Area

Fax ☐ Courier ☐ Mail ☐ Email ☒

Based on discussions with the Town of Minto, Watson has revised the population and housing allocation with the Town of Minto by urban settlement area to 2051. As part of the review Watson also reviewed the July 28, 2020 memo, Minto Long-Term Land Supply vs. Demand prepared by the County of Wellington (hereinafter referred to as "County Memo").

- The 22-year demand (2019 to 2041) housing forecast summarized in the County Memo anticipated the following annual housing for Palmerston, Harriston and Clifford:
    - Clifford – 6 housing units annually;
    - Harriston – 17 housing units annually; and
    - Palmerston – 26 housing units annually.

- As noted in the County Memo, the Town of Minto Official Plan Amendment (O.P.A.) involved a designated land residential land deduction within the Clifford Urban Settlement and an increase in designated residential land within the Palmerston Urban Settlement Area.

- The Town of Minto O.P.A. has been prepared in effort to eliminate an oversupply of residential land within the Clifford Urban Settlement Area while at the same time address the shortfall of residential land within the Palmerston Urban Settlement Area to the year 2041.

Revisions to Population and Housing Growth Allocations within the Town of Minto

Figures 1 and 2 provide further details on the revision allocation within the Town of Minto, while Appendix 1 is an updated figure to the draft allocations report prepared by Watson: County of Wellington Municipal Comprehensive Review Summary of Draft Population, Housing and Employment Growth Forecast Allocations by Area Municipality, dated October 27, 2020 (hereinafter referred to as "Draft Allocations Report").

Key highlights of the revisions are provided below:

- It is important to note that no changes were made to the overall population and housing forecast for the Town of Minto. Revisions were made only to the population and housing allocations within the Town of Minto. Further, no revisions were made to the Harriston Urban Settlement and the Rural Area.

- As summarized in Figure 1, Watson has re-allocated 520 housing units (or a population equivalent of 1,550 persons, as summarized in Figure 2) from the Clifford Urban Settlement Area to the Palmerston Urban Settlement Area over the 2016 to 2051 period.

- Over the 2016 to 2051 period, the revised forecast anticipates that Clifford urban settlement area will add 6 housing units annually, this is a decrease of 15 units annually compared to the previous forecast in the Draft Allocations Report.

- The Palmerston Urban Settlement is anticipated to add 32 housing units annually over the 2016 to 2051 period, this is an increase of 15 units annually compared to the previous forecast in the Draft Allocations Report.

As noted previously, the O.P.A. addressed an imbalance of supply and demand within the Town of Minto to 2041 by eliminating the surplus within the Clifford Urban Settlement Area and the shortfall within the Palmerston Urban Settlement Area. Beyond 2041, the following observations have been made with respect to housing needs over the 2041 to 2051 period:

- Over the 2041 to 2051 period, the Clifford Urban Settlement Area is anticipated to have a total demand of 60 housing units which would have minimal impact on land needs beyond 2041. The additional housing required beyond 2041 could be addressed through a higher density assumption on remaining vacant lands or through intensification.

- The Palmerston Urban Settlement Area is anticipated to accommodate demand for 340 units over the 2041 to 2051 period which may have an impact on the land

needs beyond 2041 depending on the density assumption utilized on the vacant lands.

- While the forecast did not change for the Harriston Urban Settlement Area, it is anticipated that the Harriston Urban Settlement Area would accommodate 14 housing units annually, which would have minimal impact on residential land needs beyond 2041.

Figure 1
Town of Minto
Housing Allocation by Urban Settlement Area and Rural Area

October 2020 Draft

Area	Housing Units					
	2016	2021	2041	2051	2016-2051	Annual Housing Units, 2016 to 2051
Clifford	340	370	850	1,080	740	21
Harriston	780	830	1,140	1,280	500	14
Palmerston	1,100	1,160	1,530	1,700	600	17
Rural Area	1,010	1,030	1,280	1,380	370	11
Town of Minto	3,230	3,390	4,800	5,440	2,210	63

May not add up precisely by area due to rounding.

December 2020 Revision

Area	Housing Units					
	2016	2021	2041	2051	2016-2051	Annual Housing Units, 2016 to 2051
Clifford	340	370	500	560	220	6
Harriston	780	830	1,140	1,280	500	14
Palmerston	1,100	1,160	1,880	2,220	1,120	32
Rural Area	1,010	1,030	1,280	1,380	370	11
Town of Minto	3,230	3,390	4,800	5,440	2,210	63

May not add up precisely by area due to rounding.

Difference

Area	2016	2021	2041	2051
Clifford	0	0	-350	-520
Harriston	0	0	0	0
Palmerston	0	0	350	520
Rural Area	0	0	0	0
Town of Minto	0	0	0	0

May not add up precisely by area due to rounding.

Figure 2
Town of Minto
Population Allocation by Urban Settlement Area and Rural Area

October 2020 Draft

Area	Population						
	2016	2021	2041	2051	Annual Growth Rate, 2016 - 2051	2016-2051	Share (%)
Clifford	860	940	2,310	2,950	3.6%	2,090	33%
Harriston	2,130	2,230	3,120	3,500	1.4%	1,370	22%
Palmerston	2,810	2,950	4,070	4,550	1.4%	1,740	28%
Rural Area	3,130	3,160	3,910	4,200	0.8%	1,070	17%
Town of Minto	8,930	9,280	13,410	15,200	1.5%	6,270	100%

May not add up precisely by area due to rounding. Rounded to nearest 10.

December 2020 Revision

Area	Population						
	2016	2021	2041	2051	Annual Growth Rate, 2016 - 2051	2016-2051	Share (%)
Clifford	860	940	1,250	1,400	1.4%	540	9%
Harriston	2,130	2,230	3,120	3,500	1.4%	1,370	22%
Palmerston	2,810	2,950	5,130	6,100	2.2%	3,290	52%
Rural Area	3,130	3,160	3,910	4,200	0.8%	1,070	17%
Town of Minto	8,930	9,280	13,410	15,200	1.5%	6,270	100%

May not add up precisely by area due to rounding. Rounded to nearest 10.

Difference

Area	2016	2021	2041	2051
Clifford	0	0	-1,060	-1,550
Harriston	0	0	0	0
Palmerston	0	0	1,060	1,550
Rural Area	0	0	0	0
Town of Minto	0	0	0	0

May not add up precisely by area due to rounding.

Appendix 1:
Town of Minto
Population and Housing Allocation by Urban Settlement Area and Rural Area

Clifford

Year	Population (Excluding Census Undercount)	Population (Including Census Undercount)[1]	Households				Persons Per Unit (PPU)
			Low Density[2]	Medium Density[3]	High Density[4]	Total	
2016	832	857	275	25	40	340	2.45
2021	912	940	296	25	51	372	2.45
2026	985	1,015	307	35	62	404	2.44
2031	1,057	1,089	317	46	72	436	2.42
2036	1,133	1,166	327	56	83	468	2.42
2041	1,211	1,247	337	66	94	500	2.42
2046	1,284	1,322	347	77	105	532	2.41
2051	1,359	1,400	358	87	116	564	2.41
2016 - 2041	378	390	62	41	54	160	
2016 - 2051	527	543	83	62	76	224	

Harriston

Year	Population (Excluding Census Undercount)	Population (Including Census Undercount)[1]	Households				Persons Per Unit (PPU)
			Low Density[2]	Medium Density[3]	High Density[4]	Total	
2016	2,070	2,132	610	10	160	780	2.65
2021	2,165	2,230	625	33	169	826	2.62
2026	2,497	2,571	715	52	174	941	2.65
2031	2,671	2,751	753	73	182	1,008	2.65
2036	2,895	2,982	800	100	190	1,090	2.66
2041	3,027	3,117	813	130	198	1,141	2.65
2046	3,184	3,279	846	145	209	1,200	2.65
2051	3,401	3,502	886	177	220	1,283	2.65
2016 - 2041	957	986	203	120	38	361	
2016 - 2051	1,331	1,371	276	167	60	503	

Palmerston

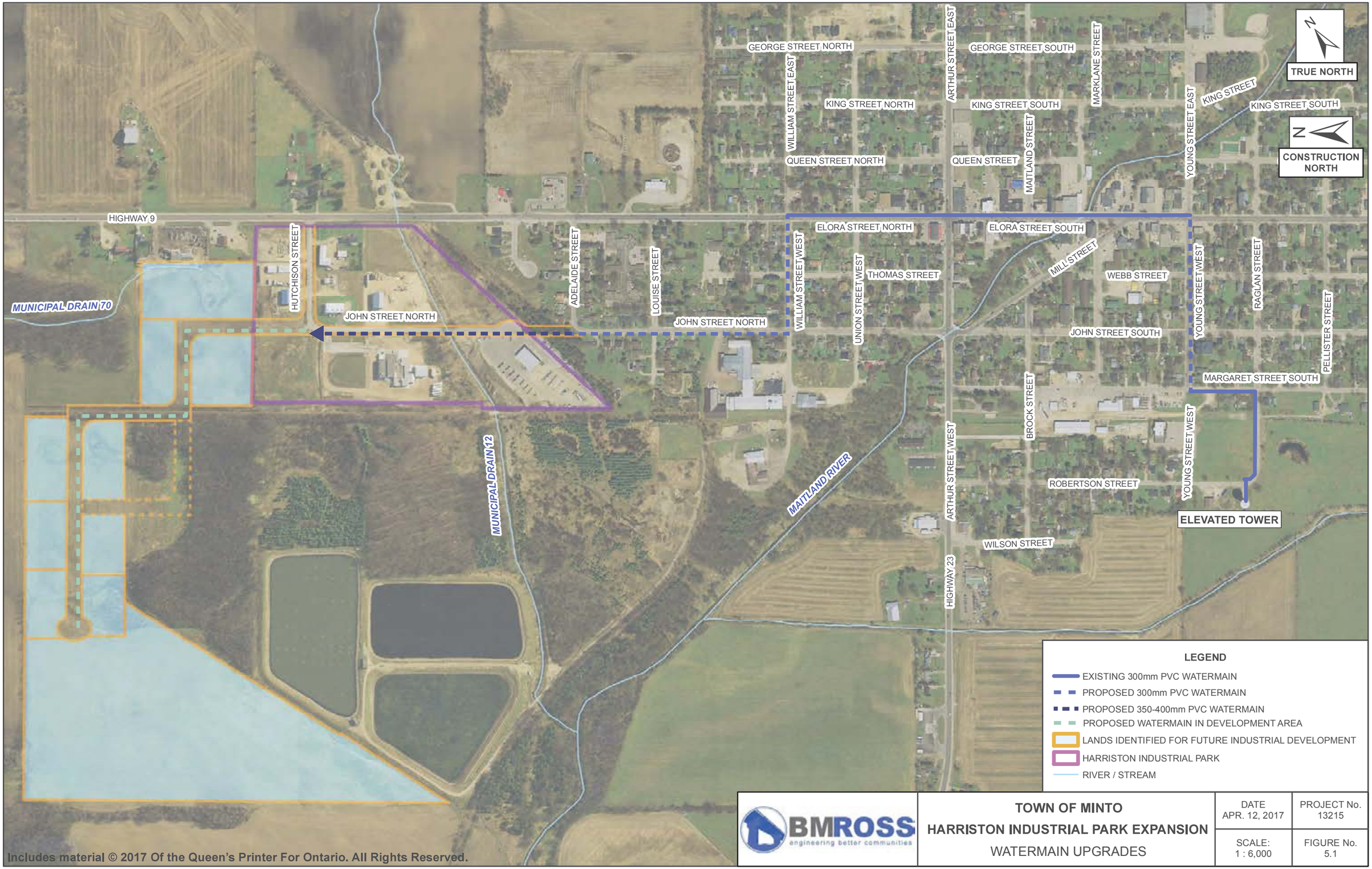
Year	Population (Excluding Census Undercount)	Population (Including Census Undercount)[1]	Households				Persons Per Unit (PPU)
			Low Density[2]	Medium Density[3]	High Density[4]	Total	
2016	2,732	2,814	865	70	165	1,100	2.48
2021	2,863	2,949	887	92	184	1,163	2.46
2026	3,318	3,417	1,020	110	184	1,315	2.52
2031	4,247	4,374	1,304	126	195	1,624	2.62
2036	4,784	4,926	1,452	149	204	1,805	2.65
2041	4,986	5,135	1,487	174	218	1,878	2.66
2046	5,433	5,595	1,589	219	235	2,044	2.66
2051	5,928	6,105	1,711	252	258	2,221	2.67
2016 - 2041	2,254	2,321	622	104	53	778	
2016 - 2051	3,196	3,291	846	182	93	1,121	

Rural

Year	Population (Excluding Census Undercount)	Population (Including Census Undercount)[1]	Households				Persons Per Unit (PPU)
			Low Density[2]	Medium Density[3]	High Density[4]	Total	
2016	3,037	3,127	1,005	0	0	1,005	3.02
2021	3,067	3,158	1,025	0	0	1,025	2.99
2026	3,487	3,590	1,168	0	0	1,168	2.99
2031	3,555	3,661	1,198	0	0	1,198	2.97
2036	3,741	3,852	1,262	0	0	1,261	2.97
2041	3,797	3,910	1,279	0	0	1,279	2.97
2046	3,922	4,039	1,325	0	0	1,325	2.96
2051	4,079	4,201	1,378	0	0	1,378	2.96
2016 - 2041	760	783	274	-	(0)	274	
2016 - 2051	1,043	1,074	373	0	0	373	

Appendix C

Figure 5.1 – Watermain Upgrades
Figure 5.2 – Sanitary Servicing Options
Screening Report for the Expansion of the Harriston Industrial Park Municipal Class Assessment
(B.M. Ross and Associates Ltd., 2017)



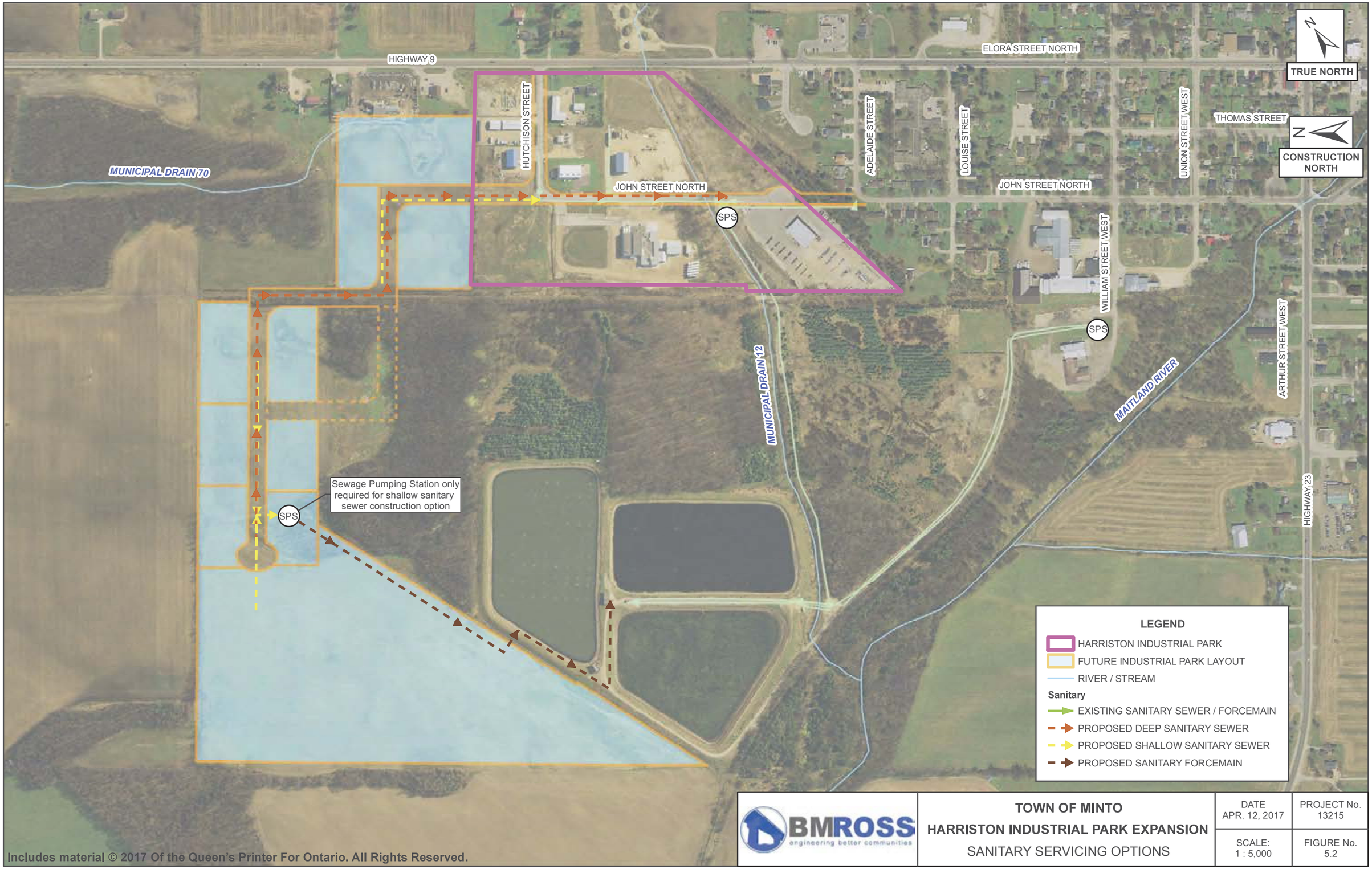
BMROSS engineering better communities

TOWN OF MINTO

HARRISTON INDUSTRIAL PARK EXPANSION

WATERMAIN UPGRADES

DATE	PROJECT No.
APR. 12, 2017	13215
SCALE: 1 : 6,000	FIGURE No. 5.1



BMROSS engineering better communities

TOWN OF MINTO

HARRISTON INDUSTRIAL PARK EXPANSION

SANITARY SERVICING OPTIONS

DATE	PROJECT No.
APR. 12, 2017	13215
SCALE: 1 : 5,000	FIGURE No. 5.2

Appendix D

Detailed Calculations for Population Growth and Projected Impacts on the Municipal Water and Sanitary Systems

(Revised) Population Growth Allocations for Town of Minto Urban Settlement Areas As per County of Wellington Growth Allocations Memo (Watson & Associates, December 14, 2020)

	Palmerston					Harriston					Clifford				
Planning Period (Year)	Serviced Population (Capita)[1]	ERUs	Capita per ERU	Target Growth (ERU/Yr)	Target Growth (Capita/Yr)	Serviced Population (Capita)[1]	ERUs	Capita per ERU	Target Growth (ERU/Yr)	Target Growth (Capita/Yr)	Serviced Population (Capita)[1]	ERUs	Capita Per ERU	Target Growth (ERU/Yr)	Target Growth (Capita/Yr)
2016	2,732	1,100	2.48	--	--	2,070	780	2.65	--	--	832	340	2.45	--	--
2021	2,863	1,163	2.46	12.6	26.2	2,165	826	2.62	9.2	19	912	372	2.45	6.4	16
2026	3,318	1,315	2.52	30.4	91	2,497	941	2.65	23	66.4	985	404	2.44	6.4	14.6
2031	4,247	1,624	2.62	61.8	185.8	2,671	1,008	2.65	13.4	34.8	1,057	436	2.42	6.4	14.4
2036	4,784	1,805	2.65	36.2	107.4	2,895	1,090	2.66	16.4	44.8	1,133	468	2.42	6.4	15.2
2041	4,986	1,878	2.65	14.6	40.4	3,027	1,141	2.65	10.2	26.4	1,211	500	2.42	6.4	15.6
2046	5,433	2,044	2.66	33.2	89.4	3,185	1,200	2.65	11.8	31.6	1,284	532	2.41	6.4	14.6
2051	5,928	2,221	2.67	35.4	99	3,401	1,283	2.65	16.6	43.2	1,359	564	2.41	6.4	15

Notes:

[1] Excluding 2016 Statistics Canada Census undercount.

Water and Sanitary Residential Connections/Services as Reported by Town of Minto Billing for Calendar Year 2020

	Palmerston Serviced Residences			Harriston Serviced Residences			Clifford Serviced Residences		
2020	Total Water Connections	Total Sewer Connections	Total Connections	Total Water Connections	Total Sewer Connections	Total Connections	Total Water Connections	Total Sewer Connections	Total Connections
Residences (ERU)	1,266	1,244	1,266	914	904	915	406	385	406
ICI	106	103	106	99	92	99	34	22	34
Population (Capita)	3,123	3,068	3,123	2,402	2,376	2,405	995	944	995

Adjusted Revised Population Growth Allocations Based on Existing Serviced Residential Units

	Palmerston			Harriston			Clifford		
Planning Period (Year)	Serviced Population (Capita)[1]	ERUs[2]	Capita per ERU)[3]	Serviced Population (Capita)[1]	ERUs[2]	Capita per ERU)[3]	Serviced Population (Capita)[1]	ERUs[2]	Capita per ERU)[3]
2020	3,123	1,266	2.466	2,405	915	2.628	995	406	2.451
2021	3,148	1,279	2.462	2,423	924	2.621	1,043	412	2.527
2026	3,610	1,431	2.523	2,758	1,039	2.654	1,117	444	2.512
2031	4,550	1,740	2.615	2,932	1,106	2.650	1,190	476	2.498
2036	5,091	1,921	2.650	3,156	1,188	2.656	1,267	508	2.491
2041	5,293	1,994	2.655	3,288	1,239	2.653	1,348	540	2.494
2046	5,741	2,160	2.658	3,446	1,298	2.654	1,423	572	2.485
2051	6,237	2,337	2.669	3,662	1,381	2.651	1,501	604	2.482

Notes:

[1] Serviced Population for years 2020 through 2051 calculated based on corrected/calculated ERU and the Capita/ERU as per Growth Allocations Memo.

[2] Equivalent residential units for years 2021 through 2051 are calculated based on existing (2020) serviced residential units (as reported by Town billing) and the target growth (ERU/year) as per County of Wellington Municipal Comprehensive Review.

[3] Capita per ERU as per Growth Allocations Memo, with Capita per ERU for 2020 interpolated based on the existing serviced ERU as reported by Town billing.

Estimated Anticipated Growth Per Planning Period Based on Assumed Maximum Potential:

Urban Area	Year	Development			Anticipated Increase in Serviced Population (Capita)[1]		Anticipated Increase in Serviced Households (ERU)[2]		Serviced Population (Capita)[4]	Serviced Households (ERU)[5]
		ID[3]	Type	Area (ha)	Per Development	Total	Per Development	Total	Total	Total
Palmerston	**2031**	C1-1	Commercial	1.0	63	**2,165**	24	**828**	**5,288**	**2,094**
		I1-1	Industrial	23.0	1,433		548			
		INST1-1	Institutional	1.4	86		33			
		R1-1	Residential	6.7	280		107			
		R2-1	Residential	2.2	92		35			
		R3-1	Residential	1.2	50		19			
		R4-1	Residential	2.7	112		43			
		R5-1	Residential	1.2	50		19			
	2041	I2-2	Industrial	15.9	990	**1,681**	373	**633**	**6,969**	**2,727**
		R6-2	Residential	7.2	305		115			
		R7-2	Residential	3.9	167		63			
		R8-2	Residential	5.1	218		82			
	2051	FD1-3	Future Development	48.6	3,024	**3,702**	1,133	**1,387**	**10,671**	**4,114**
		FD2-3	Future Development	4.0	248		93			
		FD3-3	Future Development	1.5	93		35			
		R9-3	Residential	2.0	85		32			
		R10-3	Residential	5.9	251		94			
Harriston	**2031**	FD1-1	Future Development	2.0	125	**1,306**	47	**493**	**3,711**	**1,408**
		I1-1	Industrial	1.8	111		42			
		R1-1	Residential	15.2	644		243			
		R2-1	Residential	0.7	29		11			
		R3-1	Residential	1.0	42		16			
		R4-1	Residential	8.4	355		134			
	2041	I2-2	Industrial	4.8	300	**300**	113	**113**	**4,011**	**1,521**
	2051	FD2-3	Future Development	4.0	249	**1,169**	94	**441**	**5,180**	**1,962**
		FD3-3	Future Development	0.5	32		12			
		FD4-3	Future Development	0.9	56		21			
		FD5-3	Future Development	1.2	74		28			
		FD6-3	Future Development	1.2	74		28			
		FD7-3	Future Development	1.2	74		28			
		FD8-3	Future Development	0.4	24		9			
		FD9-3	Future Development	0.3	19		7			
		FD10-3	Future Development	0.2	13		5			
		FD11-3	Future Development	2.4	148		56			
		I3-3	Industrial	5.5	342		129			
		R5-3	Residential	0.5	21		8			
		R6-3	Residential	1.0	42		16			
Clifford	**2031**	C1-1	Commercial	6.3	392	**774**	157	**310**	**1,769**	**716**
		C2-1	Commercial	5.9	367		147			
		R1-1	Residential	0.4	15		6			
	2041	R2-2	Residential	1.7	67	**564**	27	**226**	**2,333**	**942**
		R3-2	Residential	2.1	85		34			
		FD1-2	Future Development	6.6	412		165			
	2051	FD2-3	Future Development	0.5	32	**968**	13	**390**	**3,301**	**1,332**
		FD3-3	Future Development	6.1	380		153			
		FD5-3	Future Development	3.0	186		75			
		FD6-3	Future Development	2.0	124		50			
		FD4-3	Future Development	1.0	62		25			
		R4-3	Residential	3.1	124		50			
		R5-3	Residential	1.5	60		24			

Notes:

[1] Equivalent residential units (ERU) for residential developments are based upon 16 ERU/ha, as per County of Wellington Official Plan for Greenfield Housing.

Future Development assumed to represent Industrial/Commercial/Institutional (ICI) Development.

Calculated ERU for ICI Development is based on a sewage loading/water demand allowance of 28m3/(ha-d) and 0.450 m3/(capita-d) MECP Design Guidelines for Sewage Works (2008) and MECP Design Guidelines for Drinking Water Systems (2008), since actual sewage flow and water demands are unknown. Population density is consistent with the County's Growth Allocation Memo (Watson & Associates, December 14, 2020) for the planning period. Refer to table below for calculations of ERU/ha.

Urban Area	Planning Period	Capita/ERU	ERU/ha by Type of Development				
			Commercial	Industrial	Institutional	Future Development	Residential
Palmerston	**2031**	2.62	24	24	24	24	16
	2041	2.65	23	23	23	23	16
	2051	2.67	23	23	23	23	16
Harriston	**2031**	2.65	23	23	23	23	16
	2041	2.65	23	23	23	23	16
	2051	2.65	23	23	23	23	16
Clifford	**2031**	2.50	25	25	25	25	16
	2041	2.49	25	25	25	25	16
	2051	2.48	25	25	25	25	16

[2] Equivalent residential population is consistent with the County's Growth Allocation Memo (Watson & Associates, December 14, 2020) for the planning period.

[3] Refer to Development Scenario Figures for Palmerston (P-D), Harriston (H-D) and Clifford (C-D) for locations of anticipated developments.

[4] Estimated based on Town records for 2020 serviced population (ERU).

[5] Estimated based on Town records for 2020 serviced population (capita).

Table 2.1 - Minto Existing Sanitary Loading (2020)				
Description	**Units**	**Palmerston**	**Harriston**	**Clifford**
Design Capacity of Sewage Treatment Works	**m^3/d**	**2,010**	**2,378**	**500**
Average Daily Flow (Sewage)	**m^3/d**	1,243	1,500	244
Hydraulic Reserve Capacity (Surplus Treatment Capacity)	**m^3/d**	767	878	256
Existing Connected Population	**capita**	3,068	2,376	944
Existing Service Connections	**ERU**	1,244	904	385
Average Daily (Sewage) Flow per Existing Capita	**m^3/capita/d**	0.405	0.631	0.258
Average New Development Per Capita Flow	**m^3/capita/d**	0.405	0.450	0.258

		Table 2.2 - Palmerston Future Sanitary Reserve Capacity							Table 2.3 - Harriston Future Sanitary Reserve Capacity										Table 2.4 - Clifford Future Sanitary Reserve Capacity						
Growth Projection	**Planning Period (Year)**	**Serviced Population**	**ERUs**	**ADF (m^3/day)**	**Reserve Capacity (m^3/day)**	**Capita per ERU**	**ADF (m3/d/capita)**	**ADF (m3/d/ERU)**	**Serviced Population**	**ERUs**	**ADF (m^3/day)**	**Reserve Capacity (m^3/day)**	**Capita per ERU**	**Existing ADF (m^3/d/capita)**	**Future ADF (m^3/d/capita)**	**Weighted Average ADF (m^3/d/capita)**	**Existing ADF (m^3/d/ERU)**	**Future ADF (m^3/d/ERU)**	**Serviced Population**	**ERUs**	**ADF (m^3/day)**	**Reserve Capacity (m^3/day)**	**Capita per ERU**	**ADF (m3/d/capita)**	**ADF (m3/d/ERU)**
As Per County Growth Allocations Memo	2020 (Existing)	3,068	1,244	1,243	767	2.47	0.405	1.00	2,376	904	1,500	878	2.63	0.631	0.450	0.631	1.659	1.183	944	385	244	256	2.45	0.258	0.63
	2021	3,148	1,279	1,275	735	2.46	0.405	1.00	2,423	924	1,521	857	2.62	0.631	0.450	0.627	1.654	1.180	1,043	412	270	230	2.53	0.258	0.65
	2026	3,610	1,431	1,463	547	2.52	0.405	1.02	2,758	1,039	1,672	706	2.65	0.631	0.450	0.606	1.675	1.194	1,117	444	289	211	2.51	0.258	0.65
	2031	4,550	1,740	1,844	166	2.62	0.405	1.06	2,932	1,106	1,750	628	2.65	0.631	0.450	0.597	1.672	1.193	1,190	476	308	192	2.50	0.258	0.65
	2036	5,091	1,921	2,063	-53	2.65	0.405	1.07	3,156	1,188	1,851	527	2.66	0.631	0.450	0.586	1.676	1.195	1,267	508	327	173	2.49	0.258	0.64
	2041	5,293	1,994	2,145	-135	2.65	0.405	1.08	3,288	1,239	1,910	468	2.65	0.631	0.450	0.581	1.674	1.194	1,348	540	348	152	2.49	0.258	0.64
	2046	5,741	2,160	2,326	-316	2.66	0.405	1.08	3,446	1,298	1,982	397	2.65	0.631	0.450	0.575	1.675	1.195	1,423	572	368	132	2.49	0.258	0.64
	2051	6,237	2,337	2,527	-517	2.67	0.405	1.08	3,662	1,381	2,079	299	2.65	0.631	0.450	0.567	1.673	1.193	1,501	604	388	112	2.48	0.258	0.64

Table 3.1 - Minto Existing Water Supply & Storage (2020)									
		Palmerston		Harriston			Clifford		
Well(s)	**Unit**	**P1/P2**	**P3/P4**	**H1**	**H3**	**H2**	**C1**	**C3**	**C4**
PTTW Capacity	**m^3/d**	1,964	2,291	979	1,634	2,065	1,310	655	1,309
Feasible Capacity (Harriston Only)	**m^3/d**			1,728		2,065			
System Capacity	**m^3/d**	4,255		3,793			2,619		
Firm Capacity	**m^3/d**	**1,964**		**1,728**			**1,309**		
System Storage	**m^3**	2,080		1,915			1,140		

Table 3.2 - Minto Existing Water Demand (2020)				
Description	**Unit**	**Palmerston**	**Harriston**	**Clifford**
Firm Capacity	**m^3/d**	1,964	1,728	1,309
Average MDD (2018 -2020)	**m^3/d**	1322.3	1460.6	431.1
Reserve Capacity	**m^3/d**	641.7	267.4	877.9
Existing Connected Population	**capita**	3,123	2,402	995
Existing Service Connections	**ERU**	1,266	914	406
Existing MDD	**m^3/capita/d**	0.423	0.608	0.433
New MDD	**m^3/capita/d**	0.423	0.450	0.433

Table 3.3 - Palmerston
Future Water Reserve Capacity

Growth Projection	Planning Period (Year)	Serviced Population	ERUs	MDD (m^3/day)	Firm Reserve Capacity (m^3/day)	Source Reserve Capacity (m^3/day)	Average MDD (m3/d/capita)	Capita per ERU	MDD (m3/d/ERU)
As Per County Growth Allocations Memo	2020 (Existing)	3,123	1,266	1,322	642	2,933	0.423	2.47	1.044
	2021	3,148	1,279	1,333	631	2,922	0.423	2.46	1.042
	2026	3,610	1,431	1,528	436	2,727	0.423	2.52	1.068
	2031	4,550	1,740	1,927	37	2,328	0.423	2.62	1.107
	2036	5,091	1,921	2,156	-192	2,099	0.423	2.65	1.122
	2041	5,293	1,994	2,241	-277	2,014	0.423	2.65	1.124
	2046	5,741	2,160	2,431	-467	1,824	0.423	2.66	1.126
	2051	6,237	2,337	2,641	-677	1,614	0.423	2.67	1.130

Table 3.4 - Harriston
Future Water Reserve Capacity

Growth Projection	Planning Period (Year)	Serviced Population	ERUs	MDD (m^3/day)	Firm Reserve Capacity (m^3/day)	Source Reserve Capacity (m^3/day)	Existing MDD (m3/d/capita)	Future MDD (m3/d/capita)	Weighted Average MDD (m3/d/capita)	Capita per ERU	Existing MDD (m3/d/ERU)	Future MDD (m3/d/ERU)
As Per County Growth Allocations Memo	2020 (Existing)	2,402	914	1,461	267	2,332	0.608	0.450	0.608	2.63	1.598	1.183
	2021	2,423	924	1,470	258	2,323	0.608	0.450	0.607	2.62	1.594	1.180
	2026	2,758	1,039	1,621	107	2,172	0.608	0.450	0.588	2.65	1.614	1.194
	2031	2,932	1,106	1,699	29	2,094	0.608	0.450	0.580	2.65	1.612	1.193
	2036	3,156	1,188	1,800	-72	1,993	0.608	0.450	0.570	2.66	1.615	1.195
	2041	3,288	1,239	1,859	-131	1,934	0.608	0.450	0.565	2.65	1.613	1.194
	2046	3,446	1,298	1,930	-202	1,863	0.608	0.450	0.560	2.65	1.614	1.195
	2051	3,662	1,381	2,028	-300	1,765	0.608	0.450	0.554	2.65	1.612	1.193

Table 3.5 - Clifford
Future Water Reserve Capacity

Growth Projection	Planning Period (Year)	Serviced Population	ERUs	MDD (m^3/day)	Firm Reserve Capacity (m^3/day)	Source Reserve Capacity (m^3/day)	Average MDD (m3/d/capita)	Capita per ERU	MDD (m3/d/ERU)
As Per County Growth Allocations Memo	2020 (Existing)	995	406	431	878	2,188	0.433	2.45	1.062
	2021	1,043	412	452	857	2,167	0.433	2.53	1.096
	2026	1,117	444	484	825	2,135	0.433	2.51	1.089
	2031	1,190	476	516	793	2,103	0.433	2.50	1.082
	2036	1,267	508	549	760	2,070	0.433	2.49	1.080
	2041	1,348	540	584	725	2,035	0.433	2.49	1.081
	2046	1,423	572	617	692	2,002	0.433	2.49	1.077
	2051	1,501	604	650	659	1,969	0.433	2.48	1.076

Palmerston Water System Summary of Metered Consumption and SCADA Total						
	Total Metered/Billed Residential (m^3)	Total Metered/Billed ICI (m^3)	Total SCADA (Total Volume Pumped from Wells) (m^3)	% of Total Demand that is Residential	% of Total Demand that is ICI	% of Total Demand that is Unaccounted
2018	127,413.74	96,250.49	299,540.97	42.54%	32.13%	25.33%
2019	129,622.39	99,527.14	290,301.64	44.65%	34.28%	21.07%
2020	136,728.11	88,101.37	324,000.09	42.20%	27.19%	30.61%
Total	**393,764.24**	**283,879.00**	**913,842.70**	**43.09%**	**31.06%**	**25.85%**

Harriston Water System Summary of Metered Consumption and SCADA Total						
	Total Metered/Billed Residential (m^3)	Total Metered/Billed ICI (m^3)	Total SCADA (Total Volume Pumped from Wells) (m^3)	% of Total Demand that is Residential	% of Total Demand that is ICI	% of Total Demand that is Unaccounted
2018	100,367.17	161,427.19	297,565.71	33.73%	54.25%	12.02%
2019	102,229.87	157,318.26	307,361.49	33.26%	51.18%	15.56%
2020	106,985.49	150,574.31	310,332.38	34.47%	48.52%	17.01%
Total	**309,582.53**	**469,319.76**	**915,259.59**	**33.82%**	**51.28%**	**14.90%**

Clifford Water System Summary of Metered Consumption and SCADA Total						
Year	Total Metered/Billed Residential (m^3)	Total Metered/Billed ICI (m^3)	Total SCADA (Total Volume Pumped from Wells) (m^3)	% of Total Demand that is Residential	% of Total Demand that is ICI	% of Total Demand that is Unaccounted
2018	42,621.60	15,816.44	77,357.87	55.10%	20.45%	24.46%
2019	48,435.10	17,151.94	79,578.95	60.86%	21.55%	17.58%
2020	48,530.20	13,858.05	79,152.84	61.31%	17.51%	21.18%
Total	**139,586.90**	**46,826.43**	**236,089.66**	**59.12%**	**19.83%**	**21.04%**

Table 4.1 - Palmerston
Fire Storage Assessment

Growth Projection	Planning Period	Serviced Population	Duration	Fire Flow (L/s)	A (m3)	B (m^3)	C (m^3)	Required Total (m^3)	Existing Total (m^3)	Surplus (Deficit) (m^3)
As Per County Growth Allocations Memo	2020 (Existing)	3,123	2	110	792	331	281	1,403	2,080	677
	2021	3,148	2	110	792	333	281	1,407	2,080	673
	2026	3,610	2	119	857	382	310	1,549	2,080	531
	2031	4,550	2	134	965	482	362	1,808	2,080	272
	2036	5,091	2	141	1,015	539	389	1,943	2,080	137
	2041	5,293	2	144	1,037	560	399	1,996	2,080	84
	2046	5,741	2	150	1,080	608	422	2,110	2,080	-30
	2051	6,237	3	156	1,685	660	586	2,931	2,080	-851

Table 4.2 - Harriston
Fire Storage Assessment

Growth Projection	Planning Period	Serviced Population	Duration	Fire Flow (L/s)	A (m3)	B (m^3)	C (m^3)	Required Total (m^3)	Existing Total (m^3)	Surplus (Deficit) (m^3)
As Per County Growth Allocations Memo	2020 (Existing)	2,405	2	96	691	365	264	1,320	1,915	595
	2021	2,423	2	97	698	368	266	1,332	1,915	583
	2026	2,758	2	103	742	405	287	1,434	1,915	482
	2031	2,932	2	106	763	425	297	1,485	1,915	430
	2036	3,156	2	111	799	450	312	1,561	1,915	354
	2041	3,288	2	113	814	465	320	1,598	1,915	317
	2046	3,446	2	116	835	483	329	1,647	1,915	268
	2051	3,662	2	119	857	507	341	1,705	1,915	210

Table 4.3 - Clifford Fire Storage Assessment										
Growth Projection	**Planning Period**	**Serviced Population**	**Duration**	**Fire Flow (L/s)**	**A (m3)**	**B (m^3)**	**C (m^3)**	**Required Total (m^3)**	**Existing Total (m^3)**	**Surplus (Deficit) (m^3)**
As Per County Growth Allocations Memo	2020 (Existing)	995	2	65	468	108	144	720	1,140	420
	2021	1,043	2	66	475	113	147	735	1,140	405
	2026	1,117	2	68	490	121	153	763	1,140	377
	2031	1,190	2	69	497	129	156	782	1,140	358
	2036	1,267	2	71	511	137	162	811	1,140	329
	2041	1,348	2	73	526	146	168	840	1,140	300
	2046	1,423	2	75	540	154	174	868	1,140	272
	2051	1,501	2	77	554	163	179	896	1,140	244

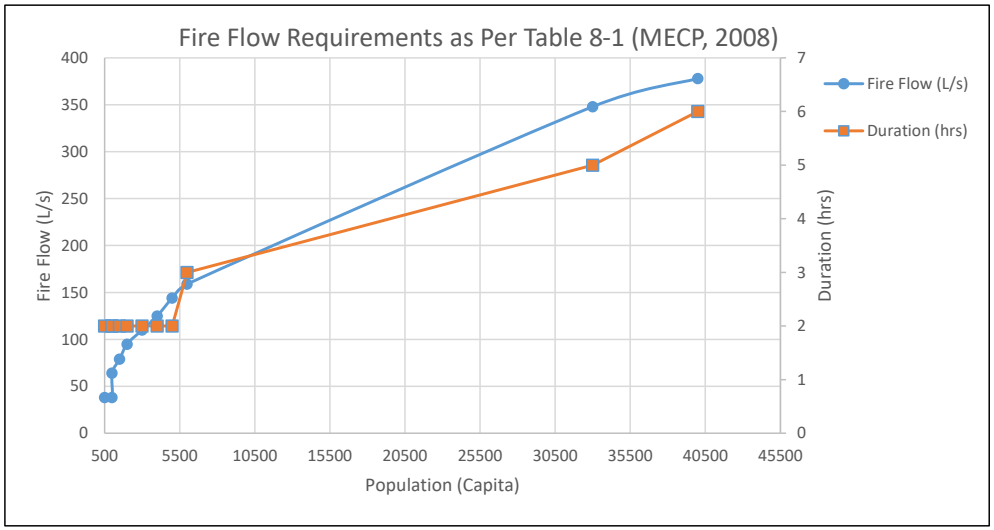


Table 8-1: Fire Flow Requirements

EQUIVALENT POPULATION[1]	SUGGESTED FIRE FLOW (L/s)	DURATION (HOURS)
500 – 1 000	38 (10 ft/s)	2
1 000	64 (17 ft/s)	2
1 500	79 (21 ft/s)	2
2 000	95 (25 ft/s)	2
3 000	110 (29 ft/s)	2
4 000	125 (33 ft/s)	2
5 000	144 (38 ft/s)	2
6 000	159 (42 ft/s)	3
10 000	189 (50 ft/s)	3
13 000	220 (58 ft/s)	3
17 000	250 (66 ft/s)	4
27 000	318 (84 ft/s)	5
33 000	348 (92 ft/s)	5
40 000	378 (100 ft/s)	6

Note [1]: When determining the fire flow allowance for commercial or industrial areas, it is recommended that the area occupied by the commercial/industrial complex be considered at an equivalent population density to the surrounding residential lands.

Source: MECP Design Guidelines for Drinking Water Systems (2008).

Appendix E

Palmerston Reserve Capacity Calculations

TABLE 3.1

SUMMARY OF RESERVE CAPACITY CALCULATIONS (2021)

PALMERSTON DRINKING WATER SYSTEM

TOWN OF MINTO, ONTARIO

Item	Description	Units	Value	Note
(1)	Design (FIRM) Capacity of the Well Supplies [(a)]	m^3/d	1,964	Refer to note (a)
(2)	Average Maximum Day Flow (2018 - 2020)	m^3/d	1,322	Refer to note (c) and Table 3.3
(3)	Reserve Capacity	m^3/d	642	(1)-(2)
(4)	Existing Connected Population[(e)]	persons	3,123	(5)*(8)
(5)	Serviced Households/Residential Connections [(b)]	ERU	1,266	Refer to Table 3.6
(6)	Maximum Day Per Capita Flow	$m^3/d/person$	0.423	(2)/(4)
(7)	Additional Population that can be Served [(d)]	persons	1,516	(3)/(6)
(8)	Existing Persons Per Equivalent Residential Unit	persons/ERU	2.47	See Note (e)
(9)	Additional Units that can be Served [(d)]	ERU	614	(7)/(8)
(10)	Number of Unconnected Approved/Committed Units	ERU	153	Refer to Table 3.5
(11)	Uncommitted Hydraulic Reserve Capacity (Water)	ERU	461	(9)-(10)
(12)	System Capacity Used Based on Max Day	%	67	(3)/(1)

(a) Firm capacity is equivalent to the total system capacity while the largest well is out of service.
The Palmerston Drinking Water System currently operates under MDWL 106-103, DWWP 106-203, and PTTW #8374-8HSPD5.
As per the MDWL for Palmerston, the rated capacity (m^3/day) for the drinking water system is as follows: Wells 1 & 2 = 1,964, Wells 3 & 4 = 2,291.
Assuming the wells can operate at their rated capacity, Firm Capacity with Wells 3 & 4 out of service is equivalent to Wells 1 & 2 = 1,964 m^3/day.

(b) Serviced households/residential connections as reported by Town Billing.

(c) Based on the average of the annual maximum day flow for 2018, 2019 and 2020.

(d) Additional population and units that can be served without consideration of unconnected approved/committed units.

(e) As per County of Wellington Municipal Comprehensive Review Growth Allocations Memo (Watson & Associates, December 14, 2020).

TABLE 3.2
SUMMARY OF RESERVE CAPACITY CALCULATIONS (2021)
PALMERSTON SEWAGE TREATMENT WORKS
TOWN OF MINTO, ONTARIO

Item	Description	Units	Value	Note
(1)	Design Capacity of Sewage Treatment Facility	m^3/d	2,010	As per MECP CoA No. 3-0466-85-876
(2)	Average Daily Flow (Sewage) (Average for 2018 - 2020) [(a)]	m^3/d	1,243	Refer to Table 3.4
(3)	Reserve Capacity (Surplus Treatment Capacity)	m^3/d	767	(1)-(2)
(4)	Existing Connected Population[(f)]	persons	3,068	(5)*(8)
(5)	Serviced Households[(b)]	ERU	1,244	Refer to Table 3.6
(6)	Average Daily (Sewage) Flow per Capita [(c)]	m^3/person/d	0.405	(2)/(4)
(7)	Additional Population that can be Served [(d)]	persons	1,893	(3)/(6)
(8)	Existing Persons Per Equivalent Residential Unit (ERU)	persons/ERU	2.47	See Note (f)
(9)	Additional ERUs that can be Served [(d)]	ERU	768	(7)/(8)
(10)	Number of Unconnected Approved/Committed Units	ERU	153	Refer to Table 3.5
(11)	Uncommitted Hydraulic Reserve Capacity (Sewage) [(e)]	ERU	615	(9)-(10)

Notes:

[(a)] Average daily flow is based on the annual total flow from all sewage sources (i.e., all types of land uses [residential, commercial, industrial, institutional, etc] and other flow sources [i.e., infiltration]) divided by the the number of days in the year. Average daily sewage flows as reported by Town of Minto.

[(b)] Serviced households/residential connections as reported by Town Billing.

[(c)] Non-residential sewage flow sources are included in the measured average daily sewage flow, which will result in a more conservative evaluation of the uncommitted hydraulic reserve capacity.

[(d)] Additional population and units that can be served without consideration of unconnected approved/committed units.

[(e)] Uncommitted reserve capacity does not consider organic reserve capacity or other performance characteristics of the sewage treatment works.

[(e)] As per County of Wellington Municipal Comprehensive Review Growth Allocations Memo (Watson & Associates, December 14, 2020).

TABLE 3.3
SUMMARY OF MAXIMUM DAY FLOW
PALMERSTON DRINKING WATER SYSTEM
TOWN OF MINTO, ONTARIO

	Maximum Day Flow (m^3/day)			
	Calendar Year			
Month	**2018 [1]**	**2019 [1]**	**2020 [1]**	
January	948.1	844.2	938.1	
February	1,041.0	936.2	888.2	
March	1,074.5	893.0	1,021.1	
April	941.4	952.5	917.3	
May	1,021.4	1,163.1	968.3	
June	**1,111.1**	1,000.0	1,407.1	
July	1,003.4	1,016.2	1,207.0	
August	867.4	1,217.2	1,242.3	
September	938.8	1,018.0	**1,553.6**	
October	954.2	1,031.1	1,109.4	
November	848.5	**1,302.2**	1,458.9	**3-Year Average Maximum**
December	840.5	993.2	1,357.3	**Day Flow**
Max Maximum Day Flow	**1,111.1**	**1,302.2**	**1,553.6**	**1,322.3**

Notes:

[1] Drinking Water System data as reported by Town of Minto and manipulated by TESL to exclude anamolous data not representative of typical consumption such as watermain breaks, water tower and well maintenance, watermain and hydrant flushing, equipment malfunctions, etc.

TABLE 3.4
SUMMARY OF RAW SEWAGE FLOWS
PALMERSTON SEWAGE TREATMENT FACILITY
TOWN OF MINTO, ONTARIO

Palmerston Sewage Treatment Facility [(1)]

		2018												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m3	16,278	49,348	36,861	73,299	40,029	24,985	21,979	26,950	22,465	23,966	32,189	40,290	408,639
Avg. day flow	m3/d	1,493	1,762	1,189	2,443	1,291	833	709	869	749	773	1,073	1,300	1,207
Max day flow	m3/d	4,204	8,112	1,704	4,480	1,853	1,110	907	2,521	905	1,495	1,618	2,301	8,112

		2019												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m3	38,972	40,512	59,771	67,251	51,825	30,173	23,416	21,420	20,250	25,058	32,092	35,770	446,510
Avg. day flow	m3/d	1,257	1,447	1,928	2,242	1,672	1,006	755	691	675	808	1,070	1,154	1,225
Max day flow	m3/d	1,973	3,516	4,588	5,513	2,691	1,364	926	862	872	2,167	2,075	2,106	5,513

		2020												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m3	62,157	30,464	81,620	41,301	37,854	29,875	25,844	32,141	26,262	30,705	34,911	42,544	475,678
Avg. day flow	m3/d	2,005	1,050	2,633	1,377	1,221	996	834	1,037	875	990	1,164	1,372	1,296
Max day flow	m3/d	10,187	1,328	8,432	2,337	2,284	1,482	1,121	2,438	1,517	1,376	1,782	2,741	10,187

COA # 3-0466-85-876

2,010 **Design Capacity (m^3/day)**

7,110 **Peak Capacity (m^3/day)**

Summary

443,609 **Annual Total Average (m^3)**

1,243 **Average Daily Flow (m^3/d)**

10,187 **Max. Daily Flow (m^3/d)**

Notes:

(1) Wastewater treatment data as reported by Town of Minto. This data is assumed to include all sewage sources (i.e., all types of land uses [i.e., residential, commercial, industrial, institutional, etc] and other flow sources [i.e., infiltration]).

TABLE 3.5
SUMMARY OF COMMITTED DEVELOPMENT (2021)
PALMERSTON
TOWN OF MINTO, ONTARIO

	Planned Development Information [1]			
Line ID	Name	Total # of Units Approved	Total Units Developed (as of December 31, 2020)	Units Remaining [2] (Committed, Undeveloped)
1	Harj Gill Subdivision	**91**	**25**	**66**
2	Dan Sinclair Subdivision	**28**	**4**	**24**
3	Clark Heinmiller Subdivision	**38**	**0**	**38**
5	Available Vacant Serviced and/or Infilling Lots	**30**	**5**	**25**
	TOTAL (sum of 1 through 4)	**187**	**34**	**153**

Notes

(1) Serviced households/residential connections as reported by Town of Minto.
Note that the Available Vacant Serviced and/or Infilling Lots may not be representative of the maximum development potential (in terms of total units) for the property. For the purpose of hydraulic reserve capacity calculations, the totals provided in this table should be considered "draft estimates" to be reviewed and confirmed by the Town of Minto.

(2) Total Commited Development = Total Planned Development - Units Developed (to date)

TABLE 3.6
SUMMARY OF WATER AND SEWER CUSTOMERS (2021)
PALMERSTON
TOWN OF MINTO, ONTARIO

	Palmerston [1]
	# of Connections
RESIDENTIAL	
Homes	967
Apartments (Total Units)	299
Total Residential Connections (Water and Sewer)	**1,266**
Residential Connections With Water Only, No Sewer	22
Residential Connections With Sewer Only, No Water	0
Total Residential Water Connections	**1,266**
Total Residential Sewer Connections	**1,244**
INDUSTRIAL, COMMERCIAL, INSTITUTIONAL (ICI)	
Municipal	14
Car Wash	2
Farms	2
Feed Mill	1
Garage	6
Businesses	62
Manufacturing	6
Restaurants & Hotels	9
Rest Homes & Boarding Houses	1
School	2
Hospital	1
Total ICI Connections (Water and Sewer)	**106**
ICI Connections With Water Only, No Sewer	3
ICI Connections with Sewer Only, No Water	0
Total ICI Water Connections	**106**
Total ICI Sewer Connections	**103**
Total Water Customers: Residential + ICI	**1,372**
Total Sewer Customers: Residential + ICI	**1,347**

Notes:
[1] Serviced connections as reported by Town Billing.

Appendix F

Letter Report Re: Harriston Well 1 and 3 Pumping Test (R.J. Burnside & Associates Ltd., Sept. 2021)

R.J. Burnside & Associates Limited 292 Speedvale Avenue West Unit 20 Guelph ON N1H 1C4 CANADA
telephone (519) 823-4995 **fax** (519) 836-5477 **web** www.rjburnside.com

BURNSIDE
[THE DIFFERENCE IS OUR PEOPLE]

September 1, 2021

Via: Email

Mr. Todd Rogers, Water Services Manager
Water Foreman
Town of Minto
5941 Highway 89
Harriston, ON N0G 1Z0

Dear Mr. Rogers:

Re: Harriston Well 1 and 3 Pumping Test
Project No.: 300053695.0000

The Town of Minto operates the Harriston municipal water supply system. The source of water for the system is three groundwater supply wells designated as Well1, Well 2 and Well 3. (Figure 1) Well 1 and Well 3 are located in close proximity to each other and are 50 m apart. The taking of water from the wells is controlled by Permit to Take Water (PTTW) 3012-A8QRPF. The PTTW allows Wells 1 and 3 to pump at maximum rates of 680 L/min. (11.3 L/s) and 1,135 L/min. (18.9 L/s) respectively. According to the PTTW this would allow for a total pumping of 30.2 L/s from Wells 1 and 3 operating together

Firm capacity for a water supply system is defined as the available supply with the largest well out of service. The firm capacity for Harriston is based on the capacity of Wells 1 and 3 when Well 2 (largest well) is out of service. As noted above the firm capacity based on the PTTW would theoretically be 30.2 L/s.

The original testing completed in 1998 when Well 3 was constructed, included a short period of 2 hours where Well 1 and 3 were operated together at a combined flow rate of 26.8 L/s. The report on the test (IWS, 1998) noted that Wells 1 and 3 had a long term combined capacity of 14.4 L/s and that the two wells could be operated together for a maximum of 30 days at 24.6 L/s and maximum day of 30.4 L/s due to rapidly declining water levels and dewatering of a shallow bedrock fracture system. Based on this previous advise Town of Minto operations staff have only operated Wells 1 and 3 separately to supply the water system.

In an effort to confirm the previous interpretation of well capacity and firm capacity R.J Burnside & Associates Limited (Burnside) was retained to complete a pumping test of Wells 1 and 3 to document the response of combined pumping of Wells 1 and 3.

The pumping test was designed to confirm the actual system firm capacity and the period that the PTTW combined flow from Wells 1 and 3 could be sustained. Burnside worked with Town of Minto staff to complete testing of Wells 1 and 3 in June 2021 using the existing permanent pumps while pumping to waste at a total rate of 26.4 L/s. During the pumping test, Burnside documented the water level and water quality response to the combined high capacity pumping as envisioned by the PTTW rates. This letter summarizes the results of the testing that was completed at Wells 1 and 3 in June 2021.

Background

Harriston Well 1 is a 62 m deep bedrock well that was constructed in the early 1930's and was the primary source of water for Harriston for 60 years. Well 3 was drilled in 1998 to provide a second source of water from the same bedrock aquifer. A liner was installed in Well 1 to 15.4 m in 2004 to secure this water source.

Figure 2 shows Wells 1 and 3 and the depths that water is drawn from the bedrock. In general, there are two primary depths that produce water from the bedrock for both wells. A shallow bedrock interval at about 16 m and a deep interval at 44 m. The static water level in the wells is about 12 m below grade and the typical pumping water level of about 20 m results in some cascading of water from the shallow bedrock at 16 m into the wells.

2021 Well Maintenance

Well 1 and Well 3 were serviced in the spring of 2021 by Well Initiatives Limited (WIL). The servicing included variable rate testing of the wells using the existing pumps and removal of the pumps for servicing. This maintenance was performed to ensure that both wells were in good working order prior to the testing. The step testing conducted after the servicing indicated that the wells were producing water at a similar efficiency as in previous tests.

June 2021 Well 1 and 3 Pumping Test

On June 14, 2021, the monitoring network for the pumping test was established and Wells 1 and 3 were taken out of service to allow the aquifer to recover for 24 hours prior to the start of the testing and for water levels to reach static conditions. In addition to the monitoring of water levels at Wells 1 and 3, water level monitoring was completed before, during and after the pumping test at four locations:

- The multi-level monitoring well (MI-MW3-00) located 12 m from Well 3;
- A private supply well at the Clyne Farm, approximately 350m to the north of Well 3;
- A private supply well at 9344 Blind Line, approximately 820m to the north of Well 3; and
- A private supply well at North Wellington Co-Operative Services, located approximately 550 m to the south west of Well 1.

The pumping test was conducted using the existing pumping equipment at Well 1 and Well 3. For the test period, water pumped from each well was routed through the supply pipe and flow control valves before being routed to waste at the existing pump house. No water was discharged to the distribution system during the testing period. The pumping test was started on June 15, 2021 at 10:00 am by turning on Well 3 at a rate of 16.8 L/s. The initial drawdown at Well 3 was about 2 m as the local aquifer began to drawdown at a rate of 0.6 m/log cycle for about 20 minutes. After 20 minutes of pumping the rate of drawdown started increasing. Well 1 was turned on after 100 minutes at a flow rate of 9.6 L/s and the rate of drawdown increased to about 11 m per log cycle in both wells for the next 24 hours. The combined flow rate for the period from 100 minutes to the end of the test was approximately 26.4 L/s.

Approximately 25 hours after the start of pumping, the water levels in Well 1 and 3 appeared to stop declining, i.e. achieve a near steady pumping level. The pumping rate during this period was more difficult to maintain at a constant rate and pumping rate adjustments were required operations staff. The effects of the pumping rate adjustments were observed as minor

fluctuations in the water levels. We note that after the pumping test was shut down the flow control valves in the main pump house were found to be partially blocked with sediment produced during the pumping test and that likely caused the flow rate variations noted in the latter parts of the test.

Air bubbles were observed in water pumped from the well during the final stages of the test indicating that water was cascading from the shallow bedrock water producing fracture in the bedrock down into the deeper zones where the pumps are set. The cascading conditions likely contributed to the production of the sediment noted above.

The pumping stopped at both wells after 1770 minutes (29.5 hours) and monitoring of water levels continued for the recovery period. Water levels recovered in Well 3, reaching 50 % recovery after 10 minutes and 70% recovery after 1.5 hours. Well 1 reached 50% recovery after 30 minutes and 70% recovery after about 3 hours. Hydrographs of water level data are attached and show the response due to testing in linear and semi logarithmic format for the test period. The hydrographs also include a period of about a week after the test that shows the typical response to pumping at Well 3 and Well 1 running separately.

The water level response in the on -ite wells is summarized in Table 1 and Figure 1. The static levels of about 12 metres below ground level (mbgl) declined by just under 20 m to about 28 mbgl to 32 mbgl during the period of active pumping at both wells. The conditions in Wells 1 and 3 including pump depth, water producing depths and pumping water levels are shown on Figure 2.

Table 1: Summary of Pumping Test at Harriston Well 1 and 3

Well	Static Level (mbgl)	Intake Level (mbgl)	Typical Pumping Level (mbgl)	*Final Pumping Test Level (mbgl)
Well 1	11.4	32.0	16.5	27.7
Well 3	12.5	38.0	21.7	31.5
MI-MW3-00 (41)	11.5	NA	16.0	26.3

*- Final water level recorded at end of pumping in June 2021

Three off site wells were selected for monitoring to identify the extent of drawdown related to an associated project to add new wells to the Harriston Water system. Dataloggers were installed in the wells and water levels were analyzed to differentiate between the individual well water levels and water level changes caused by operation of Wells 1 and 3. Table 2 and Figure 1 provide a summary of the water level response that were noted to range from 3.4 m at 345 m away at a farm well (Clyne Well) through 1.2 m at the Co-op well 560 m to the west and 0.5 m at the 9344 Blind line well 850 m to the east. Water levels in the offsite wells declined at rates of 1 to 5 m per log cycle and this rate of decline continued until the end of the pumping test.

Table 2: Summary of Pumping Test at Harriston Well 1 and 3

Well	Distance from Well 3	Typical Pumping Drawdown (m)	Final Pumping Test Drawdown (m)
Clyne Well	345	0.5	3.4
Co-op Well	560	0.1	1.2
9344 Blind Line	850	0	0.5

The water level drawdown at each well is plotted versus the approximate distance from Wells 1 and 3 on the attached Distance-Drawdown graph. This attached graph indicates a decline in drawdown of 7.8 m for each log cycle moving away from the pumping wells. The Distance Drawdown relationship established by the graph was evaluated and used to estimate aquifer transmissivity at approximately 107 m^2/day and a storativity of about 0.0004 based on the Jacob Cooper analysis. These aquifer parameters are interpreted as typical of a confined bedrock aquifer system.

We note that during the first 2 hours of the test air was observed flowing out of a vent at the top of Well 1. An air quality sensor was used to measure oxygen levels and a low oxygen level was noted in the room surrounding Well 1. This low oxygen level is attributed to the fact that Wells 1 and 3 were off for 24 hours before the pumping test. During that time the water level recovered at least 1 m above normal static levels. It is interpreted that air that was trapped in the bedrock formations was compressed and then released when pumping began. This situation also causes the deep overburden monitor well (MI-MW3-00-DO) to bubble when the wells pump.

This situation is referred to as a breathing well and is common in bedrock wells in Huron County. Well 1 should be vented to atmosphere to maintain good air quality in the Well 1 area.

Water Quality Data

Samples were collected at various times during pumping test from Wells 1 and 3, Well 2 (that ran more continuously than normal) and from the private wells monitored during the test. The concentration of sulphate was the primary parameter of interest as the level of sulphate has been typically close to or above the Ontario Drinking Water Quality Standard (ODWQS) of 500 mg/L in Well 2. The samples from Wells 1 and 3 were compared to samples taken the day before the test during normal operation and are shown in Table 3. This data show that Well 1 water typically contains a lower concentration of sulphate than Well 3 and that the concentration of sulphate rose slightly during the test in Well 1 but was stable in Well 3. However, all values for sulphate are below 100 mg/L which is significantly below the ODWQS

Table 3: Water Quality Summary at Harriston Well 1 and 3

	Well 1			Well 3		
Parameter	**Pre-Test**	**Day 1-Test**	**Day 2-Test**	**Pre-Test**	**Day 1-Test**	**Day 2-Test**
	June 14	June 15	June 16	June 14	June 15	June 16
Sulphate (mg/L)	58	57	63	92	88	90
Hardness (mg/L as CaCO3)	570	480	530	605	495	523
Sodium (mg/L)	5.62	5.77	6.10	7.78	8.58	7.79
Strontium (mg/L)	28.6	32	36.4	28.8	28.8	31.4

The concentration of sulphate in water from the offsite wells in the Harriston area have typically been interpreted to increase with depth and as you move west. The testing conducted in June indicates that the private wells all produce water with less than 100 mg/L of sulphate. Two samples were obtained from Well 2 with the second sample above the first and both above the ODWQS of 500 mg/L. The data from the offsite wells is provided in Table 4 and the data from Well 2 confirms Town of Minto staff's observation that water quality declines over time when Well 2 is pumped for long periods.

Table 4: Water Quality Summary at Monitoring Wells

Parameter	**Clyne Well**	**9344 Bline Line**	**Co-op Well**	**Harriston Well 2**	
Date	June 16	June 15	June 15	June 14	June 16
Sulphate (mg/L)	56	13	55	540	600
Hardness (mg/L as CaCO3)	308	236	448	1170	1120
Sodium (mg/L)	6.53	10.9	57.9	10.1	10.4
Strontium (mg/L)	27.6	8.33	21.0	25.6	25.5

Analysis and Summary

The operation of Harriston Wells 1 and 3 at a combined rate of 26.4 L/s for a period of 1770 minutes in June 2021 has provided new information on the capacity of the wells to be pumped at this rate and for the aquifer to sustain the pumping rate. Operation of wells 1 and 3 together on a long term basis results in the production of sediment that affects flow control equipment. The decline of water levels to within 2 m of the Well 1 intake and cascading water conditions are not considered suitable for this municipal well.

The current approach of not operating the wells together has been confirmed as the quality of water and pumping conditions were not suitable for the municipal supply after less than 24 hours. The stable water levels in the onsite wells indicate that the aquifer can likely sustain a pumping rate of 26.4 L/s. However, the existing well construction and pump depths of Well 1 and Well 3 prevent pumping at this rate to supply the water system.

A combined pumping rate in the range of 20 to 23 L/s may be feasible but further testing should be completed by Minto staff to confirm what combination of Well 3 + Well 1 is most suitable. A test of the two wells at 16 + 6 L/s should be attempted to see if the issues with the well operation are experienced at this lower pumping rate. It would be prudent for Minto staff to monitor both well water discharge and level manually during testing to track any changes in conditions over time and to maintain pumping rates

The main reason that Well 1 and Well 3 cannot sustain higher pumping rates is because they draw water from two water producing intervals in the bedrock (one shallow and one deeper system). Ideally each well should be designed to draw water from one interval. Upgrades similar to those completed in Well 2 through the installation of a liner, reduction in well depth or new well construction could be implemented at this site.

We note that Well 1 should be vented to the atmosphere outside the Well 1 building to maintain good air quality in the Well 1 area.

It is possible that the PTTW capacity of 30.4 L/s could be obtained from the Well 1 and Well 3 site through well upgrades and new well construction. This work would likely include:

1. Abandonment of Well 1
2. Upgrade of Well 3 to draw water from one interval in the bedrock.
3. Construction of a new well to draw water from the bedrock not accessed by Well 3.

The potential for upgrades at the Well 1 and Well 3 to allow higher pumping rates on a long term basis should be considered once additional exploration in Harriston is completed. The Well 1 and 3 site should be compared to other potential well sites to determine the most cost effective approach to draw water from the bedrock aquifer in the Harriston area.

Yours truly,

R.J. Burnside & Associates Limited

Jim Baxter, P.Eng.
Groundwater Resource Engineer
JB:js

Josh Donkersgoed, P.Eng.
Project Engineer

Enclosure(s) Figure 1 – Harriston Site Map
Figure 2 – Well 1 and 3 Details
Figure 3 – Distance versus Drawdown Graph
Appendices A-1 to A-10 - Hydrographs and Analytical Plots

LEGEND

- Production Well
- Monitoring Well
- (15.0m) Drawdown at Monitoring Locations (m)
- Surface Water Flow Direction
- Expressway / Highway
- Arterial / Collector Road
- Local Road
- Contour (masl)
- Wetland
- Waterbody
- Watercourse
- Stream: Intermittent

Sources:

1. Ministry of Natural Resources, © Queen's Printer for Ontario
2. Natural Resources Canada © Her Majesty the Queen in Right of Canada.
3. Background 2019 Air Photo obtained from Google Earth Professional / DigitalGlobe © Google Earth, use of products are subject to the Terms and Conditions of Licensed Google Earth Software.

Datum: North American 1983 CSRS
Coord. System: NAD 1983 CSRS UTM Zone 17N

0 100 200 300 400 500 600
Metres

BURNSIDE

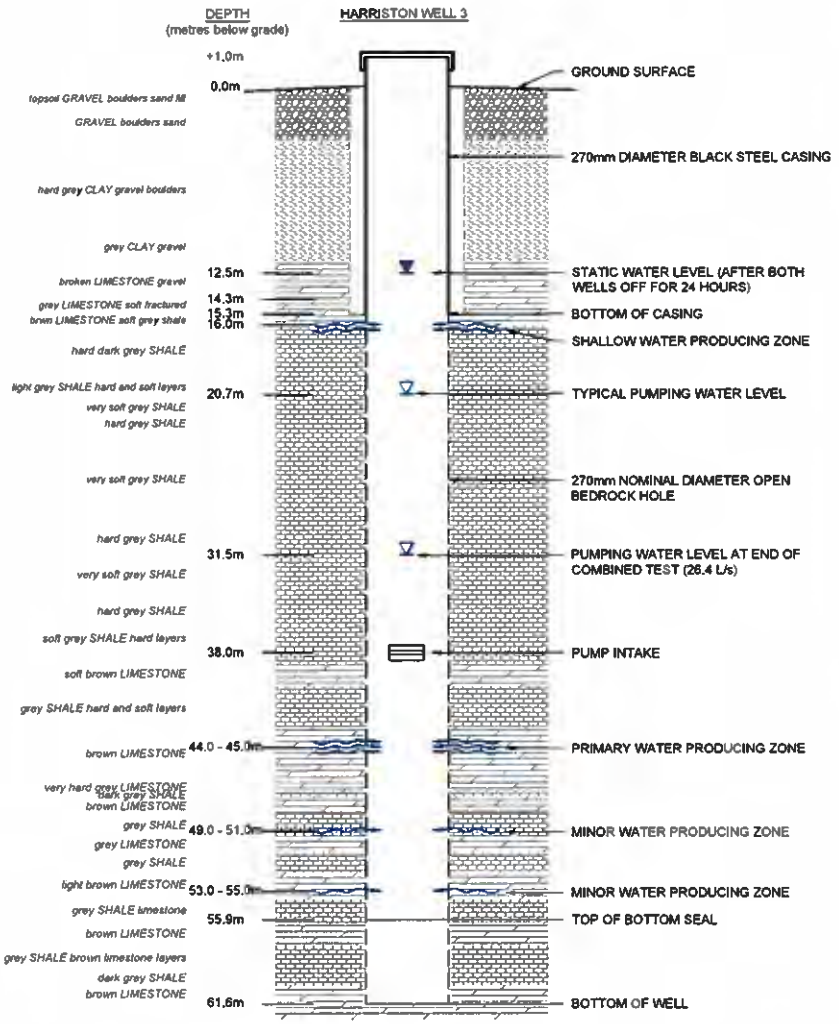
Client: **TOWN OF MINTO**

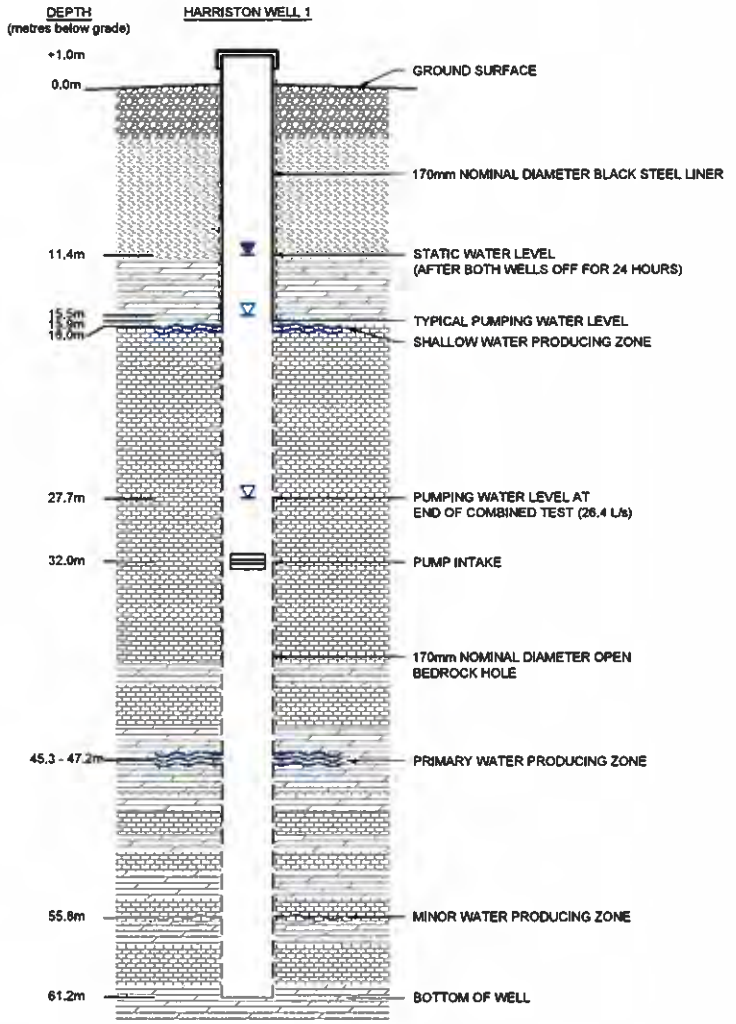
Figure Title:

HARRISTON WELL 1 AND 3 PUMPING TEST
WELL LOCATION PLAN
TOWN OF HARRISTON

Drawn	Checked	Date	Figure No.
CD	JD	July 2021	1
Scale		Project No.	
1:7,500		300053695.0000	

File Path: TELWOS\Shared Work Areas\053695 Harriston\06_GIS\053695 Harriston Well Plan.mxd Plot Date: 2021/07/09 Time: 03:33 PM





BURNSIDE

Figure Title

HARRISTON WELL 1 AND 3 PUMPING TEST

PUMPING TEST WELL DETAILS

Client	Drawn	Checked	Date	Figure No.
TOWN OF MINTO	CD	JB	July 2021	2
	Scale: N.T.S.		Project No.: 300053695.0000	

File: E:\MO-Shared Work Areas\053695 Harriston 02 Production\053695 Pumping Test\Well Details.dwg Date Plotted: August 19, 2021 - 9:48 AM

Harriston Well 1 and Well 3 Pumping Test - June 2021
Distance versus Drawdown at 26.4 L/s

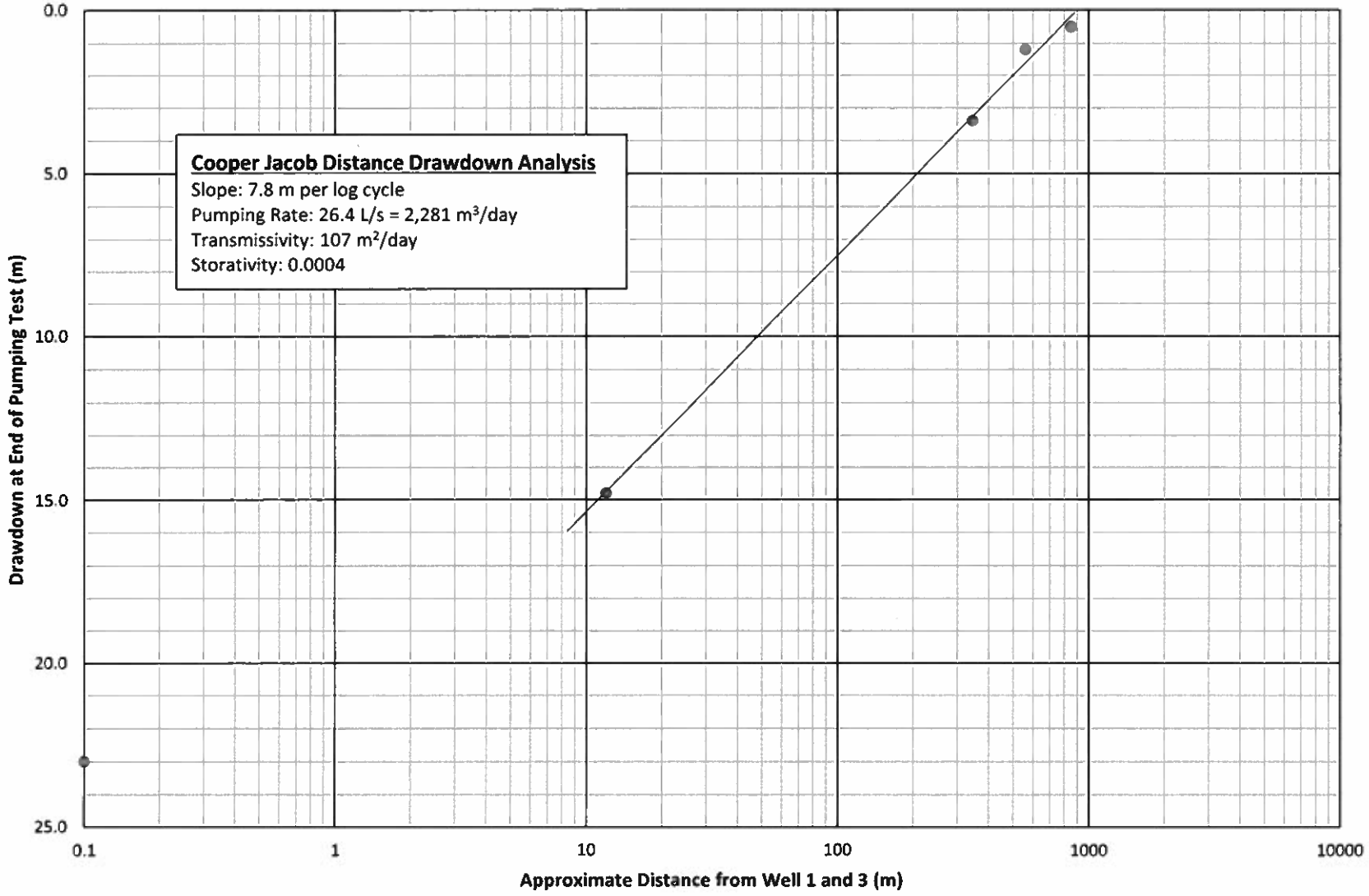


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Figure 3

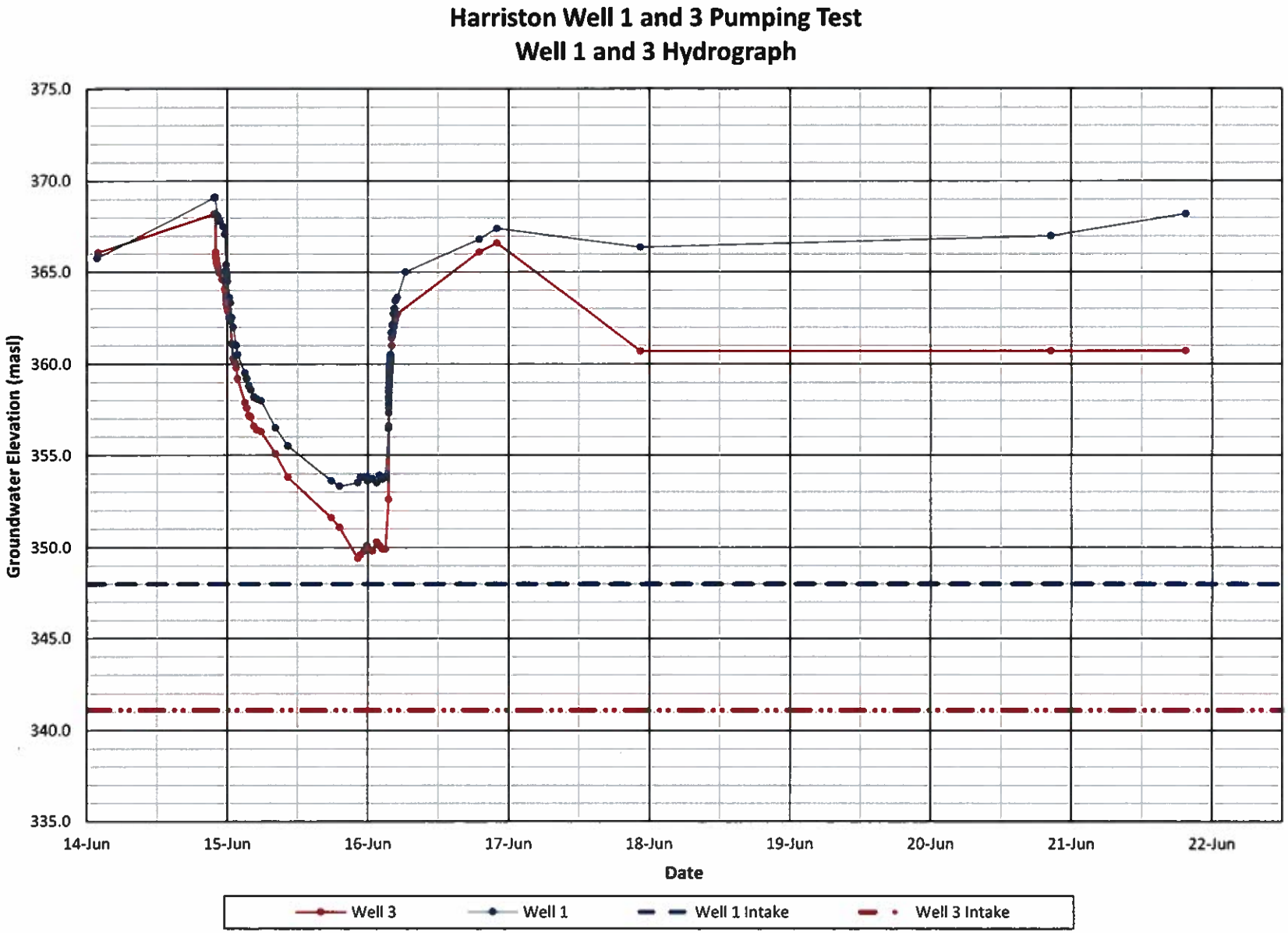

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Figure A-1

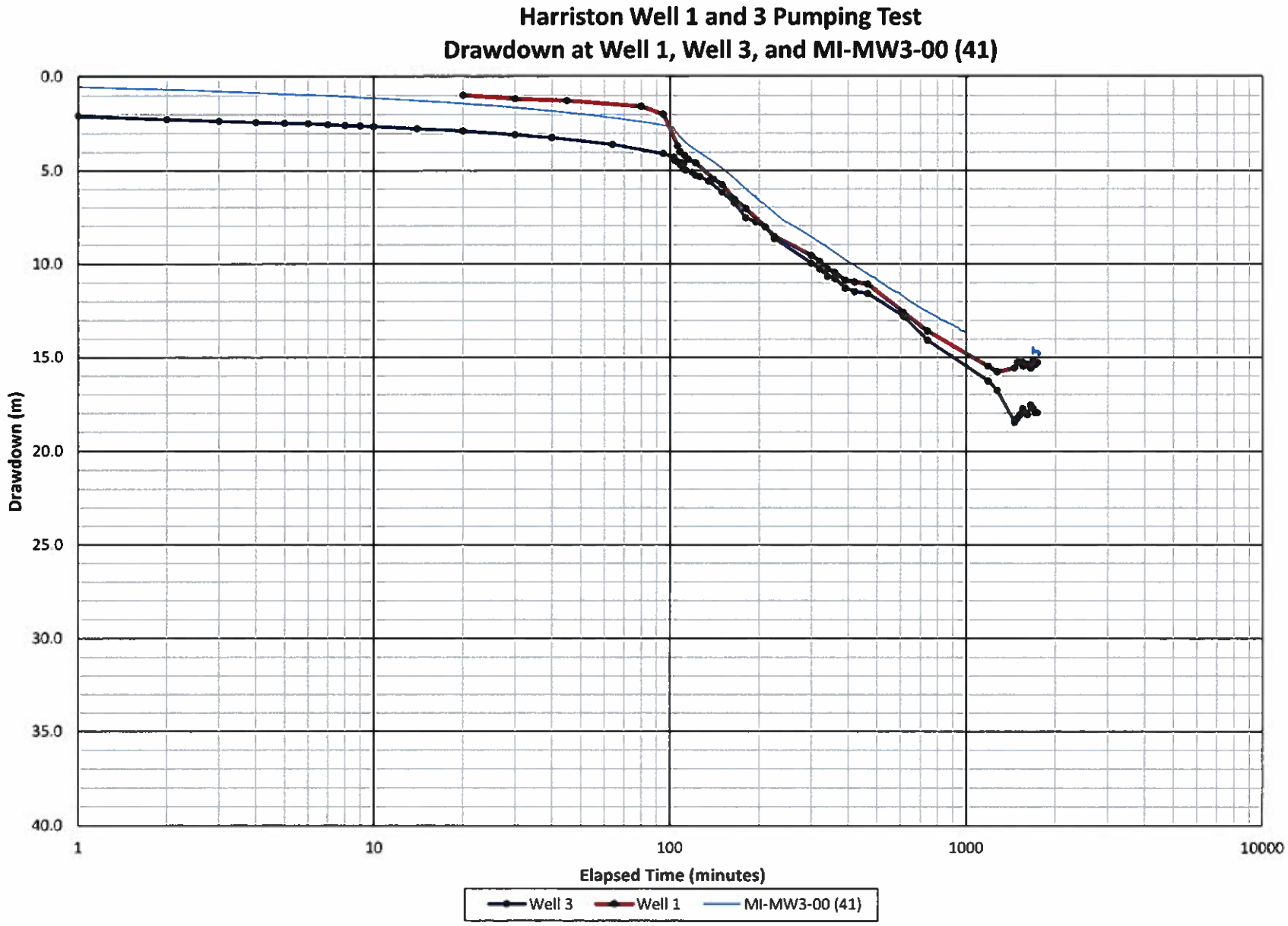

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Figure A-2

Harriston Well 1 and 3 Pumping Test
MI-MW3-00 Hydrograph

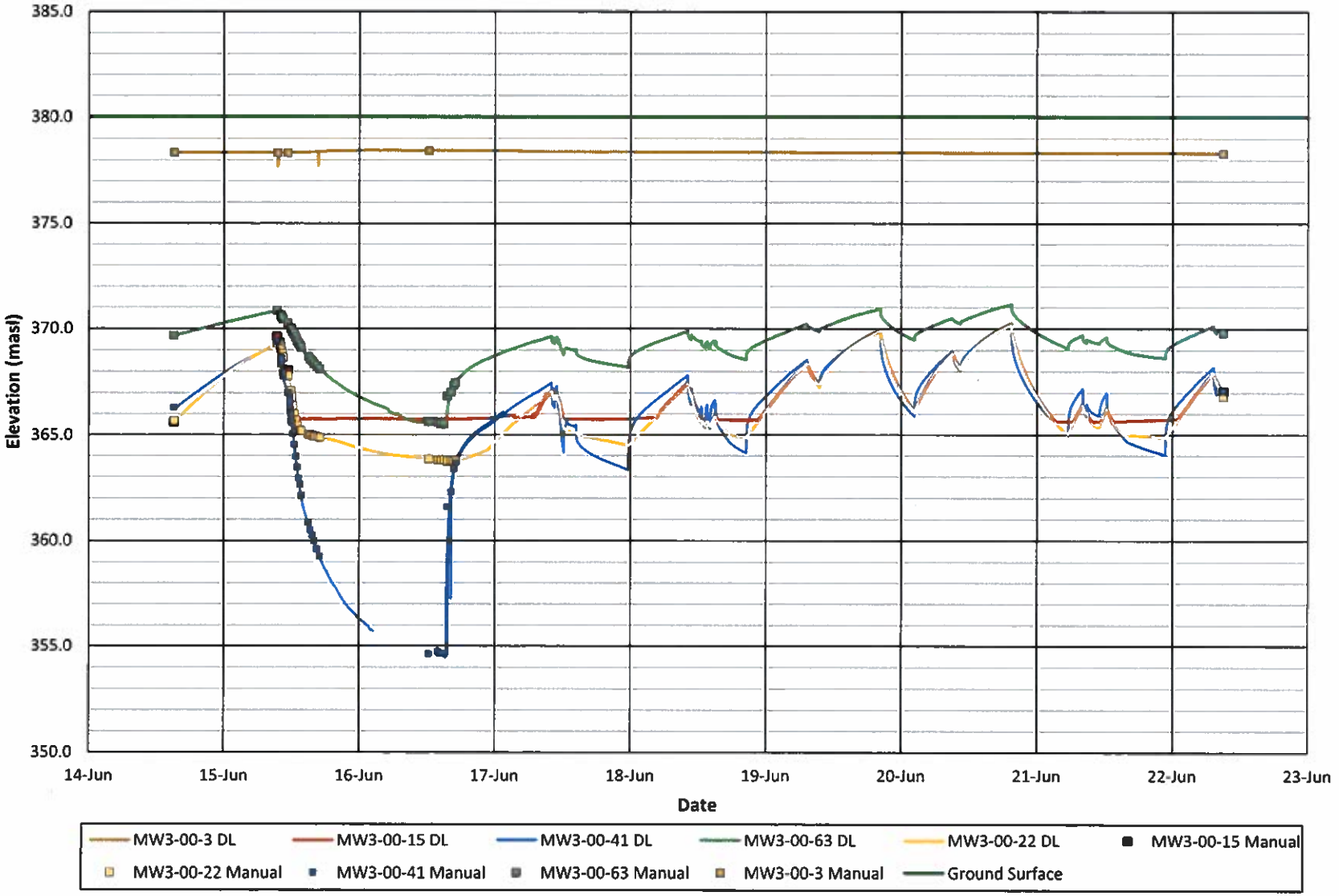

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Figure A-3

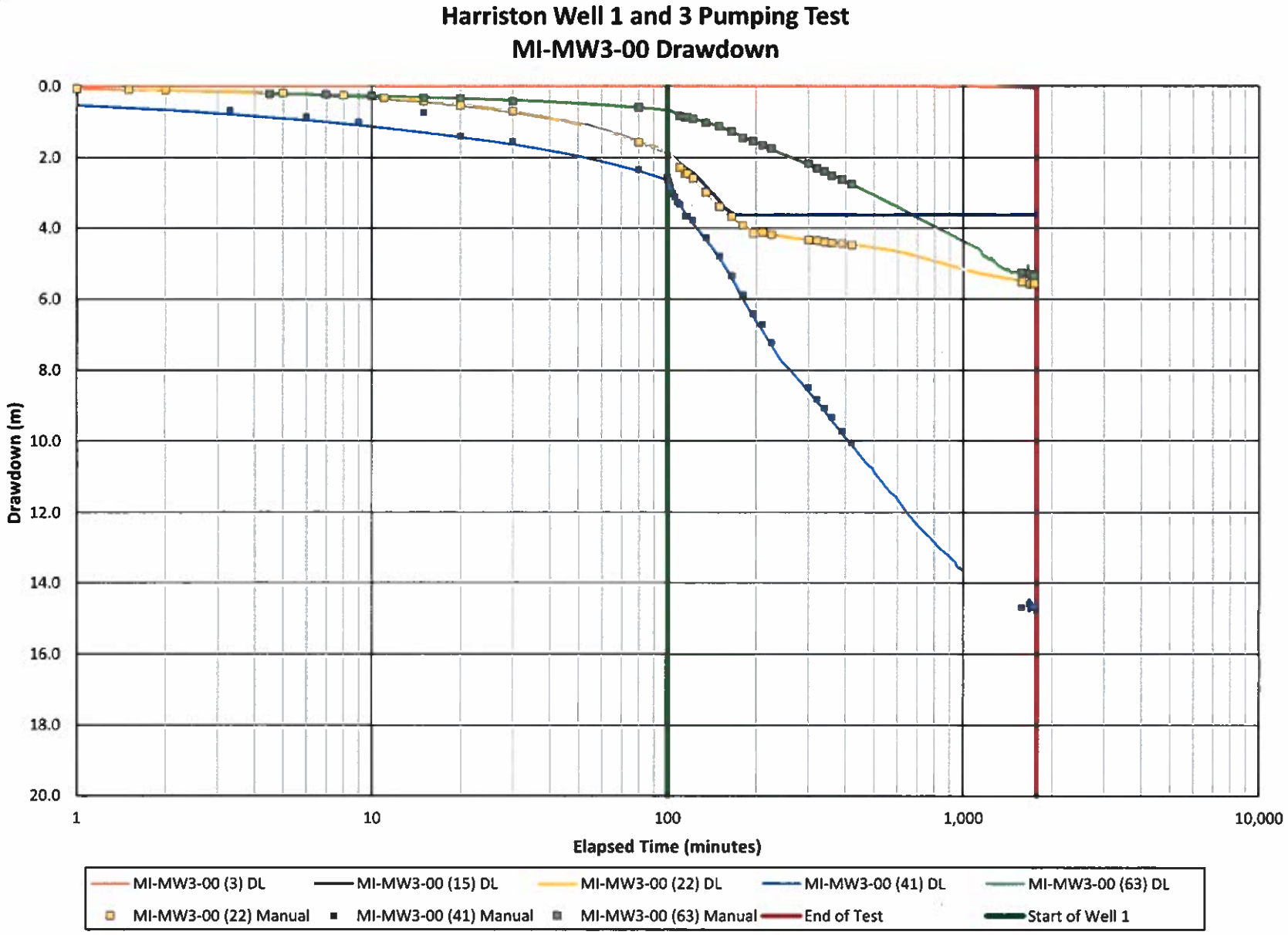

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Figure A-4

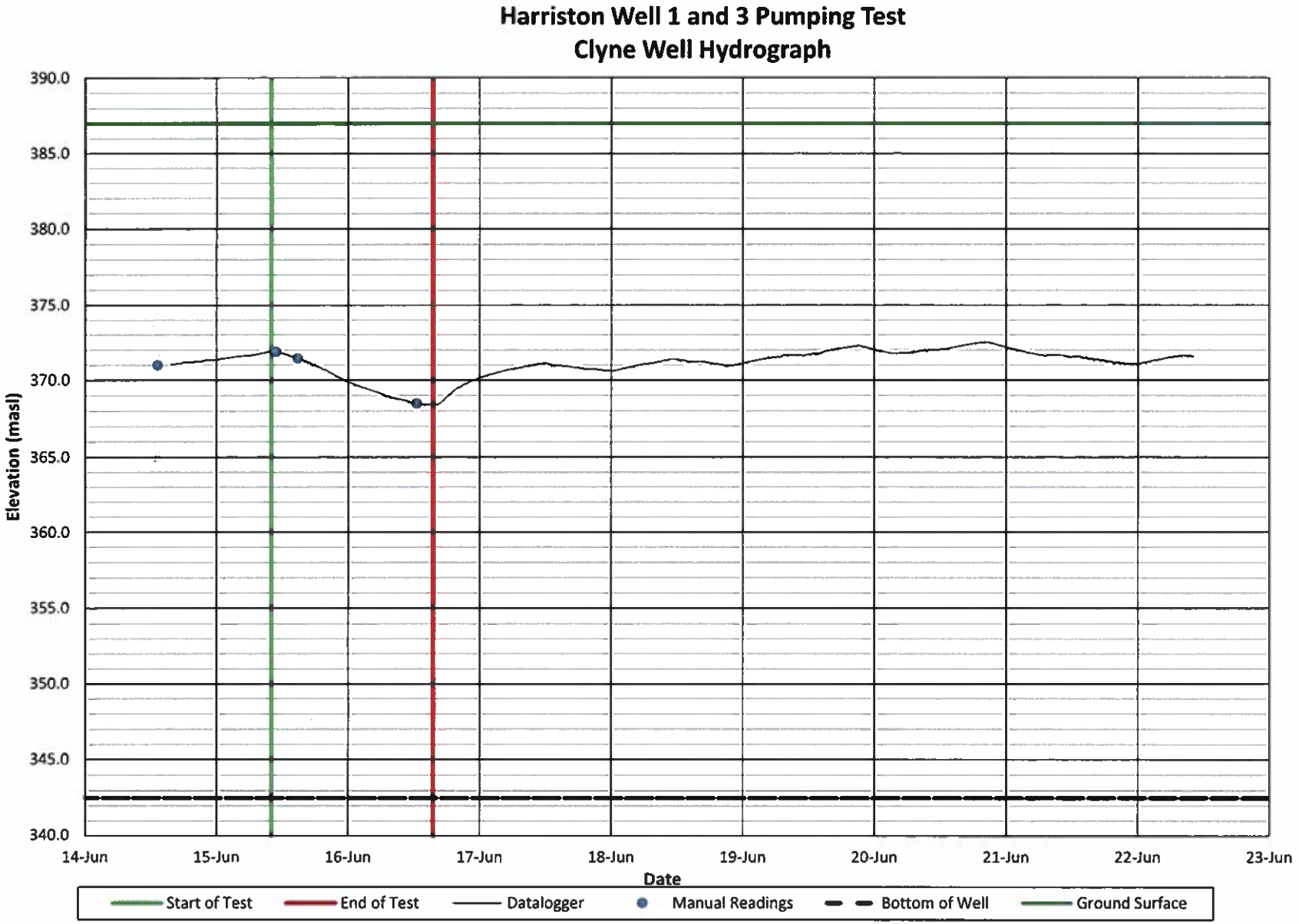

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Figure A-5

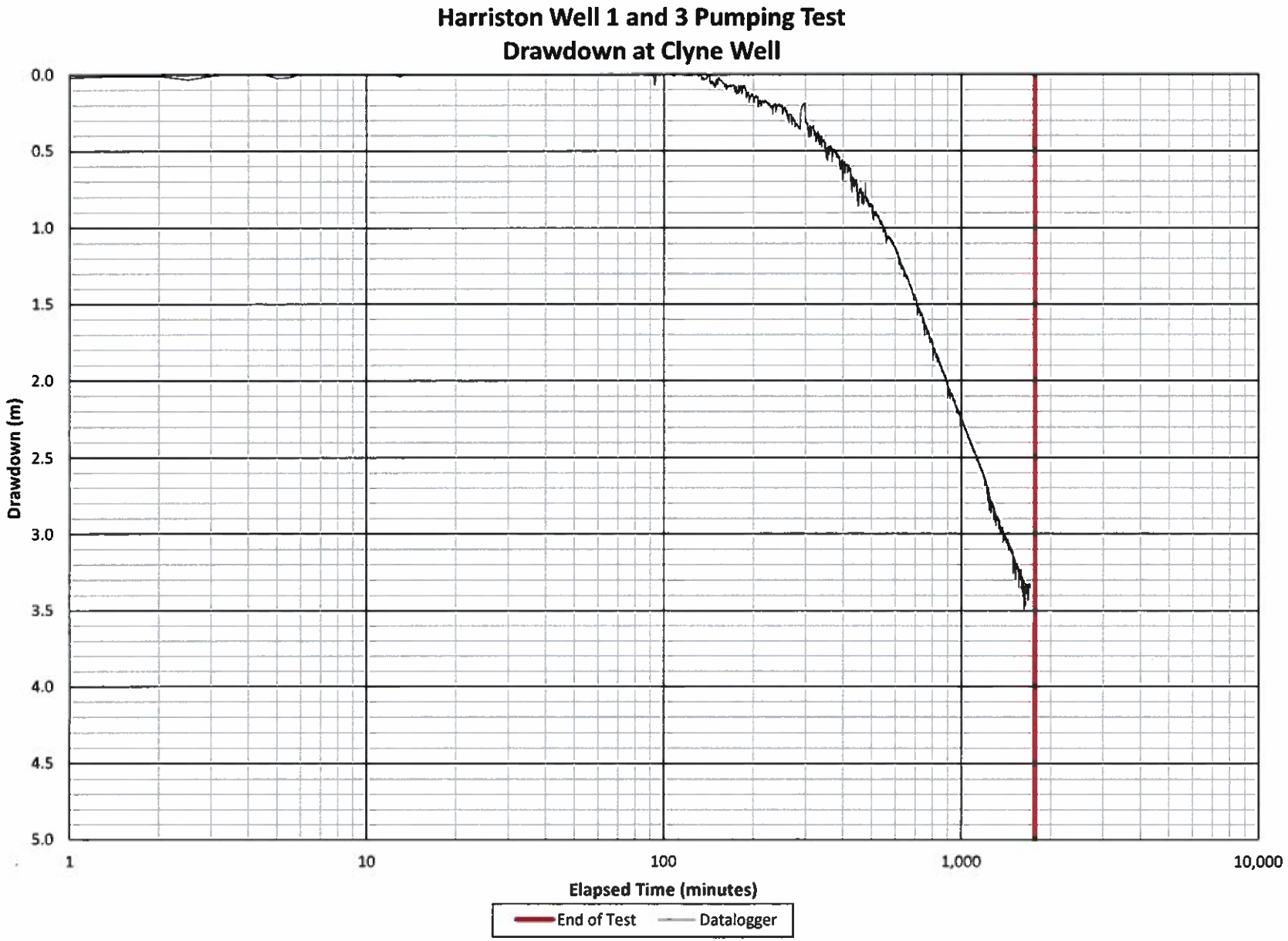

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Figure A-6

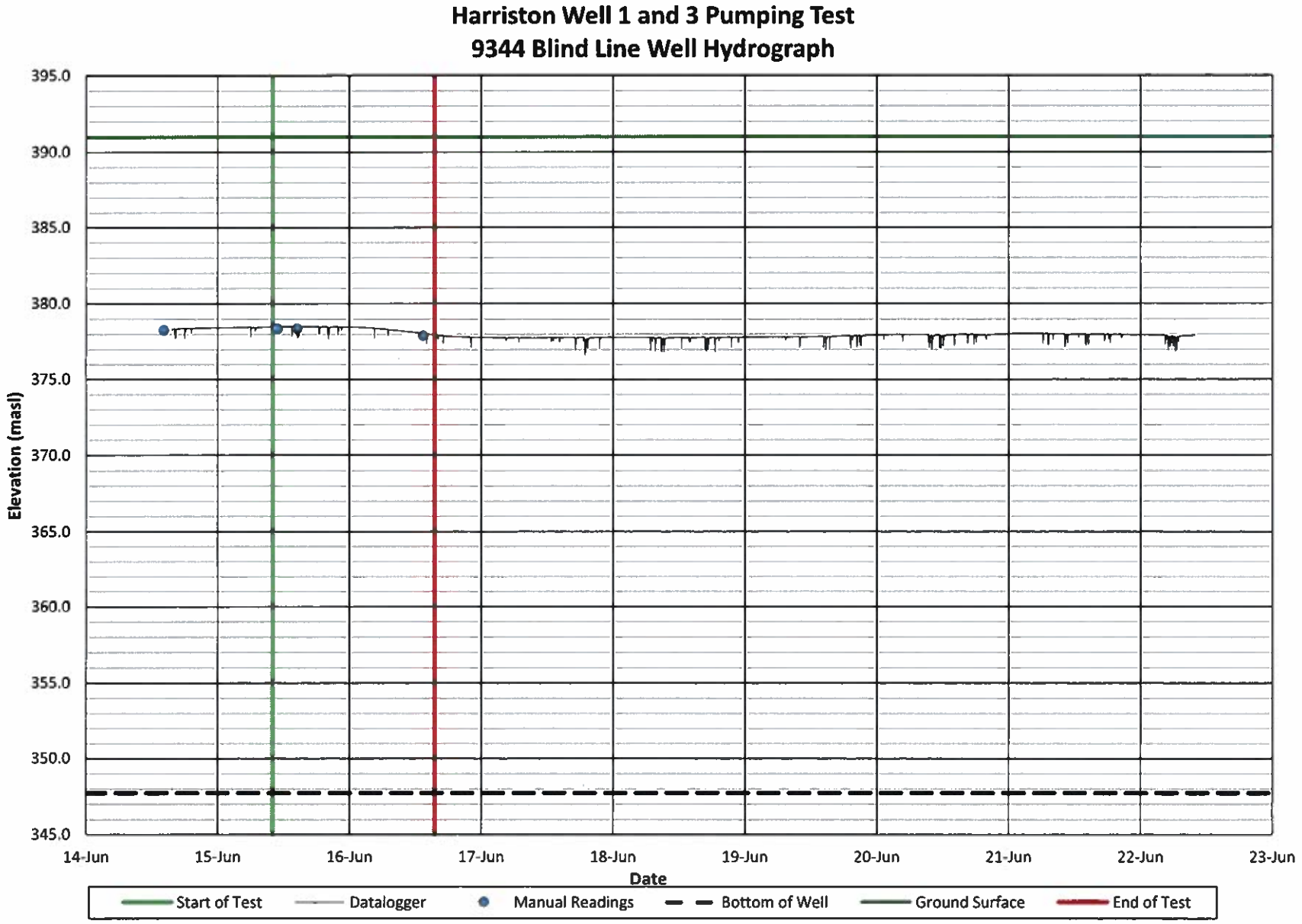

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Figure A-7

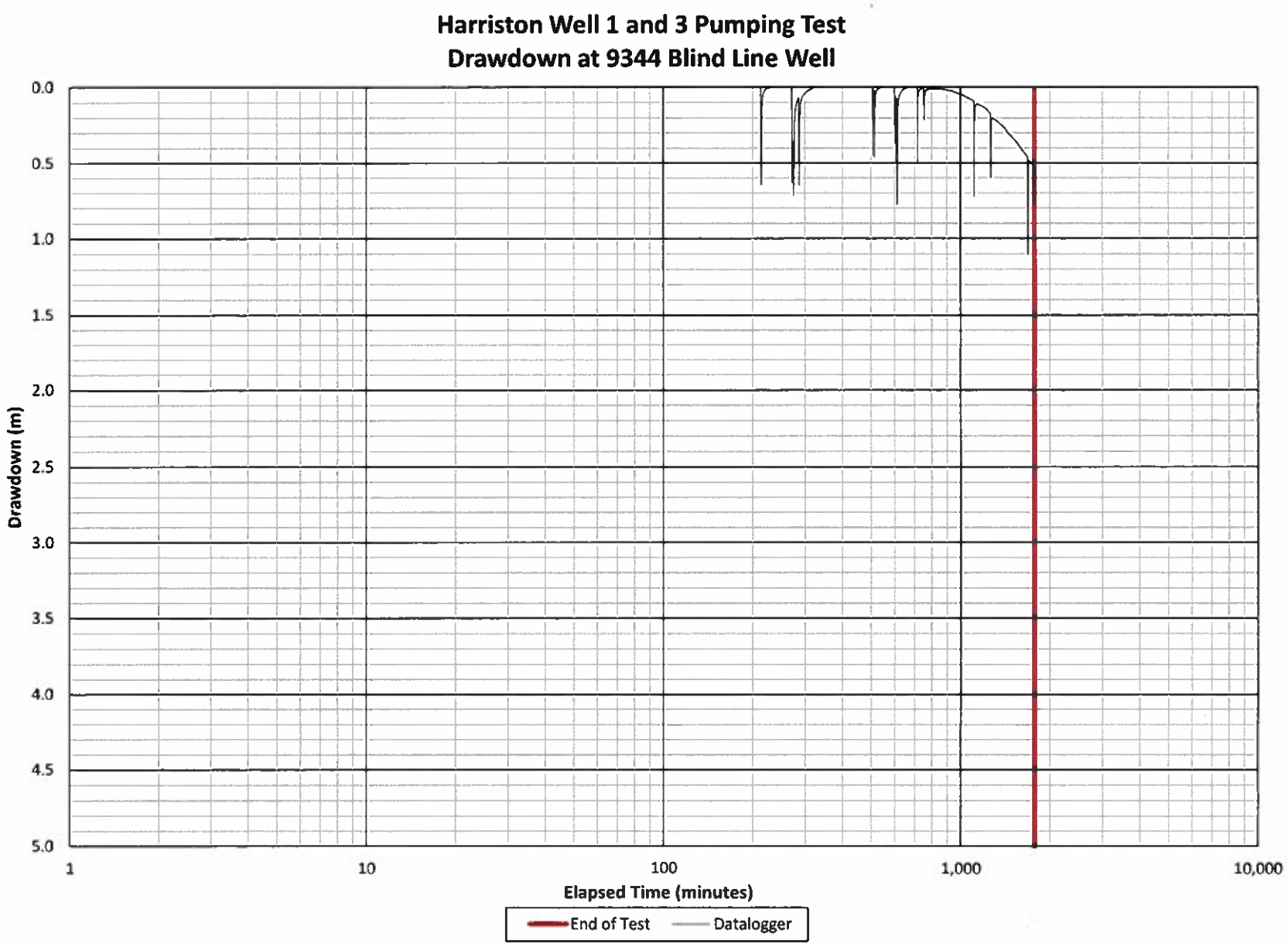

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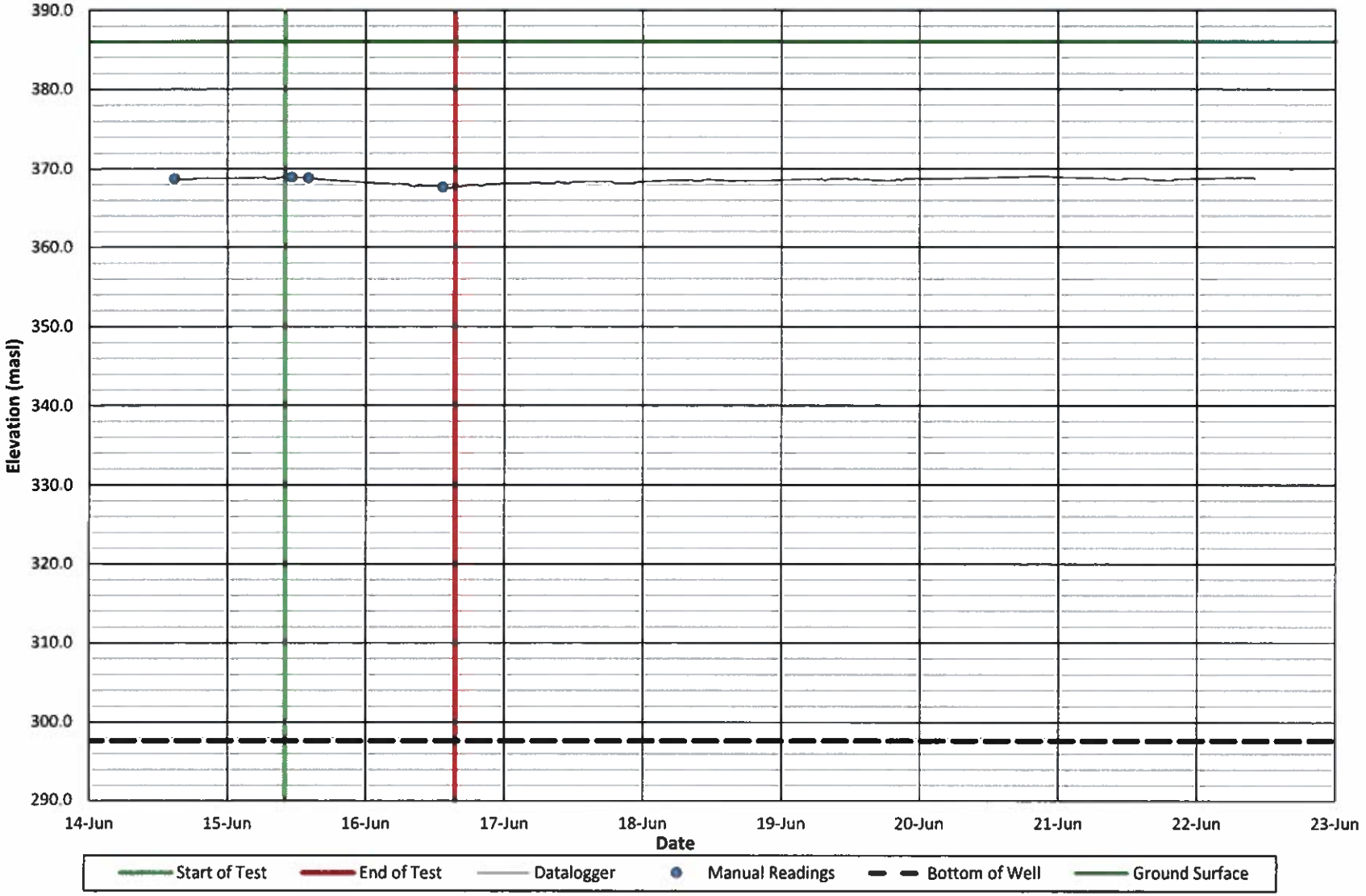
Figure A-8

Harriston Well 1 and 3 Pumping Test
Co-op Well Hydrograph



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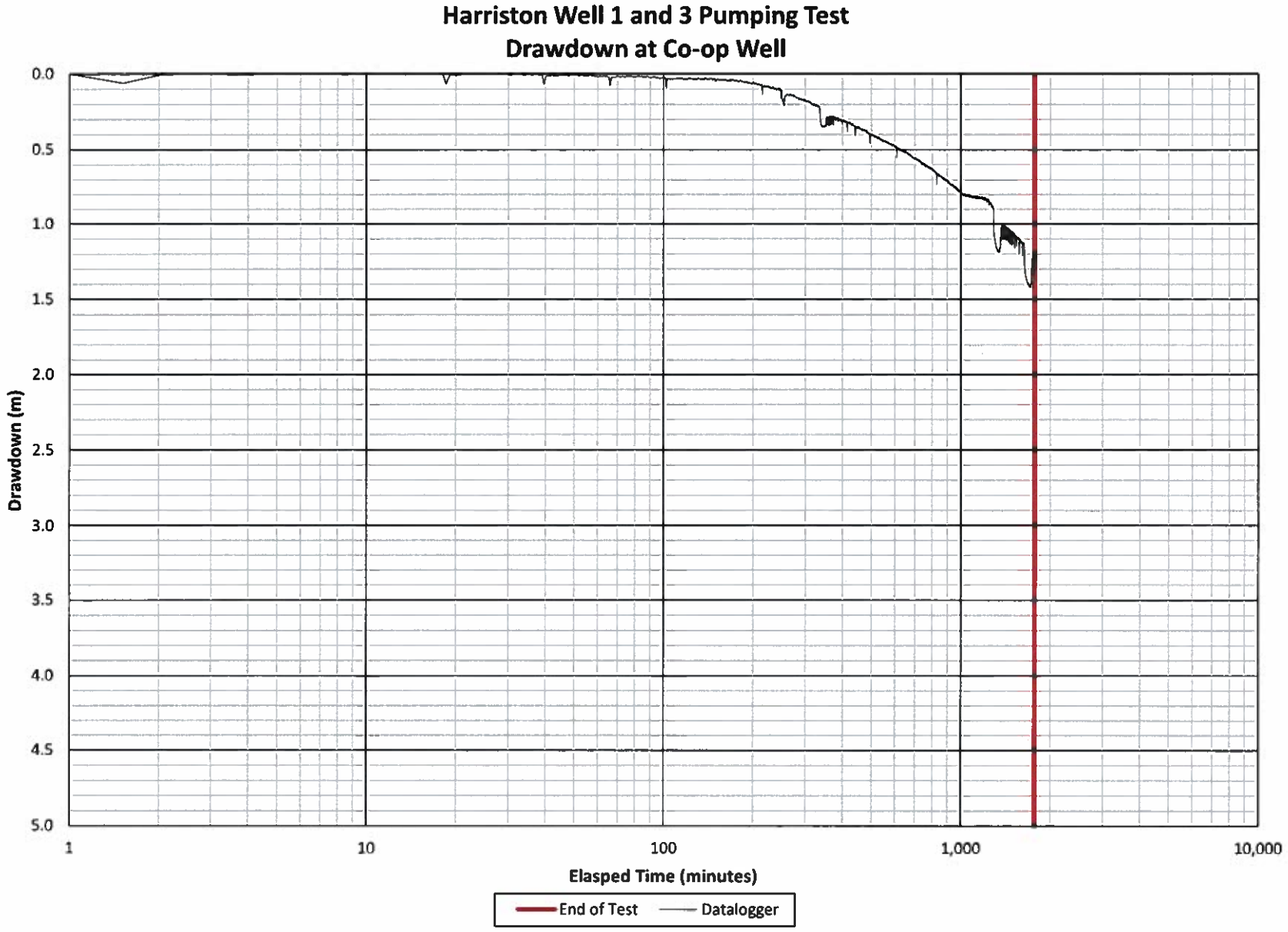
300053695

Figure A-9



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300053695

Figure A-10

Appendix G

Harriston Reserve Capacity Calculations

TABLE 2.1
SUMMARY OF RESERVE CAPACITY CALCULATIONS (2021)
HARRISTON DRINKING WATER SYSTEM
TOWN OF MINTO, ONTARIO

Item	Description	Units	Value	Note
(1)	Design (FIRM) Capacity of the Well Supplies [a]	m^3/d	1,728	Refer to note (a)
(2)	Average Maximum Day Flow (2018 -2020)	m^3/d	1,461	Refer to note (c) and Table 2.3
(3)	Reserve Capacity	m^3/d	267	(1)-(2)
(4)	Existing Connected Population[e]	persons	2,402	(5)*(8)
(5)	Serviced Households/Residential Connections [b]	ERU	914	Refer to Table 2.6
(6a)	Maximum Day Per Capita Flow (Existing Population)[c]	m^3/person/d	0.61	(2)/(4)
(6b)	Maximum Day Per Capita Flow (Future Population)	m^3/person/d	0.45	Conservative estimate of typical residential water demand for new developments
(7)	Additional Population that can be Served [d]	persons	594	(3)/(6b)
(8)	Existing Persons Per Equivalent Residential Unit	persons/ERU	2.63	See Note (e)
(9)	Additional Units that can be Served [d]	ERU	226	(7)/(8)
(10)	Number of Unconnected Approved/Committed Units	ERU	244	Refer to Table 2.5
(11)	Uncommitted Hydraulic Reserve Capacity (Water)	ERU	-18	(9)-(10)
(12)	System Capacity Used Based on Max Day	%	85	(3)/(1)

[a] Firm capacity is equivalent to the total system capacity while the largest well is out of service.
The Harriston Drinking Water System currently operates under MDWL 106-102, DWWP 106-202 and PTTW #3012-A8QRPF.
As per the PTTW for Harriston, the rated capacity for the drinking water system is as follows:
Well 1 = 979 m^3/day (11.3 L/s), Well 2 = 2,065 m^3/day (23.9 L/s) and Well 3 = 1,634 m^3/day (18.9 L/s).
Well 1 and Well 3 discharge to Well No. 3 Pumphouse for treatment before entering the distribution system. Well 2 discharges to the John Street Pumphouse for treatment prior to entering the distribution system. Wells 1 and 3 are not operated concurrently at the permitted rates to achieve the permitted 2,613 m^3/d, due to undesirable pumping conditions.
A pumping test completed in June 2021 determined the feasible combined pumping rate for Wells 1 and 3 is 1,728 m^3/day (20 L/s); however, the permitted rated capacity could be achieved through well upgrades or new well construction at the existing site. Therefore, based on current operation of the water system and the results of the June 2021 pumping test at Wells 1 and 3, the firm capacity of the system is equivalent to 1,728 m^3/d (Well 1 and 3) with Well 2 (2,065 m^3/day) out of service.

[b] Serviced households/residential connections as reported by Town Billing.

[c] Based on the average of the annual maximum day flow for 2018, 2019 and 2020.

[d] Additional population and units that can be served without consideration of unconnected approved/committed units.

[e] As per County of Wellington Municipal Comprehensive Review Growth Allocations Memo (Watson & Associates, December 14, 2020).

TABLE 2.2
SUMMARY OF HYDRAULIC RESERVE CAPACITY CALCULATIONS (2021)
HARRISTON SEWAGE TREATMENT WORKS
TOWN OF MINTO, ONTARIO

Item	Description	Units	Value	Note
(1)	Design Capacity of Sewage Treatment Works	m^3/d	2,378	As per MECP CoA No. 6100-8UYMCM
(2)	Average Daily Flow (Sewage) (Average for 2018-2020) [(a)]	m^3/d	1,500	Refer to Table 2.4
(3)	Reserve Capacity (Surplus Treatment Capacity)	m^3/d	878	(1)-(2)
(4)	Existing Connected Population[(f)]	persons	2,376	(5)*(8)
(5)	Serviced Households[(b)]	ERU	904	Refer to Table 2.6
(6a)	Average Daily (Sewage) Flow per Capita (Existing Population) [(c)]	m^3/person/d	0.63	(2)/(4)
(6b)	Average Daily (Sewage) Flow per Capita (Future Population)	m^3/person/d	0.45	Conservative estimate of typical residential sewage flow for new developments
(7)	Additional Population that can be Served [(d)]	persons	1,952	(3)/(6)
(8)	Existing Persons Per Equivalent Residential Unit (ERU)	persons/ERU	2.63	See Note (f)
(9)	Additional ERUs that can be Served [(d)]	ERU	743	(7)/(8)
(10)	Number of Unconnected Approved/Committed Units	ERU	244	Refer to Table 2.5
(11)	Uncommitted Hydraulic Reserve Capacity (Sewage) [(e)]	ERU	499	(9)-(10)

Notes:

[(a)] Average daily flow is based on the annual total flow from all sewage sources (i.e., all types of land uses [residential, commercial, industrial, institutional, etc.] and other flow sources [i.e., infiltration]) divided by the number of days in the year. Average daily sewage flows as reported by Town of Minto.

[(b)] Serviced households/residential connections as reported by Town Billing.

[(c)] Non-residential sewage flow sources are included in the measured average daily sewage flow, which will result in a more conservative evaluation of the uncommitted hydraulic reserve capacity.

[(d)] Additional population and units that can be served without consideration of unconnected approved/committed units.

[(e)] Uncommitted hydraulic reserve capacity does not consider organic reserve capacity or other performance characteristics of the sewage treatment works.

[(f)] As per County of Wellington Municipal Comprehensive Review Growth Allocations Memo (Watson & Associates, December 14, 2020).

TABLE 2.3
SUMMARY OF MAXIMUM DAY FLOW
HARRISTON DRINKING WATER SYSTEM
TOWN OF MINTO, ONTARIO

	Maximum Day Flow (m^3/day)			
	Calendar Year			
Month	**2018 [1]**	**2019 [1]**	**2020 [1]**	
January	1,033.1	967.9	1,041.4	
February	1,024.0	1,053.8	1,153.1	
March	995.5	1,082.2	1,145.2	
April	986.5	1,522.0	1,090.3	
May	1,026.4	1,160.3	1,014.9	
June	1,134.1	988.8	1,294.3	
July	1,091.3	1,374.7	**1,478.8**	
August	1,072.6	**1,586.0**	1,206.3	
September	1,099.1	1,091.3	1,075.2	
October	**1,317.2**	1,125.0	999.7	
November	1,171.1	1,136.6	1,024.3	**3-Year Average**
December	955.9	991.7	1,036.7	**Maximum Day Flow**
Max Maximum Day Flow	**1,317.2**	**1,586.0**	**1,478.8**	**1,460.6**

Notes:
[1] Drinking Water System data as reported by Town of Minto and manipulated by TESL to exclude anamolous data not representative of typical consumption such as watermain breaks, water tower and well maintenance, watermain and hydrant flushing, equipment malfunctions, etc.

TABLE 2.4
SUMMARY OF RAW SEWAGE FLOWS
HARRISTON
TOWN OF MINTO, ONTARIO

Harriston Sewage Treatment Works [1]

		2018												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m^3	55,507	57,319	44,884	76,978	47,326	33,263	29,201	33,566	31,141	34,786	45,938	53,886	543,795
Avg. day flow	m^3/d	1,791	2,047	1,448	2,566	1,527	1,109	942	1,083	1,038	1,122	1,531	1,738	1,495
Max day flow	m^3/d	4,469	7,458	2,153	4,123	2,114	1,412	1,235	1,839	1,380	1,431	2,187	2,386	7,458

		2019												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m^3	48,426	46,078	65,328	69,860	56,249	37,512	30,615	25,824	26,078	31,677	44,233	47,127	529,005
Avg. day flow	m^3/d	1,562	1,646	2,107	2,329	1,815	1,250	988	833	869	1,022	1,474	1,520	1,451
Max day flow	m^3/d	2,500	3,285	5,044	4,318	2,701	1,599	1,169	1,084	1,128	1,971	2,098	2,372	5,044

		2020												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m^3	70,819	40,484	81,357	50,811	47,019	37,704	36,416	33,485	32,367	39,812	45,817	53,128	569,219
Avg. day flow	m^3/d	2,285	1,396	2,624	1,694	1,517	1,257	1,175	1,080	1,079	1,284	1,527	1,714	1,553
Max day flow	m^3/d	7,553	1,678	6,887	2,616	2,176	1,672	1,507	1,606	1,388	1,999	1,901	2,992	7,553

ECA # 6100-8UYMCM

2,378 **Design Capacity (m^3/day)**
not rated **Peak Capacity (m^3/day)**

Summary

547,340 **Annual Total Average (m^3)**
1,500 **Average Daily Flow (m^3/d)**
7,553 **Max. Daily Flow (m^3/d)**

Notes:

[1] Wastewater treatment data as reported by Town of Minto. This data is assumed to include all sewage sources (i.e., all types of land uses [i.e., residential, commercial, industrial, institutional, etc.] and other flow sources [i.e., infiltration]).

TABLE 2.5
SUMMARY OF COMMITTED DEVELOPMENT (2021)
HARRISTON
TOWN OF MINTO, ONTARIO

	Planned Development Information [1]			
ID	Name	Total # of Units Approved	Total Units Developed (as of December 31, 2020)	Units Remaining [2] (Committed, Undeveloped)
1	Keith Gray Subdivision	**13**	**12**	**1**
2	Schikendanz Subdivision	**180**	**0**	**180**
3	Santos (Hummel)	**4**	**2**	**2**
	Wellington Construction	**1**	**1**	**0**
4	Heritage Builders	**16**	**2**	**14**
5	Moorefield Excavating (formerly Wellington Construction)	**30**	**30**	**0**
	Wellington Construction	**4**	**4**	**0**
6	Metzgers	**17**	**17**	**0**
7	Quality Homes	**23**	**23**	**0**
9	Available Vacant Serviced Infill Lots	**71**	**24**	**47**
	TOTAL (sum of 1 through 9)	**359**	**115**	**244**

Notes

(1) Serviced households/residential connections as reported by Town of Minto.
Note that the Available Vacant Serviced and/or Infilling Lots may not be representative of the maximum development potential (in terms of total units) for the property. For the purpose of hydraulic reserve capacity calculations, the totals provided in this table should be considered "draft estimates" to be reviewed and confirmed by the Town of Minto.

(2) Total Committed Development = Total Planned Development - Units Developed (to date)

TABLE 2.6
SUMMARY OF WATER AND SEWER CUSTOMERS (2021)
HARRISTON
TOWN OF MINTO, ONTARIO

	Harriston [1]
	# of Connections
RESIDENTIAL	
Homes	736
Apartments (Total Units)	179
Total Residential Connections (Water and Sewer)	**915**
Residential Connections With Water Only, No Sewer	11
Residential Connections With Sewer Only, No Water	1
Total Residential Water Connections	**914**
Total Residential Sewer Connections	**904**
INDUSTRIAL, COMMERCIAL, INSTITUTIONAL (ICI)	
Municipal	9
Car Wash	3
Farms	2
Feed Mill	2
Garage	7
Businesses	61
Manufacturing	4
Restaurants	7
Rest Homes & Boarding Houses	3
School	1
Hospital	
Total ICI Connections (Water and Sewer)	**99**
ICI Connections With Water Only, No Sewer	7
ICI Connections with Sewer Only, No Water	0
Total ICI Water Connections	**99**
Total ICI Sewer Connections	**92**
Total Water Customers: Residential + ICI	**1,013**
Total Sewer Customers: Residential + ICI	**996**

Notes:
[1] Serviced connections as reported by Town Billing.

Appendix H

Clifford Reserve Capacity Calculations

TABLE 1.1
SUMMARY OF RESERVE CAPACITY CALCULATIONS (2021)
CLIFFORD DRINKING WATER SYSTEM
TOWN OF MINTO, ONTARIO

Item	Description	Units	Value	Note
(1)	Design (FIRM) Capacity of the Well Supplies [a]	m^3/d	1,309	Refer to note (a)
(2)	Average Maximum Day Flow (2018 - 2020)	m^3/d	431	Refer to note (c) and Table 1.3
(3)	Reserve Capacity	m^3/d	878	(1)-(2)
(4)	Existing Connected Population[e]	persons	995	(5)*(8)
(5)	Serviced Households/Residential Connections [b]	ERU	406	Refer to Table 1.6
(6)	Maximum Day Per Capita Flow	m^3/person/d	0.433	(2)/(4)
(7)	Additional Population that can be Served [d]	persons	2,026	(3)/(6)
(8)	Existing Persons Per Equivalent Residential Unit	persons/ERU	2.45	See Note (e)
(9)	Additional Units that can be Served [d]	ERU	827	(7)/(8)
(10)	Number of Unconnected Approved/Committed Units	ERU	46	Refer to Table 1.5
(11)	Uncommitted Hydraulic Reserve Capacity (Water)	ERU	781	(9)-(10)
(12)	System Capacity Used Based on Max Day	%	33	(2)/(1)

[a] Firm capacity is equivalent to the total system capacity while the largest well is out of service.
The Clifford Water System currently operates under MDWL 106-101, DWWP 106-201 and PTTW #0441-AQ4H8H.
As per the PTTW for Clifford, the rated capacity (m^3/day) for the drinking water system is as follows: Well 1 = 1,310, Well 3 = 655, Well 4 = 1,309.
Wells 3 and 4 can not operate together. Consistent with the MDWL for Clifford, the rated capacity (m^3/day) for the drinking water system is Well 1 = 1,309 and Wells 3 and 4 = 1,309.
Assuming the wells can operate at their rated capacity, Firm Capacity with Well 1 out of service is equivalent to 1,309 m^3/day.

[b] Serviced households/residential connections as reported by Town Billing.

[c] Based on the average of the annual maximum day flow for 2018, 2019 and 2020.

[d] Additional population and units that can be served without consideration of unconnected approved/committed units.

[e] As per County of Wellington Municipal Comprehensive Review Growth Allocations Memo (Watson & Associates, December 14, 2020).

TABLE 1.2
SUMMARY OF RESERVE CAPACITY CALCULATIONS (2021)
CLIFFORD SEWAGE TREATMENT WORKS
TOWN OF MINTO, ONTARIO

Item	Description	Units	Value	Note
(1)	Design Capacity of Sewage Treatment Works	m^3/d	500	As per MECP ECA No. 8901-A8YJ9C
(2)	Average Daily Flow (Sewage) (Average for 2018 - 2020) [(a)]	m^3/d	244	Refer to Table 1.4
(3)	Hydraulic Reserve Capacity (Surplus Treatment Capacity)	m^3/d	256	(1)-(2)
(4)	Existing Connected Population[(f)]	persons	943	(5)*(8)
(5)	Serviced Households/Residential Connections [(b)]	ERU	385	Refer to Table 1.6
(6)	Average Daily (Sewage) Flow per Capita [(c)]	m^3/person/d	0.259	(2)/(4)
(7)	Additional Population that can be Served [(d)]	persons	991	(3)/(6)
(8)	Existing Persons Per Equivalent Residential Unit (ERU)	persons/ERU	2.45	See Note (f)
(9)	Additional Units that can be Served [(d)]	ERU	404	(7)/(8)
(10)	Number of Unconnected Approved/Committed Units	ERU	46	Refer to Table 1.5
(11)	Uncommitted Hydraulic Reserve Capacity (Sewage) [(e)]	ERU	358	(9)-(10)

[(a)] Average daily flow is based on the annual total flow from all sewage sources (i.e., all types of land uses [residential, commercial, industrial, institutional, etc] and other flow sources [i.e., infiltration]) divided by the the number of days in the year. Average daily sewage flows as reported by Town of Minto.

[(b)] Serviced households/residential connections as reported by Town Billing.

[(c)] Non-residential sewage flow sources are included in the measured daily sewage flow, which will result in a more conservative evaluation of the uncommitted hydraulic reserve capacity.

[(d)] Additional population and units that can be served without consideration of unconnected approved/committed units.

[(e)] Uncommitted hydraulic reserve capacity does not consider organic reserve capacity or other performance characteristics of the sewage treatment works. Because the Average Daily Flow is estimated due to datalogging errors, the uncommitted hydraulic reserve capacity (sewage) should be noted to be approximately only.

[(f)] As per County of Wellington Municipal Comprehensive Review Growth Allocations Memo (Watson & Associates, December 14, 2020).

TABLE 1.3
SUMMARY OF MAXIMUM DAY FLOW
CLIFFORD DRINKING WATER SYSTEM
TOWN OF MINTO, ONTARIO

	Maximum Day Flow (m^3/day)			
	Calendar Year			
Month	**2018 (1)**	**2019 (1)**	**2020 (1)**	
January	276.4	329.2	274.3	
February	270.2	260.9	268.1	
March	256.3	244.5	251.5	
April	252.9	271.4	247.3	
May	276.4	275.9	334.7	
June	**475.3**	263.1	**382.8**	
July	307.2	331.1	357.3	
August	275.5	275.3	292.9	
September	256.3	**435.1**	245.7	
October	252.0	296.2	357.7	
November	243.6	335.5	287.6	**3-Year Average**
December	273.0	350.6	259.2	**Maximum Day Flow**
Max Maximum Day Flow	**475.3**	**435.1**	**382.8**	**431.1**

Notes:

(1) Drinking Water System data as reported by Town of Minto and manipulated by TESL to exclude anamolous data not representative of typical consumption such as watermain breaks, water tower and well maintenance, watermain and hydrant flushing, equipment malfunctions, etc.

TABLE 1.4
SUMMARY OF RAW SEWAGE FLOWS
CLIFFORD SEWAGE TREATMENT WORKS
TOWN OF MINTO, ONTARIO

Clifford Sewage Treatment Works [1]

		2018												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m3	9,539	9,236	8,390	11,620	8,500	6,176	5,600	5,524	5,039	5,726	7,873	9,423	92,646
Avg. day flow	m3/d	308	330	271	387	274	206	181	178	168	185	262	304	255
Max day flow	m3/d	487	717	354	598	346	257	210	219	209	224	316	409	717

		2,019												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m3	8,554	8,237	10,295	10,970	8,497	6,347	5,042	4,751	4,640	4,870	6,920	7,883	87,006
Avg. day flow	m3/d	276	294	332	366	274	212	163	153	155	157	231	254	239
Max day flow	m3/d	403	469	579	545	348	271	194	192	196	214	288	292	579

		2,020												
Raw Flows	**Units**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Summary**
Total	m3	10,517	7,373	11,771	8,444	7,571	5,881	5,098	5,102	4,732	5,612	6,776	8,400	87,277
Avg. day flow	m3/d	339	254	380	281	244	196	164	165	158	181	226	271	238
Max day flow	m3/d	909	324	826	351	304	220	205	198	201	250	268	375	909

ECA # 8901-A8YJ9C

500 **Design Capacity (m^3/day)**

2,151 **Peak Capacity (m^3/day)**

Summary [2]

88,976 **Average Annual Total (m^3)**

244 **Annual Average Daily Flow (m^3/d)**

909 **Max Daily Flow (m^3/d)**

Notes:

[1] Wastewater treatment data as reported by Town of Minto. This data is assumed to include all sewage sources (i.e., all types of land uses [i.e., residential, commercial, industrial, institutional, etc] and other flow sources [i.e., infiltration]).

TABLE 1.5
SUMMARY OF COMMITTED DEVELOPMENT (2021)
CLIFFORD
TOWN OF MINTO, ONTARIO

ID	Planned Development Information [1]		Total Units Developed (as of December 31, 2020)	Units Remaining [2] (Committed, Undeveloped)
	Planned Development Name	Total # of Units Approved		
1	Steever	**8**	**5**	**3**
2	Rick Murray	**5**	**2**	**3**
3	Town of Minto	**27**	**27**	**0**
4	Town of Minto	**2**	**0**	**2**
5	Deb Malto	**6**	**1**	**5**
6	Wightman	**5**	**0**	**5**
7	Field of Dreams	**13**	**13**	**0**
8	Available Vacant Serviced Lots & Infill Lots	**35**	**7**	**28**
	TOTAL (sum of 1 through 8)	**101**	**55**	**46**

Notes

(1) Serviced households/residential connections as reported by Town of Minto.
Note that the Available Vacant Serviced and/or Infilling Lots may not be representative of the maximum development potential (in terms of total units) for the property. For the purpose of hydraulic reserve capacity calculations, the totals provided in this table should be considered "draft estimates" to be reviewed and confirmed by the Town of Minto.

(2) Total Commited Development = Total Planned Development - Units Developed (to date)

TABLE 1.6
SUMMARY OF WATER AND SEWER CUSTOMERS (2021)
CLIFFORD
TOWN OF MINTO, ONTARIO

	Clifford [1]
	# of Connections
RESIDENTIAL	
Homes	336
Apartments (Total Units)	70
Total Residential Connections (Water and Sewer)	**406**
Residential Connections With Water Only, No Sewer	21
Residential Connections With Sewer Only, No Water	0
Total Residential Water Connections	**406**
Total Residential Sewer Connections	**385**
INDUSTRIAL, COMMERCIAL, INSTITUTIONAL (ICI)	
Municipal	8
Car Wash	1
Farms	5
Feed Mill	1
Garage	1
Businesses	14
Manufacturing	
Restaurants	4
Rest Homes & Boarding Houses	
School	
Hospital	
Total ICI Connections (Water and Sewer)	**34**
ICI Connections With Water Only, No Sewer	12
ICI Connections with Sewer Only, No Water	0
Total ICI Water Connections	**34**
Total ICI Sewer Connections	**22**
Total Water Connections: Residential + ICI	**440**
Total Sewer Connections: Residential + ICI	**407**

Notes:
[1] Serviced connections as reported by Town Billing.

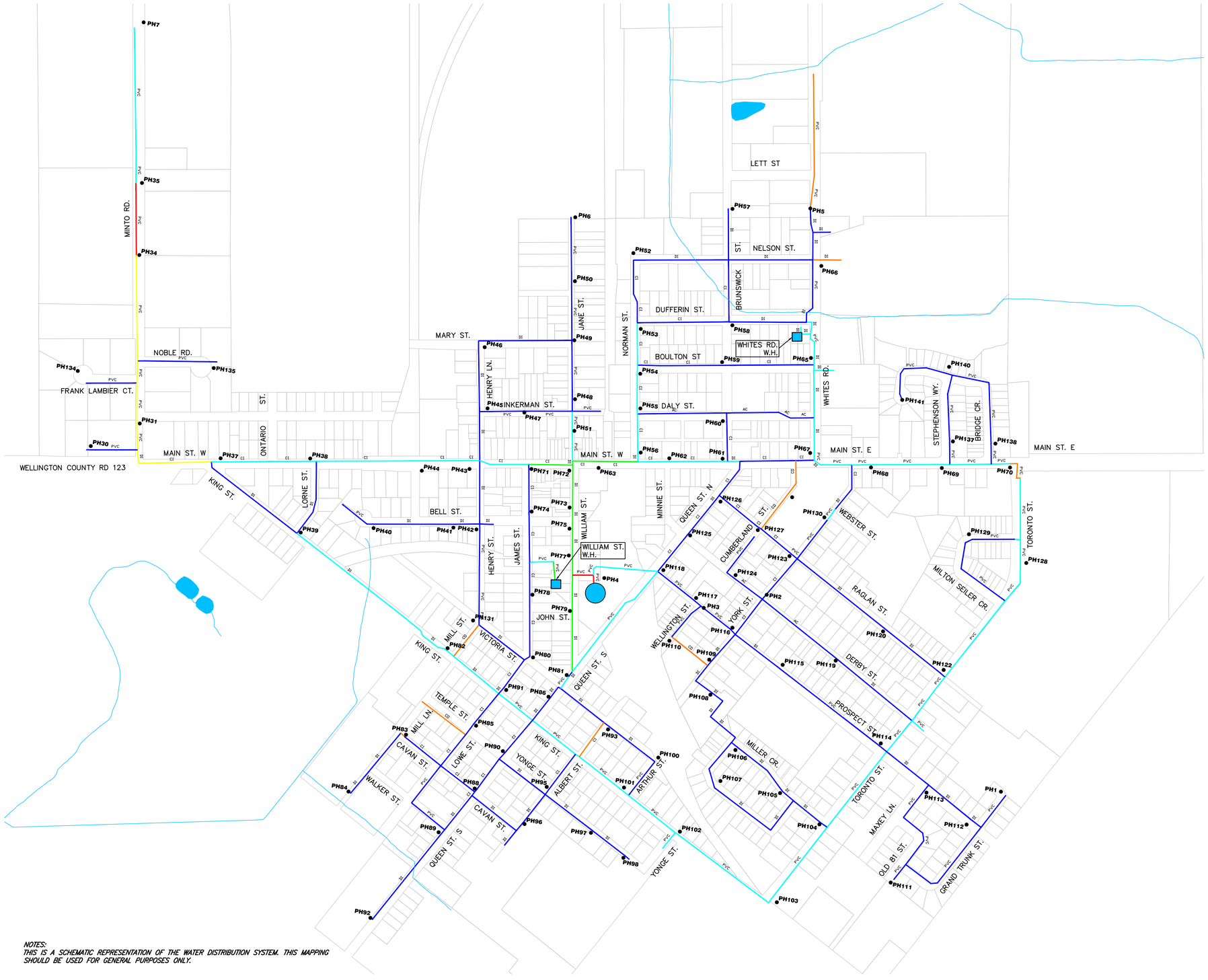
Appendix I

Water System Infrastructure Reference Plans

TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY



WATERMAIN DIAMETER

- 350mm
- 300mm
- 250mm
- 200mm
- 150mm
- ≤ 100mm

WATERMAIN MATERIAL

PVC	POLYVINYL CHLORIDE
CI	CAST IRON
DI	DUCTILE IRON
AC	ASBESTOS CEMENT
CO	COPPER

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)
- PH102 HYDRANT

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

PALMERSTON WATER SYSTEM

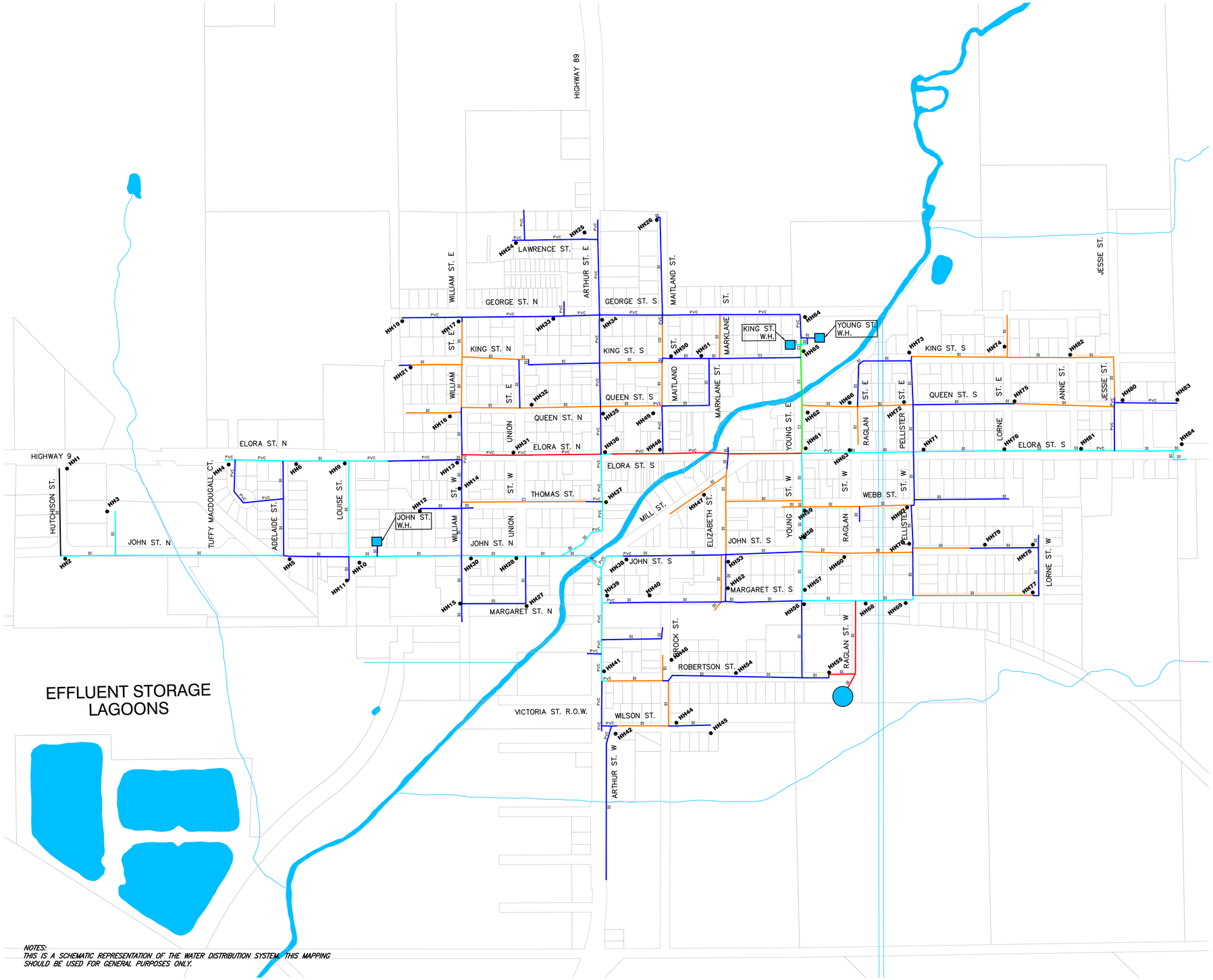
MARCH 2021
NOT TO SCALE
A3193

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY



WATERMAIN DIAMETER

300mm	
250mm	
200mm	
150mm	
≤ 100mm	

WATERMAIN MATERIAL

PVC	POLYVINYL CHLORIDE
CI	CAST IRON
DI	DUCTILE IRON
AC	ASBESTOS CEMENT
CO	COPPER

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)
- HH102 HYDRANT

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

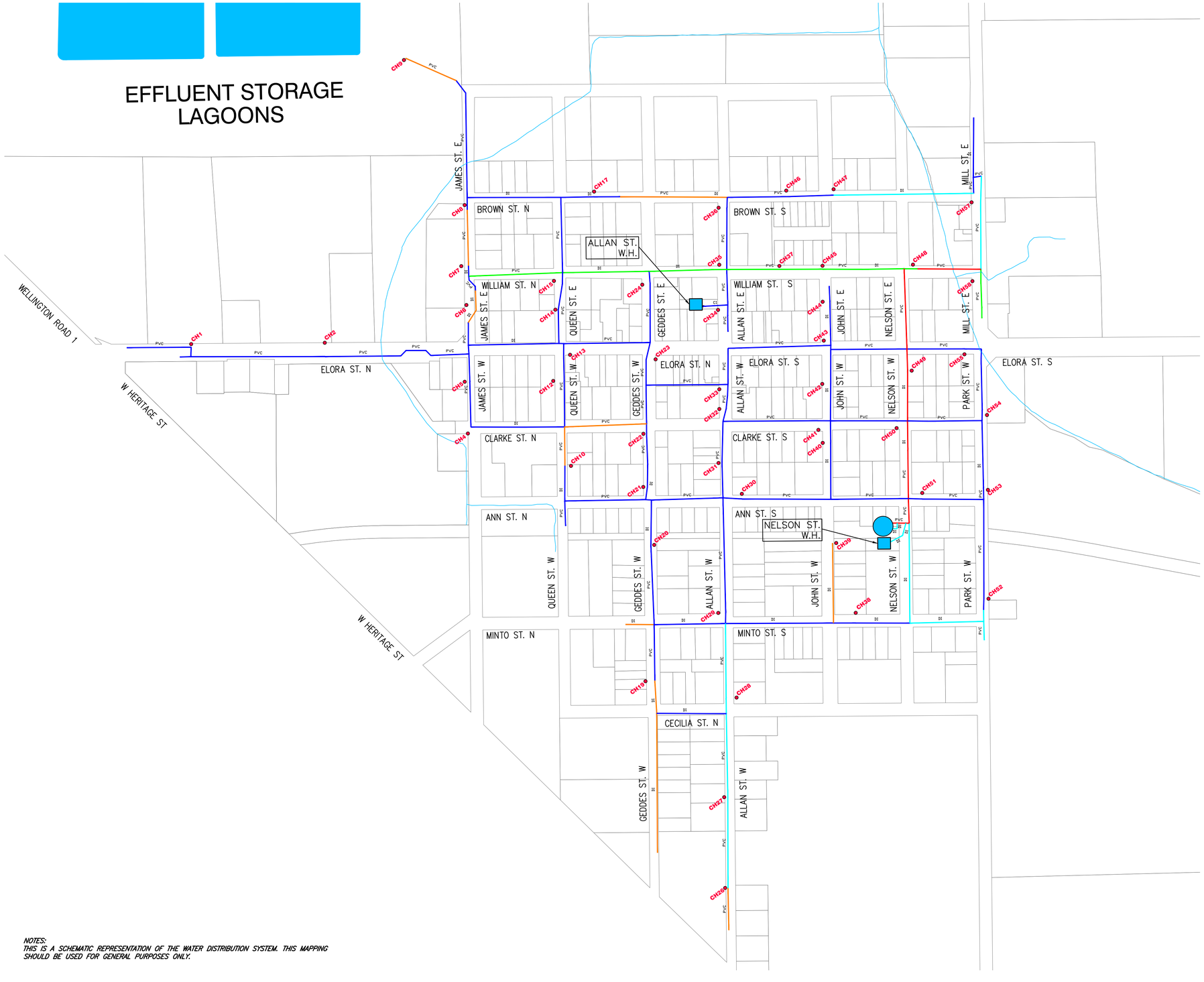
HARRISTON WATER SYSTEM

MARCH 2021
NOT TO SCALE
A3193

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

TOWN OF MINTO

EFFLUENT STORAGE LAGOONS



WATER AND SANITARY SERVICING STRATEGY

WATERMAIN DIAMETER		WATERMAIN MATERIAL	
300mm	PVC	POLYVINYL CHLORIDE	
250mm	CI	CAST IRON	
200mm	DI	DUCTILE IRON	
150mm	AC	ASBESTOS CEMENT	
≤ 100mm	CO	COPPER	

LEGEND

- WATER TOWER
- WELL HOUSE (W.H.)
- CH102 HYDRANT

FIGURE C-W.1

CLIFFORD WATER SYSTEM

EXISTING WATERMAIN SIZE & EXPECTED FIRE FLOW CAPABILITIES

NOT TO SCALE

A3193

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE WATER DISTRIBUTION SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

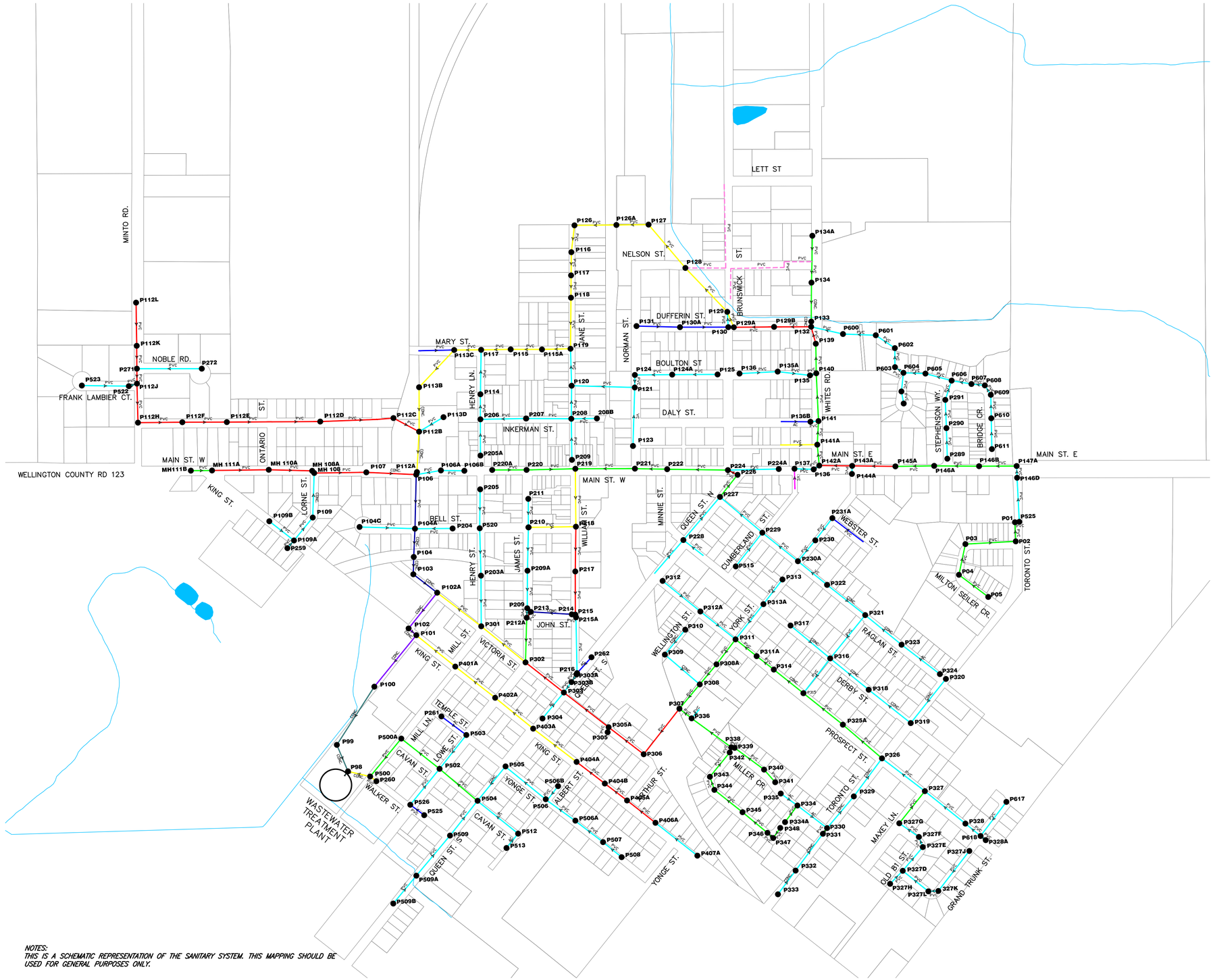
Appendix J

Sanitary System Infrastructure Reference Plans

TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY



SEWER SIZING

- 600mm
- 525mm
- 450mm
- 375mm
- 300mm
- 250mm
- 200mm
- 150mm
- ≤100mm
- 75mm FORCEMAIN

SEWER MATERIAL

- CONC. CONCRETE
- PVC POLYVINYL CHLORIDE
- AC ASBESTOS CEMENT
- VC VITRIFIED CLAY

LEGEND

- DIRECTION OF FLOW
- P120 MANHOLE ID

PALMERSTON SANITARY SYSTEM

MARCH 2021
NOT TO SCALE
A3198

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

TRITON ENGINEERING SERVICES LIMITED
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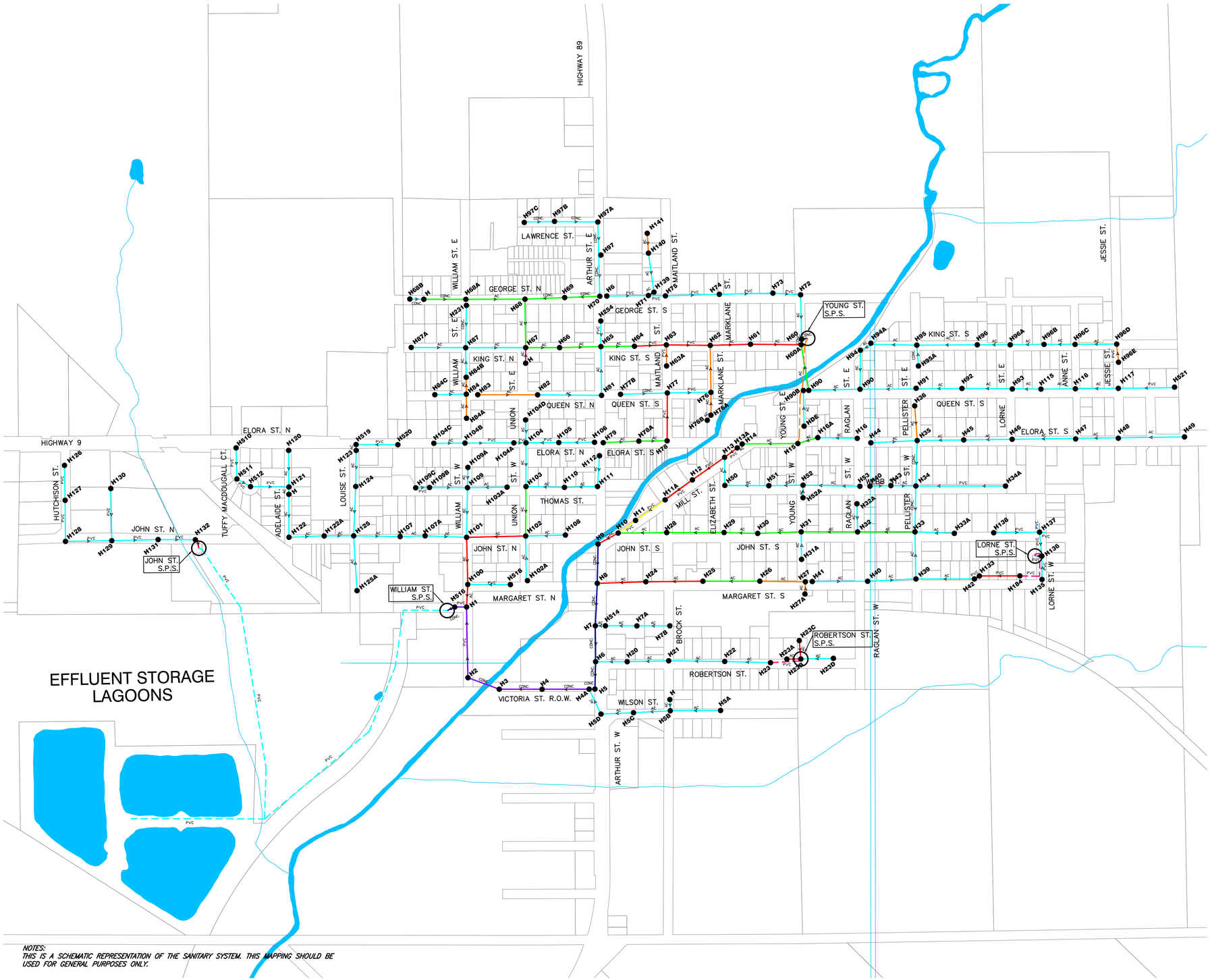
TOWN OF MINTO

Town of Minto
Where Your Family Belongs

WATER AND SANITARY SERVICING STRATEGY



NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

SEWER SIZING

- 525mm
- 450mm
- 375mm
- 300mm
- 250mm
- 200mm
- 150mm
- 100mm
- 200mm FORCEMAIN
- 150mm FORCEMAIN
- 100mm FORCEMAIN

SEWER MATERIAL

- CONC. CONCRETE
- PVC POLYVINYL CHLORIDE
- AC ASBESTOS CEMENT

LEGEND

- DIRECTION OF FLOW
- SEWAGE PUMPING STATION (S.P.S)
- ● H120 MANHOLE ID

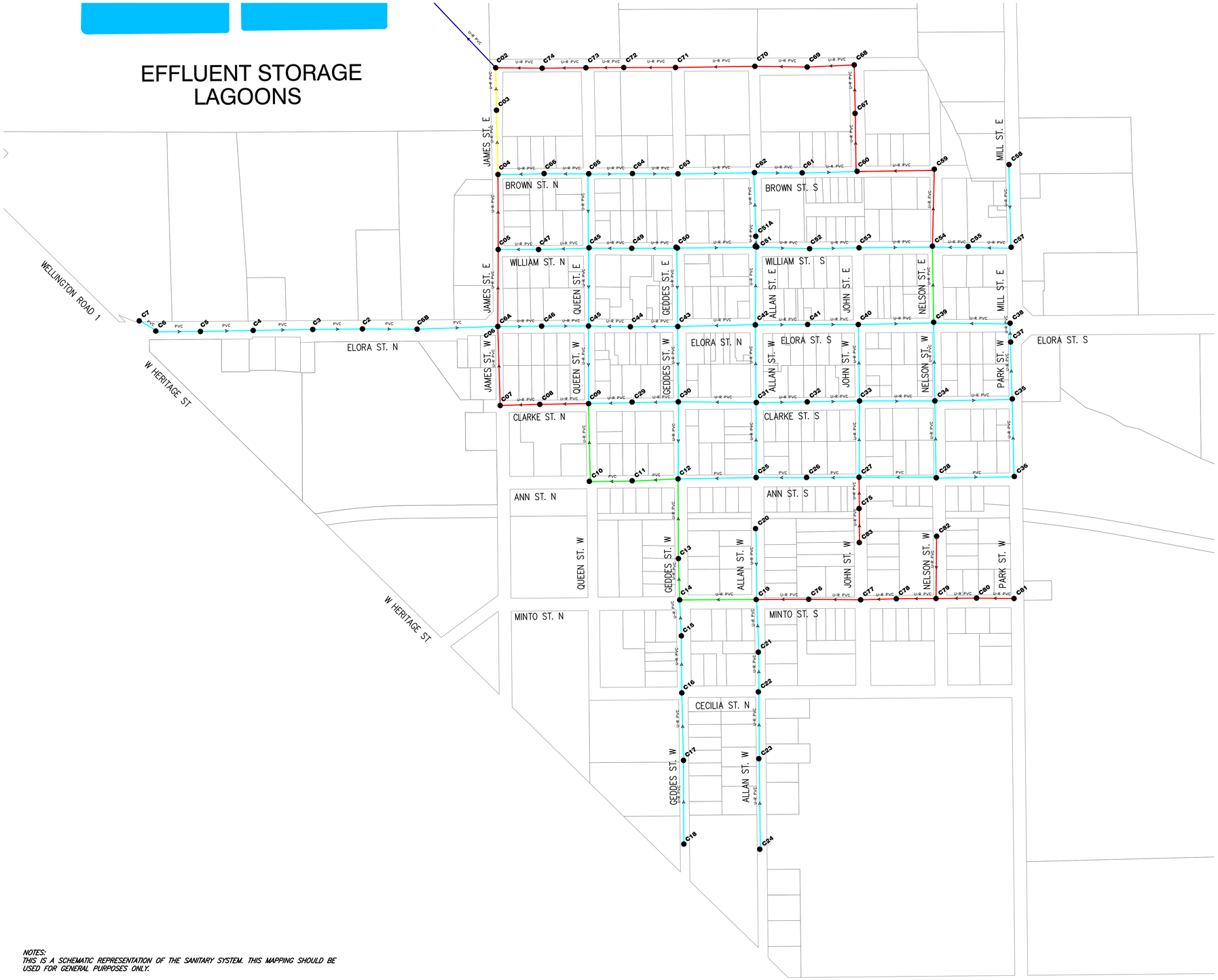
HARRISTON SANITARY SYSTEM

MARCH 2021
NOT TO SCALE
A3198

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

TOWN OF MINTO

EFFLUENT STORAGE LAGOONS



WATER AND SANITARY SERVICING STRATEGY

SEWER SIZING

- 450mm
- 375mm
- 300mm
- 250mm
- 200mm

SEWER MATERIAL

- PVC — POLYVINYL CHLORIDE
- U-R PVC — ULTRA-RIB PVC

LEGEND

- DIRECTION OF FLOW
- C120 — MANHOLE ID

CLIFFORD SANITARY SYSTEM

MARCH 2021
NOT TO SCALE
A3198

NOTES:
THIS IS A SCHEMATIC REPRESENTATION OF THE SANITARY SYSTEM. THIS MAPPING SHOULD BE USED FOR GENERAL PURPOSES ONLY.

TRITON ENGINEERING SERVICES LIMITED
Consulting Engineers

Appendix K

Detailed Lists of Recommended Water and Wastewater Capital Projects

Project ID	Project Name (Development ID)	Purpose for Project	Anticipated Timing of Development	Class EA Schedule	Size (mm) to be Provided	Approximate Length (m) of Project
PW1	Ontario St	Watermain Extension to service future development	2021-2031	A+	150	90
PW2	Future Road (West of Minto Rd)	Watermain Extension to service future development	2031-2041	A+	150	210
PW3	Brunswick St/Lett St	Watermain Extension and Looping	2031-2041	A+	150	260
PW4	Main St East	Watermain Extension to service future development	2041-2051	A+	150	340
PW5	Queen Street South	Watermain Extension to service future development	2041-2051	A+	150	90

Note:
*** -** Anticipated timing of development is based on expected timing of existing committed developments and anticipated future developments and is dependent on the status of developer applications and approvals by the municipality. Municipal works required to support the development should be implemented in advance of initiating internal (private) development works.

Project ID	Project Name	Description	Expected Time of Need*	Required Needs to be In Place By*	Class EA/Technical Studies Anticipated Initiation Timing	Class EA Schedule
PW6	Increase Source Capacity	Increase source capacity to provide adequate system redundancy	2031	2029	2022	B
PW7	Increase System Storage	Increase system storage to ensure sufficient fire storage	2041	2039	2029	B

Note:
***** - Expected time of need may change based on results of annual reserve capacity calculations. For planning purposes, the additional source capacity should be in place at least 2 years prior to the anticipated time of need. The Class EA should be initiated 10 years in advance of the expected time of need.

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Approximate Length (m)
PW8	Cavan St	Replace Existing ≤100 mm dia. Watermain, cast iron watermain and ductile iron watermain	During Reconstruction	A+	Mill Lane	to	Albert St	320
PW9	Temple St	Replace Existing ≤100 mm dia. Copper Watermain	During Reconstruction	A+	Mill Lane		Lowe St	120
PW10	Mill St	Replace Existing ≤100 mm dia. cast iron Watermain	During Reconstruction	A+	King St	to	Victoria St	90
PW11	Albert St	Replace Existing ≤100 mm dia. Watermain and copper, cast iron and ductile iron watermain	During Reconstruction	A+	40m S of Cavan St	to	Victoria St	340
PW12	Trailer Park Road	Replace Existing ≤100 mm dia. copper Watermain	During Reconstruction	A+	Wellington St	to	York St	100
PW13	Cumberland St	Replace Existing ≤100 mm dia. Watermain and cast iron watermain	During Reconstruction	A+	Queen St	to	Main St E	170
PW14	Toronto St & Main St E	Replace Existing ≤100 mm dia. Watermain	During Reconstruction	A+	40 m E of Bridge Crescent	to	30m S of Main St E	60
PW15	Nelson St	Replace Existing ≤100 mm dia. Watermain and ductile iron and asbestos cement watermain	During Reconstruction	A+	Brunswick St	to	40m E of Whites Rd	220
PW16	Whites Road	Replace Existing ≤100 mm dia. Watermain and ductile iron watermain	During Reconstruction	A+	Main St E	to	Dufferin St	390
PW17					Nelson St	to	80m S of Lett St	290
PW18	Main St E/Main St W	Replace Existing Cast Iron Watermain	During Reconstruction	A+	Minto Rd	to	Whites Rd	1,440
PW19	Norman St	Replace existing cast iron watermain	During Reconstruction	A+	Main St E	to	Nelson St	440
PW20	Brunswick St	Replace existing cast iron and ductile iron watermain	During Reconstruction		Dufferin St	to	90m S of Lett S	240
PW21				A+	Main St E	to	Daly St	110
PW22	Boulton St	Repace existing cast iron watermain	During Reconstruction	A+	Norman St	to	Whites Rd	380
PW23	Dufferin St	Replace existing cast iron and ductile iron watermain	During Reconstruction		Norman St	to	Whites Rd	360
PW24	Daly St	Replace existing asbestos cement watermain	During Reconstruction	A+	Norman St	to	Whites Rd	380
PW25	York St	Replace existing ductile iron and cast iron watermain	During Reconstruction	A+	York Mews	to	Raglan St	340
PW26					Webster St	to	Main St E	110
PW27	Queen St N	Replace Existing cast iron watermain	During Reconstruction	A+	Main St W	to	Prospect St	300
PW28	Mill Lane	Replace Existing Ductile Iron watermain	During Reconstruction	A+	Cavan St	to	Dead End	170
PW29	Lowe St	Cast Iron	During Reconstruction		Victoria St	to	Cavan St	290
PW30	Queen St S	Ductile Iron, Cast Iron	During Reconstruction	A+	250m S of Walker St	to	35m N of Victoria St	680
PW31	Raglan St	Replace cast iron and ductile iron watermain	During Reconstruction	A+	Queen St N	to	Toronto St	620
PW32	Derby St	Replace existing asbestos cement and ductile iron watermain	During Reconstruction	A+	Cumberland St	to	Toronto St	510
PW33	Prospect St	Replace existing ductile iron watermain	During Reconstruction	A+	York St	to	120m E of York St	120
PW34					Toronto St	to	Grand Trunk St	260
PW35	Miller Cres	Replace existing ductile iron watermain	During Reconstruction	A+	York St	to	Toronto St	650
PW36	Victoria St	Replace existing ductile iron watermain	During Reconstruction	A+	Mil St	to	Lowe St	130
PW37					Queen St S	to	Arthur St	260
PW38	Yonge St	Replace Existing ductile iron watermain	During Reconstruction	A+	Queen St S	to	Yonge St	350
PW39	James St	Replace existing cast iron watermain	During Reconstruction	A+	Victoria St	to	John St	150
PW40	James St	Replace existing cast iron watermain	During Reconstruction	A+	James St	to	James St Well House	100
PW41	William St	Replace existing cast iron and ductile iron watermain	During Reconstruction	A+	Queen St S	to	Main St W	440

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Approximate Length (m)
PW42	Henry St	replace existing ductile iron watermain	During Reconstruction	A+	Bell St	to	Main St W	140
PW43	Henry Ln	replace existing ductile iron watermain	During Reconstruction	A+	Main St W	to	Mary St	260
PW44	Mary St	Replace existing ductile iron watermain	During Reconstruction	A+	Henry Ln	to	Jane St	200
PW45	Bell St	Replace exising ductile iron watermain	During Reconstruction	A+	170m W of Henry St	to	30m E of Henry St	200
PW46	Lorne St	Replace exising ductile iron watermain	During Reconstruction	A+	Main St W	to	King St	170
PW47	King St	Replace exising ductile iron watermain	During Reconstruction	A+	Main St W	to	Mill St	670

Project ID	Project Name (Development ID)	Purpose for Project	Anticipated Timing of Development	Class EA Schedule	Size (mm) to be Provided	Approximate Length (m) of Project
HW1	Anne St and ROW	Extension and looping	2041-2051	A+	150	380
HW2	ROW east of Jessie St, between Elora St S and Queen St S	Looping	2041-2051	A+	150	100
HW3	Raglan St E	Looping	2041-2051	A+	150	20
HW4	Pellister St W	Extension	2041-2051	A+	150	50
HW5	Brock St/Mill St	Extension and looping	2041-2051	A+	150	100
HW6	Brock St	Extension and looping	2041-2051	A+	150	40
HW7	ROW North of Arthur St W	Extension	2041-2051	A+	150	120
HW8	Arthur St W and ROW	Extension	2041-2051	A+	150	170
HW9	William St E	Extension	2021-2031	A+	150	220
HW10	John St N	Extension	2021-2031	A+	150	100

Note:

*** -** Anticipated timing of development is based on expected timing of existing committed developments and anticipated future developments and is dependent on the status of developer applications and approvals by the municipality. Municipal works required to support the development should be implemented in advance of initiating internal (private) development works.

Project ID	Project Name	Description	Expected Time of Need*	Required Needs to be In Place By*	Class EA/Technical Studies Anticipated Initiation Timing	Class EA Schedule
HW11	Increase Source Capacity	Increase source capacity to provide adequate system redundancy	2031	2029	2022	B

Note:

***** - Expected time of need may change based on results of annual reserve capacity calculations. For planning purposes, the additional source capacity should be in place at least 2 years prior to the anticipated time of need. The Class EA should be initiated 10 years in advance of the expected time of need.

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Approximate Length (m) of Project
HW12	King St S	Replace Existing ≤100 mm dia. cast iron watermain	During Reconstruction	A+	Pellister St E	to	Jessie St	430
HW13	Lorne St E	Replace Existing ≤100 mm dia. ductile iron watermain	During Reconstruction	A+	King St S	to	dead end at ROW	90
HW14	Jessie St	Replace Existing ≤100 mm dia. ductile iron watermain	During Reconstruction	A+	Queen St S	to	King St S	90
HW15	Queen St S	Replace Existing ≤100 mm dia. ductile iron watermain	During Reconstruction	A+	Lorne St E	to	Jessie St	210
HW16	Queen St S	Replace Existing ≤100 mm dia. ductil iron watermain	During Reconstruction	A+	Yonge St E	to	Pellister St E	240
HW17	Raglan St	Replace Existing ≤100 mm dia. copper watermain	During Reconstruction	A+	Elora St S	to	Queen St S	90
HW18	Webb St	Replace Existing ≤100 mm dia. Watermain, cast iron watermain	During Reconstruction	A+	Elizabeth St	to	Pellister St W	390
HW19	Elizabeth St	Replace Existing ≤100 mm dia. cast iron and ductil iron watermain	During Reconstruction	A+	John St S	to	Mill St	170
HW20	John St S	Replace Existing ≤100 mm dia. cast iron and ductile iron watermain	During Reconstruction	A+	Young St W	to	120m E of Pellister St W	360
HW21		Replace existing cast iron watermain			40m E of Arthur St W	to	Young St W	380
HW22	Raglan St	Replace existing ductile iron watermain	During Reconstruction	A+	Webb St	to	40m S of Webb St	40
HW23	Mill St	Replace Existing ≤100 mm dia. ductile iron watermain	During Reconstruction	A+	Elora St S	to	Brock St	190
HW24	Margaret St S	Replace Existing ≤100 mm dia. Watermain	During Reconstruction	A+	Pellister St W	to	Lorne St W	260
HW25		Replace existing ductile iron watermain			Arthur St W	to	Young St W	430
HW26	Young St W	Replace existing cast iron and ductile iron watermain	During Reconstruction	A+	Robertson St	to	Elora St S	480
HW27	Robertson St	Replace Existing ≤100 mm dia. Watermain, cast iron and ductile iron watermain	During Reconstruction	A+	Arthur St W	to	60m E of Young St W	480
HW28	Brock St	Replace Existing ≤100 mm dia. Watermain, cast iron and ductile iron watermain	During Reconstruction	A+	Wilson St	to	60m N of Robertson St	150
HW29	Wilson St	Replace Existing ≤100 mm dia. Watermain, cast iron watermain	During Reconstruction	A+	Arthur St W	to	90m E of Brock St	210
HW30	Arthur St W	Replace existing cast iron watermain	During Reconstruction	A+	40m S of Wilson St	to	140m S of Wilson St	100
HW31	Marklane St	Replace Existing ≤100 mm dia. copper Watermain	During Reconstruction	A+	King St S	to	George St S	100
HW32	Maitland St	Replace Existing ≤100 mm dia. cast iron and copper Watermain	During Reconstruction	A+	Queen St S	to	George St S	200
HW33	King St S	Replace Existing ≤100 mm dia. copper Watermain	During Reconstruction	A+	Arthur St E	to	Maitland St	140
HW34	King St N	Replace Existing ≤100 mm dia. ductile iron and PVC Watermain	During Reconstruction	A+	Dead End	to	Uniton St E	250
HW35	Queen St S and Queen St N	Replace Existing ≤100 mm dia. pvc and cast iron Watermain	During Reconstruction	A+	Dead End	to	Maitland St	550
HW36	Thomas St	Replace Existing ≤100 mm dia. cast iron Watermain	During Reconstruction	A+	William St W	to	Arthur St W	280
HW37	William St E	Replace Existing ≤100 mm dia. cast iron Watermain	During Reconstruction	A+	Queen St N	to	George St N	210
HW38	Maitland St	Replace Existing 150 mm dia. cast iron Watermain	During Reconstruction	A+	George St S	to	Dead end	210
HW39	Young St W/Young St E	Replace Existing 200mm and 250 mm dia. cast iron Watermain	During Reconstruction	A+	Margaret St S	to	Young St Wellhouse	560
HW40	William St W/William St E	Replace Existing 150 mm dia. cast iron Watermain	During Reconstruction	A+	Margaret St N	to	Queen St N	410
HW41	John St N	Replace Existing 200 mm dia. cast iron Watermain	During Reconstruction	A+	John St Wellhouse	to	Arthur St W	470
HW42	King St S	Replace Existing 150 mm dia. cast iron Watermain	During Reconstruction	A+	Maitland St	to	Young St E	290
HW43	Elizabeth St	Replace Existing 100 mm and 150 mm dia. cast iron Watermain	During Reconstruction	A+	Margaret St S	to	John St S	110

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Approximate Length (m) of Project
HW44	Adelaide St	Replace Existing 200 mm dia. ductile iron Watermain	During Reconstruction	A+	John St N	to	Elora St N	200
HW45	John St N	Replace Existing 150 mm and 200 mm dia. ductile iron Watermain	During Reconstruction	A+	Adelaide St	to	John St Wellhouse	200
HW46	Young St W	Replace Existing 150 mm dia. ductile iron Watermain	During Reconstruction	A+	Robertson St	to	Margaret St S	170

Project ID	Project Name (Development ID)	Purpose for Project	Anticipated Timing of Development	Class EA Schedule	Size (mm) to be Provided	Approximate Length (m) of Project
CW1	Allan St East	Watermain Extension and Looping	2021-2031	A+	150	30
CW2	Queen St West	Watermain Extension to service future development	2021-2031	A+	150	300
CW3	James St West	Watermain Extension to service future development	2031-2041	A+	150	320
CW4	John St East	Watermain Extension and Looping	2041-2051	A+	150	30

Note:

*** -** Anticipated timing of development is based on expected timing of existing committed developments and anticipated future developments and is dependent on the status of developer applications and approvals by the municipality. Municipal works required to

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Approximate Length (m)
CW5	Brown St N	Replace Existing ≤100 mm dia. watermain.	During Reconstruction	A+	40m N of Geddes St E	to	Allan St E	140
CW6	James St E	Replace Existing ≤100 mm dia. Watermain	During Reconstruction	A+	35m E of Elora St N	to	20m W of William St N	60
CW7					20m E of William St N	to	20m W of Brown St N	90
CW8					10m NE of James St	to	30m SW of Lagoons	90
CW9	Clarke St N	Replace Existing ≤100 mm dia. Ductile Iron Watermain	During Reconstruction	A+	Queen St W	to	Geddes St W	130
CW10	Queen St W	Replace Existing ≤100 mm dia. watermain.	During Reconstruction	A+	Clarke St N	to	65m W of Clarke St N	70
CW11	Minto St N	Replace Existing ≤100 mm dia. Ductile Iron Watermain	During Reconstruction	A+	50m N of Geddes St W	to	Geddes St W	50
CW12	John St W	Replace existing ductile iron watermain	During Reconstruction	A+	Elora St S	to	70m W of Clarke St S	180
CW13	John St W	Replace Existing ≤100 mm dia. Watermain	During Reconstruction	A+	Minto St S	to	70m W of Ann St S	130
CW14	Geddes St W	Replace Existing ≤100 mm dia. Watermain	During Reconstruction	A+	55m E of Cecilia St N	to	220m W of Cecilia St N	280
CW15	Allan St Well House	Replace existing cast iron watermain	During Reconstruction	A+	Allan St E	to	Well House	40
CW16	Allan St W	Replace Existing ≤100 mm dia. Watermain	During Reconstruction	A+	280m W of Cecilia St N	to	350m W of Cecilia St N	70
CW17	John St E	Replace existing ductile iron watermain	During Reconstruction	A+	Elora St S	to	30m W of William St S	100

Project ID	Project Name (Development ID)	Purpose for Project	Anticipated Timing of Development	Class EA Schedule	Size (mm) to be Provided	Approximate Length (m) of Project
PS1	Minto Rd	Sanitary Sewer Extension to service future development	2021-2031	A+	200	500
PS2	Future Road (West of Minto Rd)	Sanitary Sewer Extension to service future development	2031-2041	A+	200	210
PS3	Brunswick St	Sanitary Sewer Extension to service future development	2031-2041	A+	200	260
PS4	Main St East	Sanitary Sewer Extension to service future development	2041-2051	A+	200	340
PS5	Lett St	Sanitary Sewer Extension to service future development	2041-2051	A+	200	170
PS6	SANMH P112A to P112C	Sanitary Sewer upgrade to service future development	2041-2051	A+	450	150
PS7	Queen Street South	Sanitary Sewer Extension to service future development	2041-2051	A+	200	130

Note:

*** -** Anticipated timing of development is based on expected timing of existing committed developments and anticipated future developments and is dependent on the status of developer applications and approvals by the municipality. Municipal works required to support the development should be implemented in advance of initiating internal (private) development works.

Project ID	Project Name	Description	Expected Time of Need*	Required Needs to be In Place By*	Class EA/Technical Studies Anticipated Initiation Timing	Class EA Schedule
PS8	Increase Treatment Capacity	Increase source capacity to provide adequate system redundancy	2031	2029	2022	B

Note:

***** - Expected time of need may change based on results of annual reserve capacity calculations. For planning purposes, the additional source capacity should be in place at least 2 years prior to the anticipated time of need. The Class EA should be initiated 10 years in advance of the expected time of need.

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Pipe Diameter (mm)	Approximate Length (m)
PS9	Norman St	Replace Exising Vitrified Clay sanitary sewer	During Reconstruction	A+	50m N of Main St W	to	30m S of Boulton St	200	130
PS10	Daly St	Replace Exising asbestos cement sanitary sewer	During Reconstruction	A+	90m E of Whites Rd		20m E of Whites Rd	150	70
PS11	Cumberland St	Replace Exising Vitrified Clay sanitary sewer	During Reconstruction	A+	Main St E	to	50m S of Main St E	150	50
PS12	Raglan St	Replace Exising Vitrified Clay sanitary sewer	During Reconstruction	A+	York St	to	80m E of York St	200	80
PS13		Replace Exising asbestos cement sanitary sewer			120m W of Toronto St	to	20m W of Toronto St	200	100
PS14	Miller Cres	Replace Exising asbestos cement sanitary sewer	During Reconstruction	A+	Toronto St	to	130m W of Toronto St	200	130
PS15	Temple St	Replace Exising asbestos cement sanitary sewer	During Reconstruction	A+	Lowe St	to	70m W of Lowe St	150	70
PS16	Cavan St	Replace Exising asbestos cement sanitary sewer	During Reconstruction	A+	Queen St S	to	40m S of Cavan St	200	150
PS17	Queen St S	Replace Existing asbestos cement sanitary sewer	During Reconstruction	A+	30m N of King St	to	Victoria St	200	80
PS18					William St	to	50m N of William St	150	50

Project ID	Project Name (Development ID)	Purpose for Project	Anticipated Timing of Development	Class EA Schedule	Size (mm) to be Provided	Approximate Length (m) of Project
HS1	Lorne St and ROW	Sanitary sewer extension	2041-2051	A+	200	150
HS2	Anne St	Sanitary sewer extension	2041-2051	A+	200	80
HS3	Pellister St W	Sanitary sewer extension	2041-2051	A+	200	70
HS4	ROW North of Arthur St W	Sanitary sewer extension	2041-2051	A+	200	70
HS5	Arthur St W and ROW	Sanitary sewer extension	2041-2051	A+	200	450
HS6	William St E	Sanitary sewer extension	2021-2031	A+	200	120
HS7	John St N	Sanitary sewer deepening and extension	2021-2031	A+	200	390

Note:

*** -** Anticipated timing of development is based on expected timing of existing committed developments and anticipated future developments and is dependent on the status of developer applications and approvals by the municipality. Municipal works required to support the development should be implemented in advance of initiating internal (private) development works.

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Size (mm)	Approximate Length (m)
HS8	King St S	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Arthur St E	to	70m E of Arthur St E	250	70
HS9					Marklane St		Young St E	300	200
HS10					Raglan St E		Jessie St	200	550
HS11	Marklane St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	King St S	to	70m S of Queen St S	200	170
HS12	Maitland St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	George St S	to	90m N of George St S	200	90
HS13					90m N of George St S	to	140m N of George St S	150	50
HS14	Young St E	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Elora St S	to	Young St S.P.S	150 Forcemain	230
HS15					30m N of Elora St S	to	Queen St S	200	80
HS16					Queen St S	to	King St S	250	100
HS17					King St S	to	Young St S.P.S	450	30
HS18					George St S	to	King St S	200	100
HS19	George St N	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	William St E	to	Union St E	250	130
HS20	King St N	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	120m W of William St E	to	Union St E	200	240
HS21					Union St E	to	Arthur St E	250	160
HS22	Queen St N	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	70m W of William St E	to	William St E	200	70
HS23					20m E of William St E	to	30m E of Union St E	150	130
HS24					30m E of Union St E	to	Arthur St E	200	140
HS25	Union St E	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	40m S of King St S	to	King St S	100	40
HS26					King St S	to	George St N	250	110
HS27					Elora St N	to	50m N of Elora St N	200	50
HS28	Adelaide St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Elora St N	to	John St N	200	190
HS29	Louise St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Elora St N	to	120m S of John St N	200	310
HS30	William St W	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	50m N of Thomas St	to	John St N	200	150
HS31					John St N	to	50m S of Margaret St N	300	150

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Size (mm)	Approximate Length (m)
HS32	John St N	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Adelaide St	to	William St W	200	380
HS33					William St W	to	Union St W	300	130
HS34					Union St W	to	90m E of Union St W	200	90
HS35	Union St W	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Margaret St	to	John St N	200	100
HS36					John St N	to	Thomas St	250	110
HS37					Thomas St	to	Elora St N	200	100
HS38	Thomas St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	80m W of William St W	to	90m E of William St W	200	170
HS39					Union St W	to	Arthur St W	200	160
HS40	Elora St N	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	70m W of William St E	to	William St E	200	70
HS41	Arthur St E	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Queen St S	to	King St S	200	110
HS42	Arthur St W	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	70m N of Thomas St	to	Thomas St	200	70
HS43					Wilson St	to	Victoria St R.O.W.	200	60
HS44	Elora St S	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Arthur St E	to	Mailtand St	250	140
HS45					Mill St	to	30m E of Young St	250	180
HS46					30m E of Young St	to	Raglan St	200	90
HS47					20m E of Raglan St	to	140m E of Jessie St	200	660
HS48	R.O.W.	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Arthur St W	to	Brock St	200	160
HS49	Wilson St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Arthur St W	to	110m E of Brock St	200	260
HS50	Robertson St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Arthur St W	to	220m E of Brock St	200	370
HS51					250m E of Brock St	to	120m W of Raglan St W	300	70
HS52					120m W of Raglan St W	to	50m W of Raglan St W	200	70
HS53	Margaret St S	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Arthur St W	to	70m E of Brock St	300	230
HS54					70m E of Brock st	to	50m W of Elizabeth St	250	120
HS55					70m E of Elizabeth St	to	Young St W	150	130
HS56					20m E of Young St W	to	130m E of Pellister St W	200	350

Project ID	Project Name	Description	Year Required	Class EA Schedule	Location			Size (mm)	Approximate Length (m)
HS57	John St S	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Mill St	to	Pellister St	250	630
HS58					Pellister St	to	90m E of Pellister St	200	90
HS59	Young St W	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	30m S of Webb St	to	Webb St	200	30
HS60					60m S of John St S	to	John St S	200	60
HS61	Mill St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Elora St S	to	120m E of John St S	300	200
HS62					120m E of John St S	to	John St S	375	120
HS63	Elizabeth St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Mill St	to	Webb St	200	60
HS64	Webb St	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Elizabeth St	to	Raglan St W	200	290
HS65					20m E of Raglan St W	to	Pellister St W	200	100
HS66	Raglan St W	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	John St S	to	30m S of Webb St	200	60
HS67	Pellister St W	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Margaret St S	to	John St S	200	100
HS68	Raglan St E	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Queen St S	to	King St S	200	90
HS69	Pellister St E	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Elora St S	to	30m S of Queen St S	150	80
HS70					King St S	to	50m N of Queen St S	200	50
HS71	Queen St S	Replace existing asbestos cement sanitary sewer	During Reconstruction	A+	Young St E	to	Jessie St	200	670

Project ID	Project Name (Development ID)	Purpose for Project	Anticipated Timing of Development	Class EA Schedule	Size (mm) to be Provided	Approximate Length (m) of Project
CS1	Queen St West	Sanitary sewer extension	2021-2031	A+	200	30
CS2	Park St West	Sanitary sewer extension	2041-2051	A+	200	160
CS3	James St West	Sanitary sewer extension	2041-2051	A+	200	320
CS4	Queen St West	Sanitary sewer extension	2041-2051	A+	200	230

Note:

*** -** Anticipated timing of development is based on expected timing of existing committed developments and anticipated future developments and is dependent on the status of developer applications and approvals by the municipality. Municipal works required to support the development should be implemented in advance of initiating internal (private) development works.