![Port Colborne logo] PORT COLBORNE

Subject: **Infrastructure Needs Study**

To: **Council**

From: **Public Works Department**

Report Number: 2024-51

Meeting Date: April 9, 2024

Recommendation:

That Public Works Department Report 2024-51 be received.

Purpose:

The City of Port Colborne initiated the Infrastructure Needs Study (INS) for core infrastructure assets which includes Roads, Sidewalks, Guiderails, Bridges, Large Diameter Culverts, Water, Stormwater, and Wastewater systems. Through a tendering process, GM Blue Plan Engineering (GMBP) was retained to facilitate the project and develop an actionable road map, including implementation schedules and financial projections for core infrastructure needs. Key objectives of the project include condition assessments, current and future needs based on condition ratings and anticipated growth demands and a sustainable implementation plan.

Background:

- The Infrastructure Needs Study (INS) report and recommendations are attached in Appendix A. The report includes a summary of condition assessments for each of the core assets, required lifecycle maintenance activities and an actionable multi-year sustainable improvement plan that addresses current and future needs including anticipated growth and development demands.

- It should be noted that several recommendations from the INS have been implemented during the duration of the project as information and findings have been made available to City staff. The following is a summary of the findings and recommendations for each of the core assets.

Discussion:

The Infrastructure Needs Study included condition assessments for each of the City's core assets. Results from the assessments were used to obtain current condition ratings, lifecycle activities required to adequately maintain them, and an actionable multi-year sustainable improvement plan that includes the City's anticipated growth and development demands.

It should be noted that several recommendations from the INS have already begun by staff during the duration of the project. The following is a summary of each of the assets, project findings, and recommendations outlined in the study's final report attached as Appendix A.

Road Network

Background

The City's Road Network consists of approximately 235 centerline-kms or 448 lane-kms of roadways, consisting of hot mix, surface treated, and gravel surfaces. The objectives of the analysis was to develop a long-term road reconstruction and maintenance program.

Analysis

A network-wide road condition assessment was conducted using Ministry of Transportation (MTO) rating methodologies based on roadway surface type which resulted in a Pavement Condition Index (PCI) rating for each road segment.

PCI rating values range between 0 and 100, with a higher value indicating a better condition and a lower value indicating a worse condition as shown in the table below. The PCI rating is based on a visual survey that assesses the number and types of deficiencies. Survey results for both hard top and gravel roads have an overall "Good" condition rating with average PCI scores of 74.3 and 71.2 respectively.

PCI Condition Categories

| Condition Category	PCI Range	Percentage of Road in each Condition Category
Very Good	80-100	37%
Good	67-80	35%
Fair	55-67	21%
Poor	35-55	7%
Very Poor	0-35	0%

The findings presented in this INS report are designed to function as a decision-making tool for shaping the City's annual road maintenance and rehabilitation program. The INS study evaluated and compared several program strategies to assess the relative

effectiveness and feasibility of the maintenance and rehabilitation needs identified through the pavement condition assessments.

The INS report includes evaluations of the four following scenarios over a period of 10 years:

1. "Do Nothing" - assumes no maintenance or rehabilitation work will be done on the roads over the next 10 years.

2. "Unlimited Budget" - assumes all current maintenance and rehabilitation needs will be performed in 2023 and in future years when a road section's PCI score reaches the Preventative Maintenance threshold (PCI=90)

3. "Maintain Current Funding Plan" – assumes a 20% annual increase

   - Maintenance Budget at $150,000
   - Rehab Program at $1,286,500 in 2023.
   - *the PCI ratings would decrease to approximately 65*

4. "Maintain Current PCI=74" - determines the annual funding requirement to maintain the current average PCI of 74.

   - Through data analysis it was determined that an annual budget of approximately $2,600,000 is required to maintain the road network at current PCI rating levels.

The results of the funding scenarios are presented graphically below:

Budget Impacts on Network PCI
"Hard Top" Roads
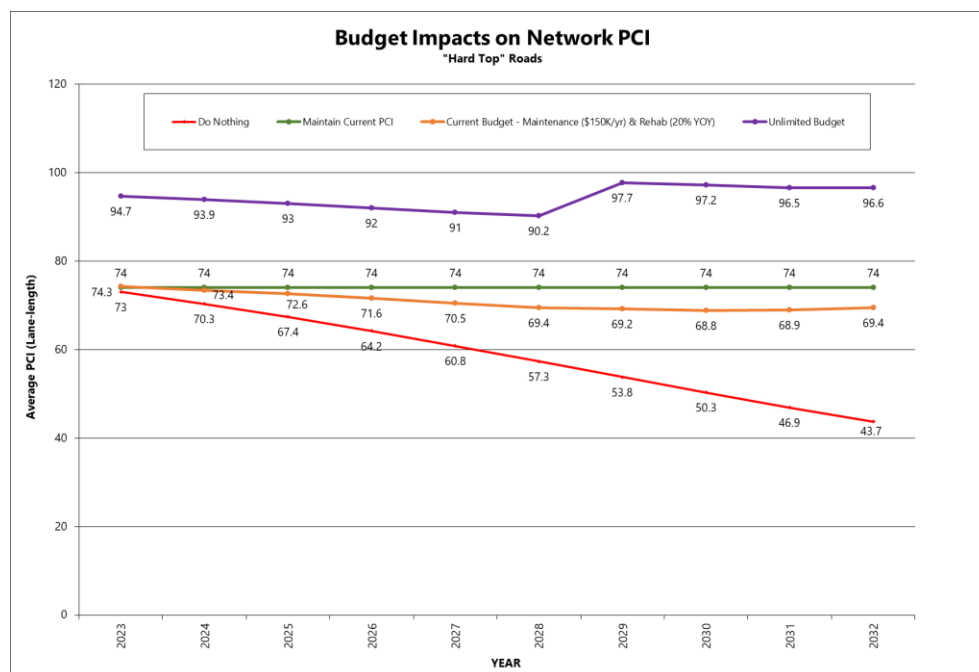
Road Network - Recommendations and Next Steps

Based on a review of each of the scenarios along with the information included in the INS report, staff recommend the following:

1. The "Maintain Current Funding Plan" scenario be supported which includes an annual maintenance budget of **$150,000** and rehabilitation program of **$1,286,500 in 2023 plus an additional 20% increase annually**. See Appendix B for the Maintenance and Rehab Needs program.

2. To ensure the road maintenance and rehabilitation program remains current and up to date, based on industry standards, it is recommended that condition surveys be completed every 2 to 3 years using consistent methodologies that provide objective and comparable results.

3. Staff complete a thorough review of selected road segments each year. Specific road segments may be deferred or advanced due to various factors including budgetary considerations, changes in traffic patterns, or the prioritization of other critical infrastructure projects. The review allows the City to adapt its program dynamically, ensuring that resources are allocated effectively and ensures all priorities are being addressed.

By approving the recommendations listed above, staff anticipate exceeding the goal set in the City's 2023 – 2026 Strategic Plan stipulating that **all roads to have a pavement condition rating greater than or equal to 35 by the year 2030.**

Sidewalk Network

Background

The City of Port Colborne owns and maintains approximately 98 kms of sidewalks that vary in age and condition with 85% of the network constructed prior to 1960. Sidewalks are part of the City's transportation system and require annual inspections for surface discontinuities in accordance with the Minimum Maintenance Standards.

Analysis

An inventory and condition assessment were completed for each segment as part of the study. The assessment included a rating based on a scale of 0 to 5 as described in the table below. A total of 6,004 defects were recorded with 91% considered to be minor in nature. Furthermore, 74 major vertical deflections were found, all of which have been addressed through the City's annual sidewalk repair and replacement program.

Grade	Description	Representative Photo	Number of Deficiencies Observed
0	No Defects		43
1	Horizontal or Vertical Cracking, Spalling, or Other Surface Defects		3,232
2	Broken off or Missing Portions		437
3	Depression or Rolling Areas		1,005
4	Vertical Displacement (minor)		1,089
5	Vertical Displacement (major)		92

In accordance with the Minimum Maintenance Standards, if a surface discontinuity on or within a sidewalk exceeds two centimetres, the standard is to treat the surface discontinuity within 14 days after acquiring actual knowledge of the fact. Treating a surface discontinuity on or within a sidewalk means taking reasonable measures to protect users of the sidewalk from the discontinuity. This includes making permanent or temporary repairs, alerting users' attention to the discontinuity, or preventing access to the area of discontinuity.

The City's current sidewalk program has a budget of $600,000. Based on current replacement costs staff anticipate approximately 2-3 kms of new or replacement sidewalk annually while also completing repairs in various areas as required.

Sidewalk Network - Recommendations and Next Steps

- All Immediate repairs will be addressed through the annual sidewalk replacement budget which include all defects found with a score of 5 along with many of the high priority scores of 4 depending on the proximity of these defects to high activity pedestrian areas (downtown) or locations with a greater likelihood of frail seniors (care homes, for example), persons with disabilities, or schools.

- Upgrade sidewalks to current standards for accessibility and width, including sidewalks with missing ramps. Upgrades of each sidewalk segment will be considered during all future capital infrastructure projects. This practice will reduce mobilization costs and disturbances to properties.

- Development of a comprehensive sidewalk replacement program incorporating high pedestrian traffic areas including downtown core, school zones, churches, parks, and missing links. The program should also consider the need for streets having sidewalks on both sides that only require one or none. Removing the unnecessary assets will reduce maintenance costs, replacement costs, and future liability. The program will also be incorporated in the Active Transportation Master Plan and Engineering Standards Update projects upon completion.

Based on the recommendations and current annual budget of $600,000, staff recommend maintaining the current annual budget.

Guiderails

Background

The City owns and maintains approximately 4,500 meters of guiderail that vary in age and condition. The study included a detailed inspection examining each guiderail and assigning a defect rating on a scale of 0 to 5 as follows.

Grade	Description
0	No Defects
1	Excellent Condition
2	Good Condition
3	Fair Condition

4	**Poor Condition**
5	**Immediate attention required**

Analysis

The defects were scored by component such as post, cable, or rail, as applicable, along with a written observation of the deficiency. Defects observed were estimated to determine an overall score. Maps were created highlighting guiderails in need of replacement based on condition and current standards. Any guiderail in poor condition has been recommended for full replacement as it is generally not cost-effective to spot repair these assets.

The total estimated cost to address short term and long term needs is $160,200 based on current replacement costs. The following table provides a breakdown of the identified needs.

Timeline	Score	Length (m)	Cost
Immediate	**4 & 5**	**186**	**$48,300**
3-5 years	**3**	**139**	**$36,200**
5+ years	**1 & 2**	**291**	**$75,700**

Staff initiated a replacement program addressing both the immediate and 3 to 5 year needs through the 2024 capital budget process. A total of $90,000 was allocated for the removal and replacement of 325 meters of guiderail. Staff issued a tender to complete the work in February 2024 and anticipate construction to commence in May 2024.

Guiderails - Recommendations and Next Steps

Recommendations include the replacement of all immediate and 3-5 year needs.

Bridges and Culverts

Background

The City of Port Colborne owns and maintains a total of 2 bridges and 26 large culvert structures that require inspections every two years under the requirements set out in the Ontario Structure Inspection Manual (OSIM). Bridges and culverts are used to support the City's transportation network by providing crossings over waterways and facilitating drainage. It is important to note that smaller drainage culverts that are typically used for driveways are not included in this asset class.

Analysis

Inspections for each of the structures were completed as part of the study and inspection scores were based on the Bridge Condition Index (BCI) rating which provides a numerical value that reflects the condition. The BCI rating typically ranges from 0 to 100, with higher values indicating a better overall condition.

BCI ratings from the inspections of the study ranged between scores of 31 to 98 with an overall average rating of 67. Staff reviewed the results and developed a replacement

and rehabilitation program that addresses the recommendations listed in the inspection reports.

Based on the approval and implementation of the 5-year plan presented below the City will achieve the goals set out in the 2023 – 2026 Strategic Plan, that **all bridges and culverts have a BCI rating greater than or equal to 41 by 2030.**

Bridges and Culverts - Recommendations and Next Steps

The following 5-year plan shown in the table below provides a summary of the replacement and rehabilitation needs identified in the reports including estimated costs.

Year	Capital Project	Estimated Cost based on OSIM Report
2023	Engineering & Design	$50,000 (funding approved in 2023)
2023	Construction and rehab of Eagle Marsh, Black Creek Drain, and Wignell Drain structures	$105,000 (funding approved in 2023)
2024	Engineering & Design	$40,000 (funding approved in 2024)
2024	Replacement of Michener and Hopf-Wagner	$570,000 (funding approved in 2024)
2025	Engineering & Design	$50,000
2025	Construction and rehab of Wignell, Indian Creek, Black Creek and Biederman	$200,000
2026	Engineering & Design	$50,000
2026	Construction and rehab of Beaverdam and Eagle Marsh	$240,000
2027	Engineering & Design	$50,000
2027	Construction & rehab repair for Lyons Creek	$30,000

Water System

Background

The City of Port Colborne owns, operates, and maintains approximately 112 kms of watermain that supply potable drinking water. The City's distribution system receives water from the Region of Niagara who draws water from the Welland Canal. Both City and Region systems are strictly regulated by the Ontario Ministry of Environment, Conservation and Parks (MECP) under the Safe Drinking Water Act (2002) to ensure the delivery of safe drinking water to the system's users.

While a few kilometers of watermains date back to the 1920s, about 50% of the system was constructed from the 1970's through the 1990's. Approximately 35% of the system is cast or ductile iron, which is more susceptible to corrosion, leaks and breaks compared to polyvinyl chloride (PVC). City-owned watermain sizes range from 100mm to 300mm in diameter.

The intention of the study provides strategies to improve management of the system and prioritize recommended capital projects. The condition assessment of the water system was primarily based on the age of the asset in comparison to the estimated service life (ESL). A condition score was assigned to each asset and grouped into five condition categories ranging from Very Good to Very Poor as shown in the figure below.

Analysis

While most of the water network falls into the Fair or Good condition, there is a large percentage that fall into Very Poor. The assets in the Very Poor range are assets that are continuing to work beyond their ESL. Compared to other infrastructure such as sewers and roads, it is difficult and costly to attain actual condition data of watermains, which is why the age-based assessment is utilized by most municipalities. This study used age, however, also included watermain break data and the use of the City's hydraulic model to develop the needs program. The hydraulic model analysis further enhanced the prioritization of watermain replacement by highlighting areas with likely fire flow deficiencies.

The watermain replacement analysis recommended budgeting approximately **$59,186,000** of watermain construction, which includes watermain upsizing and a detailed replacement schedule like for like, to meet the performance objectives.

The existing water hydraulic model was used to complete an assessment of the system's capacity and development of a servicing strategy to accommodate the anticipated residential and employment growth. The capital program is estimated in the amount of **$46,082,100** and was developed with the collaboration of the City's economic development and planning divisions. The data and assessments have been included as part of the City's Development Charge Study currently in progress.

The goal set in the City's 2023 – 2026 Strategic Plan is for all water assets to have a remaining asset life of 20% or greater by 2040. To achieve the goal, a total estimated cost of $96 million is needed.

The tables and figures below demonstrate the improving condition of the system over time to the 2040 target.

			Watermain Conditions Progressing through Asset Replacement Plan																		
			2024		**2025**		**2026**		**2027**		**2028**		**2029**		**2030**		**2031**		**2032**		**2033**	
			Meters	%	Meters	%	Meters	%	Meters	%	Meters	%	Meters	%	Meters	%	Meters	%	Meters	%	Meters	%
	Very Good	80%	12,179	11%	12,599	11%	13,733	12%	14,496	13%	15,671	14%	15,910	14%	17,821	16%	18,541	17%	17,527	16%	19,119	17%
	Good	60%	27,923	25%	27,095	24%	24,530	22%	24,570	22%	23,429	21%	23,911	21%	17,739	16%	16,196	14%	16,791	15%	17,297	15%
Condition	Fair	40%	27,184	24%	28,334	25%	30,734	27%	31,151	28%	32,538	29%	33,259	30%	38,085	34%	39,558	35%	38,441	34%	34,442	31%
	Poor	20%	2,952	3%	2,348	2%	2,439	2%	2,189	2%	1,565	1%	1,775	2%	2,895	3%	3,869	3%	6,532	6%	10,732	10%
	Very Poor	0%	41,601	37%	41,463	37%	40,404	36%	39,433	35%	38,636	35%	36,985	33%	35,301	32%	33,676	30%	32,549	29%	30,249	27%

			Watermain Conditions Progressing through Asset Replacement Plan													
			2034		**2035**		**2036**		**2037**		**2038**		**2039**		**2040**	
			Meters	%	Meters	%	Meters	%	Meters	%	Meters	%	Meters	%	Meters	%
	Very Good	80%	19,276	17%	22,539	20%	27,075	24%	31,687	28%	35,376	32%	38,592	35%	41,890	37%
	Good	60%	16,260	15%	15,101	14%	14,018	13%	13,109	12%	13,376	12%	13,478	12%	14,069	13%
Condition	Fair	40%	35,920	32%	35,878	32%	35,021	31%	33,506	30%	34,084	30%	32,424	29%	31,108	28%
	Poor	20%	12,598	11%	13,693	12%	16,119	14%	18,562	17%	19,501	17%	21,801	19%	23,672	21%
	Very Poor	0%	27,786	25%	24,629	22%	19,607	18%	14,976	13%	9,503	8%	5,544	5%	1,100	1%

Watermain Condition Breakdown
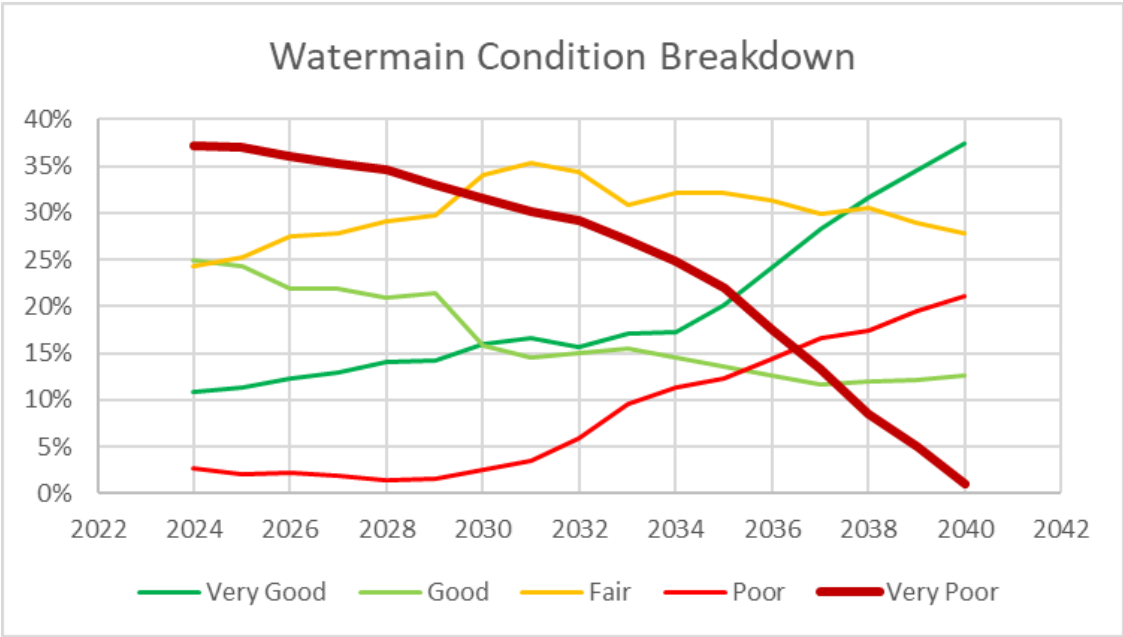
<u>Water Network - Recommendations and Next Steps</u>

The recommendations included in the INS provide a strategy to enhance the system's overall performance, address water losses, meet the needs of the City's Asset Management legislative requirements, and address future growth demands while improving the system's reliability and maintaining regulatory compliance. Staff have reviewed the recommendations and are requesting Council's financial support and approval for the following:

Data Collection & Studies

1. Water Master Plan

   Similar to the ongoing Wastewater Pollution Prevention Control Plan (PPCP), the City must undertake a Water Servicing Master Plan, which should be updated every five years. The previous water master plan is almost 10 years old and recommended for update in 2024. The data and information resulting from the project will also provide a more accurate condition assessment of the system, which will be based on up-to-date C-factor testing and modelling. The project will consist of the following entities:

   - Hydrant Flow and C-Factor Testing and Model Calibration
   - District Metering Assessment
   - Technical Analysis
   - Environment Assessment (report and PIC)

   Additional recommendations include the alignment of future water master plans with wastewater and stormwater as a single combined study, which will allow for efficiencies, cost savings, and corridor planning.

   Budget request of $250,000 in 2024.

2. Artificial Intelligence Leak Detection

   Staff have researched opportunities and innovative solutions to help reduce water losses through the system. The artificial intelligence devices measure pressure, acoustics, and monitors for transient pressure events and leaks in the water system. This leak detection technology provides an innovative solution to finding leaks and reducing water loss. The estimated cost to purchase and install each device is $15,000. Staff recommend implementing a total of 10 devices in 2024.

   Budget request of $150,000 in 2024.

3. Satellite Imagery Leak Detection

   Recent studies have proven that the use of satellite imagery technology can be an effective solution in identifying water losses throughout the system. Satellite

imagery for leak detection uses satellites to collect microwave-based images of an area which are processed by proprietary algorithms to identify underground leaks from a drinking water system. Leaks identified during post-processing are sent for follow-up investigation by a leak investigation crew. Staff can then conduct further leak detection efforts on the ground in the specific locations and dig to the main to correct the issue. Staff are recommending the implementation of the satellite imagery leak detection program in 2024.

Budget request of $50,000 in 2024.

Capital Projects

1. <u>Watermain Replacement Program ($740,000)</u>

   Implementation of a replacement program, targeting 100mm to 150mm cast iron watermain in areas with the largest fire flow deficiencies. To achieve construction activities in 2025, staff are requesting funding to complete the geotechnical and design aspects of the proposed 2025 and 2026 watermain replacement projects in year. The projects will be funded from the Water Reserve and begin upon approval of this report. The locations include:

   <u>2025 Replacement Program (Geotechnical & Design - $275,000)</u>
   - North Crescent – 245m
   - South Crescent – 235m
   - Ash Street – 95m
   - Jefferson Street – 165m

   <u>2026 Replacement Program (Geotechnical & Design - $465,000)</u>
   - Schofield Avenue – 640m
   - Hampton Avenue – 600m

Operating Budget

1. Subject Matter Expert fees of **$30,000** annually to support the water system upgrades and provide strategic advisory services.

Stormwater System

<u>Background</u>

The City's stormwater collection system consists of a mix of urban and semi-urban design comprised of approximately 105 kms of storm sewers along with a series of roadside ditches and swales. The City's drainage system is divided into 22 areas generally defined by the City's topography. The system has evolved and expanded from the earliest storm pipe being installed in 1929. Over the years, many roadside ditches were informally replaced with local storm pipes that were not designed to any standard. In some areas where basements were susceptible to high water tables and seepage, private sump

pumps were installed and directed to the sanitary sewer system. To relieve the pressure on the sanitary collection system, it is desirable to redirect these flows to grade or into the stormwater collection system where possible. Most of the system either outlets directly to the Welland Canal or Lake Erie, or via municipal drains.

A previous study was completed in 2014 and determined that approximately 60% of the City's storm network was not designed to any form of standard. Recommendations included several upgrades and initiatives in the Omer and East Village drainage areas. Since then, the design and construction of new storm sewers in the East Village have been completed and the Omer area is currently undergoing private property investigations to assess options for redirecting sump pumps that are connected to the wastewater system. Feasibility of improvements in the Omer area are being further investigated through the City's Storm Sewer Condition Assessment Project, and the Pollution Prevention Control Plan (PPCP) both currently in progress and scheduled for completion in September 2024.

Analysis

The condition assessment of the storm sewer network was based on the age of the asset in comparison to the estimated service life (ESL). A condition score was assigned to each asset and grouped into five condition categories ranging from Very Good to Very Poor, however assessed condition values were used where possible. The following table provides a breakdown of each of the assets.

Most of the stormwater network's value is in Fair to Good condition, with culverts, maintenance holes and outlets having the greatest proportion of their value falling into Poor or Very Poor condition. While sewer conditions can be estimated based on age, it does not account for varying conditions that may be present throughout the system.
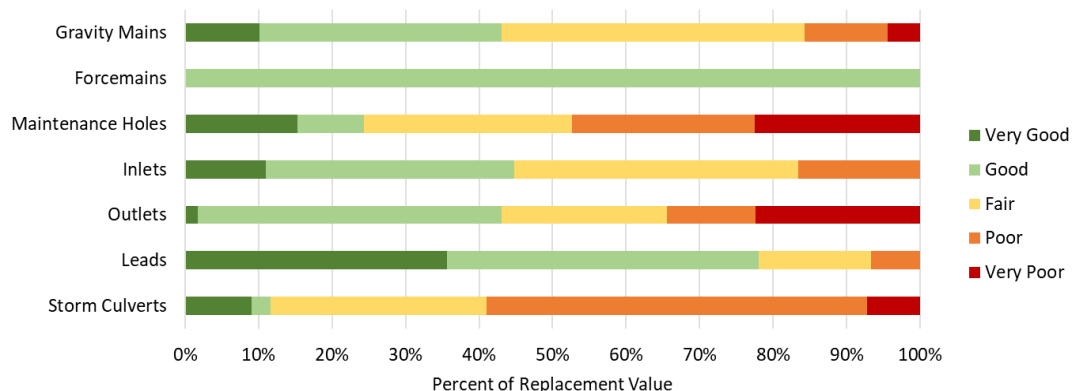
Based on the review of available data and analyses it was determined that the system does not address stormwater management needs and adaption to climate change. Due to the location and proximity of Lake Erie and the Welland Canal, many of the storm outlets get inundated with debris, sand, and experience backflow issues into the system. City staff are in the process of completing condition assessments of all storm outlets including the implementation of backflow prevention devices where needed.

The existing stormwater hydraulic model was run using a 5-year design storm to identify deficient pipes under current conditions. Note that the model was not developed for this project but was provided by the City and did not include calibration using flow monitoring data or updated network information. The recommendations are high-level for long-term budgeting purposes and will be further refined through the 2024 Master Servicing Plan and other ongoing system initiatives.

Implementation of upsizing needs based on current growth-related projections. The total sewer upsizing needs are **$30,496,000** ($17,028,000 for upsizing existing servicing and $13,468,000 for growth servicing). It should be noted that the estimated cost only includes linear work and not the construction of outfalls, pumping stations, or storage. All non-linear capital work will be identified as part of the 2024 master servicing plan.

The goals set for stormwater assets in the City's 2023 – 2026 Strategic Plan are for all stormwater assets to have a remaining asset life of 20% or greater. Until such time that the data and results of the stormwater condition assessment, flow monitoring, outfall assessments, and master servicing plan are completed, staff are unable to finalize a plan to achieve the goal. However, staff are underway in collecting this information to complete the plan.

Stormwater Network - Recommendations and Next Steps

The INS provided the opportunity to undertake a review of the stormwater system to develop a prioritized action plan to meet the Strategic Plan goals. This provides a better understanding of immediate and future needs as well as a deeper understanding of overall system deficiencies and includes several recommendations based on available data and modelling. Staff have reviewed the recommendations and request Council's financial support and approval for the following:

Data Collection & Studies

1. Master Servicing Plan

   The development of a comprehensive all-pipe model, which will include up to date inventory data and flow monitoring data, and a Stormwater Master Servicing Plan. Master plans should be updated every five years. The previous master plan was completed almost 10 years ago and is need of an update using the most current up to date inventory, flow monitoring data, and information to adequately meet current growth-related demands and capital needs.

   Budget request of $200,000 in 2024.

Operating Budget

2. Flow Monitoring Operating budget of **$100,000 annually** to ensure the system is consistently monitored and that the hydraulic model is being calibrated appropriately as the system is upgraded. It is recommended that the program begin

in 2024 to inform the storm hydraulic model build as part of the master servicing plan.

3. Subject Matter Expert fees of **$30,000** annually to support the stormwater system upgrades and provide strategic advisory services.

Wastewater System

Background

The City of Port Colborne is generally flat, resides primarily on rock, and has a high groundwater table due to the canal and proximity to Lake Erie. These conditions give the City a unique set of problems to solve as they relate to construction costs, inflow and infiltration reduction, and general wet weather management. Due to these conditions, understanding the interaction between the wastewater and stormwater sewer systems is critical when developing the City's servicing strategies. The flatness of the land makes it difficult to manage overland flow during intense rainfall events, the proximity to the lake and canal causes issues with stormwater outlets, and the high groundwater table leads to ongoing infiltration into the wastewater system. When developing the wet weather management solutions as they relate to the wastewater system, the capacity and condition of the stormwater system and stormwater servicing plan is critical to the wastewater servicing strategy.

The City's urban core is serviced by the wastewater collection system, which consists of approximately 90 kms of wastewater sewer mains which convey flow to the Seaway Wastewater Treatment Plant (WWTP) via 17 pump stations owned and operated by the Region of Niagara. Based on the City's GIS data, the pipes range in diameter from 100mm to 600mm, though 67% of the system is 200mm. The oldest sewers date from 1961, with 56% of the system built over 40 years ago.

Note that the City is in the process of updating its Pollution Prevention Control Plan (PPCP) scheduled for completion in October 2024, which includes the development of an all-pipe calibrated wastewater system model with comprehensive flow data.

Analysis

The City undertook a comprehensive flow monitoring program in 2023, capturing flows upstream of all pump stations and key anchor points within the system. The program consisted of 19 flow monitors and 2 rain gauges. This flow data will be used to calibrate the all-pipe model for the PPCP. As the data relates to the INS, it was used to prioritize Sewer System Evaluation Areas (SSEA) for inflow and infiltration reduction initiatives.

To adequately determine wastewater system condition and identify deficiencies, the use of closed-circuit television (CCTV) is essential. The City's flushing and CCTV program consists of a 6 year cycle where all pipes are flushed and inspected once every 6 years. During the INS data review and assessment GMBP identified the critical need to update specifications to align with current industry standards and best practices. Staff have implemented the update in 2023 and have since been obtaining CCTV that meets current

standards which allows for the analysis of identified deficiencies and defects in a more effective way.

The existing wastewater hydraulic model was run with the proposed residential and employment growth and the system capacity was assessed using the Region's design criteria and level of service developed as part of the 2021 MSP. Pipe surcharging and infrastructure constraints were identified and capital projects to service the planned growth were identified. The overall wastewater infrastructure needs are a combination of state of good repair (existing system condition and constraints) and new infrastructure to service new development; it is a combination of wet weather flow reduction and hard infrastructure. The hydraulic model was used to identify growth related capital needs. The estimated capital program is **$59,127,500 in 2023 dollars.** Note that the capital program will be revised during the completion of the PPCP.

Inflow and infiltration into the wastewater system comes from various sources. Recommendations resulting from the INS includes a strategy that addresses both inflow and infiltration. As part of the analysis of flow monitoring, two area maps have been developed that prioritize areas of inflow and areas of infiltration attached in Appendix C. The goal set for wastewater assets in the City's 2023 – 2026 Strategic Plan is for all wastewater assets to have a remaining asset life of 20% or greater by 2030. With the investments made by the City in 2023 and 2024 for the CIPP lining program and through the approval and implementation of the recommendations included in the INS, the City will achieve this goal by 2030.

The City-wide program included an evaluation of the deficiencies found for each pipe segment and assessed for rehabilitation. All segments were classified as Priority 1, Priority 2, or Priority 3 based on the findings which identified the magnitude of infiltration within each SSEA. If the sewer segment falls within a high infiltration area it is given a P1 priority and if it falls within a low infiltration area it is given a P3 priority. The P1 bundle of rehabilitation pipes will provide the City with the largest reduction in base groundwater infiltration and rainfall derived infiltration. The table below estimates rehabilitation costs.

Priority Bundle	Rehab Costs
P1	$ 5,479,371
P2	$ 2,922,420
P3	$ 983,026
Total	**$ 9,385,000**

Although the mainline rehabilitation program is anticipated to be effective to address infiltration within the system, a large contributor is also through deficiencies within wastewater service laterals between homes and the main sewer line. Included in the rehabilitation plan and recommendations is the implementation of a lateral inspection program that will allow for the collection of data to prioritize a lateral lining program. The lateral inspection plan targets Priority 1 areas first. They will be completed in the spring when the groundwater table and infiltration are at their highest.

While rehabilitation, maintenance scans and inspections, and grouting and sealing do have significant impact in the reduction of infiltration, other methods are needed to manage and address inflow. Smoke and dye testing along with on the ground investigations are necessary to confirm areas of inflow. Once confirmed, a disconnection or redirection plan will be implemented, and source of inflow removed from the wastewater system. The effectiveness of the storm sewer network becomes a critical component when addressing areas of inflow, as disconnected sources need an outfall.

The goal set for wastewater assets in the City's 2023 – 2026 Strategic Plan is for all wastewater assets to have a remaining asset life of 20% or greater. The proposed wastewater infrastructure rehabilitation plan highlighted in this report (sewers, maintenance holes, and laterals) will achieve this by adding 50-60 years of life to the assets being rehabilitated. The asset management plan identified approximately 20% of the system in very poor condition and the current rehabilitation plan is estimated to repair 26% of the system by 2040.

<u>Wastewater Network - Recommendations and Next Steps</u>

The wastewater system needs program is comprised of data collection, system analysis, field investigation, hard infrastructure upgrades, and wet weather flow reduction. The specific hard infrastructure upgrades will be examined through the completion of the Pollution Prevention Control Plan. Staff have reviewed the recommendations included in the report and request Council's financial support and approval for the following:

Data Collection & Studies

1. Wet Weather Management Program – Priority Areas

   Implementation of a 3-year wet weather management program will allow for continued investigation and location of sources of inflow and infiltration through field investigations, drainage surveys, smoke and dye testing, property assessments, foundation inspections, and public engagement. Additional items include tracking of completed works through GIS and ongoing flow monitoring to measure outcomes of the remediation works.

   Budget request of $550,000 in 2024.

2. Flow Monitoring Program

   This request addresses the need to further delineate source locations of inflow and infiltration within the system. Flow monitoring has already occurred within each drainage area and will now be further delineated to specific subdivisions and streets.

   Budget request of $175,000 in 2024.

3. Sewer CCTV

The INS identified gaps within the CCTV data supplied by the City. This request will ensure the remaining wastewater system has CCTV conducted and the data collected built into the Priority system.

Budget request of $325,000 in 2024.

4. City-wide Maintenance Hole Scans

Funding for this item will ensure the City's maintenance holes are inspected and remediation plan is created.

Budget request of $150,000 in 2024.

5. Lateral Launches

A 3-year program with priority streams will provide data to develop the lateral rehabilitation program in the high priority areas.

Budget request of $1.32M ($650k in 2024, $400k in 2025, 270k in 2026).

Capital Projects

1. Following the maintenance hole scans and lateral launch program, trenchless rehabilitation of maintenance holes and laterals in high priority areas over three years, starting in 2025, for the total estimated amount of **$4,735,000**.

   - Priority maintenance hole repair - **$465,000**
   - Priority lateral rehabilitation - **$4,270,000**

   It is recommended that after the Priority maintenance holes and laterals are repaired, flow monitoring be used to assess needs for maintenance holes and lateral repairs in the next Priority areas.

Operating Budget

1. Wet Weather Management Operating Budget **$200,000 annually**, of which $50,000 is already funded, beginning 2025.
   a. An ongoing flow monitoring program will also be initiated to ensure the system is consistently monitored and that areas being rehabilitated are monitored to ensure the rehabilitation that took place resolved the issue.
   b. An annual flushing and CCTV program is required to maintain the sewer infrastructure condition surveys as part of the asset management plan.

2. Subject Matter Experts and Hydraulic Modelling Operating Budget **$55,000 annually**, beginning in 2025.
   a. Consulting fees to support wet weather management program and provide strategic advisory.
   b. Hydraulic modelling for general maintenance, system updates, and development reviews.

Internal Consultations:

City staff worked collaboratively with the finance department to develop an actionable and sustainable program to address the core infrastructure needs resulting from the Infrastructure Needs Study.

Financial Implications:

The Infrastructure Needs Study included recommendations that identify various short and long-term needs for the City's core infrastructure. The following chart includes a list of the recommended projects and funding requirements for water, wastewater, and stormwater systems in 2024 to ensure the program can progress to construction in 2025. The funding for these 2024 projects is recommended to be funded through the corresponding reserves upon approval of this report.

	Sub-Project	Capital and Related Captial buget	Opearting Buget	1	2	3	4	5	6	7	8	9	10	11	12
Water															
2024 Water Master Plan	Hydrant and C-Factor Testing for Model Build	$ 50,000						T	T	T	C	C	C	F	
	District Metering Assessment	$ 50,000						T	T	T				C	C
	Master Servicing Plan	$ 150,000						T	T	T	C	C	C	C	C
AI Hydrants		$ 150,000					T	T	T	C	C	C	C	C	F
Satellite Imagery		$ 50,000					T	T	C	C	F				
2025 Watermain Replacement - North Crescent (245m), South Crescent (235m), Ash Street (95m), and Jefferson Street (165m)	Geotechnical	$ 110,000							G	G	G	G			
	Design	$ 165,000											D	D	D
2026 Watermain Replacement - Schofield Avenue (640m), Hampton Avenue (600m),	Geotechnical	$ 185,000							G	G	G	G			
	Design	$ 280,000											D	D	D
Subject Matter Experts (Increase Operating Budget)			$ 30,000	D	D	D	D	D	D	D	D	D	D	D	D
To be funded from the Water Reserve:		**$ 1,190,000**	**$ 30,000**												
Wastewater															
Wet Weather Management - Priority Areas	Drainage Inspections	$ 100,000						T	T	C	C	C	C	C	C
	Smoke & Dye Testing	$ 150,000						T	T			C	C	C	C
	Basement Inspections	$ 250,000						T	T					C	C
	3D Hydrology	$ 50,000						T	T	C	C	C	F		
Flow Monitoring Program - Priority Areas		$ 175,000						C	C	C	C	C	C	C	C
CCTV Gaps (2024)		$ 325,000						T	T	C	C	C	C	C	C
P1-3 Area Manhole Scans (x577)		$ 150,000							T	T	C	C	C	C	C
Lateral Launches	P1 Area Lateral Launches	$ 650,000							T	T	C	C	C	C	F
Subject Matter Experts (Increase Operating Budget)			$ 30,000	D	D	D	D	D	D	D	D	D	D	D	D
To be funded from the Wastewater Reserve:		**$ 1,850,000**	**$ 30,000**												
Storm															
Master Servicing Plan & Model Build		$ 200,000						T	T	C	C	C	C	C	C
Flow Monitoring Program (Increase Operating Budget)			$ 100,000				C	C	C	C	C	C	C	C	
Subject Matter Experts (Increase Operating Budget)			$ 30,000	D	D	D	D	D	D	D	D	D	D	D	D
To be funded from the Storm Sewer Reserve:		**$ 200,000**	**$ 130,000**												

The current capital reserves, before the above recommended transfers, totals:

Reserves	2023 Balance	2024 Budget Reserve Transfer	2024 Committed	Forecasted 2024 Balance
Water	$812,848	$693,300		**$1,506,148**
Wastewater	$3,029,733	$384,000		**$3,413,733**
Storm Sewer	$61,317	$884,000	(425,000)	**$520,317**

As staff progress through the programs outlined within this report, staff will continue to submit requests for funding during the annual budgeting process.

Strategic Plan Alignment:

The initiative contained within this report supports the following pillars of the strategic plan:

- Environment and Climate Change
- Welcoming, Livable, Healthy Community
- Economic Prosperity
- Increased Housing Options
- Sustainable and Resilient Infrastructure

Conclusion:

The Infrastructure Needs Study was initiated to address the City's core infrastructure needs and to develop an actionable road map, including implementation schedules and financial projections. Based on the findings and solutions provided, the INS report addressed core infrastructure needs for both short and long term demands, and analysis of future growth demands

Although the project was recently completed, many of the immediate needs and initiatives presented in the report have been implemented over the duration of the project and included in the 2023 and 2024 capital budgets.

The findings presented in the INS report are designed to function as a decision-making tool for shaping the City's core infrastructure maintenance and replacement programs for today and for the future. Implementation of the recommended initiatives and solutions included in the INS report will serve as key components to the success of the City's goals relating to sustainable and resilient infrastructure while meeting the demands for growth in the City of Port Colborne.

Subject to Council's support and approval of this report, staff will promptly proceed with the initiation and implementation of the recommended projects.

Appendices:

    a.   INS Report

    b.   Road Maintenance and Rehabilitation Program

    c.   Inflow Map and Infiltration Map

Respectfully submitted,

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Report Approval:

All reports reviewed and approved by the Department Director and also the City Treasurer when relevant. Final review and approval by the Chief Administrative Officer.