DILLON CONSULTING

TOWNSHIP OF LUCAN BIDDULPH

Asset Management Plan

2018 Update

February 2019 – 15-2416

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Executive Summary

Public infrastructure is central to prosperity and quality of life. The majority of public infrastructure in Canada is the responsibility of the municipal government, and most people take for granted the important role of these assets. Municipal infrastructure allows for the movement of people and goods, provides safe drinking water, handles waste, creates space for sport and recreation and helps protect homes from flooding and natural disasters. Examples include roads, bridges, and underground water and sewage pipes, all of which are essential to economic development, citizen safety, and quality of life. Well maintained infrastructure is critical in sustaining a municipality as an attractive place to live and do business.

The recent Canadian Infrastructure Report Card (2016), which addresses municipal roads and water systems, stated that approximately one-third of municipal infrastructure is in "fair", "poor" or "very poor" condition across Canada. This illustrates the importance of municipalities protecting their investment in infrastructure and finding creative financial solutions to keep infrastructure in good operating condition. One of the solutions to Canada's infrastructure issues is improved asset management practices.

Dillon Consulting Limited (Dillon) was originally retained by the Township of Lucan Biddulph (Township) to develop an Asset Management Plan (AMP) in 2013. Since that time, the AMP has been updated annually by Dillon. The purpose of an AMP is to set out how the Township's infrastructure will be managed to ensure that it is capable of providing the levels of service needed to support the municipality's goals. The AMP will be used as a tool to assist in decision making for the Township's financial and municipal planning, including annual budgeting, updating of the Official Plan, master plans, etc.

Asset Plan Methodology

The general methodology that has been adopted is to follow the best practices from the National Guide to Sustainable Municipal Infrastructure, also known as the *InfraGuide*. The approach is described in five steps and was designed to help asset managers assess the level of service currently provided by their tangible assets. It allows asset managers to make fact-supported infrastructure investment decisions, while maximizing the effectiveness of available funds. Each of the five steps and their key elements, presented below, were addressed in developing the AMP for the Township. The steps are outlined below.

1. Infrastructure Data Inventory – *What infrastructure do you own?*
2. Replacement Costs – *What is it worth?*
3. Condition Assessment – *What is its condition and remaining service life?*
4. State of Local Infrastructure Analysis – *What needs to be done to rehabilitate, replace, operate and maintain these assets?*
5. Asset Management Strategy – *What should be done first and how much will it cost?*

State of Local Infrastructure

Asset management best strategies suggest that 2% to 4% of the value of an asset should be spent annually to ensure sustainability of infrastructure assets. That level of funding relates mostly to capital expenditure and does not include operational costs. Without asset management tools, it is almost impossible to determine the long term effect of inadequate budget allocations. Yet, it is important for a municipality to determine if the current level of funding is appropriate to continue to provide an adequate level of service to its residents. It is also essential to allocate adequate funding to ensure sustainability of the assets in the future. For the Township, the estimated value of the assets included in this project was estimated at approximately $148.5 million. The following table shows the distribution of that asset value.

Infrastructure Network	Quantity	Replacement Cost
Sanitary Sewer	21 km	$15,621,480
Storm Sewer	14 km	$10,968,020
Water	65 km	$49,340,850
Asphalt Roads	60 km	$35,198,400
Water/Wastewater Facilities	3 Pump Stations 1 Elevated Tank 1 Booster Station 2 Treatment Plants	$12,094,190
Bridges and Culverts	19 Structures	$7,148,574
Parks/Recreation Facilities	Community Centre/Arena Scout Hall Pool 3 Parks Sports Field/Park	$9,749,043
Municipal Buildings	Administration Building Public Works Building Museum Library 2 Fire Halls Emergency Medical Services (EMS) Building	$9,126,659
	Total Asset Value	**$149,247,216**

Desired Levels of Service

A 'level of service' is a term that is used to describe the quality, quantity and availability of the service that is being provided. In the context of AMPs, levels of service are established as a way to guide the management of infrastructure in a manner that aims to achieve the level of service goals.

As described in the best practice document, *InfraGuide*, levels of service fall into two broad categories: those that are mandated by regulations (codes, standards, etc.); and those that result from community plans or objectives.

The *InfraGuide* describes the steps required to successfully establish a community's levels of service. The key elements that relate to the development of levels of service as described in the *InfraGuide* best practices are asset understanding, consultation/communication, strategic alignment, risk tolerance, and financial considerations.

A full community consultation process for establishing levels of service was not conducted as part of the AMP project. The process followed was mostly based on the *Asset Understanding* component of the process, which considered the physical and functional characteristics of an asset to define a measurable index that can be monitored over time.

Condition indices were determined for the various assets. The Township's current levels of service, measured in terms of condition index, were determined in consultation with the Township. Once acceptable levels of service were established, the information was used to identify current and future infrastructure investment requirements. The asset management tools described were provided to staff to monitor the levels of service over time, and to assess the effect of different budget scenarios on the current and future levels of service.

Asset Management Strategy

Road, Water, Sanitary and Storm Networks

At the onset of the AMP, the Township identified specific projects over the next seven years and a yearly budget of $150,000 for the remaining three years of the ten year forecast for road rehabilitation (up to 2023) with the goal of maintaining the level of service currently provided.

The Township-approved road projects that were identified have been maintained and are identified in the table below along with additional projects identified within the current ten year time frame. Operating expenditures less than $50,000 have been excluded.

Year	Project	Expenditure
2019	Highway 4/Saintsbury Traffic Signals	$250,000
2019	Main Street – Saintsbury Line to Entrance of Lucan Estates	$175,000
2019	St. James Drive Paving	$60,000
2019	Coursey Line – Elginfield Road to William Street	$495,000
2020	Coursey Line – McGillivray Drive to Mooresville Drive	$280,000
2021	Whalen Line – Mitchell Line to Granton Line (Second coat of hot mix overlay)	$495,000*
2022	Whalen Line – Granton Line to Elginfield Road (Second coat of hot mix overlay)	$715,000*
2023	Whalen Line – Saintsbury Line to Mitchell Line (CIP & hot mix overlay)	$495,000**
2023	Beech Street (Market Street to Duchess Street)	$35,000
2023	Maple Street (Market Street to Duchess Street)	$15,000

* 50% of estimated total expenditure. Remaining 50% funded by Township of Perth South.
** 50% of estimated total expenditure. Remaining 50% funded by Municipality of South Huron

For linear infrastructure assets, the Dillon Predictive Scenario Software (DPSS) was used in preparing the capital investment analysis of the AMP based on various budget scenarios. In order to understand the extent of reconstruction needs, the DPSS tool was used, assuming an unlimited budget for each of the asset categories. The needs identified in the unlimited budget scenarios for road and linear municipal infrastructure (watermain, sanitary, storm) operate independent of each other. It is reasonable to assume that if the road and infrastructure replacement are triggered within five years of one another for the same street, it would be logical to replace all identified assets at the same time. Within the next 10 years based on the unlimited budget scenarios, there are several streets that are triggered for road reconstruction and the replacement of sanitary sewer within a maximum of five years of one another. Additionally, there are a few projects that also trigger watermain replacement within the next 12 to 13 years, just outside the planning window of this AMP. The table below outlines these projects that could potentially be combined into more cost effective, larger projects. The projects are listed in order of priority based on the earliest year the replacement or reconstruction of an asset is triggered.

Street	Year Water Triggered	Year Sanitary Triggered	Year Road Reconstruction Triggered	Combined Expenditure
Nicoline Avenue (Elm Street to End)	-	2020	2023	$495,000
High Street (Granton Line to Queen Street)	-	2022	2027	$80,000
Ann Street (Granton Line to End)	-	2022	2027	$110,000
Frank Street (Main Street to William Street)	2031	2024	2025	$515,000

Street	Year Water Triggered	Year Sanitary Triggered	Year Road Reconstruction Triggered	Combined Expenditure
Francis Street (Main Street to Saintsbury Line)	-	2024	2027	$490,000
Nicoline Avenue (Elm Street to Saintsbury Line)	-	2028	2024	$415,000
Head Street (Granton Line to King Street)	-	2028	2025	$80,000
Station Street (Granton Line to End)		2028	2027	$275,000
Marlene Street (Kleinfeldt Avenue to Albert Street)	2033	-	2027	$235,000
Harold Court (Elm Street to End)	2033	-	2027	$320,000

Upon further review and discussions with Township staff, the projects outlined in the table below, are deemed the priority capital linear infrastructure projects.

Projected Construction Year	Street	Scope of Replacement	Overall Expenditure
2019	Marlene Street (Kleinfeldt Avenue to Albert Street)	Watermain Road	$235,000
2020	Frank Street (Main Street to William Street)	Watermain Sanitary Road	$515,000
2020/2021	Alice Street (Main Street to Saintsbury Line)*	Watermain Sanitary	$565,000
2021	Water Street (Main Street to William Street)	Watermain Sanitary Road	$620,000
2022	Nicoline Avenue (Elm Street to End)	Sanitary Road	$495,000

* Cost of road replacement would be funded by the County of Middlesex with sanitary and watermain replacement funded by the Township.

Bridge, Culvert and Water/Wastewater Facility Assets

No detailed condition assessment survey was carried out on the point assets. To develop a capital program, the PSAB database which contains information on year of construction, service lives and replacement costs, and OSIM condition survey reports were utilized. Based on that information, the timing for rehabilitation and replacement of those point assets and corresponding costs have been approximated. The most significant expenditures within the next ten years are outlined in the table below.

Structure Name	Location	Year	Expenditure
Culvert No. 14	Coursey Drive (100 m north of Fallon Drive)	2025	$196,691
Culvert No. 15	Coursey Drive (50 m south of Fallon Drive)	2026	$174,836
Culvert No. 12	Mooresville Drive (440 m west of Roman Line)	2027	$152,982

The AMP identifies a need incurred in 2023 with the replacement of the Granton Booster/Pump Station, with an anticipated cost of approximately $547,489, based on a 2015 replacement cost of $432,193 for the building, pumps, etc. (not including the reservoir) as provided by the Township. The reservoir was inspected in 2016 and is in good condition.

Parks/Recreational Facility Assets

Based on current information provided by the Township, the parks/recreation facility projects identified within a ten year time frame are shown in the table below, excluding equipment assets and expenditures less than $50,000. The annual capital budget for parks and recreation fluctuates from year to year depending on the current needs. The 2018 capital budget is $2,500,000.

Year	Project	Expenditure
2018	Phase 1 – Community Centre Licensed Daycare	$2,235,000
2019	Senior's Centre	$150,000
2019	Phase 2A – Community Centre Building	$8,500,000
2019	Phase 2B – Community Centre Pool	$2,300,000
2020	Community Centre Playground Equipment	$125,000
2020	Community Centre Skatepark	$250,000
2020	Granton Playground	$65,000
2020	Lucan Estates Tennis Court	$50,000
2021	Lions Field Ball Diamond Lights	$150,000
2022	Lucan Estates Playground	$75,000
2022	Community Centre Hardscape Path	$300,000
2022	Community Centre Outdoor Fitness Equipment	$100,000
2024	Lucan Estates Pavilion and Washrooms	$150,000
2025	Lions Scout Hall	$315,736
2026	Granton Park Pavilion Expansion	$150,000
2026	Granton Ball Lights	$125,000
2030	Market Street Park Playground Equipment	$65,000

Municipal Building Assets

Based on the currently available information provided by the Township, all the municipal building related projects identified within a ten year time frame have expenditures less than $50,000. These assets and operating expenses have been excluded for the purposes of this AMP.

Financing Strategy

While expenditure requirements will fluctuate year-to-year for all asset categories, it is important for the Township to implement a consistent, yet increasing annual investment in capital so that the excess annual funds can accrue in capital reserve funds. Funds which have accrued in capital reserves can then be drawn when rehabilitation/replacement activity is required.

It is understood that this AMP will be used as a guideline to determine a funding strategy with the objective of generating an investment strategy to meet the anticipated required expenditure needs.

In consultation with Township staff, an asset management strategy has been developed, including funding requirements that would ensure sustainability of the assets to continue to provide an adequate level of service to the residents of Lucan Biddulph. The following approach will be followed by the Township to pay for the current and future needs in the infrastructure networks.

General Expenditure on the Road Network

Until 2013, no funds were specifically allocated to capital projects. Capital projects are being funded using money accumulated in a reserve fund. The money transferred to reserve is increased by any year end operating surpluses. In 2018, $410,000 was put into the construction reserve and it is proposed that this amount be increased by 2% per year.

Sewer Network

There is currently a $20.00 per month capital infrastructure levy which results in accumulating approximately $310,000 per year to fund capital projects on the sewer system, including all facilities that are part of the sewer collection system.

Water Network

There is currently a $15.00 per month capital infrastructure levy, which results in accumulating approximately $250,000 per year in reserves to fund capital projects on the water system including all facilities that are part of the water distribution system.

Municipal Buildings

In 2018, $400,000 was allocated to building reserves. It is proposed that this allocation be increased by 2% per year.

It is anticipated that the revenue sources described above will ensure the sustainability of the infrastructure assets over time.

1.0 Introduction

1.1 Purpose of an Asset Management Plan

1.1.1 Significance of Municipal Infrastructure

Public infrastructure is central to prosperity and quality of life. The majority of public infrastructure in Canada is the responsibility of the municipal government, and most people take for granted the important role of these assets. Municipal infrastructure allows for the movement of people and goods, provides safe drinking water, handles waste, creates space for sport and recreation, and helps protect homes from flooding and natural disasters. Examples include roads, bridges, and underground water and sewage pipes, all of which are essential to economic development, citizen safety, and quality of life. Well maintained infrastructure is critical in sustaining a municipality as an attractive place to live and do business.

The recent Canadian Infrastructure Report Card (2016), which addresses municipal roads and water systems, stated that approximately one-third of municipal infrastructure is in "fair", "poor" or "very poor" condition across Canada. This illustrates the importance of municipalities protecting their investment in infrastructure and finding creative financial solutions to keep infrastructure in good operating condition. One of the solutions to Canada's infrastructure issues is improved asset management practices.

1.1.2 Township of Lucan Biddulph and Asset Management

The Township of Lucan Biddulph (Township) is situated in Middlesex County (the County), within the Province of Ontario. The Township was created through the amalgamation of the Village of Lucan and Biddulph Township in 1999, and is approximately 170 square kilometers in size.

The Township is an agricultural based community surrounding the Villages of Lucan and Granton. The current population is approximately 4,700 people, based on the 2016 Census. This is an increase of 8.3% from the 2011 Census. **Figure 1** illustrates the location of the Township.

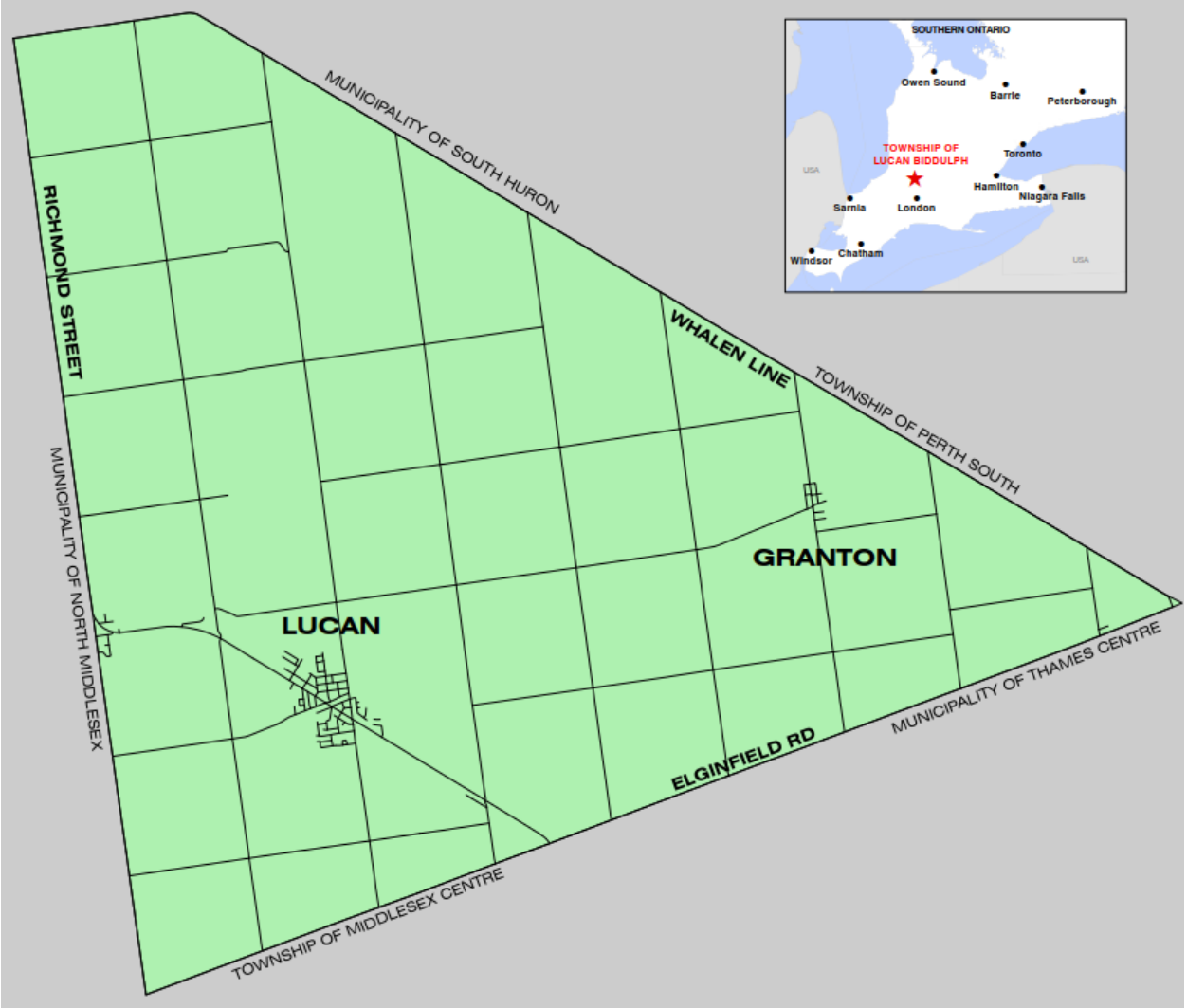

Figure 1: Location Map – Township of Lucan Biddulph

1.1.2.1 Goals of the Township of Lucan Biddulph

The current version of the Township of Lucan Biddulph's Official Plan (June 2015) outlines several goals for the Township, many of which are dependent on how the Township's infrastructure assets support economic activity and improve quality of life. Examples of some of these goals are outlined below:

- To encourage and direct the majority of population growth and residential development in the Township to the Village of Lucan
- To encourage small scale, limited residential development in the Village of Granton in keeping with its established character and role as a small settlement area capable of accommodating modest growth
- To ensure that future growth and development is adequately serviced and is within the Township's ability to provide the necessary infrastructure

- To maintain transportation corridors in order to provide for cross-jurisdictional access of regional amenities, including but not limited to public service facilities and health care facilities
- To undertake community improvements for the purposes of enhancing the quality of life for the residents of the Township.

1.1.2.2 Township of Lucan Biddulph's Asset Management Plan

Dillon Consulting Limited (Dillon) was originally retained by the Township of Lucan Biddulph (Township) to develop an Asset Management Plan (AMP) in 2013. Since that time, the AMP has been updated annually by Dillon. The purpose of an AMP is to set out how the Township's infrastructure will be managed to ensure that it is capable of providing the levels of service needed to support the municipality's goals. The AMP will be used as a tool to assist in decision making for the Township's financial and municipal planning, including annual budgeting, updating of the Official Plan, master plans, etc.

The Ministry of Infrastructure of Ontario recognizes that public infrastructure is central to prosperity and quality of life, as municipalities deliver many services that are critical to the public. Many of these services rely on well planned and maintained infrastructure. All levels of government understand also that they have an obligation to address the ever increasing infrastructure challenges, to ensure that they can continue providing an adequate level of service to tax payers. In an effort to commence addressing these challenges, the Ministry initiated a program and plan in 2012 called *Building Together*: *Guide for Municipal Asset Management Plans*. This program is meant to assist municipalities in developing a municipal infrastructure strategy. This strategy provides an opportunity for municipalities to address current and emerging infrastructure challenges. One of the main components of the strategy is to improve the current municipal infrastructure asset management practices through the development of an AMP.

The province has indicated that any municipalities seeking provincial infrastructure funding must demonstrate that they have developed an AMP and how its proposed project funding requests fit within a detailed AMP. The AMP should not only address the current needs in infrastructure, it should also identify future needs and a financing short and long-term strategy to funds those needs.

AMPs assist municipalities in making the best possible decisions regarding the building, operating, maintaining, renewing, replacing, and disposing of infrastructure assets. The intent of the plan is to make the best use of the funds available while managing risk and continuing to provide adequate levels of service to the public.

1.2 Assets Included in Asset Management Plan

It is best practice is to develop an asset management plan that covers all infrastructure assets for which the municipality is responsible. At a minimum, as recommended in the *Building Together – Guide for Municipal Asset Management Plans,* plans should cover roads, bridges, water and wastewater systems, and social housing. The Township has opted to develop a plan that includes all of the primary assets. These infrastructure assets are considered essential to continue to provide an acceptable level of service to the public. The assets included in the AMP are:

- 60 km of asphalt surface roads
- 65 km of watermain network
- 21 km of sanitary sewer network
- 14 km of storm sewer network
- 19 bridge and culvert structures
- Water/wastewater facilities (including wastewater treatment plant, water treatment plant, water tower, pump stations, and booster station)
- Parks/recreational facilities (including community centre/arena, pool, parks, and sports fields)
- Municipal buildings (including administration, public works, fire halls, museum, and library).

Detailed information related to the roads, watermain, and sewer networks is maintained in a digital database (including length, size, material, condition rating, where available, etc.).

Assets including street signs, street lights, gravel surface roads, fleet vehicles and equipment are currently not included in the AMP. The maintenance of these assets is funded primarily through the operating budget on an as-needed basis.

1.3 Asset Management Plan Development

The current version of the Township's AMP covers a timeframe of ten years and is updated on an annual basis. The AMP incorporates the entire lifecycle of the assets that are included (**Section 1.2**).

As previously mentioned, the Township's AMP was originally developed by Dillon in 2013. Dillon worked closely with Township staff, including Public Works and Finance staff, to develop the original AMP and has continued to work with the Township to update the AMP on an annual basis. The information included in the asset database is based on information obtained from various sources including as-built records from the Township and GIS data from the County.

1.3.1 Limitations of the Asset Management Plan

It should be understood that the AMP is a tool and living document which is meant to be used to inform decision making. Political, social, environmental, and operational considerations should also be taken into account in planning capital investments. However, the AMP should provide a foundation on which those decisions are made.

In addition, the usefulness of the AMP is directly related to the quality of data used in its analysis. While both the Township staff and Dillon team involved in the project were committed to data accuracy, some assumptions had to be made in extenuating circumstances. Yet, as a whole, the AMP provides an accurate approximation of the Township's current and future infrastructure needs. In the absence of condition assessment data for some assets, the current and projected needs are based on the year of construction of the assets and their expected service lives.

1.3.2 Evaluation and Improvements to the Asset Management Plan

The original development of the Township's AMP has been improved in 2018 through the incorporation of condition assessments for two major assets for the Township: sanitary sewers and asphalt roads. Prior to these condition assessments, the existing condition of these assets was solely based on age of construction.

It is recommended that the following actions be considered and implemented in order to further improve the Township's AMP:

- Condition assessments of other assets, including storm sewers, water/wastewater facilities (proposed timeline: within three years)
- Incorporation of assets that have previously not been included in the AMP (i.e., sidewalks, regulatory signs, etc.) – (proposed timeline: within three years).

2.0 Asset Management Plan Methodology

The general methodology that has been adopted to follow the best practices from the National Guide to Sustainable Municipal Infrastructure, also known as the *InfraGuide*. The approach is described in five steps and was designed to help asset managers assess the level of service currently provided by their tangible assets. It allows asset managers to make fact-supported infrastructure investment decisions, while maximizing the effectiveness of available funds. Each of the five steps and their key elements, presented below, were addressed in developing the AMP for the Township. Each step is described in detail in the sections below.

1. **Infrastructure Data Inventory – *What infrastructure do you own?***
    - Analysis of existing data and optimization of data sources
    - Transfer of physical characteristic information into databases
    - Document inventory of all assets
    - Upload of information in graphical interface such as a Geographic Information System (GIS).

2. **Replacement Costs – *What is it worth?***
    - Define bench-marking unit prices for replacement
    - Calculate replacement costs of all assets
    - Input information in analytical tools.

3. **Condition Assessment – *What is its condition and remaining service life?***
   - Review of condition assessment data
   - Transfer of condition data to analytical tools
   - Computing condition assessment indices where appropriate
   - Statistical analysis of defects to assess life expectancy
   - Determination of service life of all infrastructure assets
   - Comparison with industry standards and definition of acceptable level of service.

4. **State of Local Infrastructure Analysis – *What needs to be done to rehabilitate, replace, operate and maintain these assets?***
   - Upload condition data in asset management tools and process information
   - Review the effect of different repair alternatives
   - Consideration of lifecycle costs and extension of service life
   - Determine financial requirements to address needs identified.

5. **Asset Management Strategy – *What should be done first and how much will it cost?***
   - Consideration of selected "what if" expenditure scenarios
   - Production of a prioritized short and long term AMP.

The final part of this report, which could be incorporated as an additional question to the list above, is "How will you finance your plan?" To answer that question, we have reviewed a variety of financing strategies which could be implemented to address the needs of all assets while maintaining an acceptable level of service to the residents.

2.1 Infrastructure Data Inventory

The Township possesses a large amount of inventory data in a variety of formats; therefore, no field data collection was required on this project. We worked closely with the Township staff to make best use of the valuable information they had. To facilitate access to the information, we made sure that all asset elements were properly digitized and georeferenced in the database with unique ID numbers. The final datasets were delivered in ArcGIS geodatabase format.

It is recommended in the development of an AMP not to collect and store data just because the data is available. If the data does not add any value to the business processes, it should not be incorporated in the system. Usually, the financial investment and time spent keeping that information current could be better used elsewhere in the development of an AMP.

2.1.1 Linear Infrastructure Inventory – Road, Sewer and Water Networks

The Township staff had existing road, sewer, and water database information available in a variety of formats, including spreadsheets, CADD files and detailed on historical drawings and documentation. The files were digitized in formats compatible with the GIS system. The roads database was created using a combination of the County's GIS information and the road information contained in the Township's PSAB database. The Dillon team reviewed all the linear infrastructure information and identified data gaps that needed to be addressed before processing data for the development of the AMP. Information such as year of construction, pipe diameter, material type, and pavement widths were some of the attribute information that was required in the development of the AMP. The project team worked closely with staff to address missing data or to make educated assumptions where the information was not available.

2.1.2 Point Asset Inventory – Bridge, Culvert and Facilities Assets

Existing information pertaining to the point asset inventory within the Township, including bridge, culvert, and water/wastewater, parks/recreational, and municipal facility assets were obtained for the AMP. The main source of information for the bridges and culverts were survey reports developed to meet the requirements of the Ontario Structure Inspection Manual (OSIM). Municipalities are required to undertake OSIM surveys every two years, which report data on each bridge and culvert structure including type, dimensions, year of construction, anticipated service life, condition and rehabilitation required. The OSIM information was very valuable in the initiation of the development of the asset management system. The information related to parks/recreation and municipal building facilities was provided by the Township.

The Dillon team, in collaboration with Township staff, reviewed all available data and made appropriate adjustments to parameters such as service life and replacement cost of an asset. The goal was to tailor the existing information on current infrastructure conditions to the AMP development process.

2.2 Replacement Costs

Calculating the replacement costs of infrastructure assets provides insight on the existing financial investments on municipal infrastructure networks. To calculate overall replacement costs, each type of linear infrastructure was assigned an average unit cost per metre or square metre of construction. Unit construction costs were developed in collaboration with Township staff based on recent construction activities in the area, including all appurtenances and restoration costs. Restoration was assumed to include replacement of granular and asphalt materials for the trench for linear underground infrastructure. **Table 1** outlines the unit costs that were used. A 10% mark-up was also included in each unit cost to account for miscellaneous construction costs such as bonding, insurance, etc. Additionally, 15% of the total construction costs were added to account for engineering design fees. It should be noted, when these unit prices are used to estimate projected expenditures within the next ten years, inflation has not been included.

Table 1: Units Costs for Linear Infrastructure Assets

Asset	Unit Cost
Watermain (<=250 mm)	$950/m
Watermain (251-400 mm)	$1,200/m
Sanitary Sewer (<=250 mm)	$1,300/m
Sanitary Sewer (251-400 mm)	$1,400/m
Sanitary Sewer (>400 mm)	$1,550/m
Storm Sewer (<=250 mm)	$1,100/m
Storm Sewer (251-400 mm)	$1,200/m
Storm Sewer (>400 mm)	$1,850/m
Road Overlay (All Road Classes)	$50/m^2
Road Reconstruction – Full Urban*	$110/m^2
Road Reconstruction – Partial Urban*	$75/m^2
Road Reconstruction – Urban Rural*	$65/m^2

*Full Urban roads are asphalt roads in an urban area, which include curb and sidewalk.
Partial Urban roads are asphalt roads in an urban area with no curb or sidewalk.
Urban Rural roads are asphalt roads in a rural area.

The main source of information for the replacement values of the water/wastewater facilities was the PSAB database. The values provided in the PSAB database were inflated where required to obtain an approximation of the current replacement cost of the assets.

2.3 Condition Assessment

The generation of condition indices, using consistent and repeatable techniques, is essential in comparing assets and identifying needs in all types of infrastructure. These indices are used to track improvements to the level of service in the condition of the asset network in the form of financial investment. All condition indices for linear assets ranged from 0 to 1, with 1 representing an asset in perfect condition. Once all assets were assigned a condition rating, knowledge of assets and technical expertise were used to determine rating levels which represented the minimal level of service that can be provided to the residents. This was determined in consultation with Township staff. Any components of infrastructure rated below the minimal rating are to be repaired to improve the level of service. The minimum rating, or level of service, is called the "Threshold of Acceptability" of an asset.

The following **Figure 2** illustrates graphically an example of a deterioration model and performance threshold used for a road network.

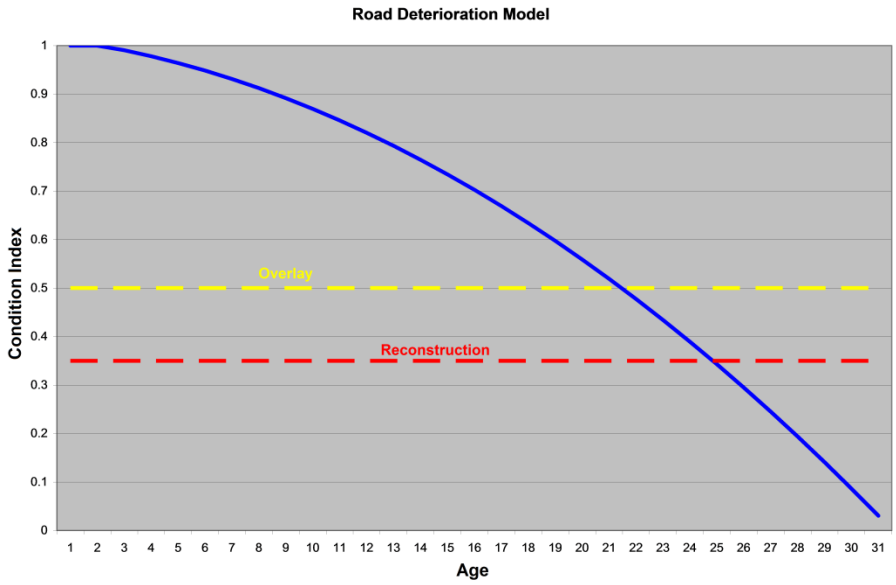

Figure 2: Deterioration Model and Threshold of Acceptability for Asphalt Roads

2.3.1 Road Network Condition Assessment Process

In 2018, the Township conducted a road condition assessment which rated the condition of all roadway sections in the network which are maintained by the Township. County of Middlesex and Ministry of Transportation, Ontario (MTO) maintained roads that are within the Township boundaries were excluded from this assessment. This information, combined with the year of construction or last rehabilitation, was used to analyze the road network over time. It is recommended that the Township conduct these types of road condition surveys on a regular basis (every three to five years) following the Pavement Condition Rating (PCR) method recommended by the MTO. Results of such a survey provide a better indication of the current condition of the road network and provide an improved basis of information to predict the deterioration of road sections over time. A summary of the 2018 road condition assessment is documented in the report, *Township of Lucan Biddulph Road Condition Assessment Report (December 2018)*. A summary of the PCR and Ride Condition Rating (RCR) results are also included in **Appendix A** of this report. The Township also conducts annual traffic counts on various roads throughout the Township which assists in assessing traffic volumes and selecting road surface types.

2.3.2 Water and Sewer Networks Condition Assessment Process

At the onset of the AMP, budgetary constraints prohibited the possibility of conducting a condition assessment survey of the sewer and water networks. To overcome this limitation, statistically developed deterioration trends were used to approximate pipe condition based on the pipe's age and material type.

The approach used to approximate the condition of these assets is illustrated on **Figure 3**. It involves using deterioration trends to estimate the condition of "families" or "asset classes" of infrastructure components with similar physical and functional characteristics. It is based on age and material type of the assets. Using the age and statistical deterioration trend of a particular material type, it is possible to approximate its current condition and establish a corresponding condition index. For high level financial analyses focused on asset sustainability of an infrastructure network, this approach is quite adequate.

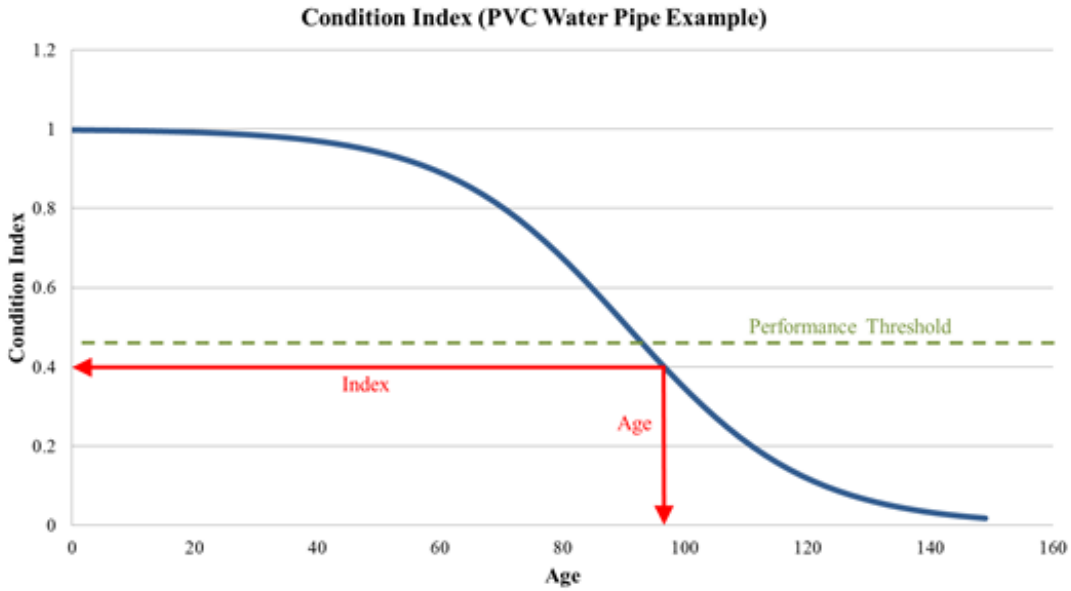

Figure 3: Determination of Condition Index

Where pertinent information relevant to network analysis was unable to be located, assumptions were made based on the age and material of surrounding pipes. All the assumptions made as part of the condition assessment process have been documented in the database.

In 2018, the Township conducted a condition assessment for the sanitary sewers using Closed Circuit Television (CCTV) so condition indices representing the actual condition could be incorporated into the AMP. This additional information aids in adding more value to the condition ratings of these assets so replacement isn't solely triggered by age of infrastructure. In the absence of a condition assessment, the age of the infrastructure will still be used as the trigger.

2.3.3 Point Asset Condition Assessment Process

No detailed condition assessment survey has been carried out on the building assets; however, OSIM surveys were recently completed for bridge and culvert assets. The OSIM and PSAB databases contained information on year of construction, service lives, and replacement costs, which was used to approximate timing for rehabilitation and replacement of those assets. The approximations were reviewed by staff and adjusted in some cases to better reflect the actual condition of some assets. The final results were reviewed and endorsed by staff.

2.4 State of Local Infrastructure Analysis

For linear assets, the Dillon Predictive Scenario Software (DPSS) was used in preparing the capital investment analysis of the AMP. The tool is a Microsoft Access application that relies on an overall assessment of the infrastructure condition to produce investment scripts based on degradation curves, which are adjusted to the Township's particular operations and thresholds of acceptability.

The DPSS tool assesses the condition, and puts the Asset Manager in control of the life cycle of assets. It also allows for planning as to where, when, how, and how much to invest in the renewal and replacement of infrastructures for the coming year, or for the next five years, ten years, 20 years or 50 years.

We used the DPSS application to develop the Township's short and long term prioritized renewal plans. **Figure 4** provides a view of a screen capture of the DPSS analytical tool.

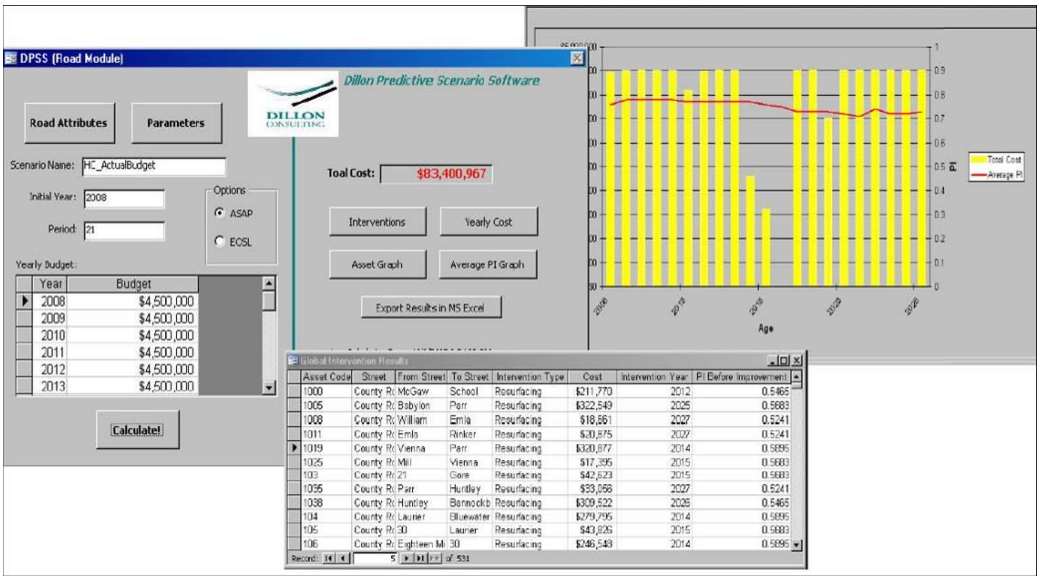

Figure 4: Dillon Predictive Scenario Software (DPSS)

For point assets, Dillon also developed a simple and practical tool to manage these types of assets. Point assets are assets such as bridges and culverts, building facilities, treatment plants, and pump stations. These assets usually behave differently than linear assets because they are composed of many different components that have variable service lives. The service lives of these components can usually be obtained from sources such as:

- The supplier's suggested service life
- The experience of the technical expert performing condition assessment
- Published industry guides on service life and maintenance requirements.

The AMP tool developed by Dillon has been designed to summarize in tabular and chart forms the maintenance and renewal costs of the components of the assets. The tool considers factors such as year of construction, expected service life, infrastructure needs, maintenance and replacement costs, and year of intervention. It has been successfully implemented in a many communities across Canada. **Figure 5** illustrates the AMP tool interface.

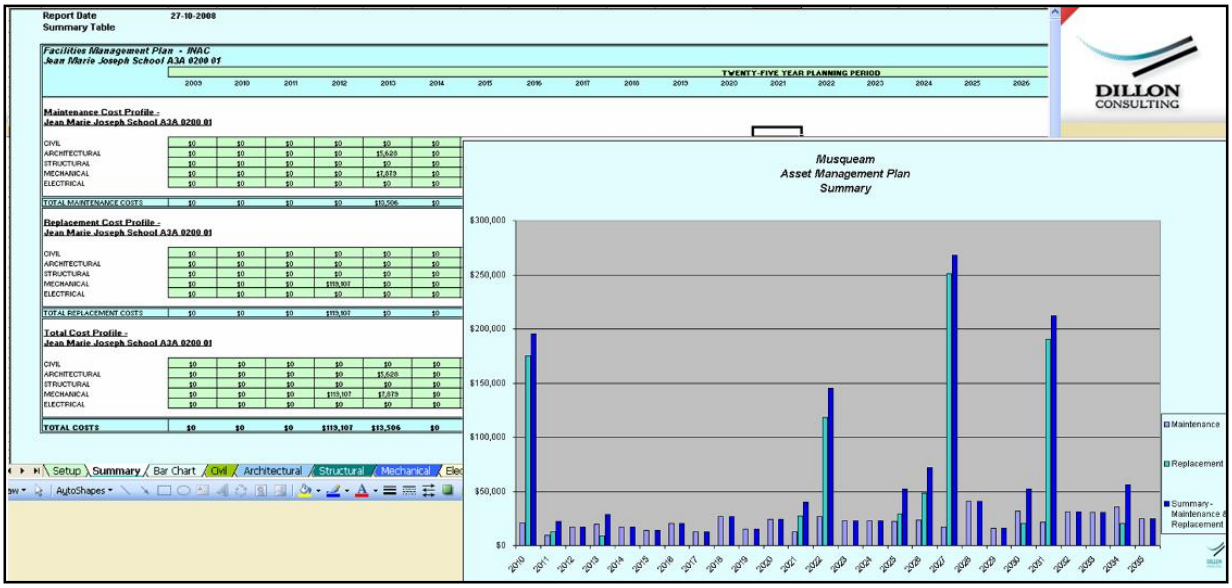

Figure 5: Condition Assessment Tool

This tool was used to develop the multi-year AMP for the point assets included in this project. The results were delivered in digital form in MS Excel format. Township staff will continue to use the applications described above to assist them in managing their infrastructure assets.

3.0 State of Local Infrastructure

3.1 Existing Infrastructure and Condition

3.1.1 Road Network

The asphalt surface road network consists of approximately 60 km of road, divided into 131 road segments. The road network has a total length, including gravel surface roads, of approximately 140 km.

Urban rural roads, full urban roads and partial urban roads are assumed to have a lifespans of 25, 20 and 15 years, respectively. The distribution of year of construction of the segments within the asphalt surface road network is shown in **Figure 6**, along with the distribution of service lives of the asphalt surface roads.

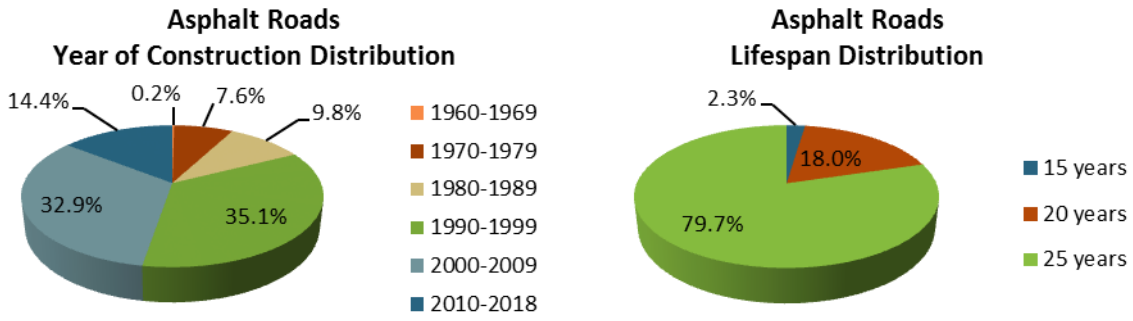

Figure 6: Distribution of Year of Construction and Life Span of the Asphalt Surface Road Network

In 2018, a road condition assessment of the asphalt surface roads was completed in order to assign a condition rating index to each road section. **Figure 7** shows the distribution of the condition ratings for the asphalt surface roads. Condition ratings provide a more comprehensive representation of the existing condition of the roads in place of basing condition on age/year of construction.

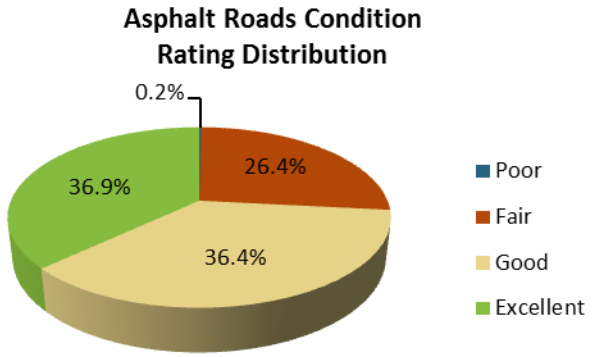

Figure 7: Distribution of Condition Rating of the Asphalt Surface Road Network

3.1.2 Water Distribution Network

The water network is primarily made up of PVC pipe material. The remainder of the pipes within the network are constructed of ductile and cast iron pipe materials. The current network ranges in year of construction from 1948 to the present day. **Figure 8** illustrates the distribution of watermain pipe ages within the network, and the material types and sizes based on a percentage of total length of watermain installed.

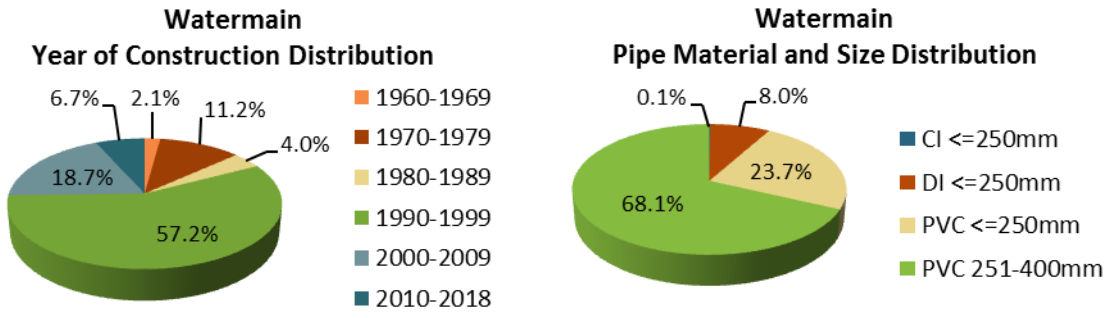

Figure 8: Distribution of Year of Construction and Pipe Material and Size of Watermain Network

The average age of the network is less than 25 years old. The life expectancy values attributed to PVC pipe is 75 years and ductile and cast iron pipes are 60 and 50 years, respectively. Based on these lifespan assumptions, this results in a water network that has generally only reached approximately 1/2 or 1/3 of its expected life, thereby is assumed largely to be in good condition.

3.1.3 Sanitary Sewer Network

The sanitary sewer network is constructed with asbestos concrete and PVC pipe materials, both of which have a high attributed life expectancy value of 60 and 75 years, respectively. Approximately half of the system was constructed between 1963 and 1975, the second half being constructed from 1991 to the present date. **Figure 9** illustrates the distribution of pipe ages within the network, and the pipe material and size distribution.

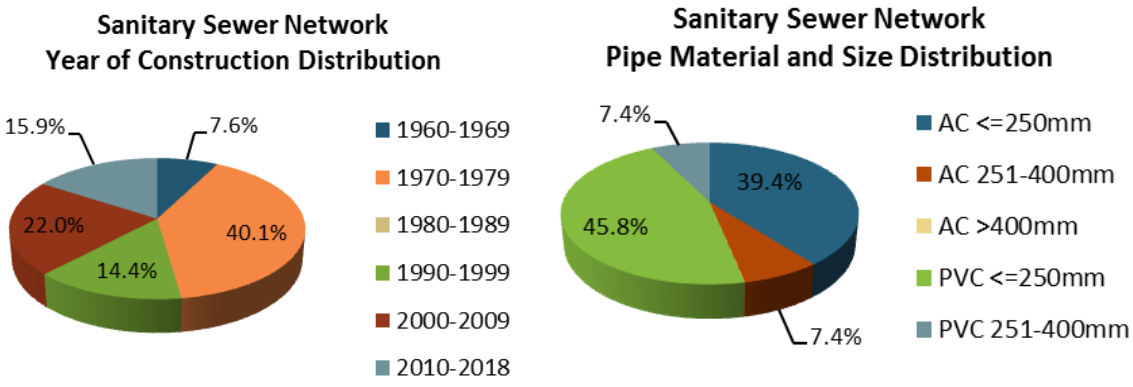

Figure 9: Distribution of Year of Construction and Pipe Material and Size of Sanitary Sewer Network

In 2018, CCTV inspection was completed for the entire sanitary sewer network. As part of this process, a condition rating was assigned to each section of sewer based on National Association of Sewer Service Companies' (NASSCO) Pipeline Assessment Certification Program (PACP). **Figure 10** shows the distribution of the condition ratings for the sanitary sewers. Condition ratings provide a more comprehensive representation of the existing condition of the sewers in place of basing condition on age of construction.

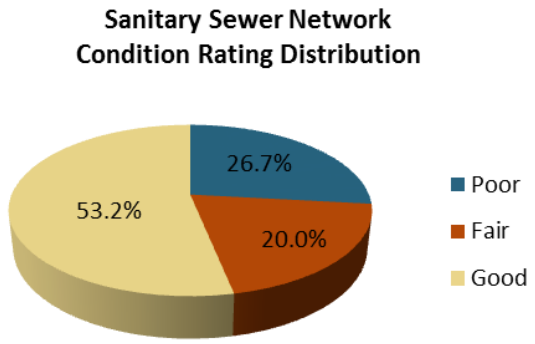

Figure 10: Distribution of Condition Rating of the Sanitary Sewer Network

3.1.4 Storm Sewer Network

The storm sewer system is constructed of concrete, PVC, and CSP materials. The system is of relatively recent construction, the oldest segments dating back to only 1966. **Figure 11** illustrates the distribution of year of construction and material type and size for the storm sewer network.

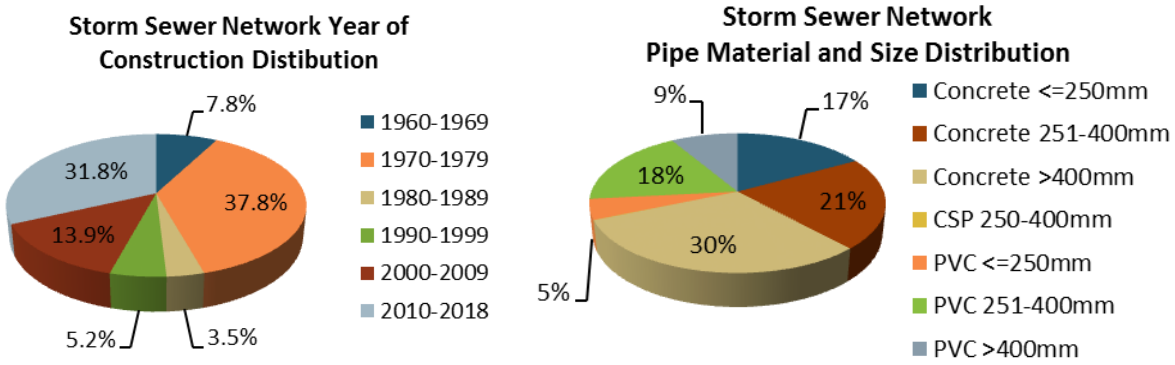

Figure 11: Distribution of Year of Construction and Pipe Material and Size of Storm Sewer Network

A life expectancy of 85 years, 75 years and 25 years is assumed for concrete, PVC and CSP storm sewers, respectively. The majority of the storm sewer network has greater than 50 years of life expectancy remaining and is assumed to be in good condition.

3.1.5 Water/Wastewater Facility Assets

The Granton Booster and Pump Station is the oldest of this type of infrastructure and was constructed in 1973. The remainder of the water and wastewater facilities were constructed within the last two decades. The life expectancy attributed to these assets is 50 years for each.

3.1.6 Bridge and Culvert Assets

There are 18 bridge and culvert structures included in the AMP, three of which are constructed of steel, the remainder of which are constructed of concrete. The life expectancy attributed to the concrete structures is 75 years, and 25 years for the steel structures. The earliest construction of these structures is 1958; the distribution of construction years is shown in **Figure 12**.

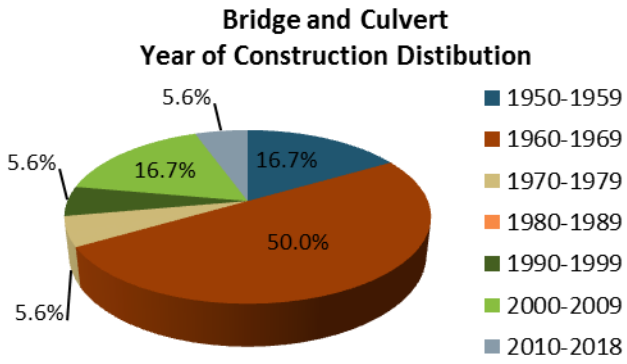

Figure 12: Distribution of Year of Construction of Bridges and Culverts

As per provincial requirements, the bridges and culverts are inspected every two years using the Ontario Structure Inspection Manual (OSIM). The most recent inspection was completed by Spriet Associates in January 2017. Overall, all components of the bridges and culverts that were inspected are in 'fair', 'good' or 'excellent' condition.

3.1.7 Parks and Recreation and Municipal Buildings

The Lucan Community Centre Building is the oldest of this type of asset and was constructed in 1976, with a life expectancy of 40 years. Based on this timeframe, the current facility is due for upgrades and/or replacement. The various components associated with the Lucan Community Centre Building vary in age from 1976 to 2015 and have life expectancies ranging from 10 years to 30 years. The old library building connected to the Community Centre Building was constructed in 1998 and has a life expectancy of 40 years.

The Pool and Pool Building were constructed in 1963 and have a life expectancy of 40 years.
The Lucan Biddulph Administration Building and Library Building are the newest of these types of assets and were both constructed in 2015. The Museum and the Public Works Building are also newer vintage, constructed in 2008 and 2013, respectively. All four buildings have a life expectancy of 40 years.

3.2 Estimated Current Asset Value

Asset management best strategies suggest that 2% to 4% of the value of an asset should be spent annually to ensure sustainability of infrastructure assets. That level of funding relates mostly to capital expenditure and does not include operational costs. Without asset management tools, it is almost impossible to determine the long term effect of inadequate budget allocations. Yet, it is important for a municipality to determine if the current level of funding is appropriate to continue to provide an adequate level of service to its residents. It is also essential to allocate adequate funding to ensure sustainability of the assets in the future. For the Township, the estimated value of the assets included in this project was estimated at approximately $149.2 million. **Table 2** and **Figure 13** show the distribution of that asset value.

Table 2: Asset Values

Infrastructure Network	Quantity	Replacement Cost
Sanitary Sewer	21 km	$15,621,480
Storm Sewer	14 km	$10,968,020
Water	65 km	$49,340,850
Asphalt Roads	60 km	$35,198,400
Water/Wastewater Facilities	3 Pump Stations 1 Elevated Tank 1 Booster Station 2 Treatment Plants	$12,094,190
Bridges and Culverts	19 Structures	$7,148,574
Parks/Recreation Facilities	Community Centre/Arena Scout Hall Pool 3 Parks Sports Field/Park	$9,749,043
Municipal Buildings	Administration Building Public Works Building Museum Library 2 Fire Halls Emergency Medical Services (EMS) Building	$9,126,659
	Total Asset Value	**$149,247,216**

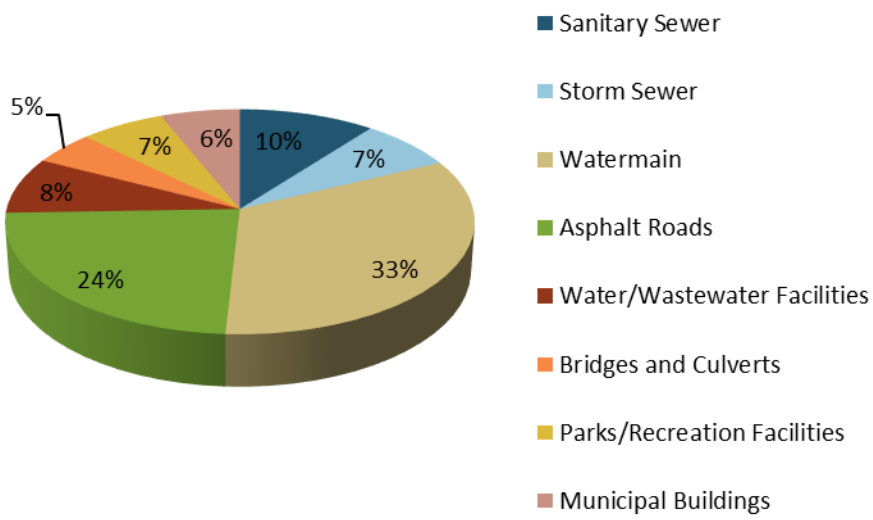

Figure 13: Distribution of Replacement Cost Estimate of Assets

Based on these results and the recommended 2% yearly investment in maintenance, theoretically the Township should allocate around $3.0 M per year to ensure future sustainability of its assets.

3.3 Asset Management Policies

3.3.1 Data Inventory

All of the infrastructure assets included in the AMP are inventoried in a spreadsheet and GIS based database, including basic asset information, such as asset type/class, physical description, location, expected useful life, etc. and information that requires updating including replacement cost and condition rating (where available).

As improvement or additions are made to the Township's linear infrastructure networks or point assets, this inventory will be updated on an annual basis to include updated information.

3.3.2 Condition Assessments

In continuing to maintain a detailed AMP over time, it is highly recommended that the municipality acquire detailed condition assessment data on all components of their infrastructure assets. It is critical to ensure the data is current and accurate, in order to maintain a useful AMP.

Roads should undergo a full condition assessment every three to five years. Given the shorter lifespan of road structures, and high variability in road construction and environment, pavement condition indices are more difficult to estimate over time. Therefore, their condition should be evaluated on a more frequent basis.

Underground pipe assets historically undergo far fewer condition assessments. A sampling approach for collecting condition data and extrapolating the results to assets with similar physical and operational characteristics is a viable option when funding is limited. For example, in this approach CCTV inspection survey might be conducted for a sample of pipes, and results can be extrapolated to pipes with similar physical characteristics. This approach is commonly used for long term financial planning. Another approach is to use the results of the DPSS to identify pipes that are or could be in need of rehabilitation now or in the next few years, and generate a CCTV program to only investigate these critical pipes. This approach is commonly used when funding is limited.

The approach for condition assessment of point assets is different except for bridge and culvert structures which are mandated to be inspected every two years. Components of buildings such as roof, HVAC systems, and electrical components usually all have different service lives. It is recommended to have one complete inspection of all facilities and to replace or monitor the components that have been identified as requiring attention now or in the future. This overall detailed inspection could be carried out every seven to ten years noting asset management tools should be used to frequently visit and monitor assets that are approaching the end of their service lives.

3.3.3 Maintenance Activities

It should be understood that most infrastructure assets will usually reach their expected service lives if routine maintenance is carried out on those assets while in service. As specified in the literature, 2% to 4% of the value of an asset should be spent on a yearly basis to ensure it reaches the end of its service life. Most municipalities will spend less than 2% a year of the value of the asset in maintenance. Maintenance activities such as crack sealing or slurry sealing a roadway or flushing and cleaning a sewer pipe should be carried out on a regular basis depending on the condition and age of the assets. There are many very good Computerized Maintenance Management Systems (CMMS) in the market that are very helpful and efficient in ensuring sustainability of infrastructure assets. Some types of CMMS could be very beneficial to the Township.

3.3.4 Integrated Rehabilitation

In order to make cost-effective decisions with regard to rehabilitation of infrastructure assets, it is recommended (as suggested in the Asset Management Best Practice published by the *Infraguide*), that an integrated approach be used to acknowledge the close proximity and high level of interaction between the infrastructure networks. Knowledge of the integrated condition of these networks provides a clear advantage to municipal administrators by giving a global view of the infrastructure networks.

The spatial proximity consideration of that approach allows for a more accurate set of interventions by using the concept of “windows of opportunity”. This enables analysis of assets, not only based on actual condition, but also on a predictive condition in time. This is made possible by defining windows of opportunity along the deterioration curves, as shown on **Figure 14**.

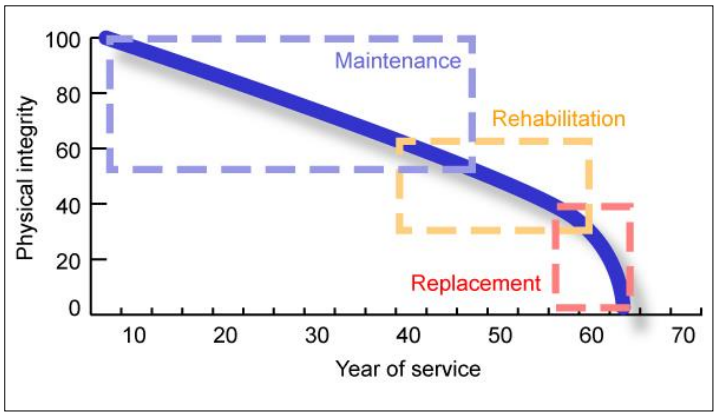

Figure 14: Windows of Opportunity

This approach relates to economics and cost-effectiveness. Priority is assigned by reviewing all locations in the network identified for repair and assigning a higher priority to locations where more than one component of the asset network requires rehabilitation. This approach provides for a reduction in replacement costs per meter of pipe by carrying out the repair of more than one pipe within the same excavation. The "window" concept allows delaying a rehabilitation activity as long as it stays within that window, to combine it with another piece of infrastructure in the vicinity of the pipe.

4.0 Desired Levels of Service

A 'level of service' is a term that is used to describe the quality, quantity and availability of the service that is being provided. In the context of AMPs, levels of service are established as a way to guide the management of infrastructure in a manner that aims to achieve the level of service goals.

As described in the best practice document in the National Guide to Sustainable Municipal Infrastructure, also known as *InfraGuide*, levels of service fall into two broad categories: those that are mandated by regulations (codes, standards, etc.); and those that result from community plans or objectives.

In general, mandated levels of service are very specific in their description of the measures to be used. This can take the form of, for example, the number of a type of bacteria per unit volume in drinking water. Community objectives tend to be less defined measurements in terms of schemes. They are future oriented, and focus less on technical measures and more on social, cultural and environmental concerns.

4.1 Mandated Levels of Service

Regulations exist to ensure the health and safety of the users of public facilities or the products delivered by a utility to the public. These regulations are enforced through codes, standards, or guidelines adopted by government authorities.

The most common regulations that apply to infrastructure include:

- Ontario Structure Inspection Manual (OSIM)
- Minimum Maintenance Standards
- Provincial Drinking Water Guidelines
- Ontario Building Code
- Provincial Fire Code.

This list is not comprehensive and the owners and managers of infrastructure need to be fully familiar with the regulations that apply to their facilities.

4.2 Community Objectives

Every community has developed objectives on the expected quality of life in their community and a vision for the future. These are established either through a structured process (such as a comprehensive community plan) or by other means. The objectives and vision usually include elements of health and safety, social wellbeing, economic and cultural development, and other factors. Community objectives rely heavily on the ability of the existing infrastructure to support such plans. In many instances, the objectives call for new infrastructure that the community will have to operate and maintain for generations.

The *InfraGuide* describes the steps required to successfully establish a community's levels of service. The key elements that relate to the development of levels of service as described in the *InfraGuide* best practices are illustrated in **Figure 15**.

Figure 15: Elements of Levels of Service (*InfraGuide* 2002)

Asset understanding refers to the knowledge about the inventory, condition and performance of infrastructure that provide the community its services: potable water, wastewater collection and treatment, solid waste management, roads and bridges, community buildings, etc. This information is provided by the AMP and is used to ensure existing and planned infrastructure can support the levels of service established.

Consultation and communication are important elements of developing community levels of service. Key stakeholders must be involved; including community leaders, operators of the assets, education and health professionals, and other levels of government officials. The consultations should be properly managed to avoid creating a "wish list", as consultations have a tendency to raise expectations amongst those involved. Instead, the consultation process should provide adequate background material, and the context and constraints (e.g., financial, environmental, material and human resources, etc.), which face the municipality. This will help generate realistic levels of services that the community can achieve and afford.

Levels of service have to be aligned to the *strategic direction* of the community. Appropriate levels of service must consider the community's ability and willingness to *tolerate risk*. The costs associated with the levels of service need to be established and evaluated in view of the capacity of the community to support them.

Ideally, each community should use this process to define their acceptable level of service. Once determined, all assets would need to be reviewed and compared to the community's expectations. Action plans on remedial measures would have to be developed to close the gap between expectations and reality, if physically and financially possible.

4.3 Determining Appropriate Levels of Service for Lucan Biddulph

A full community consultation process for establishing levels of service was not conducted as part of the AMP project. The process followed was mostly based on the *Asset Understanding* component of the process, which considered the physical and functional characteristics of an asset to define a measurable index that can be monitored over time.

Condition indices were determined as described in **Section 2.3: Condition Assessment.** The Township's current levels of service, measured in terms of condition index, were determined in consultation with the Township. Once acceptable levels of service were established, the information was used to identify current and future infrastructure investment requirements. The asset management tools described were provided to staff to monitor the levels of service over time, and to assess the effect of different budget scenarios on the current and future levels of service. The results of our analysis are presented in **Section 5: Asset Management Strategy**.

The asset management tools delivered will enable staff to set short and long term targets with regards to level of service and identify funding requirements and timeframes to meet those targets while considering affordability.

5.0 Asset Management Strategy

5.1 Road Network

In order to understand the extent of the reconstruction needs of the road network over the next ten years, the DPSS tool was used to analyze the road network needs assuming an unlimited budget. The magnitude of the estimated expenditure needs are shown graphically in **Figure 16** and summarized by project in **Table 3**.

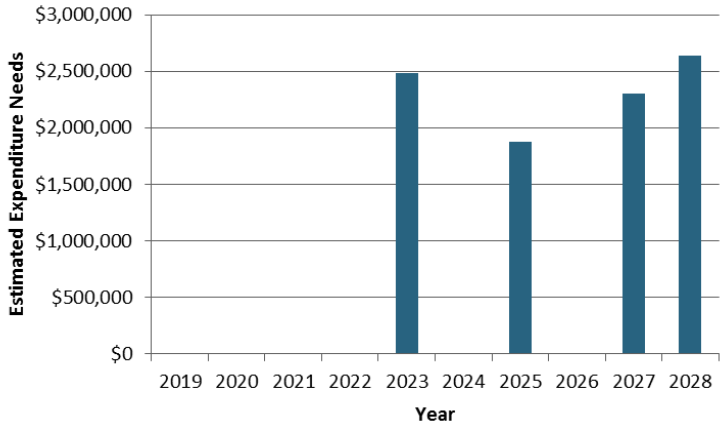

Figure 16: Estimated Road Network Expenditure Reconstruction Needs based on Unlimited Budget

Table 3: Road Network Reconstruction Projects Identified through Analysis using Unlimited Budget

Year	Limits	Expenditure
2023	Coursey Line (Elginfield Road to William Street)	$1,580,531
2023	Nicoline Avenue (Elm Street to End)	$322,104
2023	Roman Line (Richmond Street to Pavement End)	$217,445
2023	Maple Street (Market Street to Duchess Avenue)	$98,704
2025	Coursey Line (McGillivray Drive to Mooresville Drive)	$891,328
2025	Kleinfeldt Avenue (Nicoline Avenue to End)	$194,858
2025	Frank Street (William Street to Main Street)	$143,665
2025	King Street (Fallon Drive to Ann Street)	$135,713
2025	Ontario Street (Granton Line to End)	$105,963
2025	Beech Street (Market Street to Duchess Avenue)	$104,892
2025	Queen Street (William Street to End)	$80,075

Year	Limits	Expenditure
2025	Roman Line (Richmond Street to Nagle Drive)	$51,087
2025	Head Street (King Street to Granton Line)	$44,889
2027	Francis Street (Main Street to Saintsbury Line)	$270,671
2027	Water Street (William Street to Main Street)	$238,984
2027	Butler Street (Chestnut Street to Stanley Street)	$219,062
2024	Nicoline Avenue (Elm Street to Saintsbury Line)	$213,637
2027	Wellington Street (Saintsbury Line to Main Street)	$165,292
2027	Harold Court (Elm Street to End)	$208,358
2027	Beech Street (Kent Avenue to End)	$329,705
2027	Kent Avenue (Walnut Street to Beech Street)	$144,501
2027	Marlene Street (Kleinfeldt Avenue to Albert Street)	$125,074
2027	Queen Street (High Street to Isabella Street)	$114,929
2027	Station Street (Granton Line to End)	$132,171
2027	Ann Street (Granton Line to End)	$80,931
2027	Isabella Street (Granton Line to End)	$98,793
2027	High Street (Granton Line to Queen Street)	$47,453
2027	Whalen Line (Saintsbury Line to Mitchell Line)	$2,288,277

At the onset of the AMP, the Township identified specific projects over the next seven years and a yearly budget of $150,000 for the remaining three years of the ten year forecast for road rehabilitation (up to 2023) with the goal of maintaining the level of service currently provided.

The Township-approved road projects that were identified have been maintained and are identified in **Table 4**, along with additional projects identified within the current ten year time frame. Operating expenditures less than $50,000 have been excluded.

Table 4: Township-Approved Road Network Projects

Year	Project	Expenditure
2019	Highway 4/Saintsbury Traffic Signals	$250,000
2019	Main Street – Saintsbury Line to Entrance of Lucan Estates	$175,000
2019	St. James Drive Paving	$60,000
2019	Coursey Line – Elginfield Road to William Street	$495,000
2020	Coursey Line – McGillivray Drive to Mooresville Drive	$280,000
2021	Whalen Line – Mitchell Line to Granton Line (Second coat of hot mix overlay)	$495,000*
2022	Whalen Line – Granton Line to Elginfield Road (Second coat of hot mix overlay)	$715,000*
2023	Whalen Line – Saintsbury Line to Mitchell Line (CIP & hot mix overlay)	$495,000**
2023	Beech Street (Market Street to Duchess Street)	$35,000
2023	Maple Street (Market Street to Duchess Street)	$15,000

* 50% of estimated total expenditure. Remaining 50% funded by Township of Perth South.
** 50% of estimated total expenditure. Remaining 50% funded by Municipality of South Huron

Beyond the scope of the Township-approved projects, an annual budget of $150,000 was used to analyze road network capital projects based on network needs within the next ten years using DPSS. Two options were considered, which include reconstruction of the road or rehabilitation with overlay. Each option was analyzed to provide a prioritized list of rehabilitation projects for the Township that fit within the currently allotted road network budget.

The first scenario identified projects to be undertaken with full reconstruction within the specified annual budget. The projects identified are outlined in **Table 5**.

Table 5: Road Network Reconstruction Projects Identified through Analysis using $150,000/year Budget

Year	Project	Expenditure
2023	Maple Street (Market Street to Duchess Avenue)	$98,704
2025	Roman Line (Nagle Drive to Richmond Street)	$51,087
2025	Queen Street (William Street to End)	$80,075
2026	Frank Street (William Street to Main Street)	$143,665
2027	Beech Street (Market Street to Duchess Street)	$104,892

The second scenario identified projects to be undertaken with overlay within the specified annual budget. The projects identified are summarized in **Table 6**.

Table 6: Road Network Overlay Projects Identified through Analysis using $150,000/year Budget

Year	Project	Expenditure
2020	Nicoline Avenue (Elm Street to End)	$146,411
2021	Maple Street (Market Street to Duchess Avenue)	$47,002
2022	Kleinfeldt Avenue (Nicoline to End)	$88,572
2022	Roman Line (Nagle Drive to Richmond Street)	$39,298
2023	Frank Street (William Street to Main Street)	$65,302
2023	Beech Street (Market Street to Duchess Street)	$47,678
2023	Head Street (King Street to Granton Line)	$29,926
2024	Francis Street (Main Street to Saintsbury Line)	$123,032
2024	Harold Court (Elm Street to End)	$94,708
2025	Water Street (William Street to Main Street)	$108,629
2025	Beech Street (Kent Avenue to End)	$84,103
2026	Butler Street (Chestnut Street to Stanley Street)	$99,574
2027	Nicoline Avenue (Elm Street to Saintsbury Line)	$97,108
2028	Lewis Avenue (Duchess Avenue to Kent Avenue)	$47,248
2028	Wellington Street (Main Street to Saintsbury Line)	$69,706

It is recommended that the Township maintain the approved list of projects to 2021, and in subsequent years, maintain the road network using reconstruction or overlay, at the discretion of the Township and available budget.

5.2 Water Network

Analysis for long-term needs for the water network was conducted using DPSS and resulted in identification and summarization of anticipated projects and associated yearly expenditures. The Township identified an annual water budget of $250,000.

For the ten year timeframe using a $250,000 annual budget, there were no projects identified. The timeframe was adjusted to 15 years, and significant investments were identified in the years 2030 to 2033 as outlined in **Table 7**. It is recommended that annual contributions be made to water network reserve funds prior to 2030 in order to assist with funding of future projects.

Table 7: Water Network Projects

Year	Limits	Expenditure
2030	Kleinfeldt Avenue (Marlene Street to Princess Street)	$171,231
2030	Nicoline Avenue (Kleinfeldt Avenue to West Limit)	$48,661
2031	Harold Court (Kleinfeldt Avenue to Albert Street)	$146,061
2031	Kleinfeldt Avenue (Marlene Street to Harold Court)	$90,820
2032	Nicoline Avenue (Kleinfeldt Avenue to John Street)	$143,953
2032	Kleinfeldt Avenue (Nicoline Avenue to Harold Court)	$87,450
2033	Marlene Street (Kleinfeldt Avenue to Albert Street)	$143,650
2033	Harold Court (Elm Street to Albert Street)	$84,701

In addition to water network improvements projects identified through this process based on infrastructure condition, some improvements were identified by the Township to be undertaken to meet demand and fire flow requirements. The additional projects are identified in **Table 8.**

Table 8: Township-Approved Water Network Projects

Year	Project	Expenditure
2019	Lucan Booster Pumping Station Maintenance and Upgrades (Pumps)	$92,000
2019	Nagle Drive Watermain	$281,000

5.3 Sanitary Sewer Network

The DPSS program was used to analyze the sanitary sewer network for a 10 year timeframe. To understand the extent of the needs on the sanitary sewer network, this analysis included an unlimited budget scenario. The magnitude of the estimated expenditure needs over the next 10 years is shown graphically in **Figure 17**.

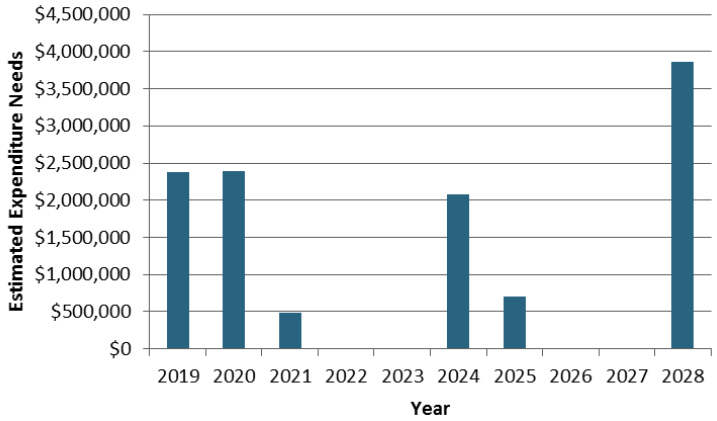

Figure 17: Estimated Sanitary Network Expenditure Needs Within 10 Years Assuming Unlimited Budget

The results of the unlimited budget scenario are also summarized in **Table 9** by individual project. In cases, where multiple sections of sewer on a specific street were triggered in varying years, the sections were accumulated together and are shown as one project triggered at the earliest timeframe for that street.

Table 9: Sanitary System Projects Identified through Analysis using Unlimited Budget

Year	Limits	Expenditure
2019	Albert Street (Main Street to Marlene Street)	$303,576
2019	Alice Street (Main Street to Saintsbury Line)	$449,211
2019	Downtown Easement (Market Street to Alice Street)	$308,849
2019	Easement (End to Water Street)	$75,400
2019	Elizabeth Street (George Street to Philip Street)	$130,015
2019	George Street (Main Street to William Street)	$424,935
2019	Kent Avenue (Saintsbury Line to Lewis Avenue)	$303,645
2019	Langford Drive (Saintsbury Line to End)	$357,842
2019	Levitt Street (Granton Line to End)	$83,816
2019	Margaret Street (Philip Street to George Street)	$108,452
2019	Market Street (Main Street to Saintsbury Line)	$817,448
2019	Oak Street (Butler Street to Market Street)	$78,185
2019	Philip Street (Elizabeth Street to Margaret Street)	$103,337
2019	Princess Avenue (Main Street to End)	$337,663
2019	Queen Street (Isabella Street to Station Street)	$215,020
2019	Main Street (Water Street to Chestnut Street)	$524,031
2019	Main Street (Saintsbury Line to End)	$312,847
2019	Saintsbury Line (Wellington Street to Francis Street)	$282,648
2019	Water Street (Main Street to William Street)	$363,819
2019	William Street (Water Street to Frank Street)	$134,448
2019	Easement (Elm Street to Albert Street)	$179,858
2019	Easement (Gibson Crescent to Trunk)	$63,050
2019	Easement (Station Street to Levitt Street)	$194,706
2019	Easement (Oak Street to Stanley Street)	$473,642
2020	Beech Street (Kent Avenue to Market Street)	$258,071
2020	Butler Street (Chestnut Street to Stanley Street)	$334,510
2020	Clarence Street (Francis Street to Wellington Street)	$145,609
2020	Duchess Avenue (Beech Street to Saintsbury Line)	$409,901

Year	Limits	Expenditure
2020	Kent Avenue (Lewis Avenue to Oak Street)	$362,036
2020	Nicoline Avenue (John Street to End)	$245,709
2020	Main Street (Albert Street to Saintsbury Line)	$461,806
2020	Stanley Street (Main Street to Butler Street)	$167,389
2020	Wellington Street (Main Street to Clarence Street)	$108,824
2020	William Street (Frank Street to Main Street)	$176,801
2020	Willow Avenue (Beech Street to Gibson Crescent)	$160,850
2020	Easement (Albert Street to Princess Street)	$357,243
2020	Easement (Princess Street to William Street)	$145,083
2022	Ann Street (King Street to End)	$48,785
2022	Gibson Crescent (Beech Street to Gibson Crescent)	$517,676
2022	Granton Line (Isabella Street to Station Street)	$235,881
2022	High Street (Granton Line to Queen Street)	$54,746
2022	Easement (Fallon Drive to Ann Street)	$304,980
2022	Easement (Granton Line to Pumping Station)	$22,795
2024	Butler Street (Chestnut Street to End)	$303,485
2024	Francis Street (Clarence Street to Saintsbury Line)	$150,680
2024	Frank Street (Main Street to William Street)	$227,548
2024	Lewis Avenue (Duchess Avenue to Kent Avenue)	$110,433
2024	Stanley Street (Butler Street to Walnut Street)	$222,645
2028	Chestnut Street (Main Street to Walnut Street)	$200,685
2028	Elm Street (Wellington Street to Langford Drive)	$147,018
2028	Head Street (Granton Line to King Street)	$57,111
2028	Nicoline Avenue (Elm Street to Saintsbury Line)	$334,378
2028	Station Street (Queen Street to End)	$128,223
2028	Wellington Street (Clarence Street to Saintsbury Line)	$135,074
2028	Easement (Head Street to End)	$191,490
2028	Easement (Walnut Street to Pumping Station)	$425,348

The average budget allocated to sanitary sewer system capital works projects between 2013 and 2018 was approximately $107,000. A scenario was run using an annual budget of $107,000 to better reflect the capital works projects within a scope attainable by the Township. The results of this scenario are outlined in **Table 10**. It should be noted that these projects identified only correspond to the section(s) of sewer within the street limits indicated that are in poorest condition and not necessarily the full

length of the street. In many cases, replacing the sanitary sewer within the entire limits of a block indicated would exceed the $107,000 annual budget.

Table 10: Sanitary Network Projects Identified through Analysis using $107,000/year Budget

Year	Location	Expenditure
2019	Princess Street (Main Street to End)	$101,642
2020	Alice Street (Maple Street to Saintsbury Line)	$96,047
2021	Levitt Street (Granton Line to End)	$83,816
2021	Elizabeth Street (Philip Street to End)	$19,408
2022	William Street (Water Street to Frank Street)	$77,414
2022	George Street (Main Street to Elizabeth Street)	$14,849
2023	Albert Street (Benn Drain to Main Street)	$73,840
2023	Easement (Elm Street to Albert Street)	$25,234
2024	William Street (Water Street to Frank Street)	$57,035
2024	Oak Street (Butler Street to Market Street)	$45,700
2025	Easement (Market Street to Alice Street)	$87,797
2025	Easement (Albert Street to Princess Street)	$15,363
2026	Queen Street (Isabella Street to Station Street)	$91,260
2027	Main Street (Wellington Street to Saintsbury Line)	$53,367
2027	Water Street (Benn Drain to Main Street)	$32,113
2028	Easement (Market Street to Stanley Street)	$56,420
2028	Ann Street (King Street to Easement)	$48,785

In addition to this analysis, the Township has identified rehabilitation work to the network and sanitary-sewer related infrastructure, based on factors additional to those considered within the DPSS. Within the analyzed 10 year timeframe, the pre-approved work for the waste water system includes the following projects, detailed in **Table 11**.

Table 11: Township-Approved Sanitary System Projects

Year	Project	Expenditure
2019	Chestnut Street Pump Station Generator Set and Pump Replacement	$402,500
2019	Lucan Sanitary Master Plan (Heenan Drain Assessment)	$28,750

5.4 Storm Sewer Network

The condition of the storm sewer network is such that there are no current needs experienced on the network within a 10 year timeframe. Monitoring and routine maintenance on the storm sewer system will suffice for some time to continue to provide an adequate level of service to the residents of the Township. A condition assessment, similar to what was completed for the sanitary sewer system, should be considered within the next three years.

5.5 Combined Road and Municipal Infrastructure Projects

As presented in the sections above, the needs identified in the unlimited budget scenarios for road and linear municipal infrastructure (watermain, sanitary, storm) operate independent of each other. It is reasonable to assume that if the road and infrastructure replacement are triggered within five to ten years of one another for the same street, it would be logical to replace all identified assets at the same time. Within the next 10 years based on the unlimited budget scenarios, there are several streets that are triggered for road reconstruction and the replacement of sanitary sewer within a maximum of five years of one another. Additionally, there are a few projects that also trigger watermain replacement within the next 12 to 13 years, just outside the planning window of this AMP. **Table 12** outlines these projects that could potentially be combined into more cost effective, larger projects. The projects are listed in order of priority based on the earliest year the replacement or reconstruction of an asset is triggered.

Table 12: Combined Road, Sanitary and Water Network Projects Triggered

Street	Year Water Triggered	Year Sanitary Triggered	Year Road Reconstruction Triggered	Combined Expenditure
Nicoline Avenue (Elm Street to End)	-	2020	2023	$495,000
High Street (Granton Line to Queen Street)	-	2022	2027	$80,000
Ann Street (Granton Line to End)	-	2022	2027	$110,000
Frank Street (Main Street to William Street)	2031	2024	2025	$515,000
Francis Street (Main Street to Saintsbury Line)	-	2024	2027	$490,000
Nicoline Avenue (Elm Street to Saintsbury Line)	-	2028	2024	$415,000
Head Street (Granton Line to King Street)	-	2028	2025	$80,000
Station Street (Granton Line to End)		2028	2027	$275,000
Marlene Street (Kleinfeldt Avenue to Albert Street)	2033	-	2027	$235,000
Harold Court (Elm Street to End)	2033	-	2027	$320,000

Upon further review of the information presented above and discussions with Township staff, the projects outlined in **Table 13**, are deemed the priority capital linear infrastructure projects until 2022.

Table 13: Priority Capital Linear Infrastructure Projects

Projected Construction Year	Street	Scope of Replacement	Overall Expenditure
2019	Marlene Street (Kleinfeldt Avenue to Albert Street)	Watermain Road	$235,000
2020	Frank Street (Main Street to William Street)	Watermain Sanitary Road	$515,000
2020/2021	Alice Street (Main Street to Saintsbury Line)*	Watermain Sanitary	$565,000
2021	Water Street (Main Street to William Street)	Watermain Sanitary Road	$620,000
2022	Nicoline Avenue (Elm Street to End)	Sanitary Road	$495,000

* Cost of road replacement would be funded by the County of Middlesex with sanitary and watermain replacement funded by the Township.

5.6 Bridge, Culvert and Water/Wastewater Facility Assets

As indicated previously, no detailed condition assessment survey was carried out on the point assets. To develop a capital program, the PSAB database which contains information on year of construction, service lives and replacement costs, and OSIM condition survey reports were utilized. Based on that information, the timing for rehabilitation and replacement of those point assets and corresponding costs have been approximated.

The replacement and repair profile generated for bridges and culverts can be found attached in **Appendix B**. The most significant expenditures within the next 10 years are outlined in **Table 14**.

Table 14: Bridge and Culvert Triggered Replacements

Structure Name	Location	Year	Expenditure
Culvert No. 14	Coursey Drive (100 m north of Fallon Drive)	2025	$196,691
Culvert No. 15	Coursey Drive (50 m south of Fallon Drive)	2026	$174,836
Culvert No. 12	Mooresville Drive (440 m west of Roman Line)	2027	$152,982

Additionally, the Township identified capital projects to be undertaken at waste water system facilities within a 10 year timeframe, which are presented in conjunction with sanitary sewer network projects in **Section 5.3**.

The AMP identifies a need incurred in 2023 with the replacement of the Granton Booster/Pump Station, with an anticipated cost of approximately $547,489, based on a 2015 replacement cost of $432,193 for

the building, pumps, etc. (not including the reservoir) as provided by the Township. The reservoir was inspected in 2016 and is in good condition.

No other needs were identified within the 25-year plan. The replacement and repair profile generated for water and wastewater point assets can be found in **Appendix B**.

5.7 Parks/Recreational Facility Assets

Based on current information provided by the Township, the parks/recreation facility projects identified within a 10 year time frame are shown in **Table 15**, excluding equipment assets and expenditures less than $50,000. The annual capital budget for parks and recreation fluctuates from year to year depending on the current needs. The 2018 capital budget is $2,500,000.

Table 15: Township-Approved Parks/Recreational Facility Projects

Year	Project	Expenditure
2018	Phase 1 – Community Centre Licensed Daycare	$2,235,000
2019	Senior's Centre	$150,000
2019	Phase 2A – Community Centre Building	$8,500,000
2019	Phase 2B – Community Centre Pool	$2,300,000
2020	Community Centre Playground Equipment	$125,000
2020	Community Centre Skatepark	$250,000
2020	Granton Playground	$65,000
2020	Lucan Estates Tennis Court	$50,000
2021	Lions Field Ball Diamond Lights	$150,000
2022	Lucan Estates Playground	$75,000
2022	Community Centre Hardscape Path	$300,000
2022	Community Centre Outdoor Fitness Equipment	$100,000
2024	Lucan Estates Pavilion and Washrooms	$150,000
2025	Lions Scout Hall	$315,736
2026	Granton Park Pavilion Expansion	$150,000
2026	Granton Ball Lights	$125,000
2030	Market Street Park Playground Equipment	$65,000

It is evident that the most significant expenditure within the 10 year timeframe is the Community Centre Building. Not only has this facility reached its life expectancy, but one of the main recommendations

from the 2015 Township of Lucan Biddulph Parks and Recreation Master Plan, prepared by Monteith Brown Planning Consultants, was a major renovation of the Lucan Community Centre. It was concluded that due to the age and condition of the current facility, combined with sustained demand into the future, there is a clear need to re-invest in the facility. A complete re-build of the facility is not the most prudent or financially feasible option, so the preferred recommendation is a major renovation, with the intent of extending the facility's lifespan for another 20 years. It was also recommended that the main objectives for this renovation should be to include barrier-free accessibility, lifecycle requirements, improving the user experience and enhancing the multi-use spaces for active recreation, community events and activities with broader social interests.

5.8 Municipal Building Assets

Based on the currently available information provided by the Township, all of the municipal building related projects identified within a 10 year time frame have expenditures less than $50,000. These assets and operating expenses have been excluded for the purposes of this AMP.

5.9 Long Term Maintenance of Level of Service for Linear Networks

A scenario was run to determine the long-term needs of the linear networks for a duration of 25 years. Although there are no, or minimal, current needs on the water network within a 10 year timeframe, needs will be incurred within the additional fifteen. This scenario is included to bring awareness to the upcoming projects to provide a sufficient basis for long-term budgeting purposes.

The budget allocation that would maintain the current performance level of service of each linear network over the next 25 years was determined. Based on our analysis, a yearly allocation of $2,295,000 would be required to maintain the level of service currently provided to the residents for linear infrastructure including water, sanitary sewer and road networks.

It is noted that no work was incurred for the storm sewer network within the analyzed 25-year timeline. It is not recommended in this case that a yearly maintenance budget be allocated, but instead a yearly contribution to reserve funds in anticipation of network maintenance beyond the analyzed period.

The approximately $2,295,000 annual allocation to address future needs is composed of allocations of $385,000 for water, $1,200,000 for road work, and $710,000 for sanitary sewer as shown in **Figure 18**, which is sufficient to maintain the level of service for each type of infrastructure, shown in **Figure 19**. These values are theoretical and are used by the Township for planning purposes.

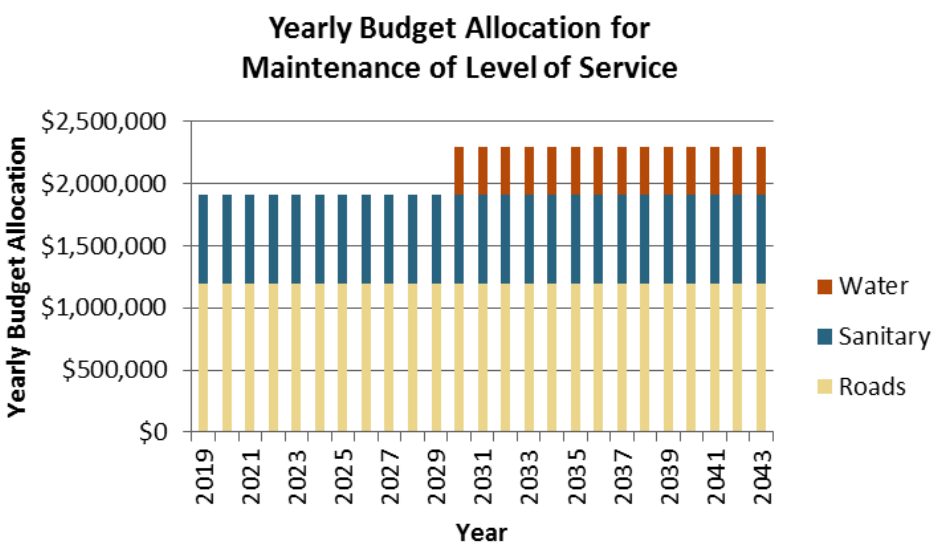

Figure 18: Allocation for Maintenance of Current Level of Service over 25 Years – $2,295,000/year Budget

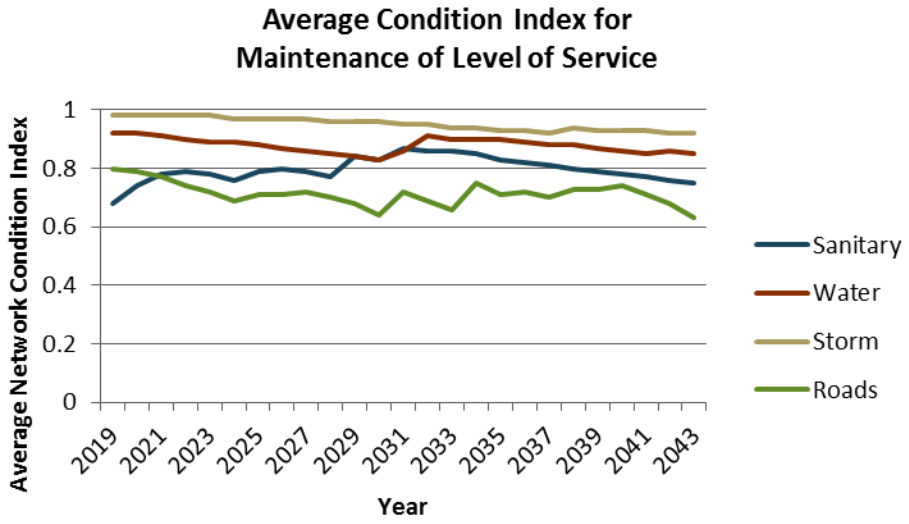

Figure 19: Average Condition Index by Network over 25 Years

As evidenced through the results of the DPSS budget scenarios, the Township may experience a funding shortfall in the road and sanitary networks funding in order to maintain the existing level of service for 25 years.

At the onset of the original AMP, a budget of $150,000 per year was identified for year 2021 and beyond for roads, but based on the analysis in **Section 5.2**, it was determined that $1,200,000 per year would be required to maintain the level of service over a 25 year timeframe.

As previously mentioned, a budget of $107,000 per year was the average capital budget for 2013-2018 for the sanitary sewer network. Based on the analysis in **Section 5.2**, it was determined that $710,000 per year would be required to maintain the level of service for the sanitary sewer network over a 25 year timeframe.

There are no water network expenditures identified with the next 10 years, but significant expenditures in years 12 and 13. Currently, the annual budget for the water network is $250,000, but based on the analysis in **Section 5.2**, an annual budget of $385,000 beginning in 2030 would be required to maintain the level of service for the water network. Annual contributions to water network reserve funds made in years prior to 2030 could assist with funding the projected expenditures.

6.0 Financing Strategy

While expenditure requirements will fluctuate year-to-year for all asset categories, it is important for the Township to implement a consistent, yet increasing annual investment in capital so that the excess annual funds can accrue in capital reserve funds. Funds which have accrued in capital reserves can then be drawn when rehabilitation/replacement activity is required.

It is understood that this AMP will be used as a guideline to determine a funding strategy with the objective of generating an investment strategy to meet the anticipated required expenditure needs.

6.1 Sources of Revenue

There are a variety of revenue sources which can be used to fund expenditure requirements, both internal to the municipality and externally. The following describes a few of those revenue sources currently used by municipalities:

Internal Revenue Sources:

- ***General Operating Revenues****:* Rural municipalities, towns and smaller cities tend to rely more on local taxes, user fees and grants than on borrowing, partly because borrowers view them as higher risk than larger cities, thus raising their borrowing costs
- ***Earmarked User Fees****:* An earmarked user fee is dedicated to a specific project; for example, water and sewer charges for water infrastructure, disposal fees for solid waste facilities, and admission charges for recreational complexes
- ***Reserves****:* Financing capital projects through funds set aside for capital spending is the reverse of financing through borrowing. A “capital levy” — usually a few percentage points of the local property tax — is set aside and accumulates in interest earning accounts segregated from general revenues
- ***Special Assessments and Local Improvement Charges****:* A special assessment is a specific charge added to the existing property tax to pay for improved capital facilities that border them. The charge is based on a specific capital expenditure in a particular year, but may be spread over a number of years

- ***Development Charges***: Most large municipalities and many smaller ones impose a specific dollar value per lot on developers to finance the off-site capital costs of new development. Developers are generally responsible for on-site services, such as local roads, sidewalks, and street lighting. Historically, development charges have financed "hard" services, such as water supply, sewage treatment, trunk mains, and roads.

External Revenue Sources:

- ***Grants:*** Municipalities sometimes rely on provincial and federal government grants for infrastructure. A program such as the MIII is a good example. In the past, capital assistance has also been made available for water, sewer, and transportation projects with all three levels of government participating
- ***Borrowing:*** Municipalities engage in both short-term and long-term borrowing. Short-term borrowing may be used to finance capital expenditures or to finance an unexpected deficit in the operating budget. For infrastructure whose benefits accrue to future residents, fairness, efficiency and accountability is enhanced if these projects are financed by borrowing with repayment coming from property tax revenues and user fees paid by future beneficiaries.

There are also a few newer financing instruments that have been made available to municipalities. The federal government's initiative to provide grants to municipalities from federal gas tax revenue is one example of a new financing instrument. The Public-Private Partnership (P3) is also a newer financing instrument that may be considered by municipalities. It involves the direct participation of the private sector in a venture controlled by the public sector. The public sector's role is to facilitate, regulate, and guarantee provision of an asset and the private sector's role is to design, finance, build, and operate the asset in a formalized partnership agreement.

6.2 Historical Expenditures

Table 16 and **Table 17** outline the yearly expenditures for the Township broken down by operating and maintenance expenditures and capital expenditures, which has included renewal and rehabilitation activates, as well as replacement activities for the various asset categories.

Table 16: Historical Operating and Maintenance Expenditures

Asset Category	2016	2017	2018 (Budgeted)
Roads (includes storm network and bridges/culverts)	$817,000	$839,000	$899,000
Water Network	$372,000	$492,000	$484,000
Sanitary Network	$535,000	$509,000	$740,500
Parks and Recreation	$1,036,000	$998,000	$1,118,000

Table 17: Historical Capital Expenditures

Asset Category	2016	2017	2018 (Budgeted)
Roads (includes storm network and bridges/culverts)	$521,500	$363,000	$1,675,000
Water Network	$455,500	$7,500	$722,000
Sanitary Network	$10,500	$39,000	$844,000
Parks and Recreation	$253,000	$302,500	$2,547,000

6.3 Lucan Biddulph Financing Strategy

In **Section 5.0** of this report, we have worked with Township staff to develop an asset management strategy, including funding requirements that would ensure sustainability of the assets to continue to provide an adequate level of service to the residents of Lucan Biddulph. The following approach will be followed by the Township to pay for the current and future needs in the infrastructure networks.

6.3.1 General Expenditure on the Road Network

Until 2013, no funds were specifically allocated to capital projects. Capital projects are being funded using money accumulated in a reserve fund. The money transferred to reserve is increased by any year end operating surpluses. In 2018, $410,000 was put into the construction reserve and it is proposed that this amount be increased by 2% per year.

6.3.2 Sewer Network

There is currently a $20.00 per month capital infrastructure levy which results in accumulating approximately $310,000 per year to fund capital projects on the sewer system, including all facilities that are part of the sewer collection system.

6.3.3 Water Network

There is currently a $15.00 per month capital infrastructure levy, which results in accumulating approximately $250,000 per year in reserves to fund capital projects on the water system including all facilities that are part of the water distribution system.

6.3.4 Municipal Buildings

In 2018, $400,000 was allocated to building reserves. It is proposed that this allocation be increased by 2% per year.

It is anticipated that the revenue sources described above will ensure the sustainability of the infrastructure assets over time.

6.4 Mitigating Funding Shortfalls

While investing annually into capital with excess annual funds being accrued in capital reserve funds may be adequate for most rehabilitation and replacement activities, this funding technique may be inadequate for large capital investments. In events where this method of funding is inadequate, the Township can consider the following options to further mitigate any funding shortfalls that occur:

- Applying rehabilitation techniques to extend the lifespan of assets (i.e., lining or spot repairs of sanitary sewers, overlay of asphalt in place of full reconstruction of roads, etc.)
- Rate, increases where needed (i.e., taxation, user fees)
- Actively seeking out and applying for grants
- Decrease expected levels of service
- Implementing operating efficiencies (i.e., reduce operating costs to allow for more capital investment).

DILLON CONSULTING LIMITED
LONDON, ONTARIO

Jason Johnson, P.Eng.
Partner

Catherine Liscumb, P.Eng.
Municipal Engineer

Appendix A

2018 Road Condition Assessment Summary

ASPHALT SURFACE ROADS RESULTS

Section ID	Road	From	To	RCR	PCR
57	Whalen Line	Coursey Line	Saintsbury Line	4	36
92	Maple Street	Duchess Avenue	Market Street	4	49
44A	Roman Line	Pavement End	Richmond Street	7	51
32	Coursey Line	Airport Drive	Elginfield Road	5	52
31	Coursey Line	William Street	Airport Drive	6	53
118	Nicoline Avenue	John Street	End	6	54
27	Coursey Line	Mooresville Drive	McGillivray Drive	7	55
116	Kleinfeldt Avenue	Nicoline Avenue	End	6	56
56	Whalen Line	Richmond Street	Coursey Line	6	57
119	Nicoline Avenue	John Street	Elm Street	6	57
82	Beech Street	Duchess Avenue	Market Street	6	60
107	Frank Street	Main Street	William Street	6	61
46	Roman Line	Richmond Street	Nagle Drive	6	64
80	Beech Street	End	Kent Avenue	7	66
117	Marlene Street	Kleinfeldt Avenue	Albert Street	6	66
84	Kent Avenue	Oak Street	Beech Street	6	67
106	Water Street	Main Street	William Street	6	67
110	Wellington Street	Main Street	Saintsbury Line	6	68
148	Ontario Street	Granton Line	End	7	69
137	Head Street	Granton Line	King Street	7	70
59	Whalen Line	Roman Line	Mitchell Line	7	71
156	Harold Court	Elm Street	End	7	71
72	Butler Street	Chestnut Street	Stanley Street	7	72
139	King Street	Ann Street	Fallon Drive	7	72
58	Whalen Line	Saintsbury Line	Roman Line	7	74
120	Nicoline Avenue	Elm Street	Saintsbury Line	7	74
28	Coursey Line	McGillivray Drive	Fallon Drive	7	75
79	Willow Avenue	Beech Street	Gibson Crescent	7	76
114	Albert Street	Main Street	Marlene Street	7	77
146	Station Street	Queen Street	End	7	77
36	Saintsbury Line	Mooresville Drive	Breen Drive	8	78
47	Nagle Drive	Roman Line	End	7	78
145	Station Street	Granton Line	Queen Street	7	78
34	Saintsbury Line	Mount Carmel Drive	Adare Drive	8	79
83	Beech Street	Market Street	Alice Street	8	79
144	Isabella Street	Granton Line	End	7	79
86	Kent Avenue	Lewis Avenue	Saintsbury Line	7	79
141	High Street	Granton Line	Queen Street	7	79
140	Ann Street	Granton Line	End	8	80
78	Gibson Crescent	Beech Street	Beech Street	7	80
35	Saintsbury Line	Adare Drive	Mooresville Drive	8	81
33	Saintsbury Line	Whalen Line	Mount Carmel Drive	8	81
87	Lewis Avenue	Kent Avenue	Duchess Avenue	8	82
89	Duchess Avenue	Beech Street	Lewis Avenue	8	82

Section ID	Road	From	To	RCR	PCR
104	Margaret Street	Philip Street	George Street	8	82
96	Oak Street	Butler Street	Market Street	7	83
142	Queen Street	High Street	Isabella Street	7	84
91	Duchess Avenue	Maple Street	Saintsbury Line	8	84
90	Duchess Avenue	Lewis Avenue	Maple Street	8	85
143	Queen Street	Isabella Street	Station Street	7	85
37	Saintsbury Line	Breen Drive	Fallon Drive	8	85
88	Duchess Avenue	Oak Street	Beech Street	8	85
153	Lewis Court	Port Street	End	8	85
81	Beech Street	Kent Avenue	Duchess Avenue	8	86
101	George Street	Main Street	William Street	9	86
102	Elizabeth Street	George Street	Philip Street	9	86
103	Philip Street	Elizabeth Street	Margaret Street	9	86
108	Princess Street	Main Street	End	8	86
126	Radcliffe Crescent	Watson Street	Watson Street	8	87
151	Porte Street	Clandeboye Drive	Chriselle Place	8	87
152	Chriselle Place	Port Street	Denfield Road	8	88
125	Watson Street	John Street	Saintsbury Line	8	88
138	King Street	Head Street	Ann Street	8	88
147	Levitt Street	Granton Line	End	8	88
61	Whalen Line	Stonehouse Line	Granton Line	8	88
150	Clandeboye Drive	Richmond Street	Denfield Road	7	88
73	Butler Street	Stanley Street	Oak Street	8	89
77	Stanley Street	Butler Street	Main Street	8	90
85	Kent Avenue	Beech Street	Lewis Avenue	8	90
95	Oak Street	Duchess Avenue	Butler Street	7	90
109	Francis Street	Main Street	Saintsbury Line	7	74
98	Market Street	Oak Street	Beech Street	9	91
60	Whalen Line	Mitchell Line	Stonehouse Line	8	92
29	Coursey Line	Fallon Drive	Richmond Street	8	92
62	Whalen Line	Granton Line	Clarke Road	8	92
100	Market Street	Maple Street	Saintsbury Line	9	93
115	Albert Street	Marlene Street	Harold Court	9	93
65	Walnut Grove Place	Walnut Street	End	8	94
75	Community Drive	Main Street	End	9	94
97	Market Street	Oak Street	Main Street	8	94
99	Market Street	Beech Street	Maple Street	9	94
123	Joseph Street	John Street	End	9	94
124	Watson Street	Joseph Street	John Street	9	94
68	Walnut Street	Oak Street	End	9	95
69	Chestnut Street	Walnut Street	Butler Street	9	95
74	Campanale Way	End	Walnut Street	9	95
76	Stanley Street	Walnut Street	Butler Street	9	95
64	Whalen Line	Prospect Hill Road	Elginfield Road	9	95
71	Butler Street	Chestnut Street	End	9	95
121	John Street	Nicoline Avenue	Joseph Street	9	95

Section ID	Road	From	To	RCR	PCR
122	John Street	Joseph Street	Watson Street	9	95
70	Chestnut Street	Butler Street	Main Street	9	96
66	Walnut Street	Chestnut Street	End	9	97
63	Whalen Line	Clarke Road	Prospect Hill Road	9	98

GRAVEL SURFACE ROADS RESULTS

Section ID	Road	From	To	RCR	PCR
12	Breen Drive	Roman Line	Mitchell Line	6	58
13	Breen Drive	Mitchell Line	Stonehouse Line	5	58
4	Adare Drive	Coursey Line	Saintsbury Line	6	59
11	Breen Drive	Saintsbury Line	Roman Line	6	62
20	Observatory Drive	Granton Line	Clarke Road	6	62
8	Mooresville Drive	Roman Line	Mitchell Line	5	63
15	Awmik Drive	Granton Line	Clarke Road	6	65
49	Stonehouse Line	Breen Drive	Fallon Drive	6	66
3	Adare Drive	Richmond Street	Coursey Line	7	67
43	Roman Line	Fallon Drive	Observatory Drive	6	67
149	St. James Drive	Richmond Street	End	5	67
105	Queen Street	William Street	End	6	67
23	Airport Drive	Saintsbury Line	Roman Line	6	68
19	Observatory Drive	Stonehouse Line	Granton Line	6	69
42	Roman Line	Breen Drive	Fallon Drive	6	69
25	Coursey Line	Mount Carmel Drive	Adare Drive	6	70
30	Coursey Line	Richmond Street	William Street	7	70
1	Mount Carmel Drive	Richmond Street	Coursey Line	7	71
26	Coursey Line	Adare Drive	Mooresville Drive	6	71
21	Airport Drive	Denfield Road	Coursey Line	6	72
41	Roman Line	Mooresville Drive	Breen Drive	6	73
24	Coursey Line	Whalen Line	Mount Carmel Drive	6	74
7	Mooresville Drive	Saintsbury Line	Roman Line	7	75
9	McGillivray Drive	Richmond Street	Coursey Line	6	75
14	Breen Drive	Stonehouse Line	Granton Line	5	75
17	Observatory Drive	Roman Line	Mitchell Line	6	75
22	Airport Drive	Coursey Line	Saintsbury Line	7	75
52	Clarke Road	Whalen Line	Awmik Drive	6	75
53	Clarke Road	Awmik Drive	Revere Drive	6	75
54	Clarke Road	Revere Drive	Observatory Drive	6	75
55	Clarke Road	Observatory Drive	Elginfield Road	6	75
18	Observatory Drive	Mitchell Line	Stonehouse Line	6	76
40	Roman Line	Whalen Line	Mooresville Drive	6	76
50	Stonehouse Line	Fallon Drive	Observatory Drive	7	76
2	Mount Carmel Drive	Coursey Line	Saintsbury Line	6	77
16	Revere Drive	Clarke Road	Prospect Hill Road	6	77
44	Roman Line	Observatory Drive	Richmond Street	7	77
5	Mooresville Drive	Richmond Street	Coursey Line	7	78
48	Stonehouse Line	Whalen Line	Breen Drive	6	78
155	Bradley Street	James Street	End	6	78
6	Mooresville Drive	Coursey Line	Saintsbury Line	7	79
154	James Street	Richmond Street	Bradley Street	6	79
45	Roman Line	Nagle Drive	Richmond Street	7	80
10	McGillivray Drive	Coursey Line	End	6	81
51	Stonehouse Line	Observatory Drive	Elginfield Road	7	81

Appendix B

Bridge/Culverts and Water/Wastewater Point Assets

DILLON CONSULTING

Table 1 - Component Inventory and Condition Report - Maintenance and Replacement Data

Last Update to Report 9-Oct-18

Facilities Management Plan - Bridges and Culverts

ID	Bridge Name	Road Name	Location	Year of Construction / Year of Inspection	No. of Spans	Deck Length (m)	Deck Width (m)	2017 Survey	Period for Repairs	Cost of Repairs	2016 Replacement Cost	Type	Normal Life Expectancy (NLE)	2019 Age / 2019 Time Lapsed	Theoretical Remaining Life (TRL)	Next Replacement Year	Adjusted Replacement Year	Calculated Planning Year of Replacement	Remaining Life (RL)	2019 Replacement Allowance	Current Bridge Condition Index
1	Culvert No. 1	Saintsbury Line	0.35 km North of Fallon Drive	1965	1.00	10.00	8.50				$ 140,000	Concrete Rigid Frame	75	54	21	2040		2040	21	$152,982	0.28
1	Culvert No. 1	Saintsbury Line	0.35 km North of Fallon Drive	2017				Install end treatments	5	$ 25,000											
2	Bridge No. 2	Coursey Line	0.30 km North of Fallon Drive	1971	1.00	28.90	9.50				$ 850,000	Precast I-beams	75	48	27	2046		2046	27	$928,818	0.36
2	Bridge No. 2	Coursey Line	0.30 km North of Fallon Drive	2017				Install end treatments	5	$ 30,000											
3	Culvert No. 3	Saintsbury Line	1.5 km North of Breen Line	1964	1.00	18.30	8.50				$ 240,000	Concrete Simple Span Culvert	75	55	20	2039		2039	20	$262,254	0.27
4	Bridge No. 4	Mooresville Drive	0.3 km West of saintsbury Drive	1993	1.00	18.92	9.46				$ 600,000	Rigid Frame - Concrete	75	26	49	2068		2068	49	$655,636	0.65
4	Bridge No. 4	Mooresville Drive	0.3 km West of saintsbury Drive	2017				Update end treatments	5	$ 25,000											
5	Bridge No. 5	Saintsbury Line	1.0 km South of Adare Drive	1965	1.00	24.10	9.60				$ 730,000	Precast I-beams	75	54	21	2040		2040	21	$797,691	0.28
5	Bridge No. 5	Saintsbury Line	1.0 km South of Adare Drive	2017				Install end treatments	5	$ 30,000											
5	Bridge No. 5	Saintsbury Line	1.0 km South of Adare Drive	2017				Repair two deck drains	5	$ 4,000											
6	Bridge No. 6	Saintsbury Line	0.1 km North of Adare Drive	1965	1.00	23.30	9.40				$ 650,000	Precast I-beams	75	54	21	2040		2040	21	$710,273	0.28
6	Bridge No. 6	Saintsbury Line	0.1 km North of Adare Drive	2017				Repair two deck drains	5	$ 4,000											
6	Bridge No. 6	Saintsbury Line	0.1 km North of Adare Drive	2017				Install end treatments	5	$ 30,000											
8	Bridge No. 8	Saintsbury Line	0.4 km South of Mount Carmel Drive	1964	1.00	33.53	9.50				$ 880,000	Precast I-beams	75	55	20	2039		2039	20	$961,600	0.27
8	Bridge No. 8	Saintsbury Line	0.4 km South of Mount Carmel Drive	2017				Concrete repairs on the wingwalls	5	$ 10,000											
8	Bridge No. 8	Saintsbury Line	0.4 km South of Mount Carmel Drive	2017				Replace deck drain	5	$ 2,000											
8	Bridge No. 8	Saintsbury Line	0.4 km South of Mount Carmel Drive	2017				Install end treatments	5	$ 30,000											
9	Bridge No. 9	Saintsbury Line / Laneway Bridge	0.4 km North of Mount Carmel Drive	1963	1.00	17.06	4.80				$ 550,000	Rigid Frame - Concrete	75	56	19	2038		2038	19	$601,000	0.25
9	Bridge No. 9	Saintsbury Line / Laneway Bridge	0.4 km North of Mount Carmel Drive	2017				Install end marker signs	5	$ 1,000											
10	Culvert No. 10	Roman Line	0.6 km South of Whalen Line	1963	1.00	18.20	7.50				$ 190,000	Concrete Simple Span Culvert	75	56	19	2038		2038	19	$207,618	0.25
11	Bridge No. 11	Roman Line	0.3 km North of Mooresville Drive	1958	1.00	9.80	7.51				$ 400,000	Rigid Frame - Concrete	75	61	14	2033		2033	14	$437,091	0.19
11	Bridge No. 11	Roman Line	0.3 km North of Mooresville Drive	2017				Concrete repairs to barriers, soffit and curbs	5	$ 36,500											
11	Bridge No. 11	Roman Line	0.3 km North of Mooresville Drive	2017				Install end marker signs	1	$ 1,000											
11	Bridge No. 11	Roman Line	0.3 km North of Mooresville Drive	2017				Install end treatments	5	$ 30,000											
11	Bridge No. 11	Roman Line	0.3 km North of Mooresville Drive	2017				Detail deck condition survey	5	$ 5,500											
12	Culvert No. 12	Mooresville Drive	0.44 km West of Roman Line	2002	1.00	21.00	8.40				$ 140,000	Corrugated Steel Pipe Arch	25	17	8	2027		2027	8	$152,982	0.32
13	Culvert No. 13	Saintsbury Line	1.0 km South of Carmel Drive	1957	1.00	11.20	8.00				$ 227,000	Rigid Frame - Concrete	75	62	13	2032		2032	13	$248,049	0.17
13	Culvert No. 13	Saintsbury Line	1.0 km South of Carmel Drive	2017				Install end markers	1	$ 1,000											
14	Culvert No. 14	Coursey Drive	0.1 km North of Fallon Drive	2000	1.00	18.60	7.80				$ 180,000	Corrugated Steel Rivetted Pipe Arch	25	19	6	2025		2025	6	$196,691	0.24
14	Culvert No. 14	Coursey Drive	0.1 km North of Fallon Drive	2017				Install rip-rap at outlet corners	5	$ 5,000											
15	Culvert No. 15	Coursey Drive	0.05 km South of Fallon Drive	2001	1.00	18.50	9.00				$ 160,000	Corrugated Steel Rivetted Pipe Arch	25	18	7	2026		2026	7	$174,836	0.28
16	Culvert No. 16	Observatory Drive	1.25 km East of Highway No. 23	1965	1.00	12.10	9.40				$ 240,000	Rigid Frame - Concrete	75	54	21	2040		2040	21	$262,254	0.28
17	Culvert No. 17	Stonehouse Line	0.42 km North of Observatory Drive	1960	1.00	8.10	7.00				$ 160,000	Rigid Frame - Concrete	75	59	16	2035		2035	16	$174,836	0.21
17	Culvert No. 17	Stonehouse Line	0.42 km North of Observatory Drive	2017				Install guiderails and end treatments	1	$ 15,000											
17	Culvert No. 17	Stonehouse Line	0.42 km North of Observatory Drive	2017				Install new end treatments	1	$ 30,000											
18	Culvert No. 18	Stonehouse Line	1.1 km North of Observatory Drive	1964	1.00	7.10	6.90				$ 160,000	Rigid Frame - Concrete	75	55	20	2039		2039	20	$174,836	0.27
18	Culvert No. 18	Stonehouse Line	1.1 km North of Observatory Drive	2017				Install guiderails and end treatments	1	$ 15,000											
18	Culvert No. 18	Stonehouse Line	1.1 km North of Observatory Drive	2017				Install new end treatments	1	$ 30,000											
19	Culvert No. 19	Campanale Way	0.1 km South of Street D	2014	2.00	22.00	8.66				$ 450,000	Precast Concrete	75	5	70	2089		2089	70	$491,727.15	0.93

AVERAGE BCI 0.35

Table 2 - Replacement & Repair Profile

Last Update to Report 9-Oct-18

Facilities Management Plan - Bridges and Culverts

REPLACEMENT PROFILE

ID	Bridge Name	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
1	Culvert No. 1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$284,591	---	---	---	---	---	---	---	---	---
1	Culvert No. 1	---	---	---	$27,318	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	Bridge No. 2	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$2,063,173	---	---	---
2	Bridge No. 2	---	---	---	$32,782	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
3	Culvert No. 3	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$473,661	---	---	---	---	---	---	---	---	---	---
4	Bridge No. 4	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
4	Bridge No. 4	---	---	---	$27,318	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5	Bridge No. 5	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$1,483,940	---	---	---	---	---	---	---	---	---
5	Bridge No. 5	---	---	---	$32,782	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
5	Bridge No. 5	---	---	---	$4,371	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6	Bridge No. 6	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$1,321,316	---	---	---	---	---	---	---	---	---
6	Bridge No. 6	---	---	---	$4,371	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
6	Bridge No. 6	---	---	---	$32,782	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8	Bridge No. 8	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$1,736,756	---	---	---	---	---	---	---	---	---	---
8	Bridge No. 8	---	---	---	$10,927	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8	Bridge No. 8	---	---	---	$2,185	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
8	Bridge No. 8	---	---	---	$32,782	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
9	Bridge No. 9	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$1,053,857	---	---	---	---	---	---	---	---	---	---	---
9	Bridge No. 9	---	---	---	$1,093	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
10	Culvert No. 10	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$364,060	---	---	---	---	---	---	---	---	---	---	---
11	Bridge No. 11	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$661,139	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11	Bridge No. 11	---	---	---	$39,885	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11	Bridge No. 11	$1,061	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11	Bridge No. 11	---	---	---	$32,782	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
11	Bridge No. 11	---	---	---	$6,010	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
12	Culvert No. 12	---	---	---	---	---	---	---	---	$193,793	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
13	Culvert No. 13	---	---	---	---	---	---	---	---	---	---	---	---	---	$364,268	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
13	Culvert No. 13	$1,061	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14	Culvert No. 14	---	---	---	---	---	---	$234,859	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
14	Culvert No. 14	---	---	---	$5,464	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
15	Culvert No. 15	---	---	---	---	---	---	---	$215,027	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
16	Culvert No. 16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$487,871	---	---	---	---	---	---	---	---	---
17	Culvert No. 17	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$280,561	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17	Culvert No. 17	$15,914	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
17	Culvert No. 17	$31,827	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
18	Culvert No. 18	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$315,774	---	---	---	---	---	---	---	---	---	---
18	Culvert No. 18	$15,914	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
18	Culvert No. 18	$31,827	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
19	Culvert No. 19	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL REPLACEMENT & REPAIR COSTS		$97,603	$0	$0	$292,851	$0	$0	$234,859	$215,027	$193,793	$0	$0	$0	$0	$364,268	$661,139	$0	$280,561	$0	$0	$1,417,917	$2,526,191	$3,577,718	$0	$0	$0	$0	$0	$2,063,173	$0	$0	$0

Table 1 - Component Inventory and Condition Report - Maintenance and Replacement Data

Last Update to Report 9-Oct-18

Facilities Management Plan - Water/Wastewater Point Assets												
ID Number	Asset Name	Location	Year of Construction or Purchase	Normal Life Expectancy (NLE)	2019 Age	Theoretical Remaining Life (TRL)	Next Replacement Year	Adjusted Replacement Year	Calculated Planning Year of Replacement	Remaining Life (RL)	2015 Replacement Cost	Current Building Condition Index
101	Lucan Water Pollution Control Plant	Lucan	1992	50	27	23	2042		2042	23	$ 6,229,644	0.46
112	Lucan Water Booster Station	Lucan	1993	50	26	24	2043		2043	24	$ 699,197	0.48
120	Lucan Elevated Water Tank	Lucan- Booster Station	1992	50	27	23	2042		2042	23	$ 1,151,616	0.46
111	Nicoline Sanitary Pump Station	Lucan- Nicoline St.	2009	50	10	40	2059		2059	40	$ 169,067	0.80
110	Lucan Sanitary Pump Station	Lucan- Chestnut St.	1992	50	27	23	2042		2042	23	$ 623,308	0.46
201	Granton Sanitary Water Pollution Control Plant	Granton	2001	50	18	32	2051		2051	32	$ 1,762,872	0.64
210	Granton Booster/Pump Station	Granton- Levitt St. and Granton Line	1973	50	46	4	2023		2023	4	$ 432,193	0.08

AVERAGE CI 0.52

Table 2 - Replacement & Repair Profile

Last Update to Report 9-Oct-18

Facilities Management Plan - Water/Wastewater Point Assets																													
REPLACEMENT PROFILE																													
ID Number	Building Name	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044
101	Lucan Water Pollution Control Plant	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$13,837,840	---	---
112	Lucan Water Booster Station	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$1,599,712	---
120	Lucan Elevated Water Tank	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$2,558,072	---	---
111	Nicoline Sanitary Pump Station	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
110	Lucan Sanitary Pump Station	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	$1,384,547	---	---
201	Granton Sanitary Water Pollution Control Plant	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
210	Granton Booster/Pump Station	---	---	---	---	$547,489	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL REPLACEMENT COSTS		$0	$0	$0	$0	$547,489	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$17,780,459	$1,599,712	$0