Town of Petrolia

PRELIMINARY ASSET MANAGEMENT PLAN

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EXECUTIVE SUMMARY

The Town of Petrolia is located in Lambton County in southwestern Ontario. The Town of Petrolia is an important central community in the County, and provides many community and social amenities to a large rural population. The Town is responsible for the management and maintenance of municipal infrastructure assets, including:

- A water supply system, including an intake from Lake Huron, a Water Treatment Plant, high lift pumps and transmission main, in-ground reservoir and booster pumping station, and a composite elevated water storage tank
- 60 km of trunk and local potable water distribution mains, including valves, hydrants, and service connections
- 50 km of conventional gravity wastewater collection system, including 12 wastewater pumping stations and associated forcemains
- An extended aeration wastewater treatment facility with tertiary filtration and ultraviolet disinfection, with a rated capacity of 3,800 m3/d, discharging effluent to Bear Creek
- 70 km of stormwater collection and drainage system
- 40 km of roads and all related infrastructure including one bridge, sidewalks, streetlights, hydro poles etc.
- Recreational and corporate facilities including parks, recreation centre, a theatre, a cemetery, as well as fleet and other equipment used during maintenance operations.

These infrastructure items are the subject of this asset management plan. The data and information used to create this document was developed from the CityWide database, finance applications, technical and economic reports produced by other firms, documentation available on the Town's Web site, Town regulations relevant to our analyses, and interviews with Town managers and representatives. The gathered information was used to develop an inventory of Town assets for the aforementioned categories and to determine the estimated replacement value, which is currently estimated at approximately $190 million.

The condition of assets was established through consultation with Town managers using a questionnaire that was based on four major themes: the condition, performance, capacity and funding for each specific asset. A summary of obtained information is presented in the following Report Card.

The methodology used in preparing this analysis was based on the methodology developed by the American Society of Civil Engineers, which periodically prepares such a Report Card for American public infrastructure.

Asset Category	Mean Grade	Trend	Comment
Water Linear	B	↓	This group of asset is globally in good condition but its condition is anticipated to deteriorate in the next few years given the current practices and level of investment. The main water line seems in excellent condition, while the Town water networks are considered in good to fair condition, with some capacity issues. All water lines do not have a sufficient investment level to maintain it. Hydrants are however in excellent condition with sufficient funding.
Water Facilities	C+	→	The water facilities are globally in fair condition and anticipated to be maintained at this level in the next few years given the current practices and level of investment. However, the portrait is variable from one asset to the other. The water tower is in excellent condition due to the recent major repairs, but the reservoir and the booster station are in fair to poor condition, and do not have a sufficient level of investment to maintain them. The water treatment plant globally offers good performance and capacity, with a sufficient level of investment to maintain it, but some components of the structure and some equipment seem to be in fair to poor physical condition.

Asset Category	Mean Grade	Trend	Comment
Wastewater Linear	B-	↓	All assets from this group are considered in good condition. However, none of them seem to have sufficient investment level to maintain it, and therefore their condition is anticipated to deteriorate in the next few years.
Wastewater Facilities	D+	↓	The wastewater facilities are overall in poor condition. All pumping stations offer a fair to poor condition and performance, and funding is not sufficient to maintain and renew them. The two main lift stations also have serious capacity problems. Most of the components of the wastewater treatment plant seem in fair to poor condition, have capacity problems and do not have a sufficient level of investment, such that a global degradation of the plant is anticipated in the next few years.
Stormwater Linear	C	↓	This group of asset is globally in fair condition, and its condition is anticipated to deteriorate in the next few years given the current practices and level of investment. Particularly, the storm pipes and laterals are considered to be in poor condition.
Roads Systems	B+	→	All assets from this group are considered in good condition, which is anticipated to be maintained within the next few years given the current practices and level of investment.
Parks	B-	→	The parks assets are globally in good condition and are considered to have a sufficient level of investment to maintain this condition. However, the children play structures and swing sets, the lighting, the tennis courts and the walking trails are the assets which seem to have the worst condition and probably require more funding to maintain and improve them.
Corporate Facilities & Lands	B	→	The corporate facilities are overall in good condition and have sufficient funding to maintain them, although the public works building, the administrative building, the Greenwood Recreation Centre and the medical centre might need a bit more investment to allow them to improve their capacity to meet the needs.
Fleet	B+	→	All vehicles seem to be in good condition and meet the needs of the Town. Funding is considered adequate for all fleet categories. The condition is anticipated to be maintained over the next few years given the current practices and levels of investment.
Town Grade	B-	→	Petrolia's group of assets in worst condition are the wastewater facilities, as most of the pumping stations and the wastewater treatment plant are in poor condition and have performance and capacity problems. It is the group of asset in greatest need of investment. The water facilities and stormwater linear also seem to be in worse condition than other Town's assets. Moreover, the water, wastewater and stormwater pipe networks all seem to lack funding, such that managers anticipate a deterioration of their condition within the next few years. The roads, parks, facilities and fleet assets are all in good condition, which managers anticipate to be able to maintain given the current practices and level of investment. However, some specific assets within these groups might require more care than others in the next few years.

Levels of service

The Town's staff participated in defining the levels of service and performance indicators for the asset categories targeted by the asset management plan. A comparison between the planned objectives and the current level to which these objectives are met allows us to conclude that the Town of Petrolia is progressing towards reaching the agreed levels of service within a short-term time span. In fact, all currently unattained levels of service are planned to be reached in four years' time (2018). Several major upgrade/rehabilitation projects are on their way to being completed and will allow the Town to maintain current levels, if not meet its given objectives.

Asset management strategy

The management strategy suggested in this Plan is aimed at achieving two separate objectives; firstly, actions associated with operation and maintenance, as well as studies, aim to implement better asset management processes and to develop and maintain better knowledge of the condition of the town's assets. This objective will assist with identification of required rehabilitation programs with greater precision to ensure optimal longevity of assets and the delivery of levels of service.

Secondly, specific projects for rehabilitation, upgrade and replacement are indicated for each asset group, along with preliminary timing and costing estimates.

The following table presents a summary of recommended activities by asset group, which are placed under five headings, including three that are associated with asset lifecycle periods. This includes support and preventive maintenance (O&M), rehabilitation and replacement. Other recommended activities are the implementation of management assistance tools and the completion of studies to determine the current condition of assets so as to better identify the timing for asset maintenance and/or rehabilitation.

Asset Category	Actions/Interventions				
	Management tools	O&M	Projects	MDS recommendations	Studies
Water Facilities	-	Program to be completed	Expansion of Mandaumin Reservoir	N/A	Assessment of the Booster Pumping Station
Wastewater Facilities	-	Program to be completed if not already done so	Expansion and upgrade of Wastewater Treatment Plant	N/A	Implementation of study recommendations on condition of pumping stations
Water Linear	Develop a breakage registry and compile breakages	Continue with current support and maintenance program	-	Investments are recommended following simulations (2019, 2021, 2022, 2023)	Pre-project study to identify necessary maintenance measures and strategy
Wastewater Linear	Develop and maintain a registry of backflows and repairs / maintenance activity	An inspection program should be implemented, along with an annual sewer cleaning program	-	No investment is planned following simulations based on age and service life	A monitoring strategy should be developed Pre-project study to identify necessary maintenance measures and strategy
Storm Linear	Develop and maintain a registry of backflows and repairs / maintenance activity	An inspection program should be implemented, along with an annual sewer cleaning program	-	A major catch-up is recommended by the management decision system following simulations based on age and service life	A monitoring strategy should be developed Pre-project study to identify necessary maintenance measures and strategy
Roads System		Plan support and maintenance interventions, such as those suggested by best practices	-	Investments are recommended following simulations based on condition data (2014-2023)	Study on traffic volume (Traffic counting) A study to evaluate the condition of street light poles is recommended in order to prepare an asset renewal program Pre-project study to identify necessary

Asset Category	Actions/Interventions Management tools	O&M	Projects	MDS recommendations	Studies
					upgrades
Parks	Creation of a registry for complaints and incidents related to park use	Continue with support programs and complete them as needed	-	Replacement interventions are recommended for deficient swing sets and play structures that do not meet standards	Assessments of the current state of tennis courts and "Other facilities and structures" identified as being in a poor state of repair in the State of Infrastructure section
Corporate Facilities	-	Complete the table of best support and maintenance practices and implement recommended practices	-	-	Proceed with evaluating buildings considered to be in poor state of repair (Greenwood Recreation Centre, Library)
Fleet	-	Complete the table of best support and maintenance practices and implement the recommended practices	-	-	-

Finally, the funding strategy provides that the majority of investments will be funded through borrowing. The Water Reserve will contribute to funding investments for water asset longevity. Government assistance will be requested, once the Town's eligibility is confirmed, to reduce the Town's contributions. The following table summarizes the planned investments by asset category. It should be reiterated that the investments planned for the rehabilitation of the storm sewer network is based on age and service life. It is strongly recommended that the Town proceeds with inspections in order to verify the sewer sections condition and that current rehabilitation needs.

Asset Category	Total Capital Expenditure ($) (2014-2023)
Capital Expenditures **:**	
Water Facilities	13,520,000
Wastewater Facilities	21,962,000
Water Linear	1,022,700
Wastewater Linear	30,000
Storm Linear	7,195,000
Roads System	4,428,400
Parks	73,200
Corporate Facilities and Lands	340,000
Fleet	8,000
TOTAL Capital Expenditures	48,579,300
Capital funding	
Provincial/Federal Grants	-
Debenture requirements	45,452,600
Water Reserve	3,126,700
TOTAL Capital Financing	48,579,300

Work completed as part of this asset management plan and the exchanges that took place with Town staff confirms that the Town's current management practices can be qualified as acceptable. Nevertheless, the management practices will require adjustments and additions. The recommendations made in this asset management plan may be gradually implemented into Town practices, since the values of the organization and its staff are based on openness and service to its citizens.

Finally, and despite the agreed efforts of data collection and exchanges with Town staff, it must be noted that some assets could not be treated with as much depth as the priority assets. This shortcoming in the Asset Management Plan does not appear to have any influence over the Town's capacity to deliver the agreed levels of service.

It is recommended that the Town update information related to Corporate Facilities (buildings, cemetery, and arena), vehicle fleet, and current routine water/wastewater system maintenance expenditures. The Town should incorporate this information and data in future updates of the Asset Management Plan.

1. INTRODUCTION

The Town of Petrolia is an important central community in the County of Lambton and provides many community and social amenities to a larger rural population. The current population in the Town of Petrolia is estimated at 5,500 people.

The Town of Petrolia is responsible for maintenance and operation of municipal infrastructure, including:

- A water supply system, including an intake from Lake Huron, a Water Treatment Plant, high lift pumps and transmission main, in-ground reservoir and booster pumping station, and a composite elevated water storage tank
- 60 km of trunk and local potable water distribution network, including valves, hydrants, and service connections
- 50 km of conventional gravity wastewater collection system, including 12 wastewater pumping stations
- An extended aeration wastewater treatment facility with tertiary filtration and ultraviolet disinfection, with a rated capacity of 3,800 m3/d, discharging effluent to Bear Creek
- 70 km of stormwater collection and drainage system
- 40 km of roads and all related infrastructure including one bridge, sidewalks, streetlights, hydro poles etc.
- Many recreational and corporate facilities including parks, recreation centre, theatre, a cemetery, as well as fleet and other equipment used during maintenance operations

All of these infrastructure components allow the Town of Petrolia to continue with the realization of its Vision 2020 goals by supporting existing development as well as the growth by providing access for all residents to sporting, cultural and leisure activities and infrastructures, and by maintaining the historic heritage of the Town.

From an administrative point of view, the tools made available to managers and elected officials aim to support them in their decisions and ensure that they are responsible and transparent in their actions.

The Town of Petrolia uses a financial modelling application called CityWide CPA to maintain its capital asset inventory. The program is used by the Town to fulfill PSAB 3150 requirements as well as extract asset information for planning purposes. As an example, current asset age and remaining useful life of each asset can readily be retrieved and reviewed by Town Staff. However, actual current condition of these assets is not well known or documented. Town staff are aware that many assets are in poor condition, and that significant investment is required for rehabilitation, upgrades or replacements. This has been clearly documented for the Petrolia Wastewater Treatment Plant in the detailed Condition Assessment Report dated August 17, 2011.

Based on these facts, it will be beneficial for the Town to gain a thorough understanding of the condition of all assets in order to prioritize maintenance and rehabilitation efforts. Another important aspect to evaluate is which assets are most important to keep at a high level of service given the potential impacts on the Town's residents should a failure occur. Finally, it is crucial to improve management practices in order to invest efficiently into the assets at the right time throughout the asset lifecycle.

The Town's Asset Management Plan takes into account the strategic vision developed by the Town Council together with the citizens of Petrolia. The actions identified in the Asset Management Plan (AMP), spread over a 10-year period, allow managers and elected officials to make safety infrastructure that provides quality service available to the citizens of Petrolia, while accounting for the residents' ability to pay and the funding options that they are prepared to support. In addition, the AMP takes account of ongoing initiatives, such as the Victoria Playhouse Petrolia Business Plan and the upgrade of the Wastewater Treatment Plant.

The Town retained CIMA to prepare an asset management plan that will be useful in day-to-day management tasks and also fulfill the requirements stipulated by the Ontario Ministry of Infrastructure.

The work completed to date has been focused on outlining Ministry of Infrastructure requirements (based on the document “Building Together: Guide for Municipal Asset Management Plans”), collecting all available data from the Town, establishing the most efficient approach for completion of the Petrolia Asset Management Plan, developing the methodology, and commencing work related to the state of infrastructure section of the Asset Management Plan.

The Asset Management Plan (AMP) will need to be periodically updated in order to take account of implemented actions and new needs, where applicable. Target service levels should also be reviewed and updated periodically to ensure residents of the Town remain satisfied. Specifically, the targeted service levels will be compared to the service levels that are currently being delivered. All negative or positive variation will be analyzed, along with support and maintenance activities and rehabilitation that are planned over the life cycle to ensure the proper functioning of assets that allow for adequate service provision. The summary of this analysis will provide input for the revision of the AMP.

This Report presents the four (4) main components of the AMP.

The first component consists of creating a portrait of all assets under the Town’s responsibility. Chapter 2 therefore will present the results of compiling inventory data, the evaluation of the replacement value of assets and the qualitative evaluation of the condition of assets, as well as their distribution based on their age.

The second part of the AMP consists of establishing the service levels that each group of assets must provide to the citizens of Petrolia. Associated with the service levels are performance indicators that will allow us to compare the provided service levels to the expected service levels. Chapter 3 will provide the results of the establishment of service levels and the targeted deadline for meeting them.

The third part of the AMP consists of determining the actions to be taken to provide the desired service levels in a sustainable manner while accounting for life cycle costs. Several considerations are included in the development of the asset management strategy, and chapter 4 will highlight the main principles in addition to detailing asset management tools, maintenance tasks and schedules, and required rehabilitation to contribute to achieving the Town's strategic objectives.

Finally, all of these maintenance activities must be funded, and chapter 5 will identify the available funding options that the Town may progressively adopt and according to the priorities identified in the preceding sections.

The following paragraphs provide more details about the work completed.

2. STATE OF LOCAL INFRASTRUCTURE

2.1 METHODOLOGY

2.1.1 Data Sources

Inventory analysis has been completed by extracting and reformatting available data stored in the CityWide CPA database. The data was analysed and presented in an efficient manner to display current asset condition and propose management strategies. For the roads, inventory data were adjusted following the results from the Stantec Road Survey from January 2013, even if they were similar to what was found in CityWide. The resulting inventory has been reviewed for completeness and accuracy with the Town Staff.

The CityWide database also specifies expected useful life values for the assets. It was proposed to modify some of these values based on theoretical knowledge, experiences in other cities or other sources of data, such as the Stantec Road Survey report from January 2013. The final values were revised by the Town representatives.

Assets age data has been extracted directly from the CityWide CPA database.

Replacement cost valuation was completed using data from the CityWide CPA database or from other sources when available, such as the Cowan Risk Management report from October 2011 for the buildings, or from the historical cost valuation to which inflation was applied. All assumptions and decisions relative to this analysis were documented. The resulting replacement values have been reviewed with the Town representatives.

Financial accounting valuation was not reported as all detailed information can be found into the CityWide CPA database as the program is used by the Town to fulfill the PSAB 3150 requirements.

2.1.2 Condition Assessment

No comprehensive data was available detailing the condition of different assets within the Town. To gain a better understanding of the general condition of the Town's assets, it was decided to complete a Report Card similar to what has recently been done by many different cities throughout Canada (such as Hamilton, Calgary, and Montreal) as well as by the American Association of Civil Engineers (ASCE). A Report Card can serve as a very useful tool and give a quick overview of asset condition, compare existing assets, and highlight assets which require more attention than others in the short term.

The preparation of Petrolia's Report Card involved completion of a survey with the Town Staff responsible for daily operation and maintenance of the given assets. The survey consisted of a detailed rating process based on an A (excellent) to F (failed) scale to qualify the condition of the assets. Table 1 presents the questions and the evaluation scale that were used. Essentially, each asset was assessed on 4 levels; its actual physical condition, its performance for the citizens, its capacity to support the needs of the community, and the adequacy of its current level of investment. Also, the change in condition anticipated in the next few years for each asset was illustrated with an arrow.

Table 1: Condition Assessment - Questions and Evaluation Scales

QUESTION	EVALUATION SCALE		
1) Condition How would you rate the actual physical condition of this group of assets?	A	Excellent	Minor defects on few assets; No signs of important deterioration; Interventions rarely required
	B	Good	Acceptable level of defects on some assets; Few signs of deterioration; Few interventions required
	C	Fair	Level of defects is increasing; Some assets are starting to deteriorate seriously; More and more interventions required
	D	Poor	High level of defects for many assets; Many signs of quick and serious deterioration; Interventions frequently required
	F	Inadequate	Serious deterioration and even failure of many assets; Many major interventions required
2) Performance How is this group of assets able to ensure a continuous and adequate service to the citizens?	A	Excellent	Events which interrupt the service rarely happen
	B	Good	Events which interrupt the service sometimes happen; Problems are generally minor and affect a few citizens
	C	Fair	Events which interrupt the service happen more often than it had before; Problems are generally minor but they affect many citizens
	D	Poor	Events which interrupt the service happen frequently; Problems are important and affect many citizens
	F	Inadequate	Major events interrupting the service happen continually; A large number of citizens are frequently affected
3) Capacity vs. needs How is this group of assets able to support the demand, in accordance with current regulations and practices?	A	Excellent	This group of assets can support 100% or more of demand, in accordance with current regulations and practices.
	B	Good	This group of assets can support 90 to 99% of demand, in accordance with current regulations and practices.
	C	Fair	This group of assets can support 80 to 89% of demand, in accordance with current regulations and practices.
	D	Poor	This group of assets can support 70 to 79% of demand, in accordance with current regulations and practices.
	F	Inadequate	This group of assets can support less than 70% of demand, in accordance with current regulations and practices.
4) Funding vs. needs How is the current level of investment for this group of assets adequate to maintaining, replacing and improving existing infrastructure?	A	Excellent	The current level of investment allow to meet 90 to 100% of the needs.
	B	Good	The current level of investment allow to meet 80 to 89 % of the needs.
	C	Fair	The current level of investment allow to meet 70 to 79 % of the needs.
	D	Poor	The current level of investment allow to meet 40 to 69% of the needs.
	F	Inadequate	The current level of investment allow to meet less than 40% of the needs.
5) Trend How is the condition for this group of assets anticipated to change in the next few years, based on current practices and level of investment?	⬆		Improvement
	➡		No progress
	⬇		Deterioration

Following the interviews, each asset had a detailed condition rating. To get the mean grade for each asset group, these rules were followed:

- Each letter grade is worth a certain number of points: A+ is 15 points, A is 14 points, A- is 13 points, B+ is 12 points, and so on until F-, for 1 point.
- For each asset, the mean grade is calculated based on the following weighted average: the grade for the physical condition is worth 40% of the mean grade, while the three other grades (performance, capacity vs. needs, and funding vs. needs) are each worth 20% of the mean grade.
- For each asset group, the mean grade is calculated based on the fact that each asset is worth the same weight.
- For the Town, the mean grade is calculated based on the fact that each asset group is worth the same weight.
- For the mean trend, the chosen trend is the one associated with the largest number of assets within the category.

2.2 DETAILED RESULTS

2.2.1 Water Linear

Petrolia's water linear network consists of a 18.7 km main line heading from an intake at Lake Huron to the Town, a 1.9 km primary network mostly made up of 300 mm diameter pipes, a 37.8 km secondary network mostly made up of diameters between 150 to 250 mm, and all necessary accessories including 225 hydrants as well as many valves and service connections. No inventory data was available for the valves and the service connections.

The main line is quite recent as it was entirely replaced in 2001. The primary and secondary networks were built after 1960, with a peak of more than 15 km at the end of the 1970s, as shown by the age distribution figure below.

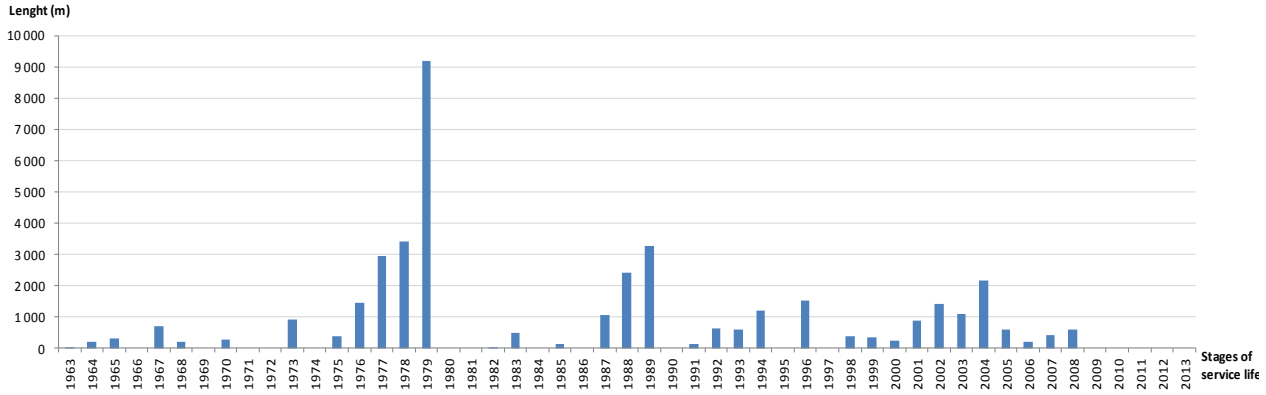


Figure 1: Water Pipes (Primary and Secondary Networks) Age Distribution

Almost all water pipes in Petrolia are made of cast iron or PVC. The mean expected useful life of water pipes was agreed upon 75 years with the Town staff. Comparing the age of each pipe to its expected useful life, the portrait illustrated by Figure 2 is obtained.

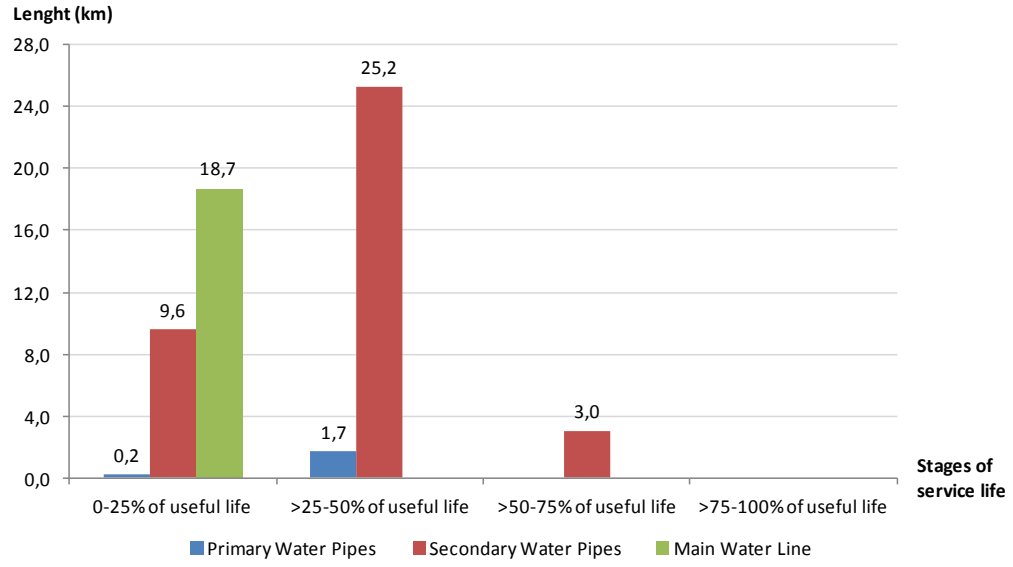


Figure 2: Water Pipes Age compared to their Expected Useful Life (75 years)

The main water line is only in its first stage of service life, aging between 0 to 25% of its useful life, while most of the primary and secondary networks did not reach more than 50% of their useful life. The portrait is similar for hydrants, as shown by Figure 3.

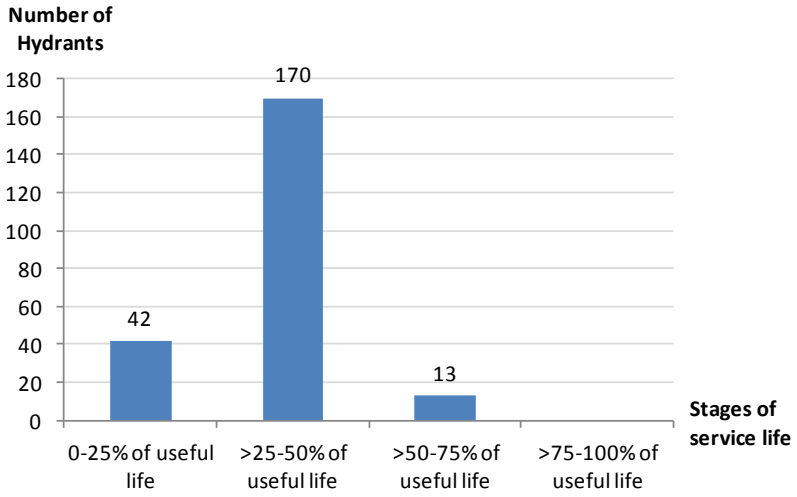


Figure 3: Hydrants Age compared to their Expected Useful Life (75 years)

The results for the condition assessment of the water linear group of assets are shown in Table 2. The main water line seems in excellent condition, primarily because of its recent construction. The primary water network is considered in good condition, while the secondary water network is generally in fair to poor condition. However, it should be noted that both networks seem to have some capacity issues. All water lines do not have a sufficient investment level to maintain the network, which might lead to faster degradation and earlier replacement needs than expected. Hydrants are in excellent condition with sufficient funding, since they have to be inspected two times a year to ensure the fire regulations are met. Overall, this group of asset is in good condition but its condition is anticipated to deteriorate in the next few years given the current practices and level of investment.

Table 2: Water Linear Condition Assessment

Asset Category	Asset	Grades				Mean Grade		Trend	
		Condition	Performance	Capacity vs. needs	Funding vs. needs				
Water Linear	Main Line	A	B+	B	C	**B+**	B	↓	↓
	Water Lines - Primary	B	B+	C	D	**C+**		↓	
	Water Lines - Secondary	C-	C-	C	D	**C-**		↓	
	Hydrants	A	A	A	A	**A**		→	

Table 3 shows the results of the valuation analysis for the water linear group of assets. The replacement values were calculated with the following unit costs: $5,250 /hydrant, $500,000/km for the main line and between $210,000 and $288,000/km for the water lines, depending on the pipeline diameter.

Table 3: Water Linear Valuation

Asset	Inventory	Replacement Cost
Main Line	18.7 km	$9,350,000
Water Lines - Primary	1.9 km	$528,000
Water Lines - Secondary	37.8 km	$8,557,000
Hydrants	225 units	$1,181,000
TOTAL – Water Linear		**$19,616,000**

This analysis shows that the replacement value of water linear system in Petrolia is close to $20 million, with almost half of this value associated with the main water line.

2.2.2 Water Facilities

Petrolia's water facilities consist of a water treatment plant, a booster pumping station, an in-ground reservoir and an elevated water storage tank.

The results for the condition assessment of the water facilities group of assets are shown in Table 4.

Table 4: Water Facilities Condition Assessment

Asset Category	Asset		Grades				Mean Grade			Trend		
			Condition	Performance	Capacity vs. needs	Funding vs. needs						
Water Facilities	Water Treatment Plant	Structure	C	B	B	C	**C+**	**B-**	C+	→	→	→
		Equipment	C-	B	B	B	**C+**			→		
		Membrane System	A-	B	A	B	**B+**			→		
	Booster Station		C-	C	B-	D	**C-**			↓		
	Reservoir		C-	C	D	D	**D+**			↓		
	Tower		A	A	A	A	**A**			→		

The Bright's Grove Water Treatment plant was initially constructed in 1896 to service the Town of Petrolia and the township of Enniskillen. The plant went through a major upgrade between 2005 and 2008 to increase the size of the building, to replace the treatment process equipment with a new micro-filtration system, and update the electrical control and instrumentation systems. The expected service life for the structure of the plant is 40 years, while the service life of the equipment is anticipated to be 15 years. A current assessment of the plant indicates that the membrane system is currently in excellent condition, while the structure and the rest of the equipment is only in fair condition. However, all components of the plant are considered to offer good performance and capacity to meet the service demands, and the level of investment to maintain the plant is good for the components of the system, and fair for the structure itself.

The Centre Street Elevated tank was initially built in 1988, and has an expected service life of 50 years. The Town undertook a major rehabilitation of the tank in 2013, including removal and replacement of the interior and exterior coating system, as well as some process piping upgrades. The elevated tank is therefore currently in excellent condition.

The Mandaumin Reservoir and Booster Pumping Station were initially built in 1961, and both have an expected useful life of 50 years. Both the reservoir and the Booster Pumping Station are in fair to poor condition, and do not have a sufficient level of investment to allow maintenance and repair.

Overall, the water facilities group of asset is in fair condition and its condition is anticipated to be maintained in the next few years given the current practices and level of investment. However, investment needs for the booster station and the reservoir should be addressed.

Table 5 shows the results of the valuation analysis for the water facilities group of assets.

Table 5: Water Facilities Valuation

Asset	Inventory	Replacement Cost[1]
Water Treatment Plant	1 unit	$10,707,000
Booster Station	1 unit	$889,000
Reservoir	1 unit	$1,046,800
Tower	1 unit	$1,814,900
TOTAL – Water Facilities		**$14,457,700**

This analysis shows that the water facilities in Petrolia are worth approximately $14.5 million, including $10,707,000 associated with the water treatment plant.

2.2.3 Wastewater Linear

Petrolia's wastewater linear network consists of approximately 33.3 km of conventional gravity sewers comprised mostly of diameters between 200 to 350 mm; a total of 21.5 km of sewer laterals; and 363 manholes. This conventional gravity wastewater collection system was built after 1960, with a peak of around 20 km within the years of 1978 and 1979, as shown by the age distribution figure below.

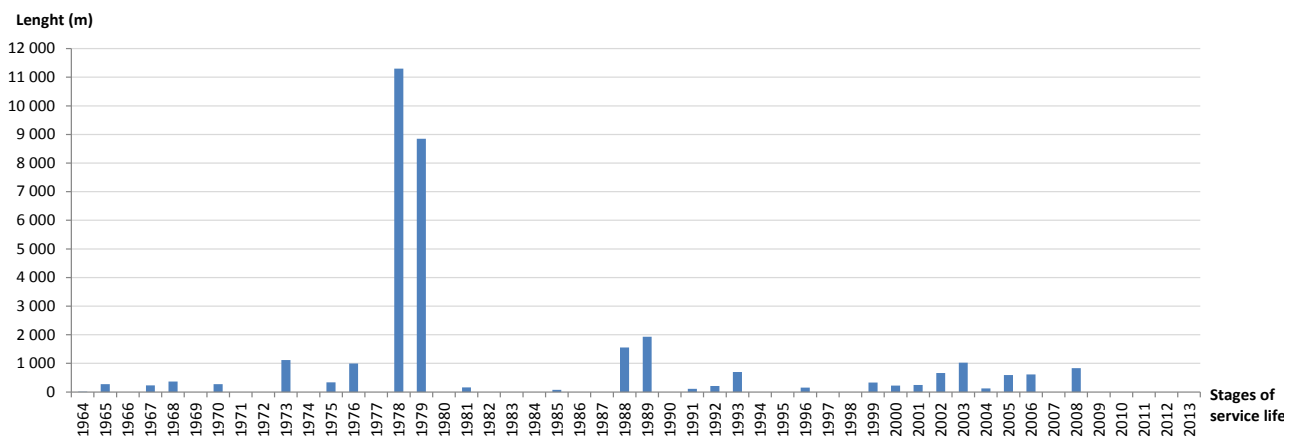


Figure 4: Sewer Pipes Age Distribution

Almost all sewer pipes in Petrolia are made of PVC, asbestos cement or concrete. The mean expected useful life of water pipes was agreed upon 100 years with the Town managers. Comparing the age of each pipe to its expected useful life, the portrait illustrated by Figure 5 is obtained.

[1] From Cowan Risk Report

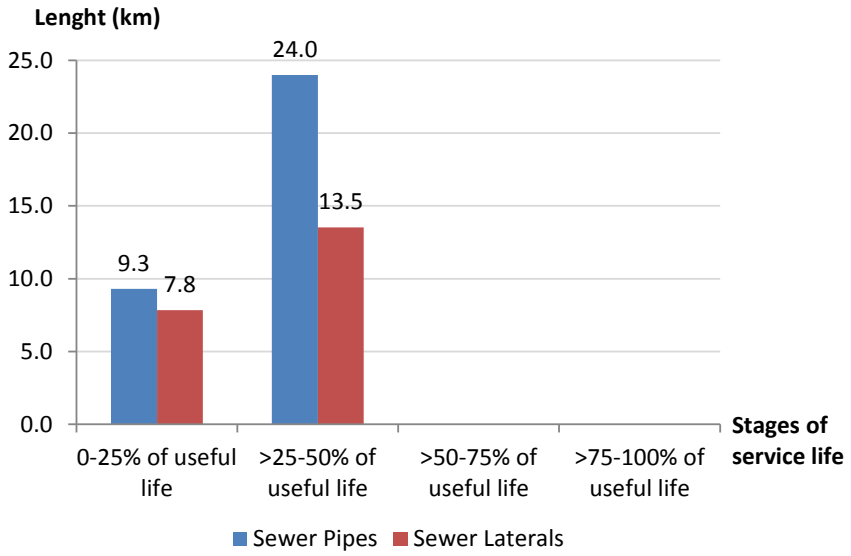


Figure 5: Sewer Pipes Age compared to their Expected Useful Life (100 years)

It can be seen that the sewer pipes and laterals network of the Town did not yet reach more than 50% of its useful life. The portrait is similar for manholes, as shown by Figure 6.

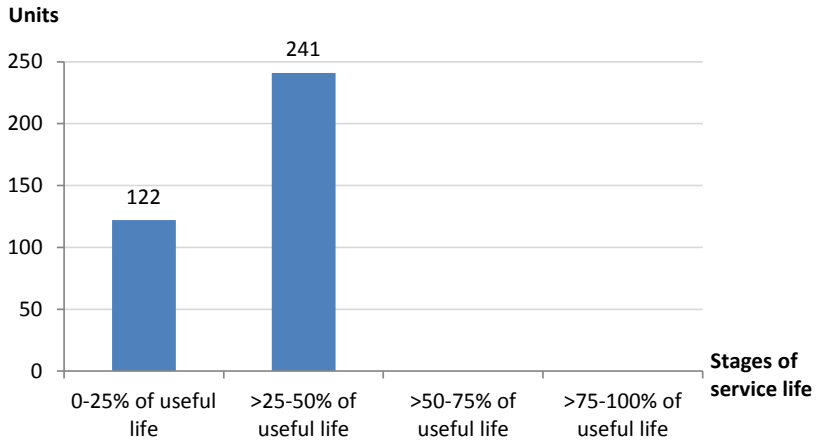


Figure 6: Sewer Manholes Age compared to their Expected Useful Life (100 years)

The results for the condition assessment of the wastewater linear group of assets are shown in Table 6.

Table 6: Wastewater Linear Condition Assessment

Asset Category	Asset	Grades				Mean Grade		Trend	
		Condition	Performance	Capacity vs. needs	Funding vs. needs				
Wastewater Linear	Sewer Pipes	B	B	B-	C-	**B-**	B-	↓	↓
	Sewer Laterals	B	B	A	C-	**B**		↓	
	Manholes	B	B	B-	C-	**B-**		↓	

All assets from the wastewater linear group are considered in good condition. However, none of them seem to have sufficient investment level to maintain the current service level, which may lead to faster degradation and earlier replacement needs than expected.

Table 7 shows the results of the valuation analysis for the wastewater linear group of assets. The replacement values were calculated assuming the following unit costs: $3,350/manhole, $285,000/km for the laterals and between $425,000 and $675,000/km for the sewer mains, depending on pipeline the diameter.

Table 7: Wastewater Linear Valuation

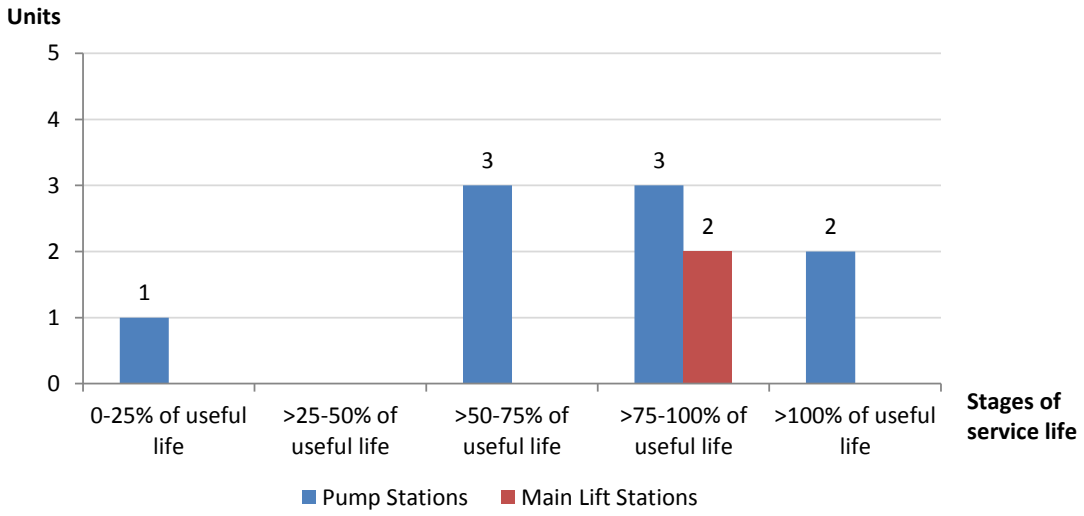
Asset	Inventory	Replacement Cost
Sewer Pipes	33.3 km	$16,700,000
Sewer Laterals	21.5 km	$6,123,000
Manholes	363 units	$1,216,000
TOTAL – Wastewater Linear		**$24,039,000**

This analysis shows that the wastewater linear system in Petrolia is worth approximately $24.0 million.

2.2.4 Wastewater Facilities

Petrolia's wastewater facilities consist of a wastewater treatment plant and 12 pumping stations along the wastewater linear network, including 2 main lift stations.

The mean expected useful life for the pump stations is 25 years according to the Town managers, while for the main lift station, the structure should last 40 years but the equipment only 20 years. Comparing the age of each pump/lift station to its expected useful life, the portrait illustrated by Figure 7 is obtained.



* There is one pump station not represented on this graph since its in-service date is unknown.

Figure 7: Pump Stations Age compared to their Expected Useful Life Pump Stations (local pump station: 25 years; main lift station: 40 years)

Most of the pumping stations as well as the two main lift stations will reach 100% of their useful life within the next 5 years, and two more pumping stations are already above 100% of their useful life. Moreover, the equipment of the two main lift stations should have undergone major rehabilitation and/or replacement many years ago.

The results for the condition assessment of the wastewater facilities group of assets are shown in

Table 8.

Table 8: Wastewater Facilities Condition Assessment

Asset Category	Asset		Grades: Condition	Performance	Capacity vs. needs	Funding vs. needs	Mean Grade			Trend		
Wastewater Facilities	Wastewater Treatment Plant	Structure	D	C	F	D	**D**	**D+**	D+	↓	↓	↓
		Electrical & Control Systems	D	C	F	D	**D**			↓		
		Headworks (screen & grit removal)	D	D	F	D	**D-**			↓		
		Secondary Treatment – Aeration & Oxygenation	D	C	D	D	**D+**			↓		
		Secondary Treatment – Clarification & RAS Pumping	D	F	D	F	**D-**			↓		
		Phosphorus Removal	C	B	C	D	**C**			↓		
		Tertiary Treatment (equalization & sand filtration)	C	C	F	D	**D+**			↓		
		UV Disinfection	A	B	F	F	**C+**			↓		
		Biosolids Handling (tanks)	F	F	F	D	**F+**			→		
		Biosolids Handling (lagoons)	A	A	B	A	**A-**			→		
	Pump Stations		C-	C	D	D-	**D+**			↓		
	Main Lift Stations		C	D	F	D	**D+**			↓		

Results show that all pumping stations offer a fair to poor condition and performance, and that funding is not sufficient to maintain and renew them. Moreover, it seems also that the Town has capacity issues with the main lift stations. During interviews, it has been mentioned that 25% of the pump stations are in poor condition and require immediate attention, and that for the two main ones (lift stations), upgrades are recommended within the next five years. These results and comments are reflected as well in the age vs. useful life portrait illustrated in Figure 7.

The Town's Wastewater Treatment Plant was initially built in 1975, and had an expected service life of 40 years for the structure, and 20 years for the equipment. The Plant has undergone several upgrades since 1975, with the latest upgrade occurring in 1994 with the implementation of a UV Disinfection system. As a result, most of the process equipment, with the exception of the UV disinfection equipment, is beyond its expected service life, and the structure is also approaching the end of its service life.

All mechanical components of the plant are in fair to poor condition, and the tanks are in poor condition. Only the UV disinfection system and the lagoons are currently in good to excellent condition. Most of the process equipment does not have sufficient capacity to accommodate current and planned flows, and there is currently insufficient investment to maintain the plant in its current state. Ongoing degradation of the plant is anticipated.

Table 9 shows the results of the valuation analysis for the wastewater facilities group of assets. The replacement values were calculated with the following unit costs: $140,000 for each pump station and $450,000 for each main lift station.

Table 9: Wastewater Facilities Valuation

Asset	Inventory	Replacement Cost
Wastewater Treatment Plant	1 unit	$9,709,000
Pump Stations	10 units	$1,260,000
Main Lift Stations	2 units	$1,350,000
TOTAL – Wastewater Facilities		**$12,319,000**

This analysis shows that the replacement value of the wastewater facilities in Petrolia is approximately $12.3 million, including $9,709,000 associated with the wastewater treatment plant.

2.2.5 Stormwater Linear

Petrolia's stormwater linear network consists of approximately 42.9 km of storm sewers with diameter ranging between 100 to 1350 mm; a total of 23.4 km of storm laterals and 3.6 km of storm leads, 274 manholes and 786 catch basins. This stormwater collection and drainage system was built throughout the 20th century, as shown by the age distribution figure below.

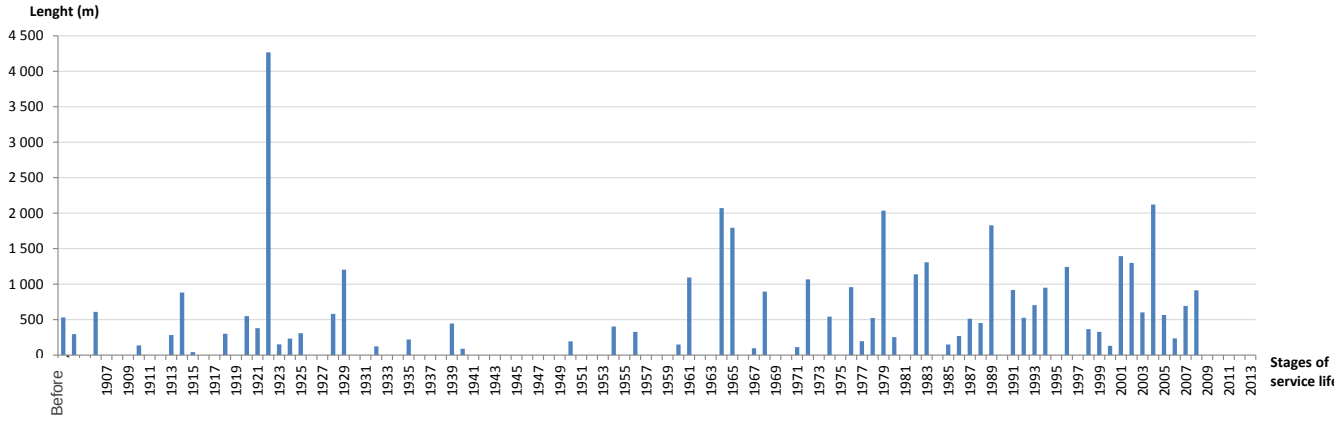


Figure 8: Storm Pipes Age Distribution

Most of the storm pipes in Petrolia are made of tile or concrete. The mean expected useful life of storm sewer pipes, laterals and manholes was agreed upon 100 years with the Town managers, while storm leads and catch basins are expected to last 50 years. Comparing the age of each pipe and accessory to its expected useful life, the portraits illustrated by Figure 9 and Figure 10 are obtained.

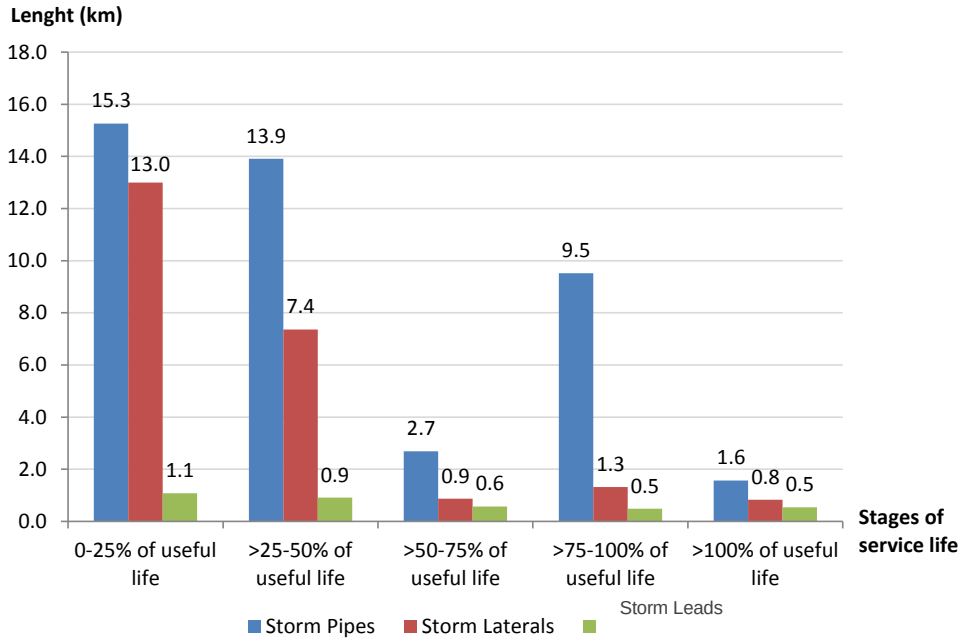


Figure 9: Storm Pipes Age compared to their Expected Useful Life (pipes & laterals: 100 years; leads: 50 years)

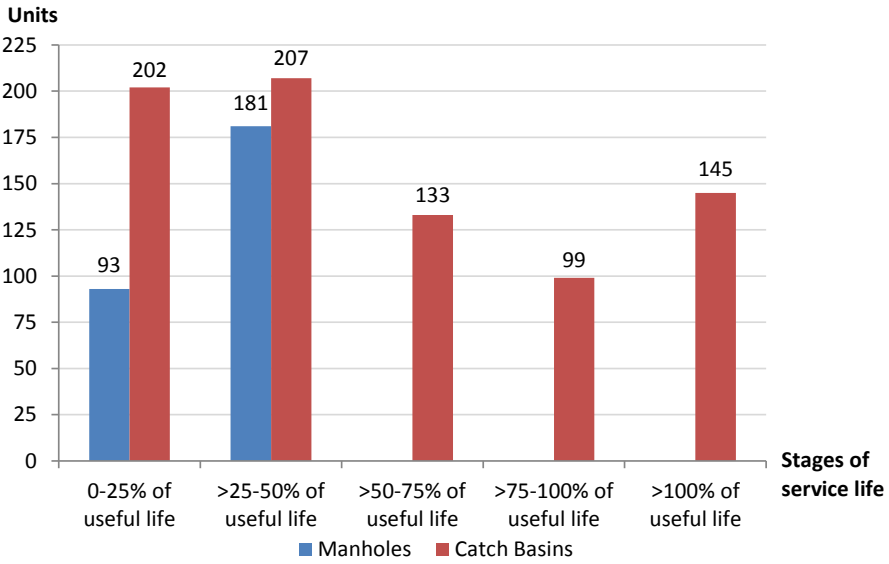


Figure 10: Storm Sewer Manholes and Catch Basins Age compared to their Expected Useful Life (manholes: 100 years; catch basins: 50 years)

It can be seen that almost 15 km of storm sewers (including laterals and leads), and 30% of the catch basins in Petrolia are at or past 100% of their expected useful life. On the other hand, all manhole structures are still within 50%of their expected useful life.

The results for the condition assessment of the stormwater linear group of assets are shown in Table 10.

Table 10: Stormwater Linear Condition Assessment

Asset Category	Asset	Grades				Mean Grade		Trend	
		Condition	Performance	Capacity vs. needs	Funding vs. needs				
Stormwater Linear	Storm Pipes	D	D	D	D	**D**	C	↓	↓
	Storm Laterals	D	D	D	D	**D**		↓	
	Storm Leads	B	B	B	D	**B-**		↓	
	Manholes	B	C	C	D	**C+**		↓	
	Catch Basins	B	C	C	D	**C+**		↓	

Storm sewers and laterals seem to be in poor condition, while storm leads are considered in good conditions. Manholes and catch basins are in good to fair condition. However, according to the preceding analysis, many catch basins would need to be renewed as they are older than their expected useful life.

All assets from the stormwater linear group do not have sufficient investment level to maintain the current or expected Level of Service, which may lead to faster degradation and earlier replacement needs than expected. Overall, this group of asset is in fair condition, which is anticipated to deteriorate in the next few years given the current practices and level of investment.

Table 11 shows the results of the valuation analysis for the stormwater linear group of assets. The replacement values were calculated with the following unit costs: $3,350/manhole and catch basins, $230,000/km for the storm laterals, $340,000/km for the storm sewer leads and between $425,000 and $750,000/km for the storm sewer, depending on the pipe diameter.

Table 11: Stormwater Linear Valuation

Asset	Inventory	Replacement Cost
Storm Pipes	42.942 km	$23,563,000
Storm Laterals	23.368 km	$5,375,000
Storm Leads	3.581 km	$1,217,000
Manholes	274 units	$918,000
Catch Basins	786 units	$2,633,000
TOTAL – Stormwater Linear		**$33,706,000**

This analysis shows that the stormwater linear system in Petrolia is worth approximately $33.7 million.

2.2.6 Roads System

Petrolia's road system has a total of 39.5 km of roads (324,391 m^2), separated into three categories: arterial roads (4.2 km and 30,684 m^2), collector roads (9.7 km and 83,126 m^2), and local roads (25.6 km and 210,581 m^2). There are also 23,639 m^2 of sidewalks or walkways, 387 BWP poles and 415 Town poles for street lighting, as well as 1 bridge, located on Discovery Line.

As mentioned earlier, the inventory for roads comes from the Stantec Road Survey from January 2013 and not from the CityWide database. Petrolia Line and Oil Heritage Road were not compiled, since they are county roads and are therefore not under the responsibility of Petrolia.

Petrolia's roads were built mostly from the 1970s up to now, as shown by the age distribution figure below.

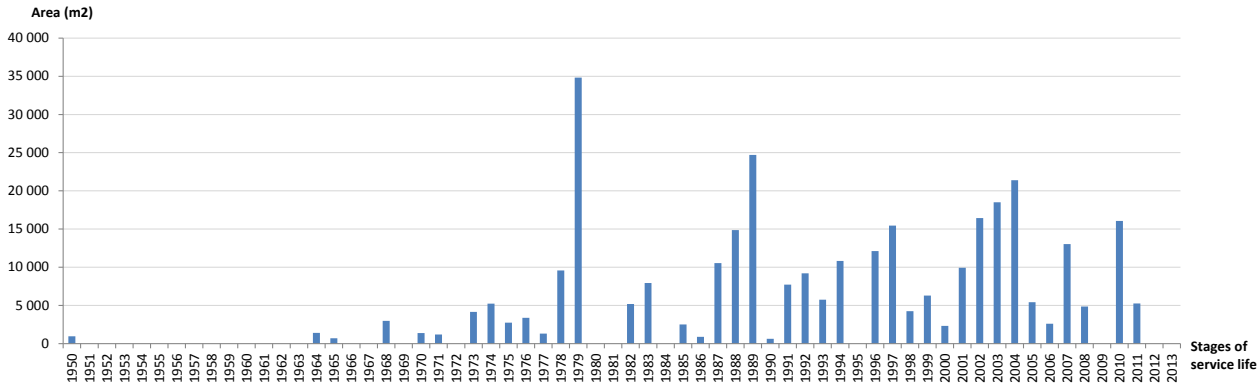


Figure 11: Roads Age Distribution

The mean expected useful life for the roads are 40 years for arterial roads, 45 years for collector roads, and 50 years for local roads. Sidewalks are expected to last 40 years. Comparing the age of each road segment to its expected useful life, the portrait illustrated by

Figure 12 is obtained.

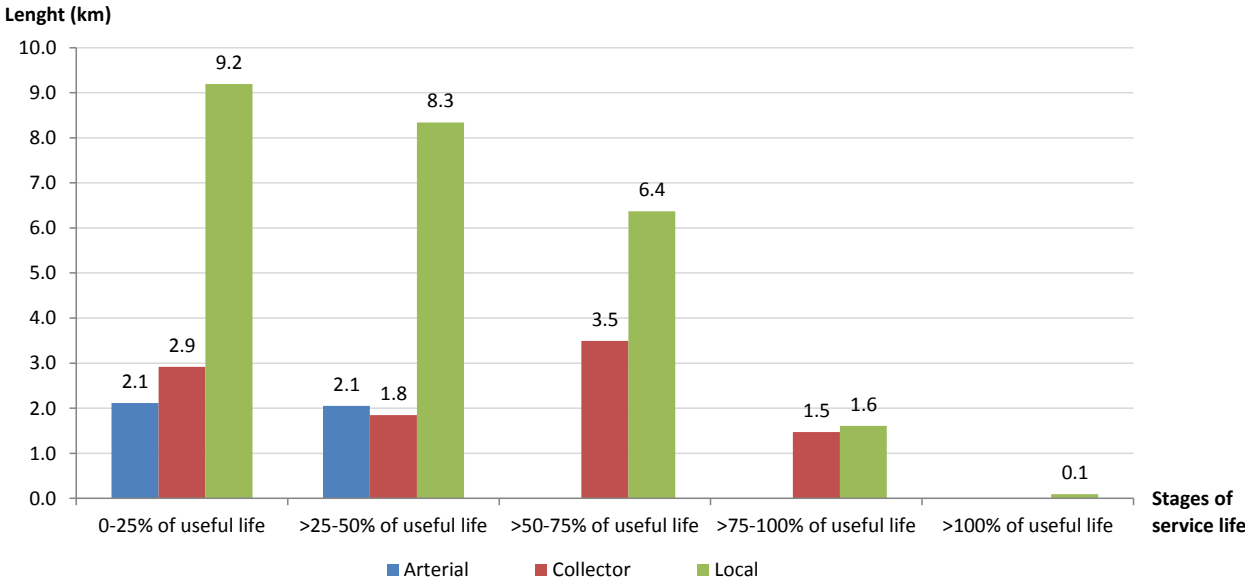


Figure 12: Roads compared to their Expected Useful Life (arterial: 40 years; collector: 45 years; local: 50 years)

Arterial roads in Petrolia are all younger than 50% of their useful life, while collector roads are equally distributed throughout the useful life cycle. There are more local roads in the early stages of the lifecycle than in the latter stages.

The streetlights poles age can also be compared to their expected useful life (25 years), to obtain the following portrait.

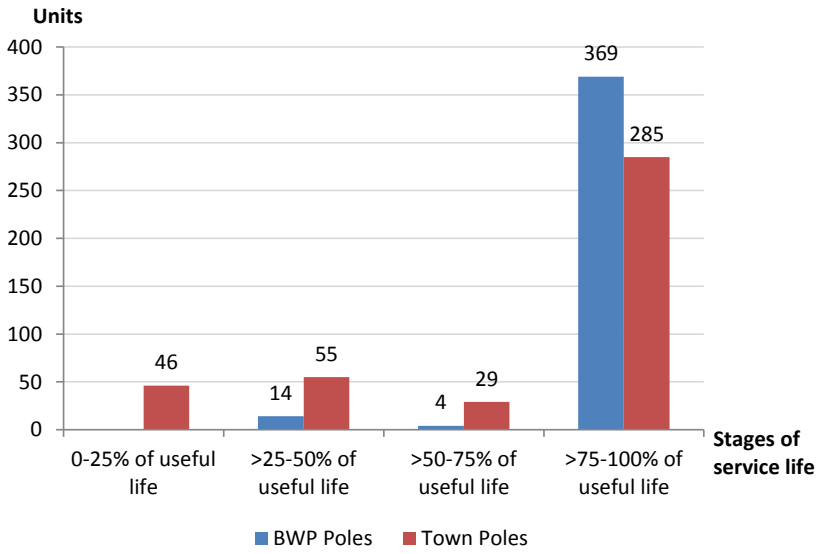


Figure 13: Streetlights Poles compared to their Expected Useful Life (25 years)

A large amount of the streetlights poles are in the last stages of their useful life and, as such, it is anticipated that this asset class will require a significant amount of investment in the near future. However, the actual condition of all these poles should be assessed prior to initiating a replacement program.

The results for the condition assessment of the roads system group of assets are shown in Table 12.

Table 12: Roads System Condition Assessment

Asset Category	Asset	Grades				Mean Grade		Trend	
		Condition	Performance	Capacity vs. needs	Funding vs. needs				
Roads System	Arterial Roads	B	B	A	B	**B+**	B+	→	→
	Collector Roads	B	B	A	B	**B+**		→	
	Local Roads	B	B	A	B	**B+**		→	
	Sidewalks & Walkways	B	B	A	A	**B+**		→	
	Street Lighting – BWP Poles	B+	B	B	A	**B+**		→	
	Street Lighting – Town Poles	B+	B	B	A	**B+**		→	
	Bridge	B	A	A	A	**A-**		→	

According to the condition assessment, all assets from the roads system are in good condition and get enough investment for this condition to be maintained within the next few years. This conclusion includes the streetlights poles, even if with the age vs. useful life portrait indicating otherwise.

The bridge was built in 1975 and has reached half of its expected useful life (75 years). It is considered in good to excellent condition with sufficient funding to maintain it. It was mentioned during the interviews that the bridge is inspected two times a year.

It should be noted that for the roads, the information presented here allows for a general portrait for this group of asset, while the Roads Asset Management Plan (Stantec, Jan 2013) gives a more precise portrait for each of the roads segment individually. The results from this report will be analyzed later on.

Table 13 shows the results of the valuation analysis for the roads systems group of assets. The replacement values were calculated with the following unit costs: \$80/m^2 for arterial roads, \$75/m^2 for collector roads, \$70/m^2 for local roads, \$45/m^2 for sidewalks, \$600/unit for the streetlights BWP poles, \$3,000/unit for the streetlights Town poles, and \$500,000 for the bridge.

Table 13: Roads Systems Valuation

Asset	Inventory	Replacement Cost
Arterial Roads	4.165 km	\$2,455,000
	30 684 m^2	
Collector Roads	9.729 km	\$6,234,000
	83 126 m^2	
Local Roads	25.609 km	\$14,741,000
	210 581 m^2	
Sidewalks & Walkways	23 639 m^2	\$1,064,000
Street Lighting – BWP Poles	387 units	\$1,477,000
Street Lighting – Town Poles	415 units	
Bridge	1 unit	\$500,000
TOTAL – Roads Systems		**\$26,471,000**

This analysis shows that the roads system in Petrolia is worth approximately \$26.5 million.

2.2.7 Parks

The parks group of assets include many components which have been distinguished to efficiently display inventory, values, expected life and current condition. The source of information is the CityWide CPA database, and interviews with Town staff. There are 12 parks in Petrolia for which a useful life has been generally considered to be 50 years old. Within these different parks, the following assets can be identified:

- 6 children play structures and 13 swing sets,
- 6 soccer fields and 8 baseball fields,
- 2 tennis courts,
- 23 bleachers and 31 benches,
- 1 major building (Kerr building),
- 11 other facilities and structures, which include all pavilions, shelters, gazebo, washrooms, the Victoria pond display and the bridge of the Bridgeview Park walking trails,
- 6 lighting units,
- 4 irrigation systems,

- walking trails in Bridgeview park.

Two of the children play structures and all the swing sets are in the last stage of their useful life of 15 years and should probably be renewed in the next few years to ensure regulations are met. All soccer fields, baseball fields, tennis courts, as well as bleachers and benches are expected to last 15 years, and currently are close to 100% of their useful life, or already are older.

The Kerr building was built recently in 2010 and has an expected useful life of 50 years. As for all other park facilities and structures mentioned above, which are considered to have an expected useful life of 30 years, more than half of them are older than that. The lighting units at Diamond # 2 are over 40 years old, well past their expected useful service life, and are in need of replacement. The lighting units at Diamond # 3 are 18 years old, and are in some maintenance within the next five years. The irrigation systems are at 50% of their expected service life, and are currently in good to excellent condition. The Town's walking trails are currently in fair to good condition.

The results for the condition assessment of the parks group of assets are shown in Table 14.

Table 14: Parks Condition Assessment

Asset Category	Asset	Grades				Mean Grade		Trend	
		Condition	Performance	Capacity vs. needs	Funding vs. needs				
Parks	Parks (Land)	B+	A	A	C	**B+**	B-	→	→
	Play structures	C	B	A	B	**B-**		→	
	Swing sets	D	D	D	D	**D**		→	
	Soccer Fields	A	A	A	B	**A-**		→	
	Baseball Fields	A	A	A	B	**A-**		→	
	Tennis Courts	D	B	A	C	**C+**		→	
	Bleachers	B	B	B	B	**B**		→	
	Buildings	D	D	C	D	**D+**		→	
	Other Facilities and Structures	B	B	B	C	**B-**		→	
	Benches	A	A	A	B	**A-**		→	
	Lighting	D	A	A	C	**C+**		→	
	Irrigation Systems	A	A	A	A	**A**		→	
	Walking Trails	C	C	B	C	**C+**		→	

The children play structures and swing sets are in fair to good condition, while the soccer fields, baseball fields, as well as the bleachers, benches and irrigation systems seem to be in good to excellent condition. The buildings are considered to be in poor condition; however the Kerr building was constructed recently and is in excellent condition. The other facilities and structures are in good condition. With the children play structures and swing sets, the tennis courts and walking trails are the parks assets which seem to require more funding to maintain and improve them.

However, the parks assets are globally in good condition and are considered to have a fair level of investment to maintain this good condition.

Table 15 shows the results of the valuation analysis for the parks group of assets. The replacement values were calculated with the following unit costs also indicated in the table.

Table 15: Parks Valuation

Asset	Inventory	Unit Costs	Replacement Cost
Parks (Land)	12 units	$100,000[2]	$1,200,000
Play structures	6 units	$12 000	$72,000
Swing sets	13 units	$1 200	$15,600
Soccer Fields	6 units	$1 500	$9,000
Baseball Fields	8 units	$8 000	$64,000
Tennis Courts	2 units	$44 000	$88,000
Bleachers	23 units	$1,200	$27,600
Buildings	1 unit	-	$126,000[3]
Other Facilities and Structures	11 units	$30,000	$330,000
Benches	31 units	$600	$18,600
Lighting	6 units	$1,200	$7,200
Irrigation Systems	4 units	$6,000	$24,000
Walking Trails	1 unit	-	$6,500
TOTAL – Parks			**$1,988,500**

This analysis shows that the parks group of assets is worth approximately $2.0 million.

2.2.8 Corporate Facilities and Lands

The corporate facilities and lands group of assets include many different assets which have been distinguished to efficiently display inventory, values, expected life and current condition. The facilities and lands that were identified from the available information in the CityWide CPA database are presented below.

- Petrolia's fire station was built in 1976 and currently has reached 75% of its expected useful life of 50 years. Almost all related equipment are expected to last 15 years, and they all have reached more than 50% of this useful life.
- The Town' public works garage was built in 1969 and currently has reached almost half of its expected useful life of 50 years. The related equipment is expected to last between 5 and 15 years, and many of them are well above 100% of their useful life.
- Petrolia's administrative building was renovated in 1992 and currently has reached 75% of its expected useful life of 50 years. The related equipment is expected to last between 5 and 20 years, and many of them are well above 100% of their useful life.
- The Town counts 5 recreation facilities:
  - the Oil Heritage District Community Centre was built in 2006 and has an expected useful life of 50 years.
  - the Greenwood Recreation Centre was built in 1961 and therefore has reached more than 100% of its expected useful life of 50 years.
  - the Victoria Playhouse was renewed in 1992, and is expected to last 75 years. The clock tower was rehabilitated in 2013.

[2] From CIMA+
[3] From Cowan Risk report

- the Town's library was built in 1961 and therefore has reached more than 100% of its expected useful life of 50 years.
- the farmers market was built recently in 2010 and is expected to last 50 years.

All related equipment for these recreation facilities are expected to last between 5 and 20 years. Most of them are older than their useful lives, except those associated with the Oil Heritage District Community Centre, which were purchased more recently in 2006.

- Petrolia's medical centre was built in 2012 and has an expected useful life of 50 years.
- There is one cemetery in Petrolia. The office was built in 1962 and so has reached its expected useful life of 50 years, while the garage was built more recently in 1990.
- According to the CityWide CPA database, the Town counts 9 parking lots, with expected useful life of 35 years. Two of these parking lots seem to have reached their expected useful life.
- According to the CityWide CPA database, the Town possesses 10 vacant lots.

The results for the condition assessment of the corporate facilities and lands group of assets are shown in Table 16.

Table 16: Corporate Facilities and Lands Condition Assessment

Asset Category	Asset		Grades				Mean Grade			Trend		
			Condition	Performance	Capacity vs. needs	Funding vs. needs						
Corporate Facilities & Lands	Fire Station & Equipment		B	A	B	B	**B+**			→		
	Public Works Building & Equipment		B	A	C	B	**B**			→		
	Administrative Building & Equipment		B-	B	C	C	**C+**			→		
	Recreation Facilities & Equipment	Oil Heritage District Community Centre	A	B+	A	B	**A-**	**B+**	B	↑	→	→
		Greenwood Recreation Centre	B	B	C	C	**B-**			→		
		Victoria Playhouse Petrolia	A	A-	B	A	**A-**			↑		
		Library	B+	A	A	A	**A-**			→		
		Farmers Market	A	A	A[4]	B	**A-**			→		
	Medical Centre		B	C	C	B	**B-**			→		
	Cemetery		B	B	A	B	**B+**			→		
	Parking Lots		B	B	B	C	**B-**			→		

It seems that most of the corporate facilities are in good to excellent condition and have sufficient funding to maintain them. However, the public works building, the administrative building, the Greenwood Recreation Centre and the medical centre only have a fair capacity to meet the demand and might need a bit more investment than the other facilities.

Table 17 shows the results of the valuation analysis for the corporate facilities & lands group of assets. Data sources are either the CityWide CPA database (Medical Centre, Cemetery and Parking Lots) or the Cowan Risk Management report (for the other facilities) from October 2011.

[4] That grade is suggested by CIMA+'s team to be consistent with other grades for this asset.

Table 17: Corporate Facilities & Lands Valuation

Asset	Inventory	Replacement Cost
Fire Station & Equipment	1 unit	$798,000
Public Works Building & Equipment	1 unit	$876,200
Administrative Building & Equipment	1 unit	$421,000
Recreation Facilities & Equipment	5 units	$25,188,000
Oil Heritage District Community Centre		$6,679,000
Greenwood Recreation Centre		$10,274,000
Victoria Playhouse Petrolia		$6,378,000
Library		$1,257,000
Farmers Market		$600,000
Medical Centre	1 unit	$500,000
Cemetery	1 unit	$40,000
Parking Lots	9 units	$1,320,000
TOTAL – Corporate Facilities & Lands		**$54,331,200**

This analysis shows that the corporate facilities in Petrolia are worth approximately $54.3 million, including $50,376,000 associated with the recreation facilities.

2.2.9 Fleet

The fleet group of assets has been divided into four categories to efficiently display inventory, values, expected life and current condition.

- The “Light” category includes smaller vehicles such as vans and pick-ups, each worth on average $30,000. The Town has 19 light vehicles which are expected to last on average 7 years.
- The “Medium” category includes small tractors and trucks, each worth on average $50,000. The Town has 6 medium vehicles for which the mean expected useful life is 12 years.
- the “Heavy” category includes for example freightliners, trucks with plow equipment and small fire trucks, each worth on average $100,000. The Town has 7 heavy vehicles which are expected to last on average 15 years.
- the “Super Heavy” category includes for example large fire trucks, street sweepers and champion graders, each worth on average $200,000. The Town has 4 super heavy vehicles for which the mean expected useful life is 20 years.

Comparing the age of each vehicle to its expected useful life, the portrait illustrated by Figure 14 is obtained.

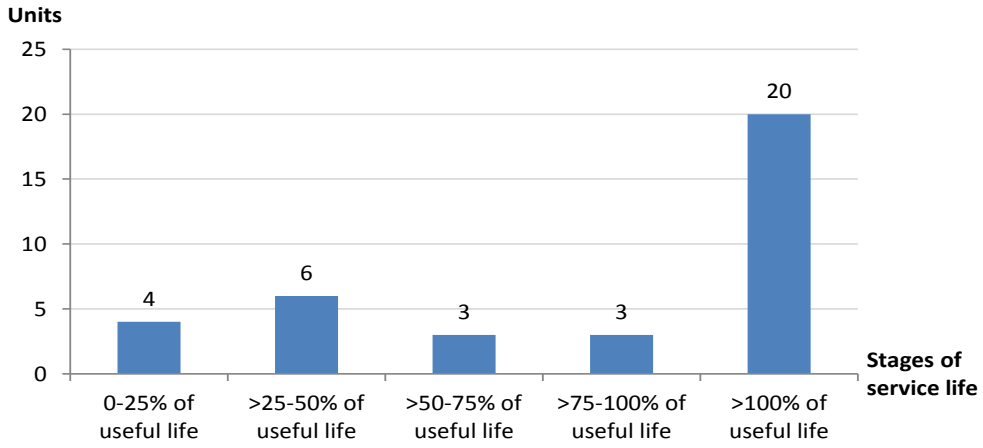


Figure 14: Fleet compared to their Expected Useful Life (light: 7 years; medium: 12 years; heavy: 15 years; Super Heavy: 20 years))

According to this analysis, 20 vehicles out of 36 are older than 100% of their useful life and therefore need to be renewed. Among those 20 vehicles, there are 13 light vehicles, 3 medium vehicles, 2 heavy vehicles and 2 super heavy vehicles.

The results for the condition assessment of the fleet group of assets are shown in Table 18.

Table 18: Fleet Condition Assessment

Asset Category	Asset	Grades				Mean Grade		Trend	
		Condition	Performance	Capacity vs. needs	Funding vs. needs				
Fleet	Light	B	C	A	B	**B**	B+	→	→
	Medium	B	B	A	B	**B+**		→	
	Heavy	B	B	A	B	**B+**		→	
	Super Heavy	B	B	B	A	**B+**		↑	

All vehicles seem to be in good condition and meet the needs of the Town, despite the fact that many of them are older than their theoretical useful life. Funding is considered adequate for all fleet categories, particularly for the "Super Heavy" category. The condition is anticipated to be maintained over the next few years given the current practices and levels of investment.

Table 19 shows the results of the valuation analysis for the fleet group of assets.

Table 19: Fleet Valuation

Asset	Inventory	Replacement Cost
Light	19 units	$570,000
Medium	6 units	$300,000
Heavy	7 units	$700,000
Super Heavy	4 units	$800,000
TOTAL – Fleet		**$2,370,000**

This analysis shows that the fleet category of assets in Petrolia is worth approximately $2.37 million.

2.3 SUMMARY OF THE RESULTS

The state of the local infrastructure for all Petrolia's groups of assets is summarized in the following tables

Inventory data were compiled from the management system "City Wide" of the Town. Then, the completeness and accuracy of this information was reviewed with the Town representatives.

Table 20: Petrolia's Assets Inventory (Part 1/2)

Asset Category	Asset	Inventory	Units
Water Linear	Main Line	18.700	km
	Water Lines - Primary	1.923	km
	Water Lines - Secondary	37.821	km
	Hydrants	225	units
Water Facilities	Water Treatment Plant	1	unit
	Booster Station	1	unit
	Reservoir	1	unit
	Tower	1	unit
Wastewater Linear	Sewer Pipes	33.305	km
	Sewer Laterals	21.484	km
	Manholes	363	units
Wastewater Facilities	Wastewater Treatment Plant	1	unit
	Pump Stations	10	units
	Main Lift Stations	2	units
Stormwater Linear	Storm Pipes	42.942	km
	Storm Laterals	23.368	km
	Storm Leads	3.581	km
	Manholes	274	units
	Catch Basins	786	units
Roads Systems	Arterial Roads	4.165	km
		30 684	m²
	Collector Roads	9.729	km
		83 126	m²
	Local Roads	25.609	km
		210 581	m²
	Sidewalks & Walkways	23 639	m²
	Street Lighting - BWP Poles	387	units
	Street Lighting - Town Poles	415	units
	Bridge	1	unit

Table 21: Petrolia's Assets Inventory (Part 2/2)

Asset Category	Asset	Inventory	Units
Parks	Parks	12	units
	Play structures	6	units
	Swing sets	13	units
	Soccer Fields	6	units
	Baseball Fields	8	units
	Tennis Courts	2	units
	Bleachers	23	units
	Buildings	1	unit
	Other Facilities and Structures	11	units
	Benches	31	units
	Lighting	6	units
	Irrigation Systems	4	units
	Walking Trails	1	unit
Corporate Facilities & Lands	Fire Station & Equipment	1	unit
	Public Works Building & Equipment	1	unit
	Administrative Building & Equipment	1	unit
	Recreation Facilities & Equipment	5	units
	Medical Centre	1	unit
	Cemetery	1	unit
	Parking Lots	9	units
	Vacant Lots	10	units
Fleet	Light	19	units
	Medium	6	units
	Heavy	7	units
	Super Heavy	4	units

Table 22: Petrolia's Assets Valuation

Asset Category	Replacement Cost
Water Linear	$19,616,000
Water Facilities	$14,457,700
Wastewater Linear	$24,039,000
Wastewater Facilities	$12,319,000
Stormwater Linear	$33,706,000
Roads Systems	$26,471,000
Parks	$1,988,500
Corporate Facilities & Lands	$54,331,200
Fleet	$2,370,000
TOTAL Petrolia	**$189,298,400**

City Wide also provides information on the assets age and useful life. The information on useful life was reviewed, based on theoretical knowledge versus the town context before proceeding with the analysis of remaining service life statistics for each asset. The Table 23 shows the expected useful age used for assets in Town of Petrolia compare to City of Hamilton.

Table 23: Petrolia's Assets Expected Useful Life

Asset Category	Asset		Expected Useful Life Town of Petrolia	Expected Useful Life per City of Hamilton*
Water Linear	Main Line		75	75
	Water Lines –Primary		75	75
	Water Lines - Secondary		75	75
	Hydrants		75	75
	Valves		75*	75
Water Facilities	Water Treatment Plant	Structure	40	Different for each component
		Equipment	15	
		System	40	
	Booster Station		50	
	Reservoir		50	
	Tower		50	
Wastewater Linear	Sewer Pipes		100	60
	Sewer Laterals		100	60
	Manholes		100	60
Wastewater Facilities	Waste water Treatment Plant	Structure	40	Different for each component
		Electrical & Control Systems	20	
		Headworks (screen and grit removal)	20	
		Secondary Treatment – Aeration &	40	
		Secondary treatment – Clarification & RAS Pumping	40	
		Phosphorus removal	20	
		Tertiary Treatment (equalization & sand filtration)	40	
		UV Disinfection	20	
		Biosolids Handling (tanks)	40	
		Biosolids Handling (lagoons)	40	
	Pump Stations		25	
	Main lift Stations		40	
Stormwater Linear	Storm Pipes		100	100
	Storm Laterals		100	100
	Storm Leads		50	100
	Manholes		100	100
	Catch Basins		50	80

Asset Category	Asset		Expected Useful Life Town of Petrolia	Expected Useful Life per City of Hamilton*
Roads System	Arterial Roads		40	28
	Collector Roads		45	30
	Local Roads		50	35
	Sidewalks & Walkways		40	45
	Street Lighting – BWP Poles		25	N/A
	Street Lighting – Town Poles		25	N/A
	Bridge		75	70
Parks	Parks (Land)		N/A	50
	Play structures		15	20
	Swing sets		15	20
	Soccer fields		15	20
	Baseball Fields		15	20
	Tennis Courts		15	20
	Bleachers		15	20
	Buildings		50	20
	Other facilities and Structures		30	20
	Benches		15	20
	Lighting		15	20
	Irrigation Systems		15	20
	Walking Trails		15	20
Corporate Facilities and Lands	Fire Station & Equipment		Building 50 Equipment 5 to 20	Building 60 to 90 Equipment 20 to 25
	Public Works Building & Equipment			
	Administrative Building & Equipment			
	Recreation Facilities & Equipment	Oil Heritage District Community Centre	50	
		Greenwood Recreation Centre	50	
		Victoria Playhouse Petrolia	75	
		Library	50	
		Farmers Market	50	
	Medical Centre		50	
	Cemetery		50	N/A
	Parking Lots		35	N/A
Fleet	Light		7	8
	Medium		12	10
	Heavy		15	12
	Super-heavy		20	N/A

*As city of Hamilton – No data from Town of Petrolia

Table 24: Petrolia's Report Card

Asset Category	Mean Grade	Trend	Comment
Water Linear	**B**	↓	This group of asset is globally in good condition but its condition is anticipated to deteriorate in the next few years given the current practices and level of investment. The main water line seems in excellent condition, while the Town water networks are considered in good to fair condition, with some capacity issues. All water lines do not have a sufficient investment level to maintain the current condition. Hydrants are however in excellent condition with sufficient funding.
Water Facilities	**C+**	→	The water facilities are globally in fair condition and anticipated to be maintained at this level in the next few years given the current practices and level of investment. However, the portrait is variable from one asset to the other. The water tower is in excellent condition due to the recent major reparations, but the reservoir and the booster station are in fair to poor condition, and do not have a sufficient level of investment to maintain them. The water treatment plant globally offers good performance and capacity, with a sufficient level of investment to maintain it, but some components of the structure and some equipment seem to be in fair to poor physical condition.
Wastewater Linear	**B-**	↓	All assets from this group are considered in good condition. However, none of them seem to have sufficient investment level to maintain it, and therefore their condition is anticipated to deteriorate in the next few years.
Wastewater Facilities	**D+**	↓	The wastewater facilities are overall in poor condition. All pumping stations offer a fair to poor condition and performance, and funding is not sufficient to maintain and renew them. The two main lift stations also have serious capacity problems. Most of the components of the wastewater treatment plant seem in fair to poor condition, have capacity problems and do not have a sufficient level of investment, such that a global degradation of the plant is anticipated in the next few years.
Stormwater Linear	**C**	↓	This group of asset is globally in fair condition, and its condition is anticipated to deteriorate in the next few years given the current practices and level of investment. Particularly, the storm pipes and laterals are considered to be in poor condition.
Roads Systems	**B+**	→	All assets from this group are considered in good condition, which is anticipated to be maintained within the next few years given the current practices and level of investment.
Parks	**B-**	→	The parks assets are globally in good condition and are considered to have a sufficient level of investment to maintain this condition. However, the children play structures and swing sets, the lighting, the tennis courts and the walking trails are the assets which seem to have the worst condition and probably require more funding to maintain and improve them.
Corporate Facilities & Lands	**B**	→	The corporate facilities are overall in good condition and have sufficient funding to maintain them, although the public works building, the administrative building, the Greenwood Recreation Centre and the medical centre might need a bit more investment to allow them to improve their capacity to meet the needs.
Fleet	**B+**	→	All vehicles seem to be in good condition and meet the needs of the Town. Funding is considered adequate for all fleet categories. The condition is anticipated to be maintained over the next few years given the current practices and levels of investment.
Town Grade	**B-**	→	Petrolia's group of assets in worst condition is the wastewater facilities, as most of the pumping stations and the wastewater treatment plant are in poor condition and have performance and capacity problems. It is the group of asset in greatest need of investment. The water facilities and stormwater linear also seem to be in worse condition when compared to other Town assets. Moreover, the water, wastewater and stormwater pipe networks all seem to lack funding, such that managers anticipate a deterioration of their condition within the next few years. The roads, parks, facilities and fleet assets are all in good condition, which managers anticipate to be able to maintain given the current practices and level of investment. However, some specific assets within these groups might require more care than others in the next few years.

3. DESIRED LEVELS OF SERVICE

Levels of service have been established in two (2) stages. First, an inventory of standards and regulations allowed us to set minimal levels of service for the assets targeted by these regulations. A table was then prepared in order to present for each asset category the levels of service, the associated performance indicators, the objectives to be met and the current degree to which they are met, and a deadline for meeting these objectives for the municipality of Petrolia.

The level of service proposal was discussed with Petrolia's managers and decision-makers in order to ensure that the retained levels of service corresponded to the needs and expectations of Petrolia's citizens. In addition, the objectives and time given to meet them should be realistic so as not to create insurmountable constraints for the municipality and public service managers.

3.1 WATER LINEAR

Three aspects were suggested to reflect best practices and the foreseeable expectations of citizens and Town staff in connection with the level of service for the drinking water network.

3.1.1 Water is safe to drink

First of all, the network must deliver drinking water that meets current regulatory requirements at all points within the system.

Periodic testing carried out on samples taken from different points of the network demonstrate that the Town's water system is providing good service. The management objective is 100% compliance and the municipality will respond to this level of service. In the event of non-compliance, the quick issuance of a boil orders allows the Town to manage potential health risks.

Currently, the municipality is complying 100% with this level of service.

3.1.2 Water network is reliable

The drinking water network itself must be reliable in order to limit service interruptions required for repairing leaks and breakages.

The compilation of the number of breaks per 100 km of network per year is an indicator of the network's condition and allows managers to target sections of the network where the risk of failures are at its peak. A maximum of 30 breaks per 100 km per year is considered to be an acceptable limit.

Currently, the number of breaks identified by the Town on the secondary pipeline network is low (8 breaks in 2011, 11 breaks in 2012 and 4 breaks in 2013, for an average of 19 breaks / 100 km / year). However, a registry of breaks has only been maintained since December 2010 and much useful information has not been compiled. A more complete registry will allow for a better interpretation of the network's condition and the causes of these breaks.

It is important to note that the rate of breaks must be analyzed by section of pipe when looking to identify the pipes whose condition requires maintenance work. This analysis has yet to be undertaken.

3.1.3 Water supply is adequate for fire-fighting purpose

Finally, the drinking water network must be able to provide the required pressure and flow rate to ensure protection against fire for the assets and people of the Town of Petrolia. These functional characteristics are ensured both by the pipelines and by accessories found on the network: fire hydrants.

Flow-pressure tests (NFPA) that are carried out periodically allow for the detection of defective sewers and accessories. Moreover, the percentage of coverage by each fire hydrant meets performance criteria.

Fire hydrants meet 100% of the requirements of standards according to evaluations done by Town staff. This data must be compiled into a registry that could be made available to the Town's insurers.

It is recommended that an overall water distribution system model be developed in order to identify system deficiencies (if any) relative to available fire flows throughout the distribution system. The model will be used to develop a plan to upgrade the system to provide adequate fire flows, and to identify servicing requirements for future growth.

3.2 WATER FACILITIES

Two aspects associated with the quality of drinking water provided by the filtration plant were seen as being essential to citizens and managers.

3.2.1 A reliable water supply is provided

Firstly, the filtration plant must be reliable. For this, the critical infrastructure and equipment allowing for the production of safe drinking water must be supervised and any indication of a possible failure must quickly lead to additional investigations in order to avoid any risk to the public's health.

To meet this objective, a risk management plan is available and it is the Ontario Clean Water Agency who oversees its implementation and follow-up on risk management measures.

3.2.2 Water is safe to drink

Drinking water produced at the plant and distributed by the network must be safe. Periodic testing allows the quality of water produced and distributed to be checked and verified. The Town has already reached this target level of service.

3.3 WASTEWATER FACILITIES

Three aspects were seen as covering all the concerns from citizens and managers regarding the management and treatment of wastewater.

3.3.1 Sewerage is managed without adversely affecting the quality of the receiving environment

All wastewater in the town of Petrolia is collected and directed to the wastewater treatment facility. Treated wastewater is discharged into Bear Creek. In order to protect the quality of water in the receiving environment, it is essential for the treatment of wastewater to meet the treatment objectives stated in the Certificate of Approval.

Meeting this objective is verified through analysis of samples of effluent samples prior to discharge into the receiving environment, and comparing the effluent quality to the CofA requirements. According to the staff, discharges from the plant generally meet regulation requirements.

It should be noted that plant by-pass does occur, primarily in periods of wet weather. Sampling of by-pass flows has not been undertaken.

3.3.2 Wastewater Treatment Plant (WWTP) capacity meet existing and future needs

The objective aims to ensure that wastewater coming from any new development or population growth is effectively treated at the wastewater purification plant while complying with all regulatory requirements. Currently, major tank processes do not provide adequate capacity to treat the approved rated flow and many of the plant processes continue to use equipment.

The Town of Petrolia completed an Environmental Assessment study to identify preferred solutions for the Town considering all potential environmental, community and costs impact to plan for the expansion of the Petrolia WWTP to meet growth needs in the Town, and to plan for long term management and treatment of leachate from the Petrolia landfill site. The recommended plan was to construct a new facility sized to accommodate planned growth in the town, as well as leachate from the landfill site.

The schedule for implementation of this project has been delayed from the initial plan due to funding constraints. The Town is actively pursuing funding assistance from higher levels of government.

3.3.3 The condition of WWTP equipment and structures allows reliability, efficiency and security

Once the Petrolia WWTP Expansion project has been undertaken, the reliability, safety and efficiency of existing equipment and infrastructure must be ensured. As part of the plant expansion, an Operations and Maintenance Manual will be developed recommending the minimum maintenance tasks and schedules for all components of the facility. Periodic inspections, along with maintenance and support activities must be carried out to avoid any rapid failures or equipment degradation.

All failures that are identified following periodic inspections are to be corrected within a maximum timeframe of 60 days.

3.4 WASTEWATER LINEAR

Two aspects were retained for addressing the major concerns of residents and staff with regards to the sewer network.

3.4.1 Sewerage is managed without risk to public health

Wastewater network management must be carried out in a manner such that there are no sewer backflows into private properties. Sewer backflows pose a risk to public health and to material goods.

The compilation of complaints regarding sewer backflows is an indicator that allows staff to measure the level of performance of the collection system. Moreover, the municipality will need to analyze each complaint to determine the root cause behind a backflow event. Sewer backflows are frequently caused by breaks or obstructions in private pipelines, but may also arise due to excessive inflow or pump station failure.

The current performance of the network regarding backflows is based on one backflow per year. The municipality is aiming to meet its objective of zero backflows by 2015.

3.4.2 Sewerage is managed without risk to public security

The structural condition of sewers may lead to their collapse as well as the collapse of the pavement. Such a situation constitutes a risk for public safety. To avoid such failures, or to manage their risk, the condition of the underground infrastructure must be known.

No condition data is currently available for the overall wastewater collection network. However, the Town has experienced no sewer collapses in its streets. It is recommended that the Town implement an inspection program to assess the condition of its network to ensure the maintenance of level of service, and to better identify rehabilitation/replacement needs.

3.5 STORMWATER LINEAR

The main aspect that concerns citizens and staff is linked to the risk of backflow from the storm water network. Climate change may cause increased flooding due to higher intensity storms occurring more frequently.

3.5.1 Stormwater is managed without risk of flooding on streets or building

The storm sewer network is composed of more than 30% of sewers installed prior to the 1960s. It is likely that these sections of the network will be insufficient to carry storm water during more frequent intense rainfall events.

The implementation of control measures at the source is promoted by the Government of Ontario. However, these new approaches are only applicable to future networks, and will be challenging to implement on existing developed properties.

The number of backflow complaints during a rainfall event remains an indicator of performance.

The Town has experienced some backflows during periods of light to moderate rainfall, and on-street flooding has occurred in some areas. Mitigation and source control measures will be implemented in order to reach the agreed-upon level of service by 2018.

3.6 ROAD SYSTEMS

Three aspects were identified for the levels of service for this group of assets: two for the sidewalks and one for the roadways.

3.6.1 The road network is in good condition and fit for purpose

A complete inspection of the roadway network was carried out by an external firm using “The Methodology of the Ministry of Transportation Ontario Inventory Manual, 1991” and the chosen performance criterion is the “Time of Need” (TON).

A target was defined with town managers and a realistic timeline was created to achieve it. Moreover, the optimal management of roadways emphasizes preventive rather than remedial actions, which allows us to significantly increase the life span of roadways. This will be discussed in chapter 4.

Roadways that require immediate attention may be the subject of various treatments aimed at holding off their reconstruction and improving the level of service for users.

The service level target is not reached and investment in road rehabilitation should achieve the level of service by 2018.

3.6.2 Sidewalk and walkways are in good condition

Sidewalks allow for the safe movement of pedestrians adjacent to roadways. These sidewalks must be in good condition in order to fulfill this role.

The performance indicator is the presence and severity of vertical displacements (trip hazards) in the surface of the sidewalk, and the surface condition of the sidewalk which could affect users, in particular those with reduced mobility. A maximum vertical displacement of 20 millimetres is judged to be acceptable for ensuring the safety and mobility of users.

Town staff have indicated that the level of service will be achieved by 2015.

3.6.3 Sidewalk and walkways are easy to access to all

One of the objectives explicitly indicated in the Town's zoning plan aims for universal access to sidewalks and walkways. This is therefore aimed at the design and configuration of sidewalks.

The municipality has already developed an action plan in this regard, which will ensure its gradual implementation.

3.6.4 Street Lightning

Two aspects of street lighting concern the citizens and managers for ensuring user safety for streets and the safety of citizens in general.

3.6.5 Lightning is provided to enhance safety for all users (cars and citizens)

Roadway authorities set a minimum for lighting (ANSI/IESNA RP-8-00) and municipal regulations manage rural lighting. Minimum illumination levels, as well as minimal variation in illumination levels are used to establish acceptable lighting, based on the roadway classification. Town managers believe that they will be able to meet this level of service by 2015.

In addition to compliance with ANSI/IESNA RP-8-00, pedestrians may have safety concerns during the night and look to have higher illumination levels in certain areas. Other citizens may complain about the presence of a streetlight in proximity to bedroom windows.

The number of complaints for insufficient (or inappropriate) lighting will be used as the performance indicator for street lighting.

The target level of service for street lighting will be one (1) complaint per year. This target is currently being achieved in Petrolia. Continuous attention will be given to this subject in the future.

3.6.6 Bridge

The status of the bridge directly influences the safety of users that travel on it. Two additional measures were retained as level of service indicators.

A program of periodic inspections of various structural elements allows us to determine the bridge's physical condition.

The number of inspections carried out based on the inspection schedule will be retained as the performance criterion for judging the condition of the bridge. Together with the inspection results, the intervention timeframe for correcting any observed deficiencies is also a gauge of safety.

Two annual inspections are considered to be the minimum for adequately following changes in the bridge's condition. Currently, only one inspection is carried out per year. The municipality aims to implement a second annual bridge inspection in 2015.

In addition, repairs or rehabilitation required following inspections must be carried out within a maximum timeframe following the inspection. The Level of Service objective was set at 12 months following the inspection. Currently, the municipality is able to proceed with rehabilitations within a 24-month timeframe. The objective of reducing this timeframe to 12 months is targeted for 2016.

3.7 PARKS

Parks and pathway facilities, as well as the safety of facilities, represent an important value for users and the community in general. Elected officials have in particular translated this priority into the adoption of municipal regulations to ensure broad accessibility for citizens to parks under safe conditions.

3.7.1 Parks facilities are accessible for everyone

Parks and recreational facilities must be accessible for all citizens, no matter their age or mobility.

The number of complaints regarding lack of accessibility will be the indicator for measuring how well this objective is met. The Town developed an action plan aimed at accessibility and stated targets therein. Implementing the plan will be done according to the planned objectives and timeframes.

3.7.2 Park System is well linked by network of trails

The zoning plan aims to connect all green spaces and parks using a single pathway network. The percentage of parks and green spaces connected by pathways is the indicator retained for measuring how well this objective is met.

According to staff, around __% of parks and green spaces are connected by pathways. These connections are planned to be completed by 2017.

3.7.3 Public parks are safe and quiet. Protection of nature and wild animal is ensured

Safety in parks and tranquility for users, as well as environmental protection, are explicitly overseen by regulation 38-2009. The number of fines imposed will be the indicator retained for measuring how well this objective is met.

To date, __ fines were issued for public disorder and disrespect for the environment. The municipality is planning a promotional campaign for respectful use of parks and green spaces and aims to reach zero fines by 2016.

3.7.4 Safe park facilities are provided (play structure and swing set)

Several structures and equipment items are available for youth and children. These structures and equipment items must meet very strict safety standards.

Two indicators were identified to measure compliance with standards and the number of incidents/accidents reported each year.

The current level of service shows that 90% of facilities for young people comply with safety requirements. Improved level of service is expected by 2014.

Moreover, there is only one incident related to the use of the swing sets and play structures during 2013. The level of service is reached. An investment recommendation to renew the non-compliant equipment is provided in chapter 4.

3.7.5 Provide high quality park facilities (sport fields)

Sport fields available in parks are also governed by standards, particularly regarding their physical characteristics. Moreover, the game surfaces and accessories must be safe for both players and spectators.

Two indicators were retained to measure the performance of sporting equipment. Firstly, the percentage of standards met in the design of each sport field. Next, the percentage of maintenance standards met and the maintenance of this equipment.

In general, sport fields meet service level selected. However, these assets will require up to standard in the medium term.

3.8 CORPORATE FACILITIES / CEMETERY

Two important values shared by the citizens of Petrolia and its managers concern the respect for both the living and the dead and the quality of their final resting place.

3.8.1 Provide high quality cemetery facility

Given the heritage value of the Petrolia cemetery and citizens' expectations, particular attention must be paid to the maintenance of the cemetery site. The number of annual complaints will be the performance indicator relating to the site itself. Municipal managers plan to be able to reach this level of service by 2016.

3.8.2 All citizens treated with respect

Every family that uses the cemetery's services must be treated with the same respect, no matter their social, economic or even cultural status.

The level of user satisfaction for this service (the families of the deceased) is the indicator that will measure how well this objective is met.

The citizens of Petrolia have filed no complaints on this issue. The level of service has been reached.

3.9 CORPORATE FACILITIES (BUILDINGS)

Public buildings dedicated to administration, health or culture are considered by citizens and elected officials as being important elements in community and citizen life. They also represent access for citizens to the public administration and various services that are essential to their quality of life.

3.9.1 Opening hours are convenient for customers

In order to have access to certain public services, opening hours for offices/buildings must correspond with the type of service being given. The number of annual complaints regarding opening hours is an indicator of how well this objective is met.

In general, there are very few complaints regarding opening hours for community centres and services for citizens.

3.9.2 Preservation of Victorian Heritage of the Town

One part of the Town's motto concerns historical heritage: "Celebrating our Heritage." This takes form in part through the architecture of old buildings. One of the objectives taken on by the Town and its citizens is to preserve heritage buildings. The percentage of conserved heritage buildings will be the indicator retained for evaluating how well this objective is met.

The attention brought by elected officials and members of the community to the town's environment in this regard has allowed them to reach the expected level of service.

3.9.3 The buildings are universally accessible

Related to opening hours, physical accessibility to public buildings is particularly important for people with reduced mobility. The number of annual complaints from senior citizens and citizens in general will be the measurement indicator for this objective.

Municipal managers plan to reach this level of service by 2016.

3.9.4 Ensure the viability of Victoria Playhouse Petrolia cultural activities

The Victoria Playhouse Petrolia is an important cultural asset for the community of Petrolia. In December 2010, the town council approved a five-year business plan to ensure the hall's viability. This action plan aims to support the administration and employees of the Victoria Playhouse in particular in order to upgrade auditorium equipment and to replace certain areas of the current building. Several other actions from this plan are aimed more specifically at income, programming, marketing etc.

The number of implemented recommendations will be the indicator of how well this objective is met. To date, the action plan is compliant with this level of service as well.

3.9.5 Ensure the continuity and development of health facility in the Town

Access to adequate and quality health services is one of the chief concerns of the citizens of Petrolia. In May 2012, an external firm submitted a final report presenting a business plan for the development of a new health centre in the town.

The indicator used is the monitoring of the implementation of this plan, which is scheduled for 2015.

3.10 CORPORATE FACILITY / FIRE STATION & EQUIPMENT

Protection from fires is a major concern for citizens, since it gives both a feeling of safety and protection for their property.

3.10.1 Fire station is located to serve all houses and building in the Town

In a rural municipality, the location of the fire station signifies the response time and the variation of insurance costs. The percentage of buildings covered by the fire station within an acceptable radius is the main performance indicator for service.

The current location is very central and straightaway meets this criterion. This indication will remain useful in the event of development or significant town growth.

3.10.2 Equipment is in good condition to be able to respond quickly and adequately in case of fire

Fighting fires requires access to individual protection and service equipment for firefighters and to mobile equipment for rescuing people and/or extinguishing fires. All of this equipment must be in good working order in order to ensure the safety of both firefighters and the fire victims.

The indicators used to measure how well the objectives are met are the frequency of inspections and the quickness with which maintenance and/or repairs are carried out.

In both cases, the levels of services are currently being reached. Maintenance activities are immediately carried out after inspections or at a maximum of 30 days after.

3.11 FLEET

3.11.1 All vehicles are safe and in good condition and can assured their specialised function

Overall and regardless the type of vehicle, the expectations are the same: safe vehicles, in good working order and capable of doing their work. Whether they are service vehicles, heavy vehicles used by public works or even fire trucks, a periodic inspection program allows us to avoid major failures that could put users in danger.

The completion of inspections and resulting O&M activities are two performance indicators for how well these levels of service are reached.

Inspections to be conducted as required by the manufacturer are bi-annual. Managers plan to be able to meet these requirements by 2014.

Moreover, the required maintenance activities are carried out within 30 days following the inspections. This level of service is achieved.

The following table summarizes the levels of service agreed upon with the Town, the performance measures, targets to achieve, current levels of service and deadlines that the Town has given to meet them.

Table 25: Levels of Service

Asset Category	By Law (if applicable)	LOS	Performance measure	Target	Actual	Timeframe
Water Linear	Safe Drinking Water Act, O Reg 170/03 Ontario Drinking Water Systems Regulation (2009) National Fire Protection Ass (NFPA) Underwriters Laboratory Canada (ULC) CSA International	Water is safe to drink	Periodical tests	Compliance 100%	100%	Present
			Notice to boil water	0 per year	0	Present
		Water Network is reliable	Count of the number of breaks /100km /year	<= 30 breaks /100 km /year	4	Present
		Water supply is adequate for fire-fighting purpose	System maintains minimum 20 psi at full flow at hydrants	100% of hydrants meet the requirements	100%	Present
			Hydrant coverage for Fire Protection	75 meters radius for 90% of the hydrants	100%	Present
Water facilities	Safe Drinking Water Act, O Reg 169-02	A reliable water supply is provided	Operative risk management in place and planned mitigation measures completed		DWSMS	Present
		Water is safe to drink	Periodical tests	100% compliance with regulations	100%	Present
Waste Water Facilities	Environmental Assessment Act (1981)	Sewerage is managed without adversely affecting the quality of the receiving environment	Compliance with regulation	100% Compliance	100%	present
		Waste Water Treatment Plant (WWTP) capacity meet the existing and future needs	Implementation plan schedule in the Environmental Study Report (May 28, 2011)	Be on schedule	85%	2015
		The condition of WWTP equipment and structures allows reliability, efficiency and security	Periodic inspection	Do repairs/actions within 60 days of the inspection date	100%	Present
Waste water linear		Sewerage is managed without risk to public health	Count the number of sewer backflow incident into habitable building due to fault in the public waste water system	None	1	2015
		Sewerage is managed without risk to public security	Count the number of breaks/blockage/100km/year	<=30	0	2013
Stormwater Linear		Storm water is managed without risk of flooding on street and building	Count the number of flooding incident during a storm event	Zero during frequent events (i.e. < 2 year return)	4	2015
		Sewer, Maintenance Holes and Catchbasins are managed without risk to public health	Count of number of breaks/blockages/100km/year	<=30		
Roads systems	Road Safety Act 2009 (Bill 126) Safer Roads for a safer Ontario Act (Bill 203) Disability Act 2001 Minimum Maintenance Standards for Municipal Roads (Ontario Regulation 23/10) Petrolia Zoning – Official Plan Document	The road network is in good condition and fit for purpose (The road system needs of the automobile must be met wherever feasible and practical in order to ensure an adequate overall transportation system)	Time of Need (TON) based on The Inventory Manual for Municipal Roads (MTO – 1991)	The percentage of « Now » needs must be less than 10% all the time	19,9%	2018
		Sidewalks and walkways are in good condition	Sidewalk and walkways trip hazards	No greater than 10 mm	20	2015
		Sidewalks and walkways are easy to access to all	Sidewalks and walkways are design or adapted (when existing) for universal access	Addressed in the Annual accessibility plan of the Town	100%	Present
Street lightning		Lightning is provide to enhance safety for all users (cars and citizens)	Minimum illuminating level according to ANSI/IESNA RP-8-00 standard and road hierarchy	85%	85%	2015
			Count the number of complaints per year from resident about poorly (heavy) light area	<10	1	2014
Bridge	Bridges Act, RSO 1990, chap B.12	The bridge is in good condition and safe	Count the number of inspection per year	Bi-annually	1	2015
			Delay to do repair/action as determined by inspection	<= 12 months	24 months	2016
Parks	Disability Act 2001 Building Code Act By-Law 62-2000 Town of Petrolia By-Law 38-2009 Town of Petrolia CAN/CSA Z614 « Children's Play spaces and Equipment » Planning Act, RSO 1990	Parks facilities are accessible for everyone	Access are design or adapted for universal access	Addressed in the Annual accessibility plan of the Town	100% on target	Present
		Park System is well linked by a network of trails	Percentage of parks and green spaces linked by trails	90%		
		Public Park (recreational areas or trails) are safe and quiet. Protection of nature and wild animals	Count the number of fine/tickets issued per year	<10		
		Safe park facilities are provided (play structure and swinging set)	% of compliance with playground safety standard	>= 95%	90%	2014
			X reported safety incident per year in parks	<= 1	1	Present
		Provide high quality park facilities (sport fields)	% of sports surfaces that meet design standards	>=90%	85%	2014
			% of compliance with sport field maintenance standard	>=85%	85%	present
Corporate facilities cemetery	Funeral, burial and cremation Services Act, 2002 Municipal Cemetery By-Law	Provide high quality cemetery facility	% of complaints per year related to operation and/or maintenance of the cemetery	<5		2016
		All citizens treated with respect even in death	% of customers are satisfied that cemetery facilities meet the needs of different customers	>=95%	100%	present
Corporate facility (buildings)	Ontario Building Code Act – Building Code	Opening hours are convenient for customers	% of complaints per year regarding inconvenient opening hours	< 5%	2%	present
		Preservation of Victorian Heritage of the Town	% of existing building preserved in the Town	>= 85 %	85%	Present
		The buildings are accessible for all	Count of the number of complaints from citizens (aged or other groups)	# per different groups (aged citizens <=2; citizens with physical disease <=2)	<=3	2016
		Insure the viability of Victoria Playhouse Petrolia cultural activities	Implementation of recommendations	# of recommendations implemented in accordance with the timeline	To follow	Referred to VPP Business Plan2011
		Insure the continuity and development of health facility in the Town	Follow up on Business plan for a new Central Lambton Health Facility (2012)	2015	2015	2015
Corporate facility (Fire Station & equipment)	Fire Protection and Prevention Act Ontario (1977) Ontario Building Code Act – Building Code	Fire station is located to serve all houses and building in the Town	% of houses and buildings at a maximum distance of 7 km from a fire station	100 %	100%	Present
		Equipment is in good shape (condition) to be able to respond quickly and adequately in case of fire	Inspection frequency	As per type of equipment (daily, weekly, monthly, season, annually)	100%	Present
			Maintenance activity performed	Within 10 working days after inspection	Immediate – 30 days	Present
Fleet	Highway Traffic Act RSO, 1990, chap H.8 Compulsory Automobile Insurance Act, RSO, 1990, chap 25	All vehicles are safe, in good condition and can assured their specialised function	Periodical inspection	As per manufacturer recommendations	2 X yearly	2014
			Maintenance done on each vehicle	Within one month after inspection	30 days	present

Prepared October 9, 2013; Revised November 26, 2013

3.12 EXTERNAL ISSUES

A major regulatory change is expected for municipal stormwater management in order to account for climatic changes and other stress factors[5]. The approval process for the Ontario Ministry of the Environment (MOE) relating to municipal stormwater management must be revised to include control measures at the source of storm runoff.

In the event that some of the anticipated changes could affect the design of stormwater networks, these recommendations would account for new construction work. An evaluation of structures and networks in place could be planned in order to evaluate the risks and associated impact. A re-evaluation of levels of service for these assets would also be planned during an update to the asset management plan.

3.13 LEVEL OF SERVICE AND FUTURE DEMAND

Currently, the only assets for which future demand constitutes a particular issue are the wastewater facilities, which has been the subject of a Class Environmental Assessment Study of alternatives. This group of major assets will require a major upgrade, not only because several processes and structures are aged and near the end of their service life, but also because they have reached, even exceeded, their maximum capacity.

The alternatives that have already been considered for the expansion of the wastewater treatment plant account for future growth in the Town.

The Town council is aware that the growth and development of the Town may have effects on the performance of basic infrastructure (roads, water network) and all new projects will need to include an impact analysis for the levels of service for these infrastructure assets.

[5] Policy Review of Municipal Stormwater Management in the Light of Climate Change – Summary Report. www.ene.gov.on.ca Viewed on November 5, 2013.

4. ASSET MANAGEMENT STRATEGY

To be able to identify the most efficient maintenance strategy that allows for the optimization of costs over the life cycle of assets and asset groups under the responsibility of the Town of Petrolia, several analyses have been conducted.

4.1 IDENTIFICATION OF MAINTENANCE ACTIVITIES TO OPTIMIZE ASSET LIFE

The asset management approach implies that various interventions must be done on assets at various periods of their lifecycles in such a way as to extend their service lives. Periodic maintenance activities are those that must be carried out throughout the life of the asset (e.g. road marking, cleaning of sewer networks), while support activities are those that must be carried out once or twice during the service life of the asset (roof replacement for a building, replacement of a gate in the drinking water network).

The goal of this section is to allow Petrolia staff to document their support and maintenance activities, to get to know the field's best practices and identify the activities that must be added to improve their management of assets over their lifecycle.

Firstly, an inventory of suggested maintenance and support activities as part of best practices was prepared for each group of assets. An intervention frequency was also attributed to each activity. A table compiling this information was presented to the Town's managers in order that they may complete it by adding the unit costs for each of these activities to it. Based on their experience and their knowledge of current practices in Petrolia, the managers should also verify the relevance of each activity, accounting for the specific context of Petrolia.

Maintenance practices could not be completed for two asset categories: Corporate Facilities and Lands, and Fleet. A complete exercise may be carried out for these two asset categories as part of a specific exercise if the Town deems it necessary to improve its general maintenance program.

The annual amount required to bring this maintenance program into being is estimated to be $1.5 million. The current annual budgets allocated to support and maintenance activities per asset category must be compared with the amounts corresponding to table 26 in order to determine whether there is a budget shortfall.

Table 26: Operation and Maintenance Activities (based on best practices and Town's costs)

Asset Category	Asset	Inventory	Activity	Frequency	Quantity	Unit cost	Annual Cost/Asset	Annual Cost/ Asset Category
Water Linear	Water Lines	39,7 km	Flushing	semi annually	39.7 km	$200/km/year	$16,000.00	$136,175.00
			Leak Detection	semi annually	275 units	$10/hydrant	$5,500.00	
			Leak Location Correlator	as required	Number of Breaks (mean)	$400/leak location	$1,600.00	
			Leak Repair	as required	Number of Breaks (mean)	$4000/repair	$16,000.00	
	Main Line	18,7 km	Leak Detection	annually	Included with water lines	$100/km	$18,700.00	
			Leak Location Correlator	as required	Included with water lines			
			Leak Repair	as required	Included with water lines			
			Major Repair/Rehabilitation	as needed	?	?		
	Hydrants	275 units	Partial Inspection	annually	275 units	$25/hydrant x 275	$6,875.00	
			Major Inspection (including flow/pressure tests)	annually	275 units	$40/hydrant x 50	$2,000.00	
			Minor Repair	once every 4 years	56 units/year	$150/hydrant x60	$9,000.00	
			Major Repair	once every 25 years	9 units/year	$1,250/hydrant x10	$12,500.00	
			Replacement	once every 55 years	3 units/year	$9,000/hydrant x 3	$27,000.00	
	Valves (hypothesis 8 valves / km)	467 units	Inspection and handling	once every 6 years	78 units/year	$100/valve x 40	$4,000.00	
			Cleaning valve casing	once every 15 years	20 units/year	20 x $100	$2,000.00	
			Minor repair	once every 75 years	6 units/year	6 x $2,000	$12,000.00	
			Major repair	once every 75 years	6 units/year	$500/repair	$3,000.00	
Water Facilities	Water Treatment Plant	1 unit	Building Maintenance & Repair	5 yrs or as required	0.2/year			OCWA Contract $360,000.00
			Systems Daily Maintenance	OCWA Contract				
			Systems Weekly Maintenance	OCWA Contract				
			Systems Monthly Maintenance	OCWA Contract				
	Booster Station	1 unit	Systems Seasonal Maintenance	once every 3 years	0.33 unit/year			
			Inspection/cleaning pit	(2) Once a year OCWA				
			Pump Maintenance	As recommended by manufacturer OCWA or Town				
			Repair	as required OCWA by or Town				
			Valves handling	Once a year yes OCWA or Town				
			Verification and calibration of electrical and controls	Once a year yes OCWA or Town				
	Reservoir	1 unit	Inspection	Once every 5 years, or as required	0.2 unit/year			
			Cleaning	Once every 25 years by Town	0.04 unit/year			
			Disinfection	when required (OCWA)				
	Tower	1 unit	Inspection external structure	Once a year by Town	1 unit/year			
			Inspection and cleaning inside surface/structure	Once every 5 years by Town	0.2 unit/year			
			Repair (minor/major)	As required by Town				
Wastewater Linear	Sewer Pipes	33,3 km	Inspection, Zoom Camera	according Long Term Inspection Plan (LTIP)	2	$125/man hole	$250.00	$122,550.00
			Inspection, CCTV	according LTIP	5 km	$8,000/km	$40,000.00	
			Cleaning	once a year (few already included in the LTIP)	5 km	$5,000/km	$25,000.00	
			Sealing	once every 100 years	333 m. lin.	$100/m. lin.	$33,000.00	
			Repair	once every 100 years	333 m. lin.	?		
	Sewer Laterals	21,5 km	Inspection from main line	according LTIP	Included in sewer pipes	-		
	Manholes	363 units	Inspection	according LTIP	Included in sewer pipes	-		
			Cleaning	once a year (few already included in the LTIP)	Included in sewer pipes	-		
			Repair	once every 100 years	4 units	$6,000/repair	$24,000.00	
			Major Repair /Replacement	as required		?		

Asset Category	Asset	Inventory	Activity	Frequency	Quantity	Unit cost	Annual Cost/Asset	Annual Cost/ Asset Category
Wastewater Facilities	Wastewater Treatment Plant	1 unit	Building Maintenance & Repair	OMI				OMI Contract $461,630.00
			Systems Daily Maintenance	OMI				
			Systems Weekly Maintenance	OMI				
			Systems Monthly Maintenance	OMI				
			Systems Seasonal Maintenance	OMI				
			Annual Maintenance	OMI	1	$461,630.00 / year	$461,630.00	
	Pump Stations / Main lift stations	12 units	Systems Seasonal Maintenance	OMI				
			Inspection/cleaning pit	Once a year				
			Pump Maintenance	As recommended by manufacturer				
			Repair	as required				
			Valves handling	Once a year				
			Verification and calibration of electrical and controls	Once a year				
Stormwater Linear	Storm Pipes	42,9 km	Inspection, Zoom Camera	according LTIP	5 man hole/year	$125/man hole	$625.00	$72,125.00
			Inspection, CCTV	according LTIP	3 km/year	$3,000/km	$9,000.00	
			Cleaning	once a year (few already included in the LTIP)	3 km/year	> $5,000/km	$15,000.00	
			Pipe Sealing	once every 100 years	430 m. lin.	$100/m. lin.	$43,000.00	
			Pipe Repairs	once every 100 years	430 m. lin.	?		
	Storm Laterals	23,4 km	Inspection	according LTIP	Included			
	Storm Leads	3,6 km	Inspection	according LTIP	Included			
	Manholes	274 units	Inspection	according LTIP	Included			
			Repair	once every 100 years	3 units			
			Major Repair /Replacement	as required				
	Catch Basins	786 units	Cleaning	once a year	50 units	$30/catch basin	$1,500.00	
			Minor Repair	once every 30 years	3 units	$1,000/repair	$3,000.00	
			Major Repair /Replacement	as required				
Roads Systems	Arterial Roads	4,2 km (30 684 m^2)	Visual Inspection	once a year	4,2 km	10$/km	420.00$	$646,417.00
			Inspection mechanized	once every 3 years	1,5 km	350$/km	525.00$	
			Street Marking	once a year	4,2 km	600$/km	2,520.00$	
			Street Flushing & Sweeping	5 times a year (once a week for 35 weeks/year)	147 km	60$/km	8,820.00$	
			Snow Plowing & Clearing	as required	39.5 km	1750	69,125.00$	
			Ditch/Catch Basin Cleaning	once every 3 years	256 units	25$/catch basin	6,400.00$	
			Catch Basin/Manhole Frame, Cover & Grating Repair	as required	?	2 000/unit	4,000.00$	
			Pot Hole Repair	as required	?	1 650$/km	3,300.00$	
			Crack Sealing	as required	1 km	4 000$/km	8,000.00$	
			Surface Repair	as required	?	8000	16,000.00$	
			Surface Treatment	once every 10 years?	3 068 sq. m. (0,4 km)	34$/sq. m.	104,312.00$	
	Collector Roads/Local Roads	40 km (293 707 m^2)	Inspection (visual or mechanized)	once every 5 years	7 km	10$/km	700.00$	
			Street Marking	once a year	35,3 km	600$/km	1,000.00$	
			Street Flushing & Sweeping	once a year (after winter time)	35,3 km	60$/km	1,500.00$	
			Snow Plowing & Clearing	as required				
			Pot Hole Repair	as required				
			Crack Sealing	as required	7 km	1 600$/km	11,200.00$	
			Surface Repair	as required	35,3 km	2 125$/km	2,125.00$	
			Surface Treatment	once every 10 years?	7 343 sq. m.	40$/sq. m.	293,720.00$	
	Sidewalks & Walkways	23 639 m^2	Inspection Visual or mechanized	once every 5 years	4 728 sq. m.	?		
			Curb/Sidewalk Repair	as required	# km	275 000$/km	5,000.00$	
			Sidewalk/Walkway Cleaning	once a year (after winter time) as required	# km	150$/km	250.00$	
	Street Lighting - BWP Poles Street Lighting - Town Poles	387 units 415 units	Lamp Replacement	once every 4 years	400 lamps	62,50$/lamp	25,000.00$	

Asset Category	Asset	Inventory	Activity	Frequency	Quantity	Unit cost	Annual Cost/Asset	Annual Cost/ Asset Category
Roads Systems (Cont)	Street Lighting - BWP Poles Street Lighting - Town Poles (Cont'd)		Minor Repair	as required	50 units	50$/repair	2,500.00$	
			Major Repair (Pole, Fixture or Wiring Replacement)	as required	10 units	5 000$/repair	50,000.00$	
			Street lighting Replacement	as required	32 units	15000	30,000.00$	
	Bridge	1 unit	Inspection					
			Culvert Cleaning					
			Minor Repair					
			Major Repair					
Parks	Parks	12 units	General Cleaning	weekly	4,3 times / unit	150$/time	7,800.00$	
			Grass cutting	weekly	35 times	1,285.00$/time	45,000.00$	
			Leaf Cleaning	2 times a year	2 units	500.00$/unit	1,000.00$	
			Vegetation & Gardening	weekly	52 times	150.00$/time	7,800.00$	
	Play structures	11 units	Inspection	once a year	12 units	250.00$/unit	3,000.00$	
			Repair – budget 5000	as required	1		5,000.00$	
	Swing sets	8 units	Inspection	once a year	12 units	250.00$/unit	7,800.00$	
			Repair	as required	1		2,500.00$	
	Soccer Fields	6 units	Sport Fields Maintenance & Repair	weekly			in grass cut	
	Baseball Fields	5 units	groomed	daily	215 times	100.00$/time	21,500.00$	$122,300.00
	Tennis Courts	2 units	maintenance	monthly	6 times	100.00$/time	600.00$	
	Bleachers	15 units	Inspection	monthly	12 times	100.00$/time	1,200.00$	
	Buildings	3 unit	Building Maintenance & Repair	as needed (budget)			2,500.00$	
	Other Facilities and Structures	11 units	Building Maintenance & Repair	monthly	12 times	200.00$/time	2,400.00$	
	Benches	31 units	Minor repair (painting)		31 units	80.00$/unit	2,500.00$	
	Lighting	32 units	Maintenance	as needed	1 unit	2500.00$/unit	2,500.00$	
	Irrigation Systems	4 units	start-up – winterizing	2 x year	2 times	1000.00$/time	2,000.00$	
	Walking Trails	1 unit	Cleaning	Weekly	30 weeks	200.00$/week	6,000.00$	
			Trail & Picnic Area Maintenance	as required	30 weeks	200.00$/week	6,000.00$	
Corporate Facilities & Lands	Fire Station & Equipment	1 unit	delivery of Fire Program	as required	1			
	Public Works Building & Equipment	1 unit						
	Administrative Building & Equipment	1 unit						
	Recreation Facilities & Equipment	5 units						
	Medical Centre	1 unit						
	Cemetery	1 unit	Building Maintenance & Repair					
			Cemetery Maintenance					
	Parking Lots	9 units	Cleaning					
			Snow Plowing & Clearing					
			Surface Repair					
			Marking					
	Vacant Lots	-	N/A					
Fleet	Light	19 units	Seasonal Inspection	2 times a year				
			Major Inspection	once every 3 years				
			Minor Repair	as required, or +/- once every 2 years				
			Major Repair	as required, or +/- once every 4 years				
	Medium?	6 units		as recommended by manufacturer				
	Heavy?	7 units		as recommended by manufacturer				
	Super Heavy?	4 units		as recommended by manufacturer				
							TOTAL	**1,499,567.00$**

4.2 IDENTIFICATION OF CRITICAL ASSETS AND RISK ANALYSIS

A risk evaluation associated with the failure of each asset was carried out using a risk matrix. The possible consequences of an asset failure were suggested and a relative weight was given to them. Table 27 summarizes the critical levels given to each asset. These critical levels are part of criteria used to prioritize an intervention on an asset, rather than over another, belonging to the same category, or between various categories of assets when available sums are insufficient to meet all immediate needs.

It is moreover important to note that the probability that failure will occur is based on the asset's condition such as described in chapter 2 of this report.

Table 27: Risks and critical assets (based on actual condition of each asset)

Asset Category	Asset	Failure Mode	Risks				Critical Level	Critical Level Asset Category
			Likelihoods (based on actual condition of each asset)	Consequence				
				Impacts	Direct Costs	Social, Economic, Environmental Costs		
Water Linear	Main Line	Break, Pipe bursting	Low	High	High	High	A	B
	Water Lines - Primary	Break, Pipe collapse	Low	High	High	High	B	
	Water Lines - Secondary	Break, Pipe collapse	Medium	Low	Medium	Medium	C	
	Hydrants	Low pressure, Low flow	Low	Medium	Medium	Medium	C	
Water Facilities	Water Treatment Plant	Break of Equipment or Failure in Operation	Medium	High	Medium	High	A	A
	Booster Station	Pump failure	High	High	Medium	High	A	
	Reservoir	Crack, Leakage, Collapse	High	High	High	Medium	A	
	Tower	Collapse	Low	High	High	Medium	B	
Wastewater Linear	Sewer Pipes	Pipe collapse	Low	Medium	Medium	Medium	B	C
	Sewer Laterals	Lateral collapse	Low	Low	Low	Low	D	
	Manholes	Chimney failure	Medium	Medium	Medium	Medium	C	
Wastewater Facilities	Wastewater Treatment Plant	Break of Equipment or Failure in Operation	High	High	High	High	A	A
	Pump Stations	Pump Failure	Medium	High	High	High	A	
	Main Lift Stations	Pump Failure	Low	High	High	High	A	
Stormwater Linear	Storm Pipes	Pipe Collapse	Medium	Medium	Medium	Medium	B	C-
	Storm Laterals	Lateral collapse	Low	Low	Low	Low	D	
	Storm Leads	Pipe Collapse	Medium	Low	Low	Medium	D	
	Manholes	Chimney failure	Low	Medium	Medium	Medium	C	
	Catch Basins	Structure failure	High	Low	Medium	Low	D	
Roads Systems	Arterial Roads	Geometry, Drainage, Capacity, Structure, Surface	Low	High	High	High	A	C+
	Collector Roads	Geometry, Drainage, Capacity, Structure, Surface	Low	Medium	Medium	Medium	B	
	Local Roads	Geometry, Drainage, Capacity, Structure, Surface	Low	Low	Low	Low	C	
	Sidewalks & Walkways	Fractures, Scaling, Break, Differential Movement	Low	Low	Medium	Medium	C	
	Street Lighting - BWP Poles	Lamp failure	High	Low	Low	Low	D	

Asset Category	Asset	Failure Mode	Risks				Critical Level	Critical Level Asset Category
			Likelihoods (based on actual condition of each asset)	Consequence				
				Impacts	Direct Costs	Social, Economic, Environmental Costs		
	Street Lighting - Town Poles	Lamp failure	High	Low	Low	Low	D	
	Bridge	Bridge Collapse	Low	High	High	High	A	
Parks	Parks	Tree's uprooting, Tree's fall down	Low	Low	Low	Medium	C	C+
	Play structures	Break, Collapse	High	High	Medium	High	A	
	Swing sets	Break, Collapse	High	High	Low	High	A	
	Soccer Fields	Drainage Failure, Equipment break	Low	Low	Medium	Medium	C	
	Baseball Fields	Drainage Failure, Equipment break	Low	Low	Medium	Medium	C	
	Tennis Courts	Drainage Failure, Equipment break	High	Low	Medium	Low	C	
	Bleachers	Break, Structure Collapse	Medium	High	High	High	A	
	Buildings	Structure Collapse	High	High	High	High	A	
	Other Facilities and Structures	Break of Equipment/Facility	Low	Low	Low	Medium	C	
	Benches	Break	Medium	Low	Low	Low	C	
	Lighting	Lamp failure	High	Low	Low	Low	D	
	Irrigation Systems	Break	Medium	Low	Low	Low	D	
	Walking Trails	Surface deterioration	Medium	Medium	Low	Medium	C	
Corporate Facilities & Lands	Fire Station & Equipment	Structure Collapse, Equipment break	Low	High	High	High	A	B
	Public Works Building & Equipment	Structure Collapse, Equipment break	Low	Medium	High	Medium	A	
	Administrative Building & Equipment	Structure Collapse, Equipment break	Low	Medium	High	Medium	A	
	Recreation Facilities & Equipment	Structure Collapse, Equipment break	Low	Medium/High	High	High	A	
	Medical Centre	Structure Collapse, Equipment break	Low	High	High	High	A	
	Cemetery	Memorial break, Break in road path	Low	Low	Low	Medium	D	
	Parking Lots	Surface deterioration, Ineffective drainage	Medium	Low	Medium	Low	D	
	Vacant Lots	-	-	-	-	-	-	
Fleet	Light	Major Break (Engine, transmission shaft)	High	Low	Low	Low	D	B-
	Medium	Major Break (Engine, transmission shaft)	High	Medium	Low	Low	C	
	Heavy	Major Break (Engine, transmission shaft)	Medium	High	Medium	Medium	B	
	Super Heavy	Major Break (Engine, transmission shaft)	Low	High	High	Medium	A	

4.3 ASSET MANAGEMENT STRATEGY

The asset management strategy will be developed on two levels: a top-down approach and a bottom-up approach.

The bottom-up approach consists of developing a detailed maintenance and rehabilitation plan for all the linear assets (roads, watermains, and wastewater and storm sewers). As stated above, collection of detailed condition data for these assets is currently in process. It is intended to collate all available information about the structural and functional condition of the roads and the underground systems. All information will be entered into a decision support system (DSS) software, along with the required levels of service, overlaid by decision-making criteria established by the Town. A short-term list (5 years) of maintenance activities to be completed each year on each type of assets will be developed. Using an integrated approach to optimize the maintenance activities over the asset lifecycle will help maintain the highest levels of service at the lowest overall cost.

The top-down approach consists of developing asset management strategies on a more general point of view. As we presented in section 4.1, the support and maintenance program for each asset group aims to provide the Town with tools that allow it to maintain the levels of service as agreed upon and presented in chapter 3. A range of activities is recommended for each asset group both at the level of management tools to implement and studies or interventions to conduct over the course of the next 10 years.

Each of these interventions aims to optimize lifecycle costs and minimize risks. The benefits associated with the proposed asset management actions will also be clarified.

Generally speaking, the following activities should be implemented each asset in each of the Town's asset groups.

- Firstly, a **unique** identification number must be assigned to each asset in such a way as to allow for the personalized compilation of physical characteristics and status. None of us like it when the doctor gives us the same diagnosis as the one that the last doctor gave us!

  In addition, each fire hydrant, as well as each manhole, each sport structure, each road segment, each truck etc., will bear a unique number.

- Next, it would be beneficial to define the hierarchy of assets in linear networks (roadway, drinking water, sewer), since this hierarchy is useful, even necessary, for prioritizing inspections, and rehabilitation and reconstruction interventions.

In the following paragraphs, we will outline the recommended actions for improving asset management practices in order to ensure their longevity and minimize lifecycle costs.

4.3.1 Water Linear

Much of the Town's drinking water network is relatively new, with most of the local distribution system constructed over the last forty years. Older sections of watermains were constructed with cast iron piping, and have been identified for replacement.

The rate of repair (breaks) is the criterion generally used as an indicator for the structural status of sewers. The number of repairs indexed in Petrolia is less significant when evaluating at the network level.

Management tools

A registry of breaks should be developed to compile a break history for each pipeline segment, as well as for supplementary information that is useful for determining the most successful preventive actions (such as protection against external corrosion).

Maintenance activities (O&M)

Continuation of the annual program for detecting leaks will allow for the further reduction of water loss that has been evaluated at nearly 19% (KMK Consultants Ltd. Report – December 2004).

Continued inspection programs for fire hydrants and valves allow for the optimization of equipment life cycles and ensure an optimal level of service for fire protection.

Lifecycle

Simulations using a management decision system (MDS), first for the drinking water system individually and then integrated into the sewer and roadway networks, have allowed us to determine the required investments over the course of the next 10 years (as well as over their 80-year life cycle). The recommended intervention is rehabilitation without trenches using the structural lining technique. The detailed results of the analysis completed using the MDS is presented in section 4.4.

Other actions are suggested to facilitate and improve the network management life cycle.

4.3.2 Water Facilities

The risk analysis allows us to attribute a high critical level (A) to structures and equipment of this asset group, since the quality of water used by the public must meet regulation requirements.

Management tools

Maintenance activities (O&M)

If a detailed support and maintenance intervention plan is not already available, the Town should task the Ontario Clean Water Agency with creating one. Such a plan aims to ensure the maintenance of infrastructure and equipment over its life cycle. This planning must include all preventive interventions to be completed, the recommended frequency and an evaluation of associated costs.

Maintenance interventions carried out at the right moment allow not only for the useful life span to be reached, but also surpassed.

Planned interventions (Life cycle)

Major investments are planned over the course of the next three years, which will allow certain infrastructure elements to be improved. The condition of the Mandaumin reservoir and the Booster pumping station were listed as low to poor. A two-phase reservoir upgrade project is on its way to being completed.

Proposed study

An evaluation of the Booster pumping station should be planned for the short term in order to accurately define the upgrade requirements in order to ensure its proper function and optimize its longevity.

4.3.3 Wastewater Linear

As with the drinking water network, most of the sewer network was constructed toward the end of the 1970s. Although the sewers have a probable service life of 100 years, it is possible that some of them will require maintenance or rehabilitation work. 72% of sewers are nearly 35 years old and are 25-50% through their life cycle. As such, there may be structural issues and/or infiltration issues in the system that should be addressed, in order to prevent ongoing deterioration or unnecessary expenditure for treating groundwater.

Management tools

The Town should develop and maintain a registry of backflows and maintenance activities for the network. This registry would be used to document trouble spots within the system, and assist in targeting repairs to those areas needing the highest level of attention.

Maintenance activities (O&M)

The Town should implement a sewer cleaning program for sewers and manholes. It is recommended that all sewers within the system be cleaned no less frequently than once every three years.

In addition, an annual sewer CCTV inspection program should be implemented, with 20% of the sewer network inspected annually. Data obtained from the inspections may then be used to identify areas of concern in the overall network, and help guide an annual rehabilitation program.

Other activities - Studies

It has been previously documented that there is no direct link between the age of a sewer and its condition. Accordingly, the Town should develop a monitoring strategy that will allow the Town to prioritize the sewer sections to inspect each year. This strategy will cover both the storm sewer and sanitary sewer networks.

Lifecycle

Simulations performed using the MDS were based on physical data only (age, material etc.) Detailed condition assessments of sewer segments were not available to assist in developing the decision matrix. The detailed results of the analyses completed using the MDS are presented in section 4.4.

4.3.4 Wastewater Facilities

Management tools

No specific Management Tool for Wastewater Facilities is recommended at this time.

Maintenance activities (O&M)

If a detailed support and maintenance intervention plan is not already available, the Town should give a mandate to OMI with completing one. Such a plan would aim to ensure the maintenance of infrastructure

and equipment over their life cycle. This plan must include all preventive interventions to carry out, the recommended frequency and an evaluation of associated costs.

Maintenance interventions carried out at the right time allow not only for the useful life span to be reached, but also surpassed.

Planned activities

Major investments are planned over the course of the coming years to expand and upgrade the wastewater treatment plant. A detailed design is underway and the first phase of construction is planned toward the end of 2014, subject to receipt of funding assistance from senior levels of government.

Life cycle

CIMA completed an assessment of the condition of the Town's pumping stations in 2012. The Condition Assessment Report recommended a series of upgrades and maintenance activities to ensure the longevity and proper functioning of these assets. Two pumping stations have already reached the end of their useful life and five others will reach it over the course of the next 10 years.

4.3.5 Storm water Linear

Unlike the sanitary sewer network, the storm sewer network is older, since more than 30% of its sewers have reached 50 to 100% of their useful life span (25% of pipes were built before 1939).

Management tools

It is recommended that a registry of events and interventions on the storm sewer network be kept up to date. Such a registry is a relevant source of information, allowing for future interventions to be more efficiently planned.

Maintenance activities (O&M)

The Town should implement a sewer cleaning program for sewers, manholes and catchbasins. It is recommended that all sewers and manholes within the system be cleaned no less frequently than once every three years, and that catchbasins be cleaned annually.

In addition, an annual sewer CCTV inspection program should be implemented, with 20% of the sewer network inspected annually. Data obtained from the inspections may then be used to identify areas of concern in the overall network, and help guide an annual rehabilitation program.

Other activities – Studies

It is recommended that an overall Drainage Master Plan be prepared to identify sewer system capacity deficiencies, and to provide direction for capacity upgrades in the system.

Lifecycle

Simulations conducted using the MDS are based on physical data only (age, material etc.). There is no existing status data on which a diagnostic or an intervention can be based. The detailed results of analyses undertaken using the MDS is presented in section 4.4.

4.3.6 Road Systems

Management Tools

No specific Management Tool for Road Assets is recommended at this time.

Maintenance activities (O&M)

It is recommended to proceed with a periodic evaluation of roadway conditions as a measure of the effectiveness of the roadway asset management strategy. In accordance with Provincial Standards, a bi-annual Roads Needs Assessment should be undertaken.

Moreover, it is also recommended to perform traffic counting on a three or five-year cycle. This data is required during the evaluation of roadway conditions and intervention recommendations.

The suggested O&M activities for best practices, which are listed in table 28, make up a vital work base that is complementary to information presented in the Road Asset Management Plan (Stantec, 2013) report.

Other activities - Study

It is worth noting that 82% of street light poles would have reached the end of their useful life by 2009. A program for inspecting and evaluating their current condition should be launched in the short term in order to develop a broad rehabilitation/renovation strategy over a time period that the Town can reasonably finance.

Lifecycle

Two complementary exercises were completed to determine the required investments on the municipal roadway network over the next 10 years.

The main recommendations arising from the roadway condition evaluation completed as part of the Road Asset Management Plan (Stantec, 2013) brings together those which are formulated in this asset management plan. Indeed, the road life can be increased while maintaining the agreed level of service by performing maintenance and rehabilitation delaying the need of reconstruction.

The required investments for the next 10 years were determined using the MDS during simulations that integrated the needs of other infrastructure items situated on the right-of-way (drinking water network, sanitary sewers and storm sewers).

The retained integrated approach for determining investments in the “linear” asset category is also part of Road Asset Management Plan recommendations. "The road system is, in reality, a utility corridor. The priority of the road could be dictated by the other utility (storm sewer, sanitary sewer, water line) and an integrated solution should be the best way to serve the municipality and citizens interests” (Stantec, 2013).

4.3.7 Parks

Management tools

The Town should develop and maintain a “Complaint Registry” to document and track complaints, breaches or other incidents involving the use of Town parks.

Maintenance activities (O&M)

The suggested O&M activities for best practices, which are listed in table 28, make up a vital work base for implementing a support and maintenance program for assets in this category.

Other activities - Study

Other assets such as “Other facilities and structures" and tennis courts should be the subject of an inspection and a specific evaluation, as well as recommendations for targeted maintenance or rehabilitation that will allow them to reach the expected level of service.

Life cycle

The State of Local Infrastructures has allowed us to identify several assets that have reached the end of their useful life or will do so in the near future.

All existing infrastructure that represents a risk to the safety of users – for example, swing sets and children’s play structures, should be replaced as soon as possible. These assets do not need major investments.

4.3.8 Corporate Facilities

Management tools

No specific Management Tool for Corporate Facilities is recommended at this time.

Recurrent activities (O&M)

The suggested O&M activities for best practices, which are listed in table 28, make up a vital work base for ensuring the adequate support and maintenance of assets in this category.

Other activities - Study

We suggest proceeding with a precise evaluation of the state of these assets and determining the maintenance or required refurbishment over the next 10 years in order to ensure that they are safe and functional.

Three buildings have already reached the end of their useful life and two other will by 2019. Despite their age, Town managers estimate that their physical condition is acceptable and that in general, the agreed investments will allow them to maintain these building in an acceptable state.

4.3.9 Fleet

Management tools

No specific Management Tool for Fleet is recommended at this time.

Maintenance activities (O&M)

The O&M activities suggested in the manufacturer’s manuals constitute a vital work base for developing an adequate support and maintenance program for assets in this category.

Other activities – Study

No Study activities related to Fleet are recommended at this time.

Life cycle

All fleet vehicles are in acceptable condition despite the fact that 20 vehicles have passed the end of their useful life. Three other vehicles are expected to reach the end of their useful life over the next five years. Several vehicles, including the heavy and super heavy vehicles, have current life spans that are much

longer than their theoretical life spans. We recommend that the Town plan out a gradual replacement of light and medium vehicles once maintenance costs become too high, and evaluate the intervention options for heavy and super heavy vehicles based on needs identified following rigorous inspections, more particularly with regard to fire trucks, whose maximum service age is governed by regulations.

Table 28: Summary of the Asset Management Strategy

Asset Category	Actions/Interventions				
	Management tools	O&M	Projects	MDS recommendations	Studies
Water Facilities	-	Program to be completed if not already done	Expansion of Mandaumin Reservoir	N/A	Assessment of the Booster Pumping Station
Wastewater Facilities	-	Program to be completed if not already done so	Expansion and upgrade of Wastewater Treatment Plant	N/A	Implementation of study recommendations on status of pumping stations
Water Linear	Improve the breakage registry and compile breakages	Continue with current support and maintenance program	-	Investments are recommended following simulations (2019, 2021, 2022, 2023)	Pre-project study to identify necessary interventions
Wastewater Linear	A registry of backflows and interventions should be updated	An inspection program should be implemented, along with an annual sewer cleaning program	-	No investment is planned following simulations based on age and service life	An inspection and monitoring strategy should be developed Pre-project study to identify necessary interventions
Storm Linear	A registry of backflows and interventions should be updated	An inspection program should be implemented, along with an annual sewer cleaning program	-	A major catch-up is recommended by the management decision system following simulations based on age and service life	A monitoring strategy should be developed Pre-project study to identify necessary interventions
Roads System		Plan support and maintenance interventions, such as those suggested by best practices	-	Investments are recommended following simulations based on condition data (2014-2023)	Study on traffic volume (Traffic counting) A study to evaluate the condition of street light poles is recommended in order to prepare an asset renewal program Pre-project study to identify necessary interventions
Parks	Creation of a registry for complaints and incidents related to park use	Continue with support programs and complete them as needed	-	Replacement interventions are recommended for deficient swing sets and play structures that do not meet standards	Assessments of the current state of tennis courts and “Other facilities and structures” identified as being in a poor state of repair in the State of Infrastructure section
Corporate	-	Complete the table	-	-	Proceed with

Asset Category	Actions/Interventions Management tools	O&M	Projects	MDS recommendations	Studies
Facilities		of best support and maintenance practices and implement minimal practices			evaluating buildings considered to be in poor state of repair (Greenwood Recreation Centre, Library)
Fleet	-	Complete the table of best support and maintenance practices and implement the recommended practices	-	-	-

4.3.10 Required investments by asset class

A cost assessment for required rehabilitation, upgrade and replacement interventions to ensure the longevity of assets was completed. The cost of each intervention, as well as the year of completion, is indicated in Table 29.

The investments planned for the water facilities and wastewater facilities come from the report done by Watson & Associates Economists Ltd. The investments planned for the Water Linear, Wastewater Linear, Storm Linear and Roads System come from simulations completed using a management decision system that was used as part of this mandate. Section 4.6 provides all the details related to this exercise.

Finally, the plans for investments presented for the Parks, Corporate Facilities and Lands, and Fleet consist mainly of studies to be completed in the short term to clarify the status of assets having reached the end of their useful life. The goal of these studies is to clarify the current status of assets and to suggest maintenance and renovation interventions to be undertaken over the course of the next 10 years.

Table 29: Schedule of Capital Investment per Asset Category

Asset Category	Mean Grade	Trend	Activities	Years									
				2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Water Facilities	C+	→	Mandaumin Reservoir	$1,215,000	$3,680,000	$3,754,000							
			New Intake		$4,871,000								
			Condition assessment Booster Pumping Station										
Wastewater Facilities	D+	↓	Plant Expansion	$5,140,000	$15,727,000								
			Wastewater Facilities Lifecycle				$1,095,000						
			Pump Station and Main Lift Station Lifecycle										
Water Linear	B	↓	Rehabilitation						$162,000		$101,000	$690,000	$69,700
Wastewater Linear	B-	↓	Inspection and monitoring strategy	$30,000									
Storm Linear	C	↓	Rehabilitation & Replacement	$6,267,000		$91,000	$531,000			$212,000	$94,000		
Roads System	B+	→	Rehabilitation & Reconstruction	$457,000	$111,000	$320,000	$539,000	$240,000	$95,000	$609,000	$982,000	$357,000	$598,000
			Replacement of Streetlight Poles						$120,400				
Parks	B-	→	Replacement Swing set, Play structures and Lighting		$43,200								
			Condition Assessment “Other Facilities and Structures” and Tennis Court			$30,000							
Corporate Facilities and Lands	B	→	Condition Assessment Greenwood Recreation Centre and Town’s Library		$50,000								
			Lifecycle Office Cemetery and Municipal Garage & Entrepôt	$40,000					$250,000				
Fleet	B+	→	Condition Assessment Heavy and Super Heavy Vehicles		$8,000								

December 5, 2013

4.4 INTEGRATED MANAGEMENT OF LINEAR NETWORKS (ROADS, DRINKING WATER AND SEWERS)

The linear networks lend themselves well to the principles of integrated management, since they are situated in the same domain and any intervention on one network may have an effect and the service life of the others.

Historically, roadway networks and underground networks were managed using silo management, often through separate Town services that shared the same offices. Once the responsibility for roadway and underground network management fell upon the same manager, more often than not the management approach became one of “as long as”: as long as the roadways and/or drinking water pipes are being replaced, the storm sewers may as well as be replaced also.

These decisions accounted neither for the current state of assets, nor their residual life. It resulted in an economic loss that was never accounted for.

Current asset management strategies are aimed to modify these procedures. An MDS was used in order to analyze interventions to be done on Petrolia’s roadway, drinking water and sewer networks in an integrated fashion, allowing for the optimization of investments on the life cycle of these networks.

The approach and working hypotheses are presented in the following paragraphs, as well as the complete results of simulations.

4.4.1 Linear Infrastructure Financial Planning with the DSS Software (InfraModex)

Data Input

This integrated financial analysis with the software called “InfraModex” was possible for all the linear infrastructure of Petrolia, meaning the four following groups of assets: water linear, wastewater linear, stormwater linear and roads.

The database to be used into the DSS software had to be built from the available data. Data from the Road Asset Management Plan (Stantec, 2013) was considered the basic information available for the roads, completed with some information from CityWide. The following data was taken into account:

- Street Name
- Location (from which street intersection to which street intersection)
- Length
- Width
- Material (high class bit. asphalt; low class bit. surface treated; concrete; or gravel, stone & other loose top)
- Condition (out of 100)
- Type (arterial, collector, or local) – from CityWide
- In-Service Date – from CityWide

For the water linear, wastewater linear and stormwater linear, data from CityWide was considered the basic information available. However, for a few pipe segments, missing data (location, length or material) had to be completed based on different assumptions.

The following data was taken into account for each water pipe section:

- Location
    - corresponding street name
    - from which street intersection
    - to which street intersection

- Length
- Diameter
- Material
- In-Service Date
- Hierarchy (A, B or C)
- Breaks (available data between 2010 and 2012)

All these information were available in CityWide, except the breaks, compiled by the Town, and the hierarchy, determined based on the diameters (A are 250-300 mm diameter pipes, B are 200 mm diameter pipes, and C are 150mm and less diameter pipes).

The following data was taken into account for each wastewater and stormwater pipe section:

- Location
    - corresponding street name
    - from which street intersection
    - to which street intersection
- Length
- Diameter
- Material
- In-Service Date

Before the integration into the DSS software, it was ensured that each segment of road or pipe had a unique identification number. Also, each segment of pipe had to be clearly associated to the corresponding segment of road between two intersections. As a result, each road segment between two intersections has a unique and global identification number which is associated with all linear assets underneath, that is all water pipe segments, wastewater pipe segments and stormwater pipe segments comprised between those two intersections.

Parameters considered

Assets useful life

The ages of assets are compared to their expected useful lives to plan future interventions. The useful life values considered within InfraModex are always comprised within the interval set by a minimum and a maximum values, but are mostly concentrated around the most probable value, as dictated by the principles of probabilities.

Tables 30, 31 and 32 respectively show the useful life brackets considered for the water pipes, the wastewater pipes and the stormwater pipes in Petrolia. The values are variable depending on the pipe material, and these values were determined based on theoretical knowledge and past experiences with other cities. However, the most probable values of 75 years for the water pipes and 100 years for the wastewater and stormwater pipes were discussed and approved by the Town managers. The initial material are considered, although it is assumed that following renewal, all water pipes and wastewater pipes will be made of PVC material, and all stormwater pipes will be made of concrete material.

Table 30: Useful Life for Water Pipes

Replacement	Minimum value	Most probable value	Maximum value
Cast iron	65	75	90
PVC	70	75	100
Other (copper, plastic, etc)	70	75	80
Rehabilitation	Minimum value	Most probable value	Maximum value
Pipe lining	35	50	65

Table 31: Useful Life for Wastewater Pipes

Replacement	Minimum value	Most probable value	Maximum value
Concrete	95	100	150
PVC	95	100	105
Other (plastic, trans, etc)	95	100	105
Rehabilitation	Minimum value	Most probable value	Maximum value
Pipe lining	35	50	65

Table 32: Useful Life for Stormwater Pipes

Replacement	Minimum value	Most probable value	Maximum value
Concrete	95	100	150
PVC	95	100	105
HDPE	95	100	105
Other	95	100	105
Rehabilitation	Minimum value	Most probable value	Maximum value
Pipe lining	35	50	65

Table 33 shows the useful life brackets considered for the roads in Petrolia. The values are variable depending on the type of road (arterial, collector or local), as stated into CityWide. Also, they were determined based on the information stated into the 2013 road survey report by Stantec for the most probable values, and on the theoretical knowledge and past experiences with other cities for the minimum and maximum values.

Table 33: Useful Life for Roads

Reconstruction	Minimum value	Most probable value	Maximum value
Arterial	30	40	45
Collector	35	45	50
Local	40	50	55
Resurfacing	Minimum value	Most probable value	Maximum value
Arterial	8	12	16
Collector	10	14	18
Local	12	16	20
Regravel	Minimum value	Most probable value	Maximum value
Arterial, collector or local	2	3	4

Rehabilitation and Replacement Costs

The costs of each intervention have to be stated in order to plan future investments. As for the useful lives, the values for the unit costs considered within InfraModex are always comprised within a stated interval, based on probabilities.

Table 34 shows the unit cost brackets for replacement and rehabilitation of water pipes, variable for three different groups of diameters. Replacement costs were estimated based on the cost of pipes and accessories (hydrants) taken from CityWide, and the cost of installation, assumed to be $800/m. Rehabilitation costs were determined based on past experiences with rehabilitation projects.

Table 34: Costs for Water Pipes ($/m)

Replacement	Minimum value	Most probable value	Maximum value
150 mm diameter & less	950	1000	1050
150-410 mm diameter	1050	1100	1150
More than 410 mm diameter	1150	1200	1250
Rehabilitation	Minimum value	Most probable value	Maximum value
150 mm diameter & less	625	650	675
150-410 mm diameter	675	700	725
More than 410 mm diameter	725	750	775

Table 35 shows the unit cost brackets for replacement and rehabilitation of wastewater pipes, variable for three different groups of diameters. Replacement costs were estimated based on the cost of pipes and accessories (manholes and laterals) taken from CityWide, and the cost of installation, assumed to be $1,200/m. Rehabilitation costs were determined based on past experiences with rehabilitation projects.

Table 35: Costs for Wastewater Pipes ($/m)

Replacement	Minimum value	Most probable value	Maximum value
375 mm diameter & less	1900	1950	2000
375-900 mm diameter	2000	2050	2100
More than 900 mm diameter	2100	2150	2200
Rehabilitation	Minimum value	Most probable value	Maximum value
375 mm diameter & less	325	350	375
375-900 mm diameter	375	400	425
More than 900 mm diameter	425	450	475

Table 36 shows the unit cost brackets for replacement and rehabilitation of stormwater pipes, variable for three different groups of diameters. Replacement costs were estimated based on the cost of pipes and accessories (manholes, catch basins, laterals and leads) taken from CityWide, and the cost of installation, assumed to be $600/m. Rehabilitation costs were determined based on past experiences with rehabilitation projects.

Table 36: Costs for Stormwater Pipes ($/m)

Replacement	Minimum value	Most probable value	Maximum value
600 mm diameter & less	1275	1350	1425
600-1500 mm diameter	1450	1525	1600
More than 1500 mm diameter	1600	1650	1725
Rehabilitation	Minimum value	Most probable value	Maximum value
600 mm diameter & less	325	350	375
600-1500 mm diameter	375	400	425
More than 1500 mm diameter	425	450	475

Table 37 shows the unit cost brackets for replacement and rehabilitation of roads. Replacement costs are variable depending on the type of roads (arterial, collector or local), as stated in CityWide. They were estimated based on the cost of the roads themselves and of associated assets (sidewalks and street lights), taken from CityWide. Resurfacing costs for paved roads as well as re-graveling costs for non-paved roads were determined based on the information stated into the 2013 road survey report by Stantec.

Table 37: Costs for Roads ($/m^2)

Reconstruction	Minimum value	Most probable value	Maximum value
Arterial	79	89	99
Collector	73	83	93
Local	67	77	87
Resurfacing	Minimum value	Most probable value	Maximum value
Arterial, collector or local	20	24	30
Re-graveling	Minimum value	Most probable value	Maximum value
Arterial, collector or local	6	7	8

Simulation parameters

The renewal and financial planning was simulated with InfraModex software over 80 years starting in 2013. Inflation is taken into account at a rate between 2 and 4.5% over the years. Also, to calculate the present value of future investments, a discount rate of 6% is applied.

The assets condition is usually the basic information required to simulate the renewal and financial plan with the DSS software. However, for Petrolia, condition data was available only for the roads, but not for the water, sanitary sewer and storm sewer pipes. Therefore, pipes condition had to be assumed based on their remaining useful life (age versus useful life).

InfraModex is simulating the degradation of assets condition over time in order to plan future interventions. It was assumed that the degradation of pipes and roads in Petrolia would follow a linear curve from a perfect condition (100) to a null condition (0) over the number of years stated by the useful life of each asset.

Decisional Criteria

The decisional criteria dictate the timing of assets renewal activities in the next decades.

First, decisional parameters have to be stated for each asset group individually, usually based on their condition. The basic decisional parameter for roads was therefore its condition (from the 2013 road survey by Stantec), while for pipes it had to be the age of the asset.

Also, it was decided that a pipe rehabilitation should always be planned during its life, in order to extend its useful life while ensuring a better level of service throughout, and to optimize the replacement costs and the period of time between the renewal activities, which imply much more inconvenient for the citizens than are rehabilitation activities. Rehabilitation activities consist in cleaning the existing pipe and lining its walls with a resin-soaked fiber tube, which is then hardened using steam or hot water. These activities usually take no more than a few days and imply no excavation since access through manholes is sufficient.

For the roads, it was assumed that two resurfacing should be done before the road is due for a complete reconstruction.

The individual decision trees that were used for the final scenario are presented below.

Figure 15 shows the water linear decision. Essentially, each water pipe will be rehabilitated when it reaches 75% of its useful life (75 years on average), and will be replaced when it reaches 100% of the useful life of the rehabilitation (50 years on average).

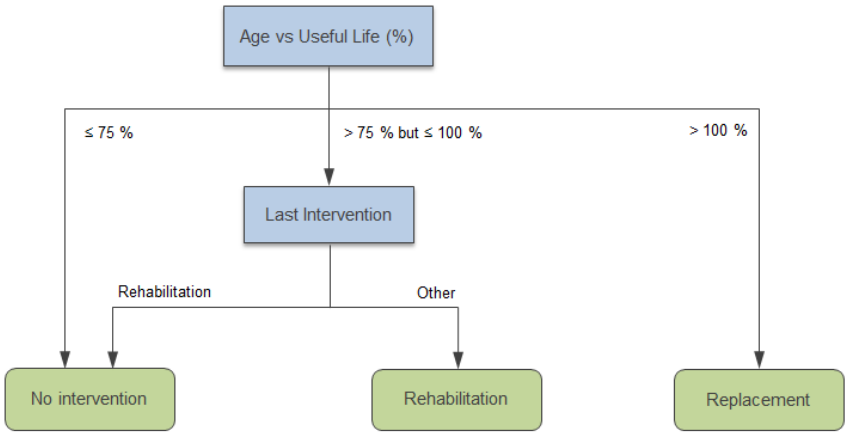


Figure 15: Water Linear Decision Tree

Figure 16 shows the wastewater linear decision tree. Essentially, each sewer pipe will be rehabilitated when it reaches 80% of its useful life (100 years on average), and will be replaced when it reaches 100% of the useful life of the rehabilitation (50 years on average).

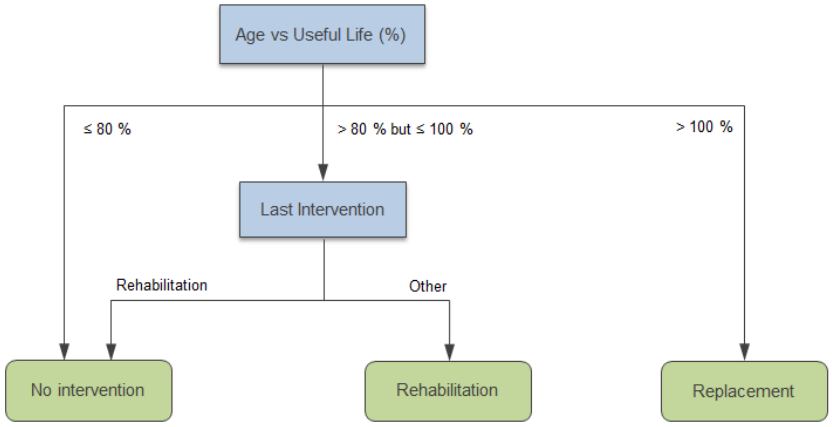


Figure 16: Wastewater Linear Decision Tree

Figure 17 shows the stormwater linear decision tree. Essentially, each storm sewer pipe will be rehabilitated when it reaches 80% of its useful life (100 years on average), and will be replaced when it reaches 100% of the useful life of the rehabilitation (50 years on average).

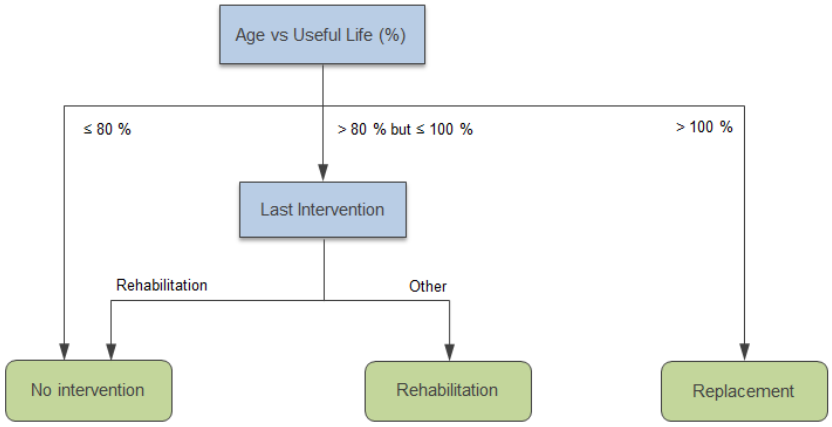


Figure 17: Stormwater Linear Decision Tree

Figure 18 shows the road decision tree. Essentially, each road segment will be rehabilitated for a first time when its condition reaches 60 and less (out of 100), it will be rehabilitated for a second time when its condition reaches 20 and less, and then it will be reconstructed when its condition reaches again 20 and less. It should be noted that the condition will degrade more rapidly after a rehabilitation than after a reconstruction (based on the useful life stated for each of these interventions).

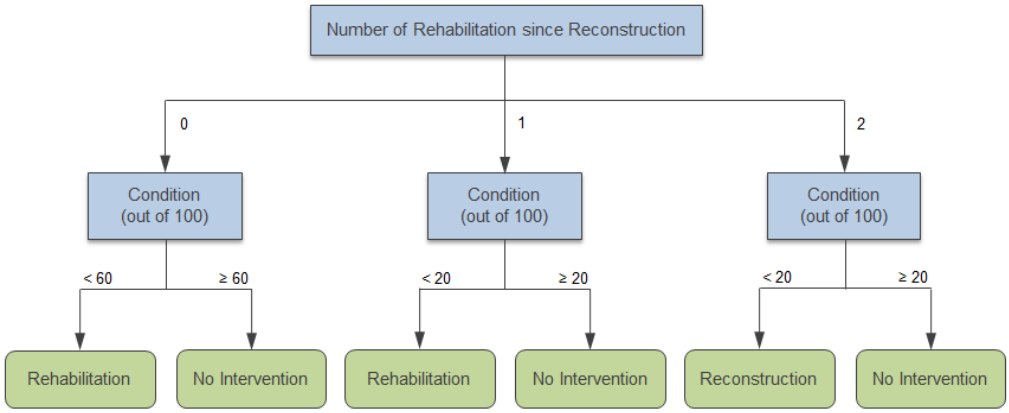


Figure 18: Road Decision Tree

Secondly, the basic principles of integrated management between all these groups of asset have to be stated as well. For Petrolia, here are the basic decisional criteria that were used for the final scenario:

- Before any intervention on the road and before the renewal of any pipe, the upcoming interventions within the next 5 years are verified.
- If a wastewater pipe is due for replacement, it will drive the replacement of all assets above (water pipe, stormwater pipe and road).
- If a water pipe is due for replacement, it will drive the replacement of all assets above (stormwater pipe and road).
- Wastewater, water and stormwater pipes rehabilitation do not drive any other intervention and are not affected by other intervention, unless a pipe below need replacement at the same time, which will drive the replacement of assets above instead of rehabilitation.
- If a stormwater pipe is due for replacement, this intervention will wait until the road has to be reconstructed or rehabilitated or until another pipe has to be replaced, unless no other intervention is planned within the next few years.

Figure 19 shows the detailed integrated management decision tree that was chosen for the final scenario. The box below describes the different steps of this decision tree in more details.

DESCRIPTION OF THE INTEGRATED MANAGEMENT DECISION TREE

If sanitary sewer is due for replacement:

- and at least one other asset needs intervention, the decision is to replace all pipe assets and reconstruct the road;
- and at least one other asset needs intervention within the next 5 years, the decision is to wait a few years before replacing everything;
- and no other asset need intervention within the next 5 years, the decision is to proceed with the sanitary sewer replacement only.

If the water pipe is due for replacement but not the sanitary sewer:

- if the sanitary sewer is due for replacement within the next 5 years, the decision is to proceed now with the replacement of all assets;
- if the road is due for reconstruction or rehabilitation within the next 5 years, the decision is to proceed now with the replacement of the water pipe and the reconstruction of the road;
- if the storm sewer is due for replacement within the next 5 years, the decision is to proceed now with the replacement of the water pipe and the storm sewer, and to reconstruct the road at the same time;
- if no other asset need intervention within the next 5 years, the decision is to proceed only with the replacement of the water pipe.

N.B. If sanitary or storm rehabilitation are planned, these interventions are done no matter what is planned for the other assets.

If the road is due for rehabilitation or for reconstruction, but not the water pipe nor the sanitary sewer:

- if the water pipe or the sanitary sewer is due for replacement within the next 5 years, the decision is to wait before rehabilitating or reconstructing the road;
- if the storm sewer is due for replacement within the next 5 years, the decision is to proceed now with the replacement of the storm sewer and the reconstruction of the road.

N.B. If water pipe, sanitary sewer or storm sewer rehabilitation are planned, these interventions are done no matter what is planned for the other assets.

If the storm sewer is due for replacement, but not the water pipe nor the sanitary sewer nor the road:

- if the water pipe or the sanitary sewer is due for replacement within the next 5 years, the decision is to wait for these interventions before replacing the storm sewer;
- if the road is due for reconstruction or rehabilitation within the next 5 years, the decision is to wait for these interventions before replacing the storm sewer;

N.B. If water pipe or sanitary sewer rehabilitation are planned, these interventions are done no matter what is planned for the other assets.

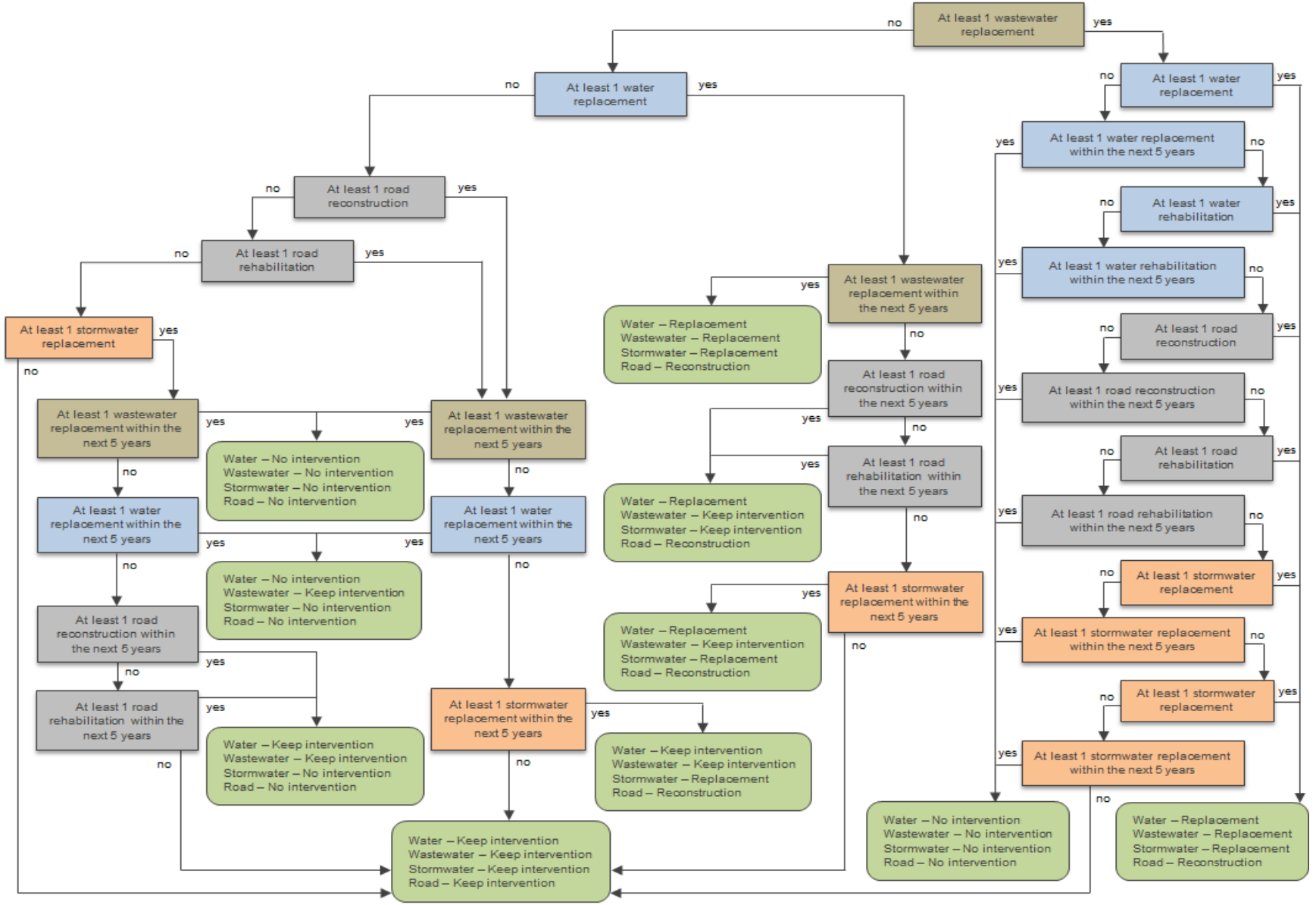


Figure 19: Integrated Management Decision Tree

Results

Analysis of Scenarios

A number of scenarios were simulated and analyzed to evaluate the impact on the resulting renewal and investment plan. The decisional criteria (decision trees) were mainly the parameters that were changed between the different scenarios tested in order to try to optimize the interventions and the costs over the life cycle of each asset. During this analysis, the reality of the Town of Petrolia had to be kept in mind, since asset managers from smaller municipalities usually do not base their decisions on the same criteria than do asset managers of a larger centre.

The most important observation through this analysis was that management planning could not be based on the actual current condition of the existing assets, since very little information was available on the real condition of pipe assets. Results therefore, may not be representative of the Town's reality. A better portrait could be obtained by applying theoretical management principles based on the age of assets; however, it is known that the age of assets is usually not representative of their actual condition. Strategic and financial management is best planned when based on the initial condition of assets. Therefore, it is recommended that the Town of Petrolia undertake an inspection and assessment program to document the condition of their pipe systems.

For the water linear asset, every water break should be documented with its precise location. All other known hydraulic deficiency or water quality issue should also be documented. This registry should be developed and maintained, with the information made available to assist with the financial planning analysis.

For the wastewater linear and stormwater linear, every sewer backup event or pipe collapse should be documented with its precise location. All other known issues (i.e. hydraulic capacity, odour generation, etc.) should also be documented. An inspection program should be implemented in order to identify and track the structural condition of sewer pipes (fractures, holes, surface damages, etc.) and functional condition (obstacles, deposits, blockage, etc.), especially for pipes which are located in a sensitive area. An inspection program would consist of a CCTV inspection of a certain number of sewer pipe kilometers each year, starting with those which are potentially in the worst condition (based on age and known problems). Inspections should always be done by a specialized company in accordance with the PACP6 certification program from NASSCO, in order to have standardized and quality inspections throughout the years.

Discussion of Results

The decision trees presented in the last section are those which were used for the final scenario for Petrolia. In this scenario, rehabilitation activities are planned to extend the pipes useful life while ensuring a better level of service throughout, and to optimize the replacement costs and the period of time between the renewal activities, which imply much more inconvenient for the citizens than are rehabilitation activities. Results are presented and discussed below.

Figure 20 shows the linear impacted throughout the years for each asset group based on the decisional criteria chosen.

For the water linear, the results show that many pipes of the network are starting to reach rehabilitation stage in the next decades, which allow to extend their useful life and to push the replacement activities after 2070.

For the stormwater linear, the results show a peak of more than 10 km of pipes that are already due for rehabilitation in 2013. This is due to the fact that many stormwater pipes are old according to CityWide data; the oldest having been constructed as early as 1904. However, it has to be kept in mind that this analysis

6 The *Pipeline Assessment and Certification Program* defines a method to record all deficiencies observed during a TV inspection into a standard database format, and to give every pipe standard structural and functional condition rating from 1 (acceptable) to 5 (imminent collapse).

was performed based only on the age of the pipes while the real condition of these pipes is unknown. Inspection of these pipes should be done before any decision is made to proceed with rehabilitation activities. It might be possible that some of these pipes are in acceptable condition and able to wait many years before rehabilitation, while others may be such in bad condition that replacement might be the only option.

For the wastewater linear, rehabilitation activities start only around the 2050's since the network is quite recent, all pipes having been installed after 1960 according to CityWide data. Again, the real condition of the pipes is unknown and it might be possible that some rehabilitation or replacement activities be necessary prior to the 2050s. Inspection of a few kilometers of pipes each year would assist identifying the pipes in needing early attention.

Finally, for the roads, a few kilometers of rehabilitation and reconstruction are necessary each year to ensure a constant level of service to the citizens, since the useful life of paved roads is quite short compared to those of pipes.

In terms of financial planning, figure 21 shows the portrait over the next 80 years, while figure 22 shows a close-up of this portrait for the next 20 years.

As illustrated by the linear impacted (figure 8), there are no investments required in the next few years for the water pipes and the sewer pipes. However, $6.76 million and $1.24 million (2013 present value) would be necessary in the next 5 years for the storm sewer pipes and the roads, respectively. Again, this financial picture is based on the age of assets and not on their real condition.

Over 80 years, the following amount of investment (2013 present value) would be necessary: $18.14 million for the water linear network, $4.78 million for the wastewater linear network, $18.22 million for the stormwater linear network, and $29.64 million for the roads, for a total amount of $70.78 million. This amount of investment represents an annual budget of $2.22 million (2013 present value), which increase each year to account for inflation.

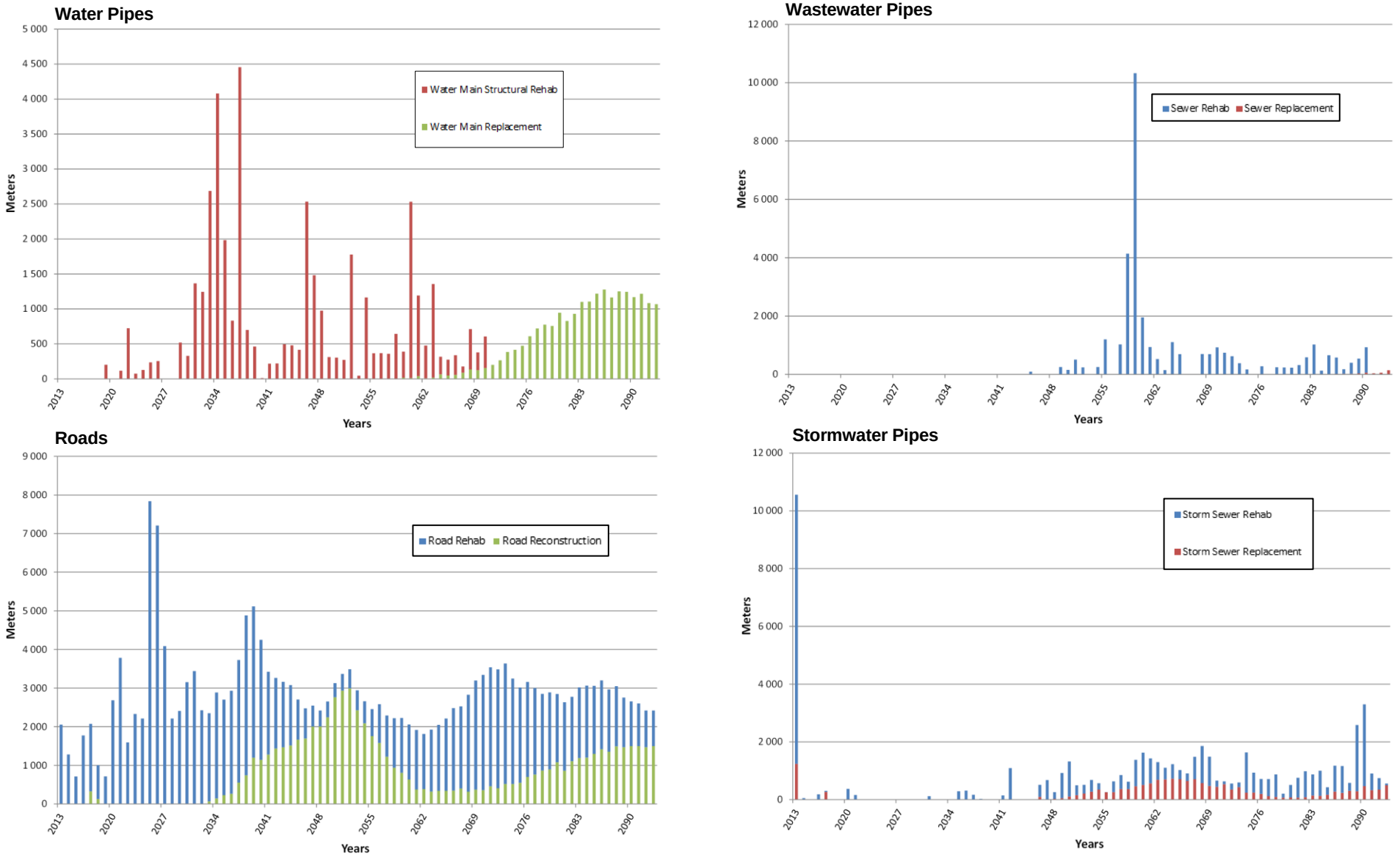


Figure 20: Final Scenario: Impacted Linear for Water Pipes, Wastewater Pipes, Roads and Storm water Pipes

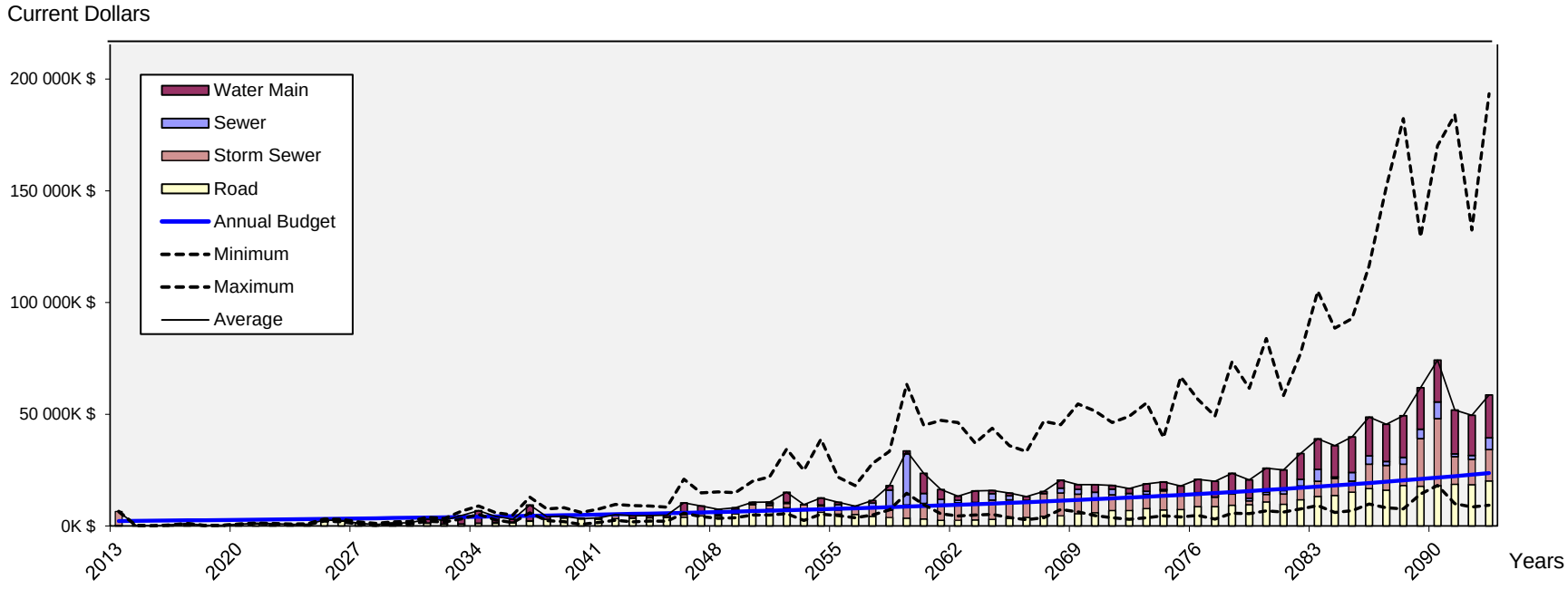


Figure 21: Final Scenario: Financial picture over the next 80 years

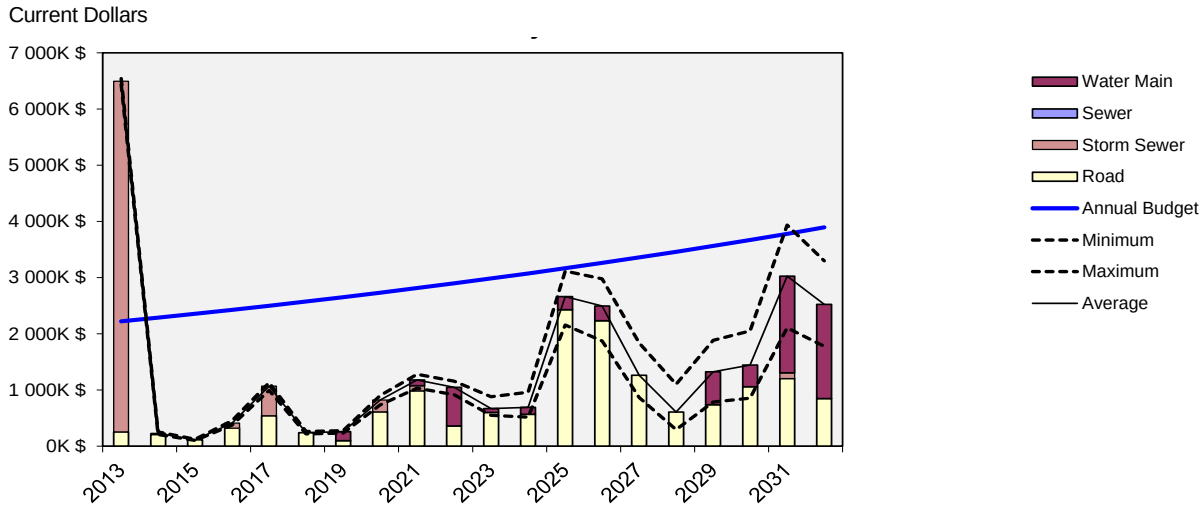


Figure 22: Final Scenario: Financial picture over the next 20 years

To go further into our analysis and to illustrate the advantage of including rehabilitation activities into financial planning, a management scenario in which only replacement activities are allowed on pipes was tested. All other parameters and decisional criteria were kept the same as for the final scenario presented above. For this scenario without rehabilitation, Figure 23 shows the linear impacted throughout the years for each asset group, while Figure 24 illustrates the financial portrait over the next 80 years and Figure 25, a close-up of this portrait for the next 20 years.

For the water linear, in the scenario without rehabilitation, pipes start to reach replacement stage in the 2050s, whereas in the rehabilitation scenario, pipes start to reach rehabilitation stage in the 2020s, while the replacement stage would be reached much later on, around the 2070's.

For the wastewater pipes and the stormwater pipes, it can be observed that through the next 80 years, without rehabilitation a significantly greater number of pipes is impacted and will need to be replaced.

In terms of financial planning, the scenario without rehabilitation requires lower investments on the short term, but requires significantly more investment after only 10 years. This fact is also illustrated by the annual budget required (in 2013 present value, increasing annually with inflation) which is $2.74 million for the scenario without rehabilitation versus $2.22 million for the final scenario, which includes rehabilitation activities.

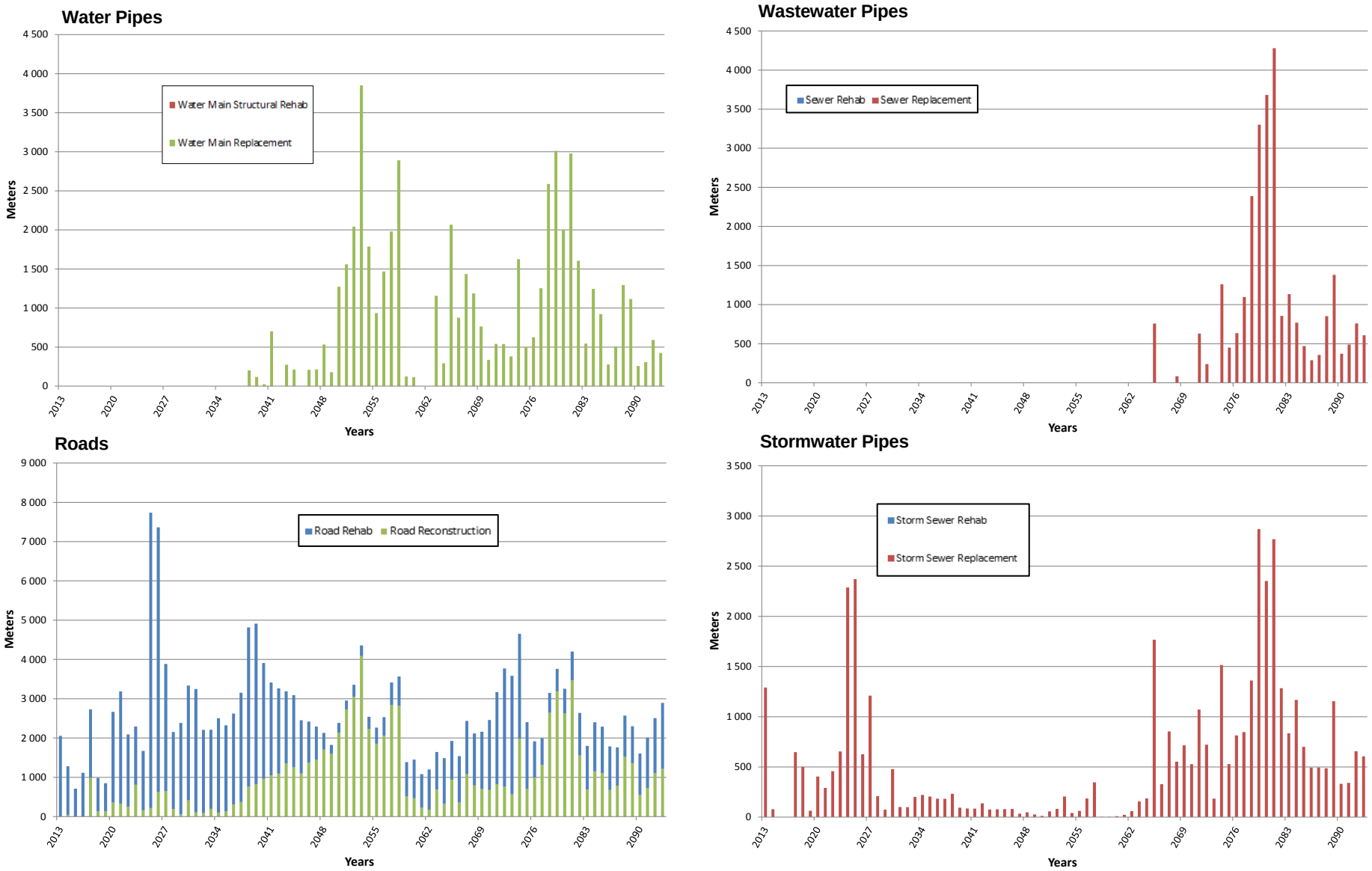


Figure 23: Scenario Without Pipes Rehabilitation: Impacted Linear for Water Pipes, Wastewater Pipes, Roads and Stormwater Pipes

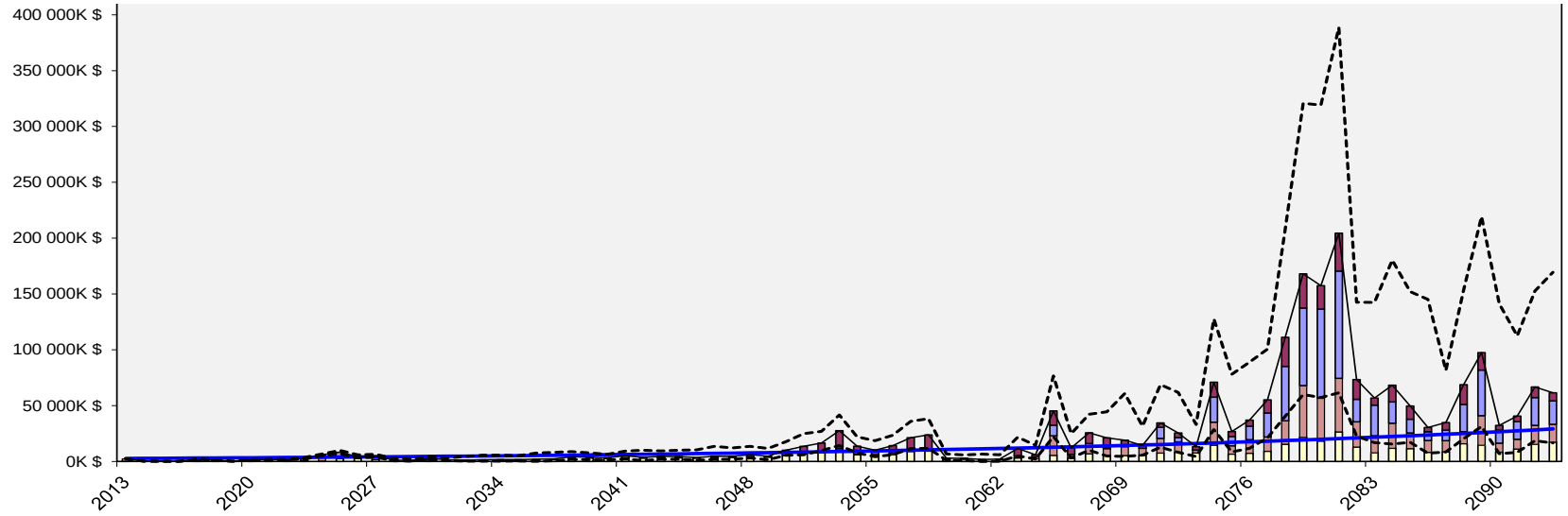


Figure 24: Scenario Without Pipes Rehabilitation: Financial picture over the next 80 years

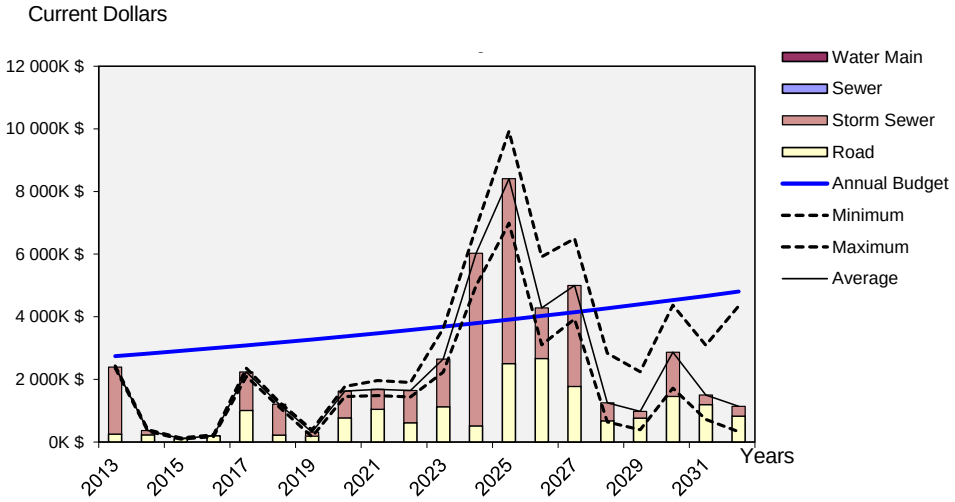


Figure 25: Scenario Without Pipes Rehabilitation: Financial picture over the next 20 years

Therefore the financial advantages of doing rehabilitation activities throughout the useful life of pipes were shown, not to forget that proceeding with rehabilitation activities extend the period of time between the renewal activities, which imply much more inconvenient for the citizens than are rehabilitation activities. Also, by including rehabilitation activities it ensures a better level of service throughout the useful life of the pipes, as shown by figure 26 below.

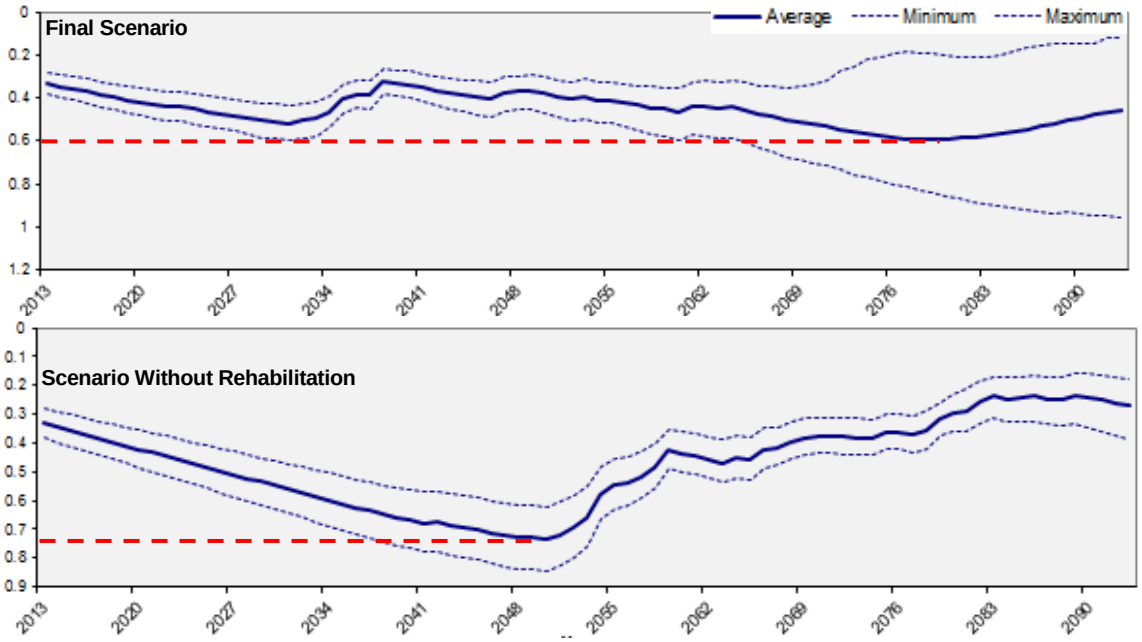


Figure 26: Fluctuation of the level of service for water linear network over the next 80 years: Comparison between the final scenario and the scenario without pipe rehabilitation

Moreover, the difference between these two scenarios would probably be even bigger if the analysis had been done based on the real condition of pipes. The costs associated with an annual inspection program are much lower than what can be saved over the years by planning every renewal and rehabilitation activity at the right time.

Y a-t-il une courte liste d'interventions à faire à court terme ?

5. FINANCING STRATEGY

As previously indicated, the projects that are planned over the course of 2014 to 2016, which target the Mandaumin Reservoir, the new drinking water reservoir and the wastewater treatment plant expansion, were determined following studies that allowed us to determine their condition and to clarify the interventions needing to be done.

The roadways were the subject of monitoring, and the collected data allowed us to produce lists of short- , medium- , and long-term interventions.

Moreover, to take into account lifecycle optimization principles, an integrated analysis of interventions to be done on the sewer and drinking water networks, including the roadways, was carried out using a management decision system (MDS). The status of sanitary and stormwater systems was determined starting with theoretical degradation curves, since we had no status data (structural and functional status data from televised inspections). Regarding status data for the drinking water network, only one register of inventoried breaks between December 2010 and October 2012 was available.

One of the results stemming from the simulations on the network showed a need for a catch-up investment of $6.3 million for storm sewers in 2014. For sanitary sewers, no investments are planned for the coming 10 years (2014-2023). Investments are planned between 2019 and 2023 for the drinking water network.

Investments valued at $4.4 million between 2014 and 2023 will be needed for the roadways. They are mainly aimed at rehabilitation work that will allow for levels of service to be maintained while minimizing investments required over their lifecycle.

It is recommended that the sewer networks be inspected and a diagnostic to be run on their structural and functional condition before definitively concluding intervention needs on these assets. Table 38 presents the investment needs for 2014-2023 for all Town assets. These investments total $48,461,300.

It is important to note that the required investments are largely devoted to assets groups that are judged critical in our analysis (Table 27, section 4.2), totalling $35,482,000 (73%).

Table 38: Investment needs for 2014-2023

Asset Category	Total Capital Expenditure ($)	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Capital Expenditures :											
Water Facilities	13,520,000	1,215,000	8,551,000	3,754,000							
Wastewater Facilities	21,962,000	5,140,000	15,727,000		1,095,000[7]						
Water Linear*	1,022,700						162,000		101,000	690,000	69,700
Wastewater Linear*	30,000	30,000									
Storm Linear*	7,195,000	6,267,000		91,000	531,000			212,000	94,000		
Roads System*	4,428,400	457,000	111,000	320,000	539,000	240,000	215,400	609,000	982,000	357,000	598,000
Parks	73,200		43,200	30,000							
Corporate Facilities and Lands	340,000	40,000	50,000				250,000				
Fleet	8,000		8,000								
TOTAL Capital Expenditures	48,579,300	13,149,000	24,490,200	4,195,000	2,165,000	240,000	627,400	821,000	1,177,000	1,047,000	667,700
Capital Funding :											
Provincial/Federal Grants	-	-	-	-	-	-	-	-	-	-	-
Debenture requirements	45,452,600	12,524,000	23,765,200	3,441,000	2,165,000	240,000	465,400	821,000	1,076,000	357,000	598,000
Water Reserve	3,126,700	625,000	725,000	754,000	-	-	162,000	-	101,000	690,000	69,700
TOTAL Capital Financing	48,579,300	13,149,000	24,490,200	4,195,000	2,165,000	240,000	627,400	821,000	1,177,000	1,047,000	667,700

[7] From Presentation February, 2012 (Watson & Assoc.)
* A pre-project is required to determine interventions.

Status of asset management practices in Petrolia

The Town of Petrolia currently has practices that are generally acceptable and several of the active initiatives show a proactive attitude towards priority assets. However, many of the management tools and documentation required from a formal Asset Management Plan have not been implemented. Developing these tools and practices into everyday use will represent a significant challenge to staff.

The Town of Petrolia is similar to many small towns with respect to a lack of documented condition assessment of their sewer networks (both sanitary and stormwater). The lack of attention that it has given to these assets is explained by the fact that a large part of these networks were built less than 50 years ago. However, given the need to make the best use of available resources, it is time to bring attention to this aspect of management of the Town's assets, since several roadways will need attention in the short-term, and the integrated management approach proves to be the most efficient from a financial perspective.

The following table summarizes the status of asset management. The areas in green indicate that best practices are in place and being applied. The areas in yellow show that the practices in place may be incomplete or that action must be taken. Finally, the red areas indicate that several practices are lacking or that immediate attention is required.

Table 39: Condition of asset management practices during their lifecycle

Asset Category	Lifecycle activities			
	Condition Assessment	**O&M**	**Rehabilitation**	**Replacement**
Water Facilities				
Wastewater Facilities				
Water Linear				
Wastewater Linear				
Storm Linear				
Roads System				
Parks				
Corporate Facilities and Lands				
Fleet				

6. CONCLUSIONS

The goal of this report is to develop an asset management plan for the Town of Petrolia in order to meet provincial requirements. The obligation for Ontario municipalities to create a detailed asset management plan aims to allow them to implement a structured and efficient plan for the optimal management of their assets over their lifecycle.

The “Building Together” Guide, available at the Ontario Ministry of Infrastructure’s Web site, served as the basis for creating the present asset management plan. The assets targeted by this plan include Water Facilities, Wastewater Facilities, the drinking water supply and distribution networks, the wastewater and stormwater collection networks, roadways, parks, Corporate Facilities and Fleet.

Four steps allow for the development of an asset management plan. The first step was devoted to the assessment of the status of assets in each considered group. Levels of service were then defined together with Town representatives and a deadline was established to meet objectives if these were not already met. The third step consisted of identifying critical assets and defining required actions and interventions to ensure the longevity of assets, taking into account their status and their importance. Finally, the last step consisted of determining the required investments for each asset group over the next 10 years. The results of past studies conducted by the Town allowed for the identification of required projects for the Water Facilities and the Wastewater Facilities, while a management decision system was used for the integrated analysis of investment needs for the drinking water, waste water, storm water, and roadway networks.

Investment needs for the other asset categories are limited to study recommendations, which would allow for the more precise determination of the condition of assets that were highlighted by managers. Minor investments were included when the condition of assets posed a risk to public safety.

The current asset management plan forms the basis of a structured management that includes best practices and allows for the optimization of asset lifecycles. However, the main difficulties encountered for proceeding with more precise analyses and recommending more realistic interventions have consisted of an absence of current condition data, particularly for the sanitary and storm sewer networks. As a result, the age of the networks and their probable service life was used to determine investment needs. A “theoretical” immediate investment need of $6.3 million for the storm sewer system is a direct result of this assumption, which should be verified by actual assessments of the sewer system prior to undertaking any maintenance or rehabilitation works.

6.1 SUMMARY OF RESULTS

The Report Card produced during the first stage of this management plan show that Petrolia’s assets are in good enough shape and that the situation will be maintained if the same management practices are employed. However, if we examine the results by asset group, the Wastewater Facilities appear to be the assets that are in the worst state and risk deteriorating with time. This situation is well known to the Town, which has already taken the necessary actions to remedy the situation and prevent the level of service from deteriorating. The planned investments are substantial (over $20 million), which represents a significant burden to the Town. The Town plans to fund this investment through its sewer rates, development charges, along with funding assistance from Waste Management (landfill leachate) and potential grant funding from senior levels of government.

The second asset group to be monitored include the Water Facilities. The Town has already taken some required corrective action, and has identified a program which will be staggered over the next three years. The investments are substantial (more than $13 million), and will likely have an impact to the Town’s Water Rates. The Town plans to fund part of these investments through its Water Reserve, as well as potential grant funding from senior levels of government.

Regarding the linear sewer networks and water distribution system, it is anticipated that the storm sewers are in a state that requires short-term attention. However, the current condition of the storm sewer and sanitary sewer systems are not well known. Although the sewer systems condition is considered acceptable

by the Town staff, they also anticipate that the storm, sanitary, and water networks will deteriorate in the future if the management practices are not modified.

This management plan recommends the development of a monitoring strategy for the sanitary and storm sewer networks over a time span of five to 10 years in order to gather data on their structural and functional condition. The information developed from the monitoring program will assist in planning of a more realistic schedule of investments based on the condition of the sewers, rather than just the age.

The Integrated analyses of the linear networks included consideration of the roadways. In the case of the Town's roads, recent inspection data was able to be used in investment scenarios. The decision trees used included best practices for roadway management, namely an increase in service life through successive preventive rehabilitation interventions. Planned investments for maintaining roadway levels of service figure at around $4.2 million over the next ten years.

Finally, the investments planned for assets in other asset categories are limited to around $333,000, corresponding to the replacement of assets identified by the managers as being unsafe and at the end of their useful life. However, studies are recommended to determine the current condition of other assets that have reached the end of their useful life. These studies total $118,000. These studies will allow for more precise planning of current investment needs.

Work completed as part of this asset management plan and exchanges that took place with Town managers and representatives allowed us to affirm that the Town's current management practices can be qualified as acceptable. Nevertheless, they require adjustments and additions. We are convinced that the recommendations that we have made in this asset management plan may be gradually implemented in Town practices, since the values of this organization and its staff are based on openness and service to citizens.

Finally, and despite all agreed efforts during data gathering and exchanges with Town managers, it must be noted that some assets could not be handled with as much depth. This shortcoming in the Asset Management Plan does not seem, however, to have any influence on the capacity of the Town to deliver the agreed levels of service.

By contrast, the Town will need to make up for this lack of information and data over the period that will separate the creation of this management plan and its future update. More specifically, the missing data concerns Corporate Facilities (buildings, cemetery, arena) and the vehicle fleet.

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APPENDIX 1

ASSESSMENT MANAGEMENT STRATEGY SUMMARY