

Town of Englehart

# Asset Management Plan

**Prepared by:**

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**Project Number:**

60286316

**Date:**

January 18, 2016

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January 18, 2016

Susan Renaud  
Clerk-Treasurer-Administrator  
Town of Englehart  
61 Fifth Ave, P.O Box 399  
Englehart, Ontario  
P0J 1H0

Dear Susan:

**Project No: 60286316**

**Regarding: Town of Englehart – Asset Management Plan**

We are pleased to submit the attached Revision No. 2 Asset Management Plan for the Town of Englehart. This plan has been developed using the Ontario Provincial Government's Guide for Municipal Asset Management Plans for the following assets:

- Transportation System
- Drainage System;
- Sanitary System ; and
- Water System

We acknowledge and are grateful for the assistance and input provided by the Town staff in the preparation of this document.

Sincerely,  
**AECOM Canada Ltd.**



Gerry McCrank, CET, LEL  
Project Manager  
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GM:ah  
Encl.

## Distribution List

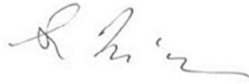
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1	yes	Susan Renaud / Town of Englehart

## Revision Log

Revision #	Revised By	Date	Issue / Revision Description
0	GM	7 Jan 2014	Report issued for Small Rural & Northern Municipal Infrastructure Fund Application
1	GM	Dec 15, 2014	Report updated
2	GM	Jan 18, 2016	Report Updated


## AECOM Signatures

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Report Reviewed By:



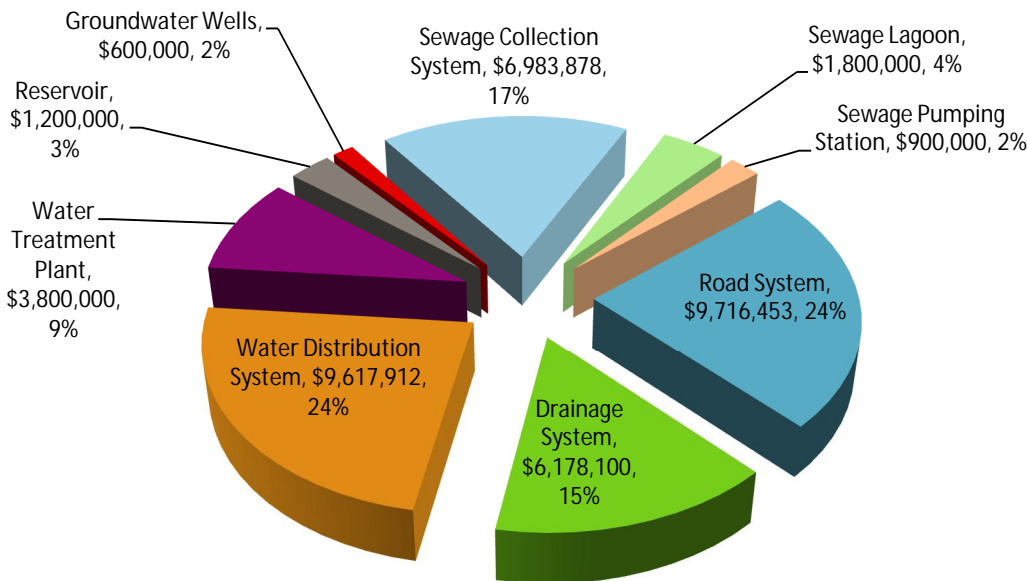
\_\_\_\_\_  
 Bruce McMullan  
 Senior Project Manager

# Executive Summary



Water System	Sanitary System	Drainage System	Road System
<ul style="list-style-type: none"> <li>• 14,323.7m of watermain</li> <li>• 61 Hydrants</li> <li>• 107 Valves</li> <li>• 1 Water Treatment Plant</li> <li>• 2 Groundwater Wells</li> <li>• 1 Water Storage Reservoir</li> </ul>	<ul style="list-style-type: none"> <li>• 10,465.4m of Sanitary Sewer</li> <li>• 601 Services</li> <li>• 96 Manholes</li> <li>• 1 Lagoon</li> <li>• 1 Pumping Stations</li> </ul>	<ul style="list-style-type: none"> <li>• 1,745.1m of Storm Sewer</li> <li>• 26 Storm Manholes</li> <li>• 150 Catch Basins</li> <li>• 5,763.5m of swale and ditches</li> <li>• 7,910.0m of Storm / Ditches</li> </ul>	<ul style="list-style-type: none"> <li>• 15,418.6m of Roads</li> </ul>

This Asset Management Plan Revision 2 has been developed for the Town of Englehart's Water System, Sanitary System, Drainage System and Road System and is based on the guidelines provided by the Ontario Ministry of Infrastructure in their Building Together Guide for Municipal Asset Management Plans. Detailed in the graphic above is a summary of the assets included in this plan. The total replacement cost (2013) of the assets is provided in the Table below.



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# 1. Introduction

## 1.1 The Town of Englehart

The Town of Englehart was created in 1906-1908 by the building of the Temiskaming and Northern Ontario (T & NO) Railway (now called the ONTC Railway) and named after the T & NO Chairman at the time, Jacob Lewis Englehart. The community was incorporated as the Town of Englehart in late 1908. The railway was responsible for the development of this area of Northeastern Ontario until Ferguson Highway, now called Provincial Highway 11, was opened in 1927. Grant Forest Products (Grant waferboard) was founded in 1981 and purchased in 2010 by Georgia-Pacific is still a major employer in the Town. The 2011 census indicates that the population of Englehart is 1,519 persons, a 1.7% increase from the 2006 census. The Town is situated along Provincial highway No. 11, 44 km north of Temiskaming Shores and 44 km South of Kirkland Lake. The Ontario Northland Transportation Commission (ONTC) Railway splits the Town and is approximately the midway point from North Bay to Cochrane.

The Municipality is committed to improving resident's quality of life; encouraging tourism, establishing long term development strategies and providing a nurturing environment for new and future business.

Infrastructure supports services vital to achieving these goals: the water system provides life sustaining potable water; the wastewater system removes and treats sewage to improve hygiene and quality of life, the road network provides access to businesses and homes, and the drainage system provides flood protection. To facilitate the provision of these services, the Town owns, operates and maintains a various number of infrastructure assets.

## 1.2 Asset Management

All Municipally owned infrastructure systems are made up of assets that require monitoring and maintenance. The goal of asset management is defined as meeting a required level of service in the most cost effective way through the creation, acquisition, operation, maintenance, rehabilitation and disposal of assets to provide for present and future municipal users.

Municipalities should care about managing these assets in a cost effective manner for the reasons as follows:

1. Infrastructure assets are a major municipal investment.
2. Maintained infrastructure is important to economic development.
3. Proper operation and maintenance is essential for public health and safety.
4. Infrastructure provides an essential customer service.
5. Asset management promotes efficiency and innovation in the operation of the infrastructure.

## 1.3 Benefits of Asset Management

There are many benefits of asset management and once the principals are incorporated by the Municipality, some of the results will be immediately apparent while others will take time to implement. Some of the benefits of asset management are as follows:

- Better operational decisions;
- Improved emergency response;
- Ability to plan and pay for future repairs and replacements;
- Increased knowledge of the location of assets;
- Increased knowledge of which infrastructure assets are critical to the Municipality;
- Additional efficient operation of asset;

- Better communication with municipal users;
- Tax rates and user fees based on sound operational information;
- Increased acceptance of tax rates and user fees; and
- Capital improvement projects that meet the needs of the system.

#### **1.4 Plan Assets**

Asset Management Plans can be prepared for a portion of or all of the municipal assets as follows:

- Bridges and culverts (>3m);
- Roads (paved, gravel, and surface treated);
- Signs (regulatory, warning and information);
- Traffic signal systems;
- Guiderails, retaining walls and safety barriers;
- Storm water management system including storm sewers, maintenance holes, catchbasins, ditches, etc.;
- Sanitary system including sewage treatment plant, sanitary sewers, maintenance holes, services, etc.;
- Water system, including water treatment plant, watermain, valves, hydrants, services, etc.;
- Municipal buildings including works garage, municipal building, arena, library, community center;
- Rolling stock including tractors, trucks, loaders, graders, etc.;
- Social housing;
- Recreational Facilities including baseball diamonds, outdoor rinks, playgrounds, tennis courts; and
- Other facilities such as cemetery, landfill, etc.

Since developing an asset management plan for this number of assets is very onerous for a small municipality and could result in stalling the project from moving forward, a smaller sample of assets will be included in the initial plan. For this Municipality only the more expensive portion of assets is being considered under their plan and they are as follows:

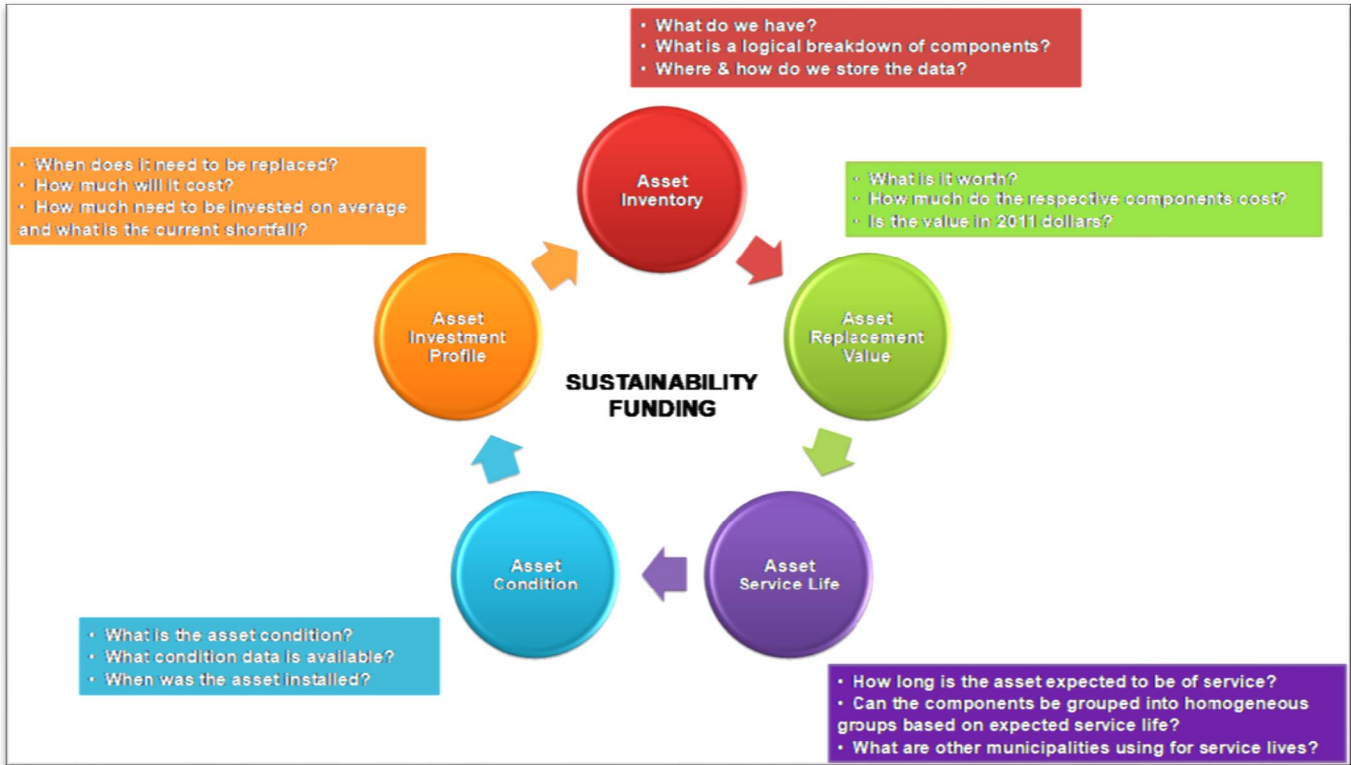
1. Municipal roads (bridges and culverts over 3m in diameter are not included)
2. Storm water management system including storm sewers, maintenance holes, catchbasins, ditches, etc.;
3. Water system, including water treatment plant, watermain, valves, hydrants, services, etc; and
4. Sanitary system including sewage treatment lagoon, sanitary sewers, maintenance holes, services, etc,

As the Municipality moves forward with asset management and staff become more familiar with the use of the document additional assets can be added or revised to include new information or greater clarification.

#### **1.5 Plan Development and Methodology**

This plan was developed using the Ministry of Infrastructure guidelines and data provided by the municipality. Municipal staff and council assisted AECOM in completing the asset management plan.

AECOM performed an asset review using a methodology originally developed by the National Research Council of Canada (NRC) and popularized by the National Guide to Sustainable Municipal Infrastructure’s (“InfraGuide”) best practice on Managing Infrastructure Assets. The methodology follows a series of logical steps for answering questions related to asset inventory, replacement value, condition and expected service life to develop a long-term capital replacement profile, as summarized below:



**Figure 1.5-1: Plan Development and Methodology**

**1.6 Plan Implementation**

As with all planning documents that require constant review this asset management plan will cover the Municipalities identified assets over the next ten (10) years and should be updated as needed to reflect any new asset information. The recommended asset improvements should be reviewed annually by the Municipality to determine if revisions to the program are necessary due to unexpected changes in the condition of assets or where work could not be completed as planned.

**1.7 Report Format**

The report is structured in separate sections for each of Sanitary, Water, Drainage and Transportation, with each main section addressing asset-specific questions related to asset inventory, replacement value, service life, condition and replacement profiles, and key recommendations. Appendixes A to D contain tabular summaries of the Water, Sanitary, Drainage, and Transportation asset inventories, as indicated in the Index.

## 1.8 Financial Considerations

The renewal forecast for this study was completed using an MS-Excel based Capital Asset Planning (CAP) model. It is important to note that the model and the findings in this report provide a current “snapshot” of the Town’s Water, Sanitary, Drainage and Transportation infrastructure as per the asset data from the following sources

1. The work completed to satisfy the Public Sector Accounting Board’s (PSAB) reporting requirements for Tangible Capital Assets (TCA) completed in 2009, primarily for non-linear assets.
2. Data exported from the Town’s GIS, primarily road, sewer and water infrastructure.
3. Data exported from the Town’s previous water and sewer replacement upgrade projects
4. Data obtained from existing sewer and water plans

As this Asset Management Plan was based on information generally available in 2013, should any of the infrastructure elements change in the future, such as the upgrade of an existing wells or replacement of a watermain, then the model needs to be updated accordingly.

All costs estimates have been prepared using current (2013) Canadian dollars to facilitate year to year comparisons and to avoid the uncertainty of projecting inflation and discount rates far into the future.

## 2. State of Local Infrastructure

The Town provides numerous services to their community and has various assets as indicated previously but the only assets to be included in this plan at this time are the following:

- Transportation system;
- Drainage System;
- Water System; and
- Sanitary System

### 2.1 Transportation System

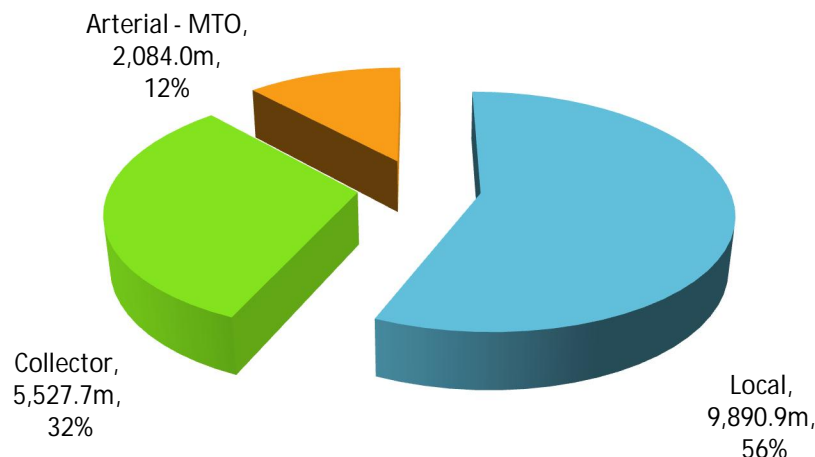
#### 2.1.1 Transportation Asset Inventory

AECOM completed a review of all of the Town roads in the summer of 2013, to determine the current condition of the road system. The roads were evaluated using the procedures outlined in the Methods and Inventory Manual for Road Management Plans for Small, Lower Tier Municipalities which was produced by the Ministry of Transportation in 1987. This manual was designed as a simple way to assess roads and develop long range planning for rehabilitation and reconstruction.

Almost all of the Town's roads are considered semi-urban (open ditches) with just a few street sections in the downtown core that are considered urban (underground storm sewer and curb and gutter).

#### 2.1.2 Breakdown of Road System by Function

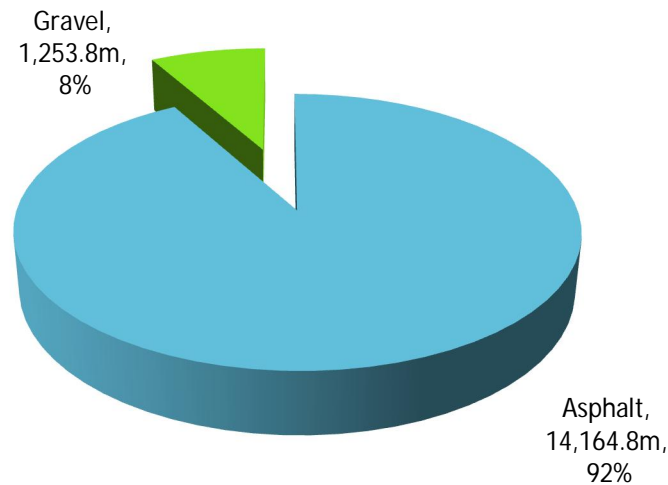
The Town streets are laid out in a grid fashion with the Ontario Northland Railway to the North, the Provincial Highway No. 11 to the South and the Englehart River runs along the East side. First Street crosses the railway providing access to land north of the tracks and neighbouring Town. First Street, Second Street, Third Street, Fifth Street and Fourth Avenue, all intersects with Provincial Highway No.11 (arterial road) and are considered collector roads. The Highway No. 11 roads are maintained by the Ministry of Transportation and are not included with the Town's assets. Seventh Street is considered a collector road for the local roads in that area and will provide access to the Town's Industrial/ Commercial subdivision in the future. A breakdown of the Town roads by function is summarized in Table 2.1-1.



**Figure 2.1-1: Breakdown of Roads by Function**

### 2.1.3 Breakdown of Road System by Surface Type

The surface type of the Municipalities road system does not reflect the condition of the road structure but does indicate locations where the road does not meet Town standards and require rehabilitation / maintenance earlier in its life cycle (i.e. Gravel roads)



**Figure 2.1-2: Breakdown of Roads by Surface Type**

### 2.1.4 Asset Replacement Value

Accepted replacement values in 2013 dollars for the Municipalities transportation assets are summarized in Table 2.1-1.

**Table 2.1-1: Road Replacement Unit Costs**

Type of Road	Cost per meter of Road
Asphalt Surface semi-urban (single lift of HMHL)	\$158.00
Asphalt surface urban (double lift HMHL, 4 lane)	\$486.00
Granular Base semi-urban (2 lane)	\$72.00
Granular Base urban (4 lane)	\$94.00
Granular Sub-Base semi-urban (2 lane)	\$115.00
Granular Sub-Base urban (4 lane)	\$125.00
Earth Excavation semi urban (2 lane)	\$120.00
Earth Excavation urban (4 lane)	\$120.00
Curb and Gutter (both sides of Road)	\$200.00
Sidewalk (both sides of road)	\$240.00
Misc. Semi Urban (Engineering, Contingencies) -	\$116.00
Misc. Urban (Engineering, Contingencies)	\$330.00

The above cost applies to one meter of road reconstructed across its total width but does not include ditching or storm sewers which are included in the Drainage component of this AMP. Unit rates for road reconstruction were obtained from the municipality's recent road and watermain upgrade projects completed in 2013.

The total replacement value of the Municipalities roads using an asphalt surface in 2013 dollars is summarized in Table 2.1-2.

**Table 2.1-2: Road Replacement Cost**

Road Type	Cost per Meter	Length	Total (2013)
Urban	\$1,648	714.5m	1,177,496.00
Semi-Urban	\$581	14,704.1m	8,543,082.00
<b>Total</b>		15,418.6m	9,716,453.00

2.1.5 Asset Service Life

The expected service life of transportation assets, as experienced by the industry and other municipalities in Northeastern Ontario and depending on traffic volumes are summarized in Table 2.1-3.

**Table 2.1-3: Road Asset Expected Service Life**

Material	Years
Asphalt Pavement	20
Surface Treatment	10
Gravel Surface	20
Road Base	50

It is important to note that expected service lives are entirely contingent upon maintenance funding. For example, pavement structure is dependent on a number of factors including:

- Ø Quality of initial design.
  - Adequate drainage.
  - Accurate traffic counts.
  - Accurate truck counts.
- Ø Quality of the materials.
- Ø Quality of the construction.
- Ø Maintenance programming.

2.1.6 Asset Condition

By visual inspecting each road section we were able to identify the various existing pavement distress types and associate it with a specific condition rating. A simplified condition rating associated with this traffic type was implemented as detailed in Table 2.1-4.

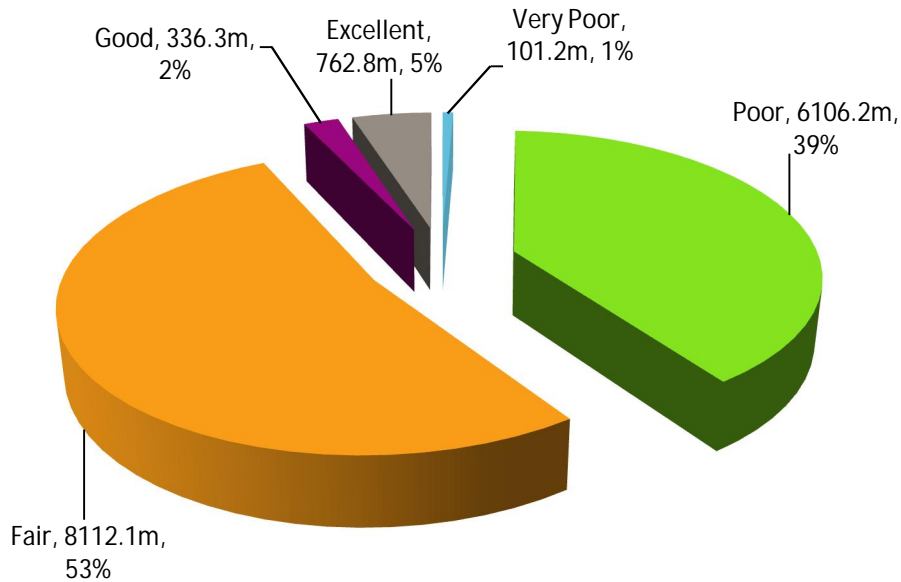
**Table 2.1-4: Road Condition Rating Description**

Condition	Description
Excellent	Very smooth with no cracking, surface deformation or surface defects
Good	Smooth with a few cracks, surface deformation or surface defects
Fair	Comfortable with intermittent cracks, surface deformations or surface cracks



Condition	Description
Poor	Uncomfortable with frequent cracks, surface deformation or surface defects
Very Poor	Uncomfortable with constant cracks, surface deformation or surface defects. Trail roads are included with this pavement condition.

The Town transportation system has a condition rating as indicated in Figure 2.1-3.



**Figure 2.1-3: Road Condition Rating**

To assist the Town to make decisions on where to budget for maintenance work or what sections of road that will be rehabilitated or reconstructed through the Town capital works budget, a decision matrix is provided in Table 2.1-5.

This matrix is a guideline and should be used in conjunction with municipal personnel observations of the road. The Town can adjust the matrix to provide alternate trigger points for rehabilitation or reconstruction. Specific maintenance and rehabilitation actions should always be based on the actual distress of the existing pavement.

**Table 2.1-5: Road Improvement Time**

Condition	Time of Improvement in Years	Cost (2013)
Excellent	10 – 18	\$214,900
Good	6 – 10	\$94,800
Fair	1 – 5	\$2,287,000
Poor	Now - Rehabilitate	\$1,518,600
Very Poor	Now - Reconstruct	\$58,800
<b>Total</b>		<b>\$4,174,100</b>

To ensure that the Town is able to provide the level of service required, rehabilitation type improvements were estimated for each condition other than the very poor road(s) that require reconstruction. As each time for improvement occurs, the roads can be reassessed and adjustments to the timing can be determined so rehabilitation of the roads can fit within the Town’s budget.

## 2.2 Drainage System

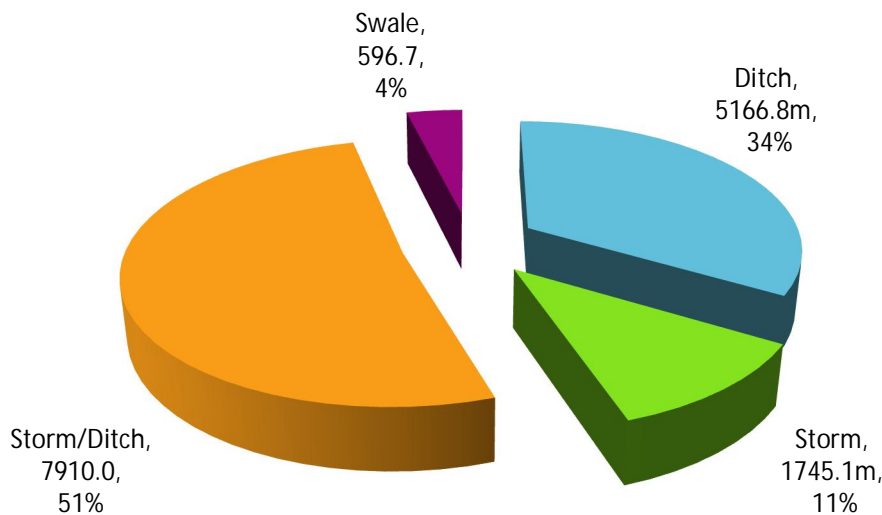
### 2.2.1 Drainage Asset Inventory

The data for the Towns drainage inventory was obtained from data supplied by the Municipality and from observations of each road during the condition review completed in the summer of 2013. Roads identified as having storm sewers were not camera inspected and associated structures (maintenance holes, catchbasins) were not opened or entered for inspection.

### 2.2.2 Breakdown of Drainage System by Type

The majority of the drainage systems in the Town are either a combination of storm sewers and ditches or just a ditched drainage system with culvert crossing at roadways and driveways. The storm flow is directed to large ditches to the North and under the tracks or to the Englehart River to the East. The Town is considered relatively flat with drainage problems associated with the flat grade of roads and minimal storm water outlets.

The breakdown of Drainage System Types is as indicated in Figure 2.2-1



**Figure 2.2-1: Drainage System Types**

The Municipality does not have any storm water management ponds or storm service connections and all drainage systems on Provincial Highway 11 are the responsibility of the Ministry of Transportation.

### 2.2.3 Asset Replacement Value

Acceptable replacement values in 2013 dollars for the Municipalities drainage assets are summarized in Table 2.2-1.

**Table 2.2-1: Drainage Unit Replacement Costs**

Description	Cost
Roadside Ditching	\$80.00/m
CSP Storm Sewer	\$800.00/m
Concrete Structure	\$5,000.00/ea.
CSP Culvert	\$300.00/m

The unit rates indicated above reflect recent reconstruction projects completed in the Town during 2012.

The total replacement values of the Municipalities Drainage System in 2013 dollars is summarised in Table 2.2-2

**Table 2.2-2 Drainage Replacement Cost**

Description	Cost
Roadside Ditching	\$ 2,467,200
Storm Sewer	\$ 967,000
Concrete Structure	\$ 880,000
CSP Culverts	\$ 1,863,900
<b>Total</b>	<b>\$6,178,100</b>

2.2.4 Asset Service Life

The expected service life of drainage assets, as experienced by the industry and other municipalities in Northeastern Ontario are summarized in Table 2.2-3.

Table 2.2-3 Drainage Estimated Service life

Asset	Estimated Service life
Ditches	100 years
CSP Sewer	50 years
Concrete MH	50 years
CSP Culvert	50 years

2.2.5 Asset Condition

Based on observations made during the inspections of the transportation and drainage systems, the drainage system conditions reflect the conditions of the roads and can be summarized as per Figure 2.2-2.



**Figure 2.2-2: Drainage Assets Condition**

Reconstruction or rehabilitation of the drainage assets will occur at the same time as the various roads are completed. Drainage cost should be added to the Roads cost when determining budgets.

## 2.3 Water System

### 2.3.1 Water Asset Inventory

The data for the Towns Water inventory is based on their GIS, upgrades to their water system completed in 2012 and drawings supplied by the Town. A good portion of their system is located in laneway easement between the roads right of ways and is generally located within a 1.5m offset of the sanitary sewer. With the infrastructure being so close together the Town has found that replacement of both pipes must be completed at the same time. Watermain and sanitary sewers located within these narrow easements will generally be of the same age and condition. The Town is over 100 years old and locations of some drawings indicating the systems existing age or pipe material is unknown. The Town has various sized watermain and unknown information as summarized in Table 2.3-1.

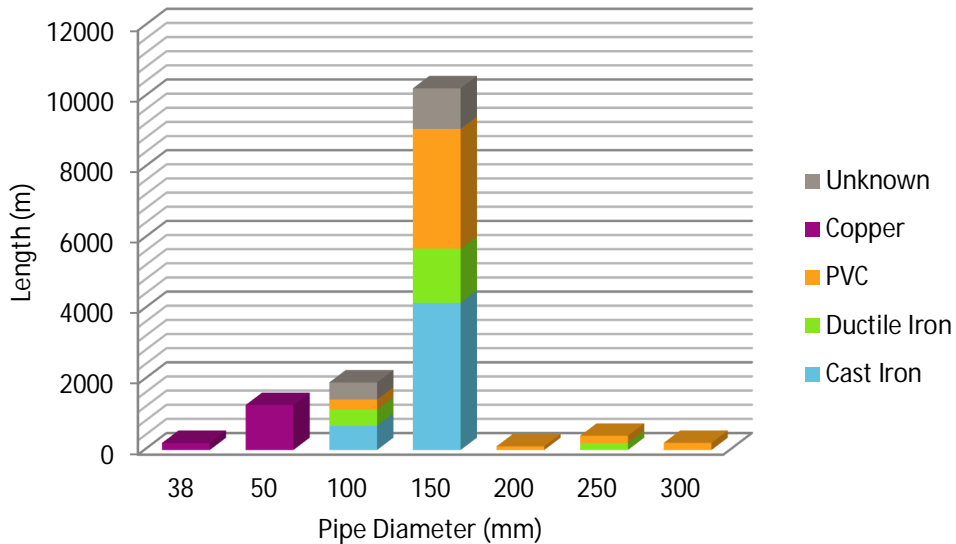
**Table 2.3-1: Watermain Inventory**

Watermain Material	Pipe Diameter	Length (m)	Total Length (m)
Cast Iron	100	682.0m	4,842.5m
	150	4,160.5m	
Ductile Iron	100	462.0m	2,194.0m
	150	1,535.0m	
	250	197.0m	
PVC	100	284.0m	4,183.7m
	150	3,388.7m	
	200	104.0m	
	250	205.0m	
	300	202.0m	
Unknown	100	482.5m	1,630.5m
	150	1,148.0m	
<b>Total Length of Watermain</b>		14,323.7m	14,323.7m

### 2.3.2 Breakdown of Watermain by Diameter

During planning of the water system in 1977, the Town decided that their distribution system would be able to provide fire flow. A review of their WTP pumps indicate that they cannot provide the necessary fire flow from their wells, but the distribution system watermain and hydrants are sized and located as per MOE guidelines.

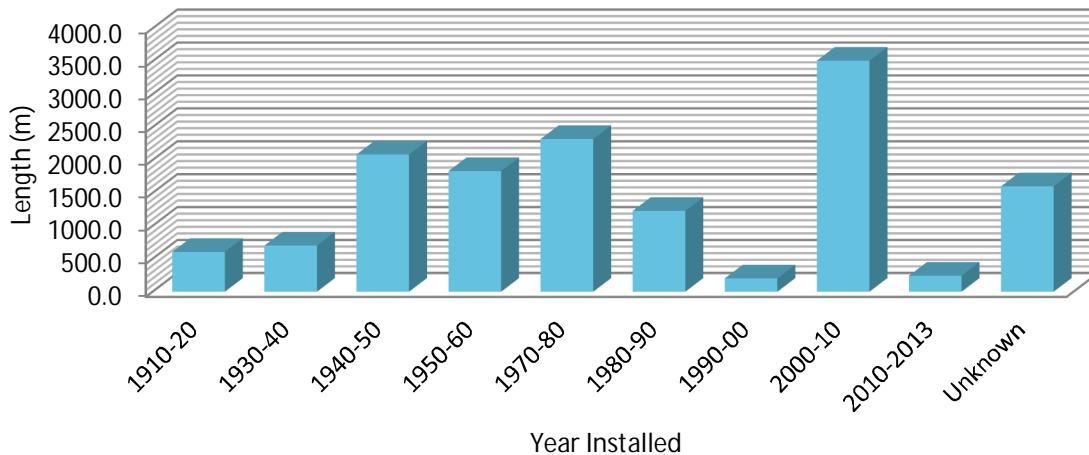
A breakdown of the watermain by size and material is summarized in Figure 2.3-1



**Figure 2.3-1: Watermain Breakdown by Size and Material**

### 2.3.3 Breakdown of Watermain by Age

The Town has watermain that was installed in 1916 that is still in service but is getting near the end of its service life. Other sections installed in the 1930's, 1940's and 1950's have been inspected during recent watermain replacement projects and has been noted to be heavily coated with tubercles, restricting flow through the watermain.



**Figure 2.3-2: Watermain Breakdown by Age**

### 2.3.4 Inventory of Hydrants, Valves and Water Services.

The Municipality appears to have sufficient hydrants but a check of their coverage as per MOE guidelines was not completed. The existing age of the hydrant will reflect the age of the watermain it is connected to.

**Table 2.3-2: Hydrant Inventory**

Hydrant	Quantity
Fire Hydrants	61

The municipality appears to have sufficient valves throughout the community but could benefit from additional valves at multiple legged intersections as per the MOE guideline. The existing age of the valve will reflect the age of the watermain it is connected to.

**Table 2.3-3: Valve Inventory**

Size	Quantity
38mm	2
50mm	7
100mm	10
150mm	85
250mm	0
300mm	22
<b>Total</b>	<b>107</b>

**Table 2.3-4: Service Inventory**

Service Size	Quantity
19mm Copper	623
25mm Copper	11
38mm Copper	5
50mm Copper	6
100mm Unknown	3
150mm Unknown	1

### 2.3.5 Inventory of Water Treatment Plant, Groundwater Wells and Reservoir

Table 2.3-5 summarizes the major process equipment currently installed at the Englehart WTP. The information in this table was obtained from the design and shop drawings, plant Operation & Maintenance Manuals, and the observations during the plant visit.

**Table 2.3-5 Enlehart WTP Major Process Equipment/Components**

Component	Existing Equipment	Notes
<b>Wells and Well Pumps</b>	Well #1: abandoned Well #2: <ul style="list-style-type: none"> <li>PTTW capacity – 1,204.69 m<sup>3</sup>/day</li> <li>Vertical turbine pump (Floway 8JKL/M-7) with 11 kW electric motor</li> </ul> Well #3 <ul style="list-style-type: none"> <li>PTTW capacity – 1,591.10 m<sup>3</sup>/day</li> <li>Vertical turbine pump (Floway 8JKL/M-7) with 11 kW electric motor</li> </ul>	<ul style="list-style-type: none"> <li>Total allowable taking: 2,795.79 m<sup>3</sup>/day</li> <li>Equipment condition: good</li> <li>As per MOE, with the larger raw water pump out of service the Town's raw water firm capacity is 1,205m<sup>3</sup>/day and is 361m<sup>3</sup>/day less than the maximum day demand</li> </ul>
<b>Treatment Vessels</b>	Sodium hypochlorite reaction vessel: <ul style="list-style-type: none"> <li>Filtronics V-500</li> </ul> Sodium bisulphite (SBS) reaction vessel: <ul style="list-style-type: none"> <li>Filtronics V-500</li> </ul> Filter vessel: <ul style="list-style-type: none"> <li>Filtronics FH-11 rated at 2,998 m<sup>3</sup>/day</li> </ul> Filter Backwash Pump (BWP): <ul style="list-style-type: none"> <li>One submersible pump, rated at 40 L/s (640 gpm)</li> </ul>	<ul style="list-style-type: none"> <li>Vessel condition: good</li> <li>BWP condition: unknown</li> </ul>
<b>Sodium Hypochlorite Storage and Feed System</b>	<ul style="list-style-type: none"> <li>Storage Tanks: two 852L (225 gallon) tanks</li> <li>Metering Pumps: two Prominent SICa HM diaphragm pumps</li> </ul>	<ul style="list-style-type: none"> <li>Equipment condition: chemical scaling found on both pumps. Pump #2 had more white deposits on the liquid end.</li> </ul>
<b>Sodium Bisulphite Storage and Feed System</b>	<ul style="list-style-type: none"> <li>Storage Tank: one 246L (65 gallon) tank</li> <li>Metering Pump: one Prominent Gala diaphragm pump</li> </ul>	<ul style="list-style-type: none"> <li>Equipment condition: good.</li> <li>SBS system is currently not used.</li> </ul>
<b>Reservoir</b>	<ul style="list-style-type: none"> <li>One circular reservoir (diameter 27.43 metres) separated by a mid-dividing wall to two cells.</li> <li>Reservoir has an effective volume of 1,163m<sup>3</sup> with a total volume of 1,564m<sup>3</sup></li> </ul>	<ul style="list-style-type: none"> <li>Condition: unknown</li> <li>Undersized by approximately 934m<sup>3</sup></li> </ul>
<b>High Lift Pumps</b>	<ul style="list-style-type: none"> <li>Two vertical turbine pump, one (Floway 10JKH-3) rated at 37.9 L/s @ 38 m TDH with 19 kW electric motor, another rated at 45.4 L/s</li> </ul>	<ul style="list-style-type: none"> <li>Equipment condition: Pump #2 head appears heavily corroded; Pump #1 had light rust, is generally good.</li> <li>Does not have a dedicated pump to supply fire flow.</li> <li>As per MO, with the largest pump out of service the firm high lift pumping capacity is 37.9 L/s</li> </ul>

The Town has not completed a review of the WTP, wells and reservoir's individual assets (i.e. pump, vessels, etc.) to determine the age or estimated service life of each individual unit other than what was completed for the recently completed WTP Study but will complete these tasks as part of future revisions of this asset management plan.

### 2.3.6 Asset Replacement Value

Accepted replacement values in 2013 dollars for the Municipalities water distribution system assets are detailed in Table 2.3-6.

**Table 2.3-6: Water System Estimated Unit Replacement Cost**

Asset	Size	Unit Cost
	38mm	\$375.00/m

Asset	Size	Unit Cost
Watermain	50mm	\$400.00/m
	100mm	\$500.00/m
	150mm	\$560.00/m
	200mm	\$600.00/m
	250mm	\$640.00/m
	300mm	\$675.00/m
Hydrant		\$6,500.00/ea.
Valve	38mm	\$1,000.00/ea.
	50mm	\$1,100.00/ea.
	100mm	\$1,300.00/ea.
	150mm	\$1,600.00/ea.
	200mm	\$2,000.00/ea.
	250mm	\$2,600.00/ea.
	300mm	\$2900.00/ea.
Service	19mm	\$2,000.00/ea.
	25mm	\$2,200.00/ea.
	38mm	\$2,400.00/ea.
	50mm	\$2,800.00/ea.
	100mm	\$4,200.00/ea.
	150mm	\$5,600.00/ea.

Accepted order of magnitude replacement values in 2013 dollars, using comparisons to facilities recently constructed in the Northeastern Ontario for the Municipalities water treatment plant, wells and reservoir assets are detailed in Table 2.3-7.

**Table 2.3-7: Non-Linear Estimated Replacement Cost**

Description	Unit cost
Water Treatment Plant	\$ 3,800,000.00
Circular Reservoir	\$1,200,000.00
Groundwater Wells (2)	\$600,000.00
<b>Total</b>	<b>\$5,600,000.00</b>

The total replacement value of the municipality's water system in 2013 dollars is summarized in Table 2.3-8.

**Table 2.3-8: Replacement Cost of Water System**

Water Asset	Replacement Cost
Watermain	\$7,725,512
Hydrants	\$ 396,500
Valves	\$ 167,100
Services	\$ 1,316,000
WTP, Reservoir and Wells	\$ 5,600,000
<b>Total</b>	<b>\$15,205,112</b>



### 2.3.7 Asset Service Life

An asset's expected service life is that period of time which it is expected to be of use to the owner, after which it needs to be replaced. This section will address in detail the different expected service lives assumed for the range of water assets owned and managed by the Town.

The expected service life of water assets, as experienced by the industry and other municipalities in Northeastern Ontario are summarized in Table 2.3-9.

**Table 2.3-9: Water Assets Estimated Service Life**

Asset Description	Estimated Service Life (ESL)
PVC Watermain	100
Ductile Iron Watermain	100
Copper Watermain	100
PEX Watermain	100
Hydrants	100
Valves	100
Copper Service	100

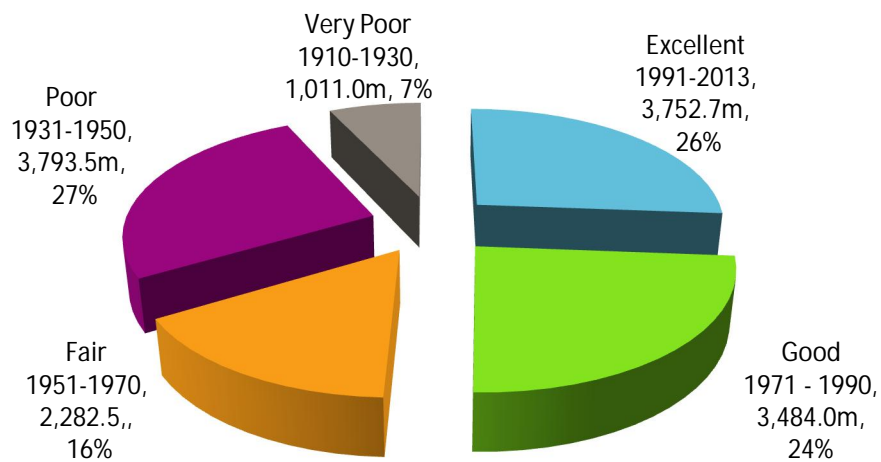
**Table 2.3-10: Water Treatment Plant Estimated Service Life - Components**

Description	Estimated Service Life (ESL)
Water Treatment Plant	22
Reservoir	32
Groundwater Wells	30

For the Town's first asset management plan the ESL for each of the non-linear assets will be assumed using a average weighted expected useful life of all the traditional assets found in each. Once the Town creates an inventory of individual assets within each non-linear asset indicating the condition, age, service history, cost, etc. they can better define their life cycle costs.

### 2.3.8 Asset Condition

The Town doesn't keep records of the number watermain breaks a certain main has since it was install and they can't provide details on the condition of any mains they unearthed when working on the watermain (i.e. valve replacement, installing a water service, etc.). For this first asset management plan the condition of the watermain and associated hydrants and valves will be based on the age of the pipe and the remaining service life. As a result the watermain condition is summarized in Figure 2.3-3.



**Figure 2.3-3: Watermain Condition Rating**

The Town's Water Treatment was built in 1914 and the process upgraded in 2004 with the addition of an iron and manganese removal/pressure filtration system. The Englehart WTP will experience shortages on its raw water and treated water firm pumping capacities, and the treated water storage capacity now and in the future. A report that was completed in 2013 has indicated that the water treatment plant has installed major treatment equipment with sufficient rated capacity to meet water production requirements for the next 20 years but has deficiencies as follows:

- The raw water firm pumping capacities cannot meet the present day requirements. As per the MOE guidelines, with the larger well pump out of service the Town's raw water supply firm capacity is 1,205 m<sup>3</sup>/d which is 361 m<sup>3</sup>/day less than the maximum day demand (1,566 m<sup>3</sup>/day);
- The treated water firm pumping capacities cannot meet the present day requirements. As per the MOE guidelines, with the larger well pump out of service the Town's treated water supply firm capacity is 37.9 L/s which is far less than the 97 L/s (now) to 98L/s (future) pumping capacity requirement;
- High levels of THM, a disinfection by-product, should be addressed by the optimizations and improvements to the water treatment process; and
- The reservoir is a twin cell underground clear well with a total effective volume (@ HWL) of 1,163.0m<sup>3</sup>. The reservoir is undersized by approximately 943m<sup>3</sup> and cannot meet the storage and primary disinfection requirements of the system.

## 2.4 Sanitary system

### 2.4.1 Sanitary Asset Inventory

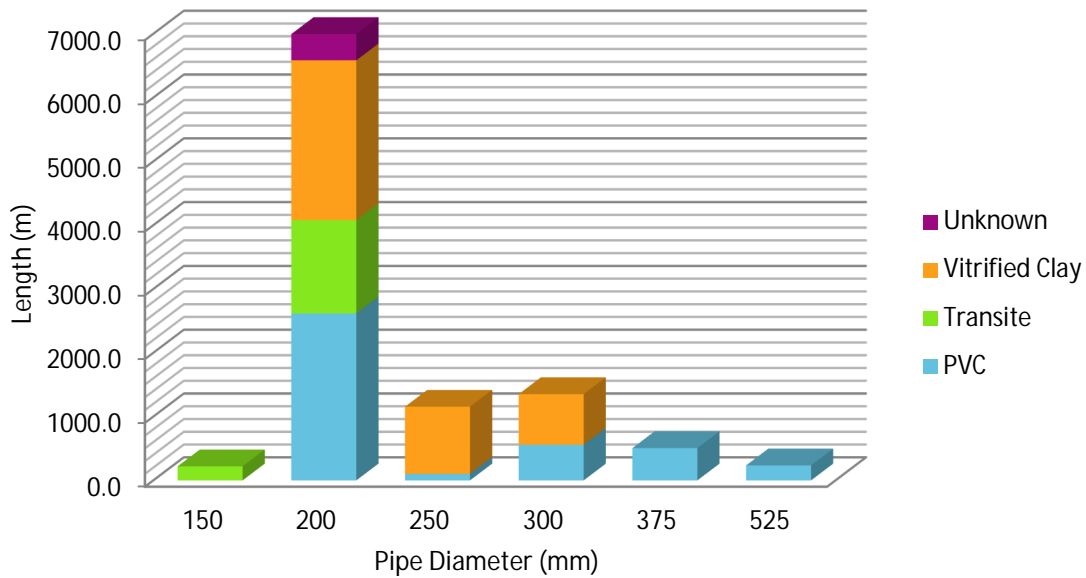
The data for the Town's sanitary sewer inventory is based on their GIS, upgrades to their sanitary system completed in 2012 and drawings supplied by the Town. A good portion of their system is located in laneway easements between the roads right of ways and is generally located within a 1.5m offset of the watermain. With the

infrastructure being so close together the Town has found that replacement of both pipes must be completed at the same time. Watermain and sanitary sewers located within these narrow easements will generally be of the same age and condition. The Town is over 100 years old and locations of some drawings indicating the systems existing age or pipe material is unknown. The Town has various sized sewer pipe and unknown information as summarized in Table 2.4-1.

**Table 2.4-1: Sanitary Sewer Pipe Inventory**

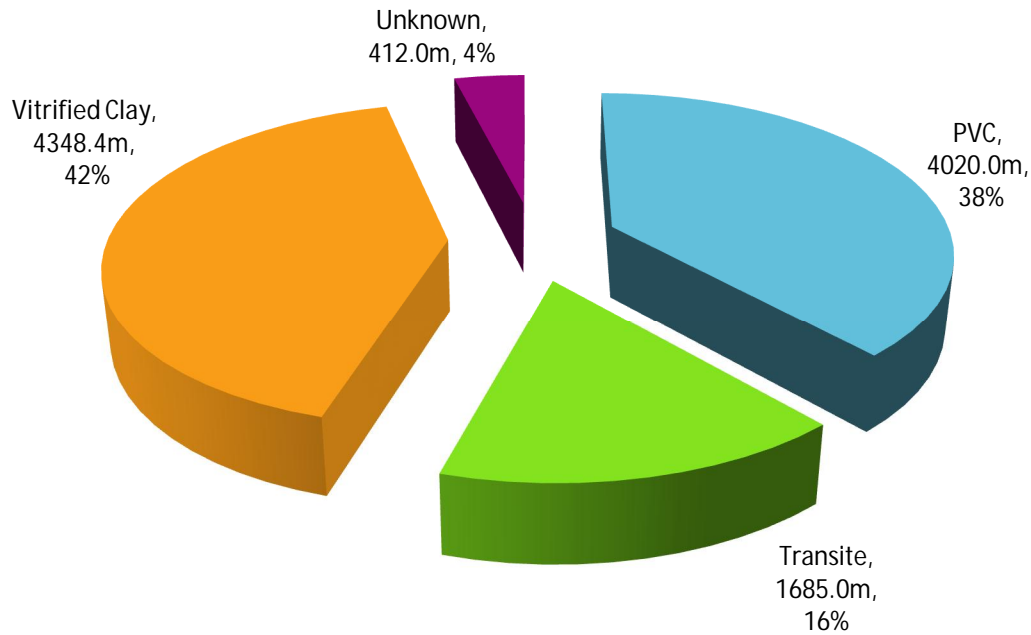
Sewer Pipe Material	Pipe Diameter	Length (m)	Total Length (m)
PVC	200	2,617.5	4,050.0
	250	103.0	
	300	558.5	
	375	506.0	
	525	235.0	
Transite	150	221.0	1,685.0
	200	1,464.0	
Vitrified Clay	200	2,503.0	4,348.4
	250	1,052.0	
	300	793.4	
Unknown	200	412.0	412.0
<b>Total Length of Watermain</b>		10,465.4	10,465.4

2.4.2 Breakdown of Sewer Pipe by Diameter and Material



**Figure 2.4-1: Sanitary Sewer Breakdown by Size and Material**

### 2.4.3 Breakdown of Sanitary Sewer by Material



**Figure 2.4-2: Sanitary Sewer Breakdown by Material**

### 2.4.4 Inventory of Maintenance Holes and Services

**Table 2.4-2: Maintenance Hole Inventory**

Description	Quantity
Maintenance Holes	96

**Table 2.4-3: Sanitary Service Inventory**

Description	Quantity
150mm Sanitary Service	601

### 2.4.5 Pumping Station

The Town has one pumping station adjacent to their three celled facultative lagoon. It has two 25hp submersible pumps with a rated capacity of 65.9 L/s in a 1.5m x 2.0m wet well complete with electrical and electronic control systems, chemical addition facilities for phosphorus removal, ultrasonic level transmitter with back-up float switches, 450mm overflow pipe, 200mm discharge forcemain, and 35 kW diesel engine generator set.

## 2.4.6 Lagoon

The Town treats their sewage at a 4 hectare, three celled facultative lagoon located north of the ONR tracks and at the end of Lagoon Road. The lagoon system has a rated capacity of 1950m<sup>3</sup>/day and continuously discharges to the Englehart River.

## 2.4.7 Asset Replacement Value

Accepted replacement values for the Town's sewage collection system were obtained from recently completed projects and are detailed in Table 2.4-4

**Table 2.4-4: Sewage Collection Replacement Estimated Unit Cost**

Asset Description	Unit Cost
200mm sanitary sewer	\$500/m
250mm sanitary sewer	\$510/m
300mm sanitary sewer	\$520/m
375mm sanitary sewer	\$570/m
525mm sanitary sewer	\$590/m
525mm sanitary sewer and Casing	\$2,900/m
Maintenance Hole	\$6,000/ea.
150mm sanitary service	\$2,000/ea.

Accepted order of magnitude replacement values in 2013 dollars, using comparisons to facilities recently constructed in the Northeastern Ontario for the Municipalities pumping station and lagoon assets are detailed in Table 2.4-5

**Table 2.4-5: Pumping station and Lagoon Estimated Replacement Value**

Description	Cost
Pumping Station	\$900,000
Lagoon	\$1,800,000

The total replacement value of the Town's Sewage collection and treatment system is summarized in Table 2.4-6

**Table 2.4-6: Replacement Cost of Sanitary System**

Asset	Replacement Cost
Sewer Pipe	\$5,283,878
Maintenance Holes	\$540,000
Services	\$1,160,000
Pumping station	\$900,000
Sewage Treatment Lagoon	\$1,800,000
<b>Total</b>	<b>\$9,683,878</b>

### 2.4.8 Asset Service Life

An asset's expected service life is that period of time which it is expected to be of use to the owner, after which it needs to be replaced. This section will address in detail the different expected service lives assumed for the range of sanitary assets owned and managed by the Town.

A sewer pipe service life depends on many factors – material, quality of installation, soil conditions, and disturbances by adjacent construction.

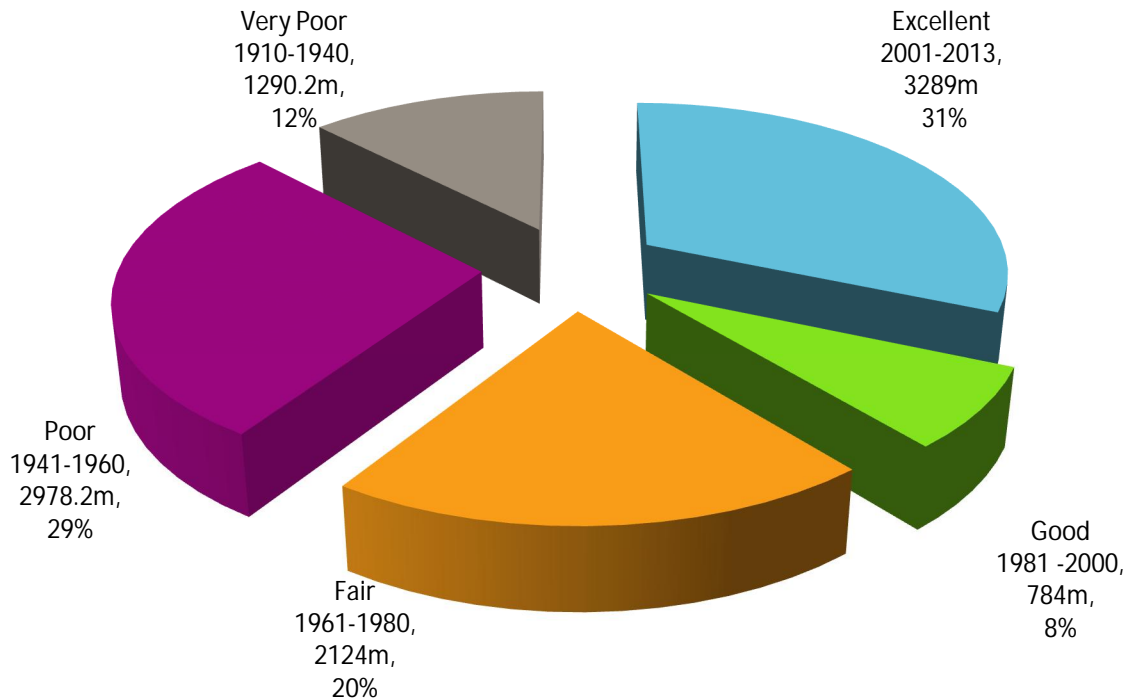
The expected service life of sewer assets, as experienced by the industry and other municipalities in Northeastern Ontario are summarized in Table 2.4-7

**Table 2.4-7: Sanitary System Estimated Service Life**

Asset	Estimated Service Life
Gravity Sewer Pipe	75
Maintenance Hole	75
Service	75
Pumping Station Wet Well	80
Pumping Station Piping and Pumps	20
Lagoon	100

### 2.4.9 Asset Condition

For this first asset management plan the condition of the watermain and associated maintenance holes and services will be based on the age of the pipe and the remaining service life. As a result the sanitary system condition is summarized in Figure 2.4-3.



**Figure 2.4-3: Sanitary Sewer Condition Rating**

### 3. Desired Level of Service

The Town currently provides a high level of service for all their assets but the only assets to have a defined service level under this plan are as follows:

- Transportation System;
- Drainage System;
- Sanitary System;
- Water System.

The service levels for each system are discussed in the sections below.

#### 3.1 Transportation System

##### 3.1.1 Introduction

A level of service defines the way the Town and its staff (includes contractors) want the transportation system to perform over the long term and the costs associated with that commitment. As with all municipalities the costs associated with the level of service provided to their residents for these services is always under scrutiny. To ensure the least cost approach is delivered to the community, a defined level of service will be established.

##### 3.1.2 Level of Service

The Municipalities Transportation Level of Service is as follows:

- All work on municipal roads by Town Staff and contractors will follow safety requirements as set by provincial and federal legislation.
- Vehicle ride should be smooth with minimum bumps and need to avoid rough road sections.
- All potholes will be filled with either cold mix or hot mix (when available) upon detection by the Town staff. Any customer complaints about potholes will be filled within a four (4) hour period. If pot filling material is not available and the hole is significant, a florescent marker (pylon) will warn travelers of the location.
- All gravel shoulders will be inspected in the spring to ensure that sufficient granular material exists along the edge of all roads to ensure pavement edge cracking does not occur.
- Gravel Roads will be graded on a monthly basis
- Roads will be plowed after every significant snow storm (25mm snow accumulation on the ground)
- Plowed roads will have sand applied at each leg of intersection.
- Any necessary work on municipal roads will be completed with either at least one lane of traffic and proper vehicle control or a detour as set out in provincial and federal legislation.

##### 3.1.3 Critical Assets

The Town has four collector roads that connect up with the main arterial road (Hwy No. 11) and each can be accessed using the existing local road pattern during emergencies. Critical roads in the town of Englehart can be identified as roads through their downtown core and roads adjacent to the hospital and schools. These roads must be maintained at all times and are closely reviewed daily by Town public works staff.

## **3.2 Drainage System**

### **3.2.1 Introduction**

A level of service defines the way the Town and its staff (includes contractors) want the drainage system to perform over the long term and the costs associated with that commitment. As with all municipalities the costs associated with the level of service provided to their residents for these services is always under scrutiny. To ensure the least cost approach is delivered to the community, a defined level of service will be established.

### **3.2.2 Level of Service**

The Municipalities drainage system Level of Service is as follows:

- All work on municipal drainage systems by Town Staff will follow safety requirements as set by provincial and federal legislation.
- Storm water flow will be maintained in the system for a minimum 2-year storm. All major storm flows will be drained using the existing right of ways.
- Flooding will not occur
- Drainage ditches will be maintained and filling of ditches in front of houses will not be permitted.

### **3.2.3 Critical Assets**

Ditches and overland flow, for the majority of the town, travels in a Northerly direction following the existing road pattern with storm water flow in the east side of town flowing to the Englehart River. There are approximately three (3) locations where storm water flow from town crosses the ONR tracks through pipe culverts owned and maintained by ONR forces. If any of these culverts were to plug storm water would back up into the roadside ditches creating minor flooding. If the culvert crossing was to collapse ONR forces would need to make repairs under emergency conditions and could have an effect on drainage from town property.

## **3.3 Sanitary System**

### **3.3.1 Introduction**

The Municipal sanitary system is considered very old with sections of vitrified clay pipe that was installed in 1916 and is now at the end of its estimated service life.

A level of service defines the way the Town and its staff (includes contractors) want the Sanitary system to perform over the long term and the costs associated with that commitment. As with all municipalities the costs associated with the level of service provided to their residents for these services is always under scrutiny. To ensure the least cost approach is delivered to the community, a defined level of service will be established.

### **3.3.2 Level of Service**

The Municipalities sanitary system Level of Service is as follows:

- All work on municipal sanitary systems by Town Staff will follow safety requirements as set by provincial and federal legislation.
- Through best management practices and technological advancements, the Town is committed to maintaining the health of our environment and protecting Englehart River, and its watershed.
- Provide adequate infrastructure capacity



### 3.3.3 Critical Assets

The Town realized that their infrastructure was getting old and their most critical sanitary asset was the sanitary trunk sewer that starts at the pumping station adjacent to the sewage treatment lagoon, crosses under the ONR tracks and rail yard, and continues in a southerly direction on Fifth Street to an easement between Fifth and Sixth Ave, and then on Fourth St to an easement between Seventh and Eighth Ave, required replacement due to its condition. Starting in 2007 and completed in 2012, this sanitary trunk sewer was replaced with the most difficult and critical section being the sewer main under the ONR tracks and Rail Yard.

## 3.4 Water system

### 3.4.1 Introduction

The Municipal water system is considered very old with sections of cast iron pipe that was installed in 1916 and is now at the end of its estimated service life..

A level of service defines the way the Town and its staff (includes contractors) want the water system to perform over the long term and the costs associated with that commitment. As with all municipalities the costs associated with the level of service provided to their residents for these services is always under scrutiny. To ensure the least cost approach is delivered to the community, a defined level of service will be established.

### 3.4.2 Level of Service

The Municipalities level of service for the water system is as follows:

- Provide clean, safe drinking water through the operation and maintenance of the water system in a manner that adheres to all applicable legislation and regulations.
- All work on the municipal water system by Town Staff will follow safety requirements as set by provincial and federal legislation
- Repair all watermain leaks immediately as they are found and the resources to make the repair are organized;
- Provide potable water to the community that is economical to produce.

### 3.4.3 Critical Assets

When requiring a clean, safe, reliable and economic water system all parts of the asset are critical. The Town should continue to operate and maintain their system in this fashion. Through the asset inventory review the water system will require additional assets that are considered critical to the overall operation. The water treatment plant has installed major treatment equipment with sufficient rated capacity to meet water production requirements for the next 20 years but has deficiencies that require correction as follows:

- The Englehart WTP will experience the shortages on its raw water and treated water firm pumping capacities, and the treated water storage capacity in the future.
- The raw water and treated water firm pumping capacities cannot even meet the present day requirements.
- High levels of THM, a disinfection by-product, should be addressed by the optimizations and improvements to the water treatment process.

# 4. Asset Management Strategy

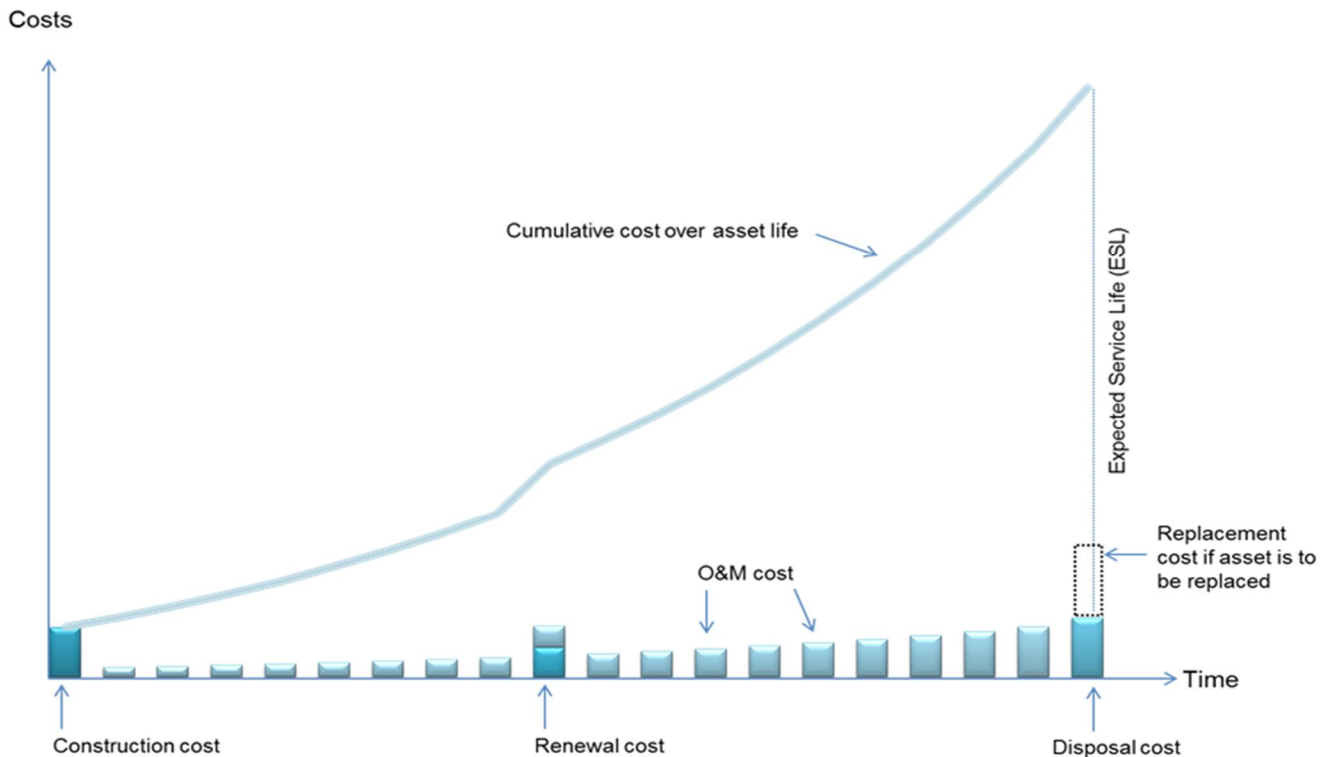
## 4.1 Introduction

**The asset management strategy is the set of planned actions that will enable the assets to provide the desired levels of service in a sustainable way, while managing risk, at the lowest lifecycle cost (e.g., through preventative action).**

### Life Cycle Costs of Infrastructure Ownership

Life cycle cost is the total cost of an asset throughout its life including planning, design, construction, operation, maintenance, renewal, replacement, and disposal costs. Once the Town acquires infrastructure assets, they become responsible for a substantial stream of future resourcing requirements that will be required not only as long as the asset can be operated cost effectively, but as long as the service that the asset provides is required. In other words, the Town is responsible for the replacement of deteriorated assets as long as the service is required. While individual assets may have a useful life that can be predicted in years or decades, the service that the asset provides could be required for a substantially longer duration (perhaps in perpetuity). The purpose of the Asset Management Strategy is to fully understand and predict the financial requirements for the Town’s infrastructure to provide the desired levels of service in a sustainable way, while managing risk at the lowest lifecycle cost.

The Figure 4.1-1 illustrates how costs typically accumulate over an asset’s life.



**Figure 4.1-1 Accumulation of Costs Over an Asset’s Life**

Expressed simply, full life cycle cost of infrastructure can be accumulated under the following broad headings:

1. **Installation Cost:** Since 1914, by far the largest investment that the Town has made is the design and construction of its municipal infrastructure. The Town's infrastructure inventory was therefore created over many decades through infrastructure paid for by the Town.
2. **Ongoing Operations and Maintenance (O&M) Cost:** The Town accepts the responsibility of operating and maintaining the infrastructure according to O&M standards to ensure that the infrastructure is safe and reliable. Operations staff provides the day to day support required to operate infrastructure. In some cases, operations costs are minor, or they can be substantial and technically complex. For example, underground pipes require almost no operational support while a treatment plant may require full-time staff to operate the facility safely and efficiently. Maintenance expenses include periodic preventive maintenance to ensure that the infrastructure can provide reliable service throughout the life of the asset and corrective maintenance that is required to repair defective assets as and when needed. The amount of O&M resources required in any period is a function of the current inventory of infrastructure and total O&M needs required for each asset. As the Town's inventory of infrastructure grows, total O&M requirements will also grow.
3. **Renewal or Replacement Cost:** The third portion of full life cycle costing relates to the renewal and replacement of infrastructure that has deteriorated to the point where it no longer provides the required service. Renewal cost is sometime incurred during the life of an asset where an investment is made to improve the condition and / or functionality of the asset e.g., resurfacing of a road. Disposal and replacement costs are incurred at the end of an asset's life when it is disposed of and replaced by a fully new asset. Many Canadian municipalities have not traditionally factored renewal or replacement costs into future budget projections, except for assets that have a relatively short life such as computer equipment and vehicles. Part of the problem lies in the fact that large portions of this infrastructure inventory can have a very long life e.g., from 75 to 100 years for underground pipes. For young communities like the Town of Englehart, there has not been a historical need to forecast expenses that are not anticipated for decades. However, based on the experiences of older Canadian cities such as Victoria, Montreal and Hamilton, (where vast inventories of old assets are now in dire need of renewal or replacement), it is vital that communities fully understand the looming obligations of infrastructure renewal or replacement and develop a strategy to respond in a manner that is fair and affordable.

The Asset Management Strategy therefore presents the Town's current approach for responding to the full life cycle costs of all its infrastructure assets, as well as the strategy to improve the Town's ability to predict full life cycle costs of their infrastructure over time. Englehart's approach to managing assets considers:

- Non-Infrastructure Strategies
- Operations and Maintenance Strategies
- Asset-specific planning for Rehabilitation/Replacement and Expansion activities
- Water System specific strategies
- Drainage System specific strategies
- Roads System specific strategies
- Procurement strategies
- Risk Management strategies

## 4.2 Non-Infrastructure Strategies

Non-infrastructure solutions are actions that are undertaken to either extend asset life or lower costs. These strategies are not directly related to individual assets, but affect the system as a whole.

1. Water Conservation Program
2. Leak Detection Program
3. CCTV Inspection Program
4. Drainage Maintenance Program
5. Road Maintenance Program
6. Integrated infrastructure planning – e.g. scheduling road and water replacement at the same time
7. Data Verification

#### 4.2.1 Water Conservation Program

Conservation measures encourage the efficient use of water, thereby reducing the quantity of water required per capita, and reducing the need for additional water infrastructure to meet population growth needs. The Town's water demand is approximately 428 L/cap·d, once the Georgia Pacific Wafer Plant and adjacent Town usage is deducted from the total annual water flow which at the high end of the provincial average (270-450 L/cap·d). The Town is not aware of any houses using water bleeders to prevent their service from freezing. As part of their water system operation and maintenance, the Town should find any location of homes using bleeders and provide information on when to start the bleeders in the late fall and when to shut them off in the spring. A permanent list of residents using bleeders should be maintained by the Town. Contact with residents using bleeders will be made using a direct mail-out or insert in the tax bills.

#### 4.2.2 Leak Detection Program

Leak detection programs focus on water distribution networks and assist municipalities to locate where water is being lost. A simple way to address water loss in a system is to fix the problem once it is observed flowing on the surface but this is not always the case due to soil conditions. Strategies to address water loss vary but the cost savings achieved from treatment and distribution of the water lost as well as the potential capacity regained through leak detection activities can hold significant benefits to a Town. A leak detection survey should be completed on the Town's water system to ensure that treated water is not being lost

#### 4.2.3 CCTV Inspection Programs

In order to properly assess the conditions facing the sewer system the Town needs to embark upon a comprehensive CCTV inspection and review process. Only through conducting and reviewing video tapes of the underground infrastructure can a municipality properly determine where the areas of concern may be and what action need to be taken in order to rehabilitate the sewer pipes and associated manholes. Not only should the mains be inspected but an investigation of maintenance holes, catchbasin and ditch inlets should be a fundamental element to any program. Several preventive maintenance initiatives can then be developed based on the outcome of this work.

#### 4.2.4 Drainage Maintenance Program

A properly drained road and community relies on properly designed storm infrastructure such as storm sewers and ditches. Englehart is a community where most of the storm drainage is via ditches. The Town should make their residents aware that installing undersized culverts or filling of the ditch without permission will directly affect the operation of this infrastructure. Locations where the ditch has been filled in by a homeowner or filled over time by silt accumulating in the ditch will minimize the condition of the system. Existing ditches and culverts should be lowered to provide proper drainage of the road base and ensure culverts are open and clear so blockage of drainage does not occur. This work can occur on its own or during the rehabilitation of the existing road.

#### 4.2.5 Road Maintenance Program

A road maintenance program will focus on maintaining existing roads and extending its life as long as possible. Maintenance programs should include the following components:

- Ø Spot improvements to the asphalt surface.
- Ø Spot improvements to the road drainage system.
- Ø Crack sealing.
- Ø Resurfacing/overlays at the appropriate time.
- Ø Pavement preservation strategies if appropriate, include:
  - Micro-surfacing.
  - Crack sealing.
  - Surface Treatment
  - Slurry Seals.
  - Reclamite.

Each one of the above-noted treatments represents an extension to the pavement's life at relatively lesser cost than rehabilitation or full reconstruction. For example, it is generally accepted that crack sealing will extend the pavement life by two years; slurry seals, microsurfacing and surface treatment for four to seven years. However, preservation type treatments do have a functional limit for usage and cannot be the exclusive technique used for pavement management as these treatments generally do not have a structural value. Hot Mix Asphalt Overlay treatments will add structure and extend the pavement life from 7 to 10 years depending on traffic volumes. Optimal timing of maintenance and rehabilitation efforts is the key to maximizing life expectancy of existing pavement structures

#### 4.2.6 Integrated Infrastructure Renewal

Through determining road, sanitary sewer and watermain replacement schedules, actions can be taken to align replacement times. For example, if a road section was approaching its replacement year, but a sanitary sewer and watermain located underneath the road was expected to be replaced in 5 years, the road could be flagged as potential candidate for rehabilitative/maintenance actions to increase its service life.

Through taking actions to increase the service life of the road through rehabilitative/maintenance actions (i.e. pulverize and repave, etc.), the road life can be extended to match the sewer pipe and watermain replacement year, allowing for the road to be replaced after excavation of the site occurs which would be required to replace sewer and watermain pipes. Utilizing this approach saves costs, minimizes waste, and maximizes the use of assets. This approach will only be successful in a few locations in Englehart due to most of the underground infrastructure being located is in back yard laneways and not under the roads.

#### 4.2.7 Data Verification

Following the completion to this document, the Town's first Asset Management Plan (AMP) the Town will continue work on asset management, utilizing lessons learned during the preparation of the AMP to consolidate the existing data and add remaining assets (ex. buildings, rolling stock, etc.). The Town will need to obtain information (asset description, installation date, estimated service life, rehabilitation date, etc.) on the individual assets located at the water treatment plant, sewage pumping station, and sewage treatment lagoons and insert into the future revised asset management plan.

### **4.3 Operation and Maintenance Strategies**

The goal of a maintenance plan is to ensure infrastructure assets are being maintained in a reliable and sustainable manner that supports customer satisfaction, and ensures, for example, treatment and distribution of safe potable water that meets or exceeds regulatory requirements. Adopting comprehensive operation and maintenance programs, coupled with supporting policies, procedures, and systems, is the number one approach to ensure the reliability, sustainability and safe operation of infrastructure assets and the functions they serve: safe and reliable delivery of services. Well maintained assets reduce the risk of failure; regularly conducted preventive maintenance and inspections help identify problems before they become a serious and potentially costly issue, minimizing or eliminating consequences of asset failures when they do occur.

As assets continue to age, it is expected that corrective maintenance will gradually increase; there is also an increased risk that more assets will fail as they approach the end of their expected life (this is when the decision should be made to run an asset to failure, for example if redundancy is in place, or to replace the asset. At the same time, the asset base continues to expand as population and demand increase; this also translates into increases in preventive and corrective maintenance activities. To address these combined challenges, best practices support enhanced preventive maintenance programs to extend the lives of assets (potentially reducing future corrective maintenance requirements) to help ensure a safe, efficient, and reliable service. This combination of enhancing preventive maintenance and addressing increasing corrective maintenance requirements requires organizational commitment, resources, funding, and support.

### **4.4 Asset Renewal/Rehabilitation/Replacement and Growth/Expansion Strategies**

Rehabilitation and renewal of existing infrastructure involves performing significant repairs designed to extend the life and return assets to near-original condition and operation, for example pulverizing the existing asphalt surface and repaving. Replacement of existing infrastructure involves the construction of a new asset to fulfill the service requirements of the existing asset, and is typically expected to occur when the asset has reached the end of its useful life and renewal/rehabilitation is no longer an option.

To best plan for rehabilitation and replacement of infrastructure, it is necessary to estimate both the year (range of years) when the activity is expected, and the necessary cost. Because assets typically have a long life-span (30-100 years) and deteriorate at varying rates, depending on everything from local soil conditions, weather, installation/construction practices, materials, and maintenance performed on the asset, it is difficult to know the rehabilitation and replacement needs of a particular asset without knowing its current condition.

The roads condition information is provided through the recently completed visual review of all roads and drainage assets. However, for sewer, water and drainage assets, age is the only documented proxy for condition. In addition, unlike above ground assets, condition data is not always available for buried water and sewer mains.

Typically, non-linear asset investment profiles are created using basic inventory data coupled with straight-line depreciation over expected service life. This approach was utilized for roads, sewer pipe, structures, watermain, hydrants, valves, and services. However, for more complex, non-linear assets such as treatment plants, pumping station, lagoons and wells, this approach could not reasonably be applied. It is recognized that major components that comprise these assets have different service lives than the overall assets. These complex infrastructure assets are comprised of, for example, process mechanical, structural, building mechanical, electrical and instrumentation control components with varying expected service lives. For example, pumps may have an expected service life of 25 years, so applying an overall service life of 75 years to an overall pumping station would misrepresent the facility's reinvestment requirements for pumps which have a shorter life expectancy. In addition, the approach would not recognize any improvements or reinvestments already made to the stations. To more accurately predict the

replacement and renewal of these more complex infrastructure assets, an asset inventory at the component level and current condition data is required.

It is the Town's intention to collect this information over time and store this information in the existing infrastructure data management system.

## **4.5 Water System**

### **4.5.1 Water System Infrastructure Operations and Maintenance**

The goals of the Town's operation and maintenance (O&M) activities are as follows:

- Ensure infrastructure assets are being maintained in a reliable and sustainable manner that supports customer satisfaction as outlined in the levels of service framework.
- Support treatment and distribution of safe potable water that meets or exceeds regulatory requirements.
- Reduce the risk of failure which is directly related to meeting regulatory requirements and customer satisfaction.
- Maximize value by determining lowest sustainable cost alternatives for maintenance over asset lifecycles.

The following water Operations and Maintenance activities have been identified as necessary for the Town's infrastructure:

- Swabbing, flushing, and disinfecting watermains
- Overhauling well pumps
- Chemical clean, purge, and retest wells
- Site works and structural maintenance for facilities
- Maintenance of process mechanical (pumps, valves, piping, etc.) for facilities
- Maintenance of electrical systems (control panels, distribution, transformers, stand-by power, etc.) for facilities
- Interior and exterior painting of facilities
- Valve cycling
- Hydrant inspections and maintenance
- Emergency and non-emergency repairs
- Operation of water treatment, supply and distribution infrastructure.

The Town does not currently track maintenance activities in such a way that they can be attributed to individual assets. It is the Town's intention to build upon the existing asset inventory, develop an asset hierarchy, and collect asset component and condition data. As this is completed, the Town will be in a better position to detail all O&M activities required and completed against each asset component. For the purposes of this first draft of the Town's Asset Management Plan, current O&M practices and budgets are assumed to be adequate to meet the Town's needs, however, this will continue to be evaluated as the Town expands on current Asset Management Planning and Management. Future O&M needs are estimated based on budgeted costs and the anticipated needs.

The Town's O&M needs for 2012 and 2013 are presented in the Town's 2013 Operating Budget. The budget includes costs for the following services:

- Treatment, supply and distribution of potable water through ground water wells and the Water Treatment Plant to approximately 1700 customers.
- Activities relating to ensuring regulatory compliance.

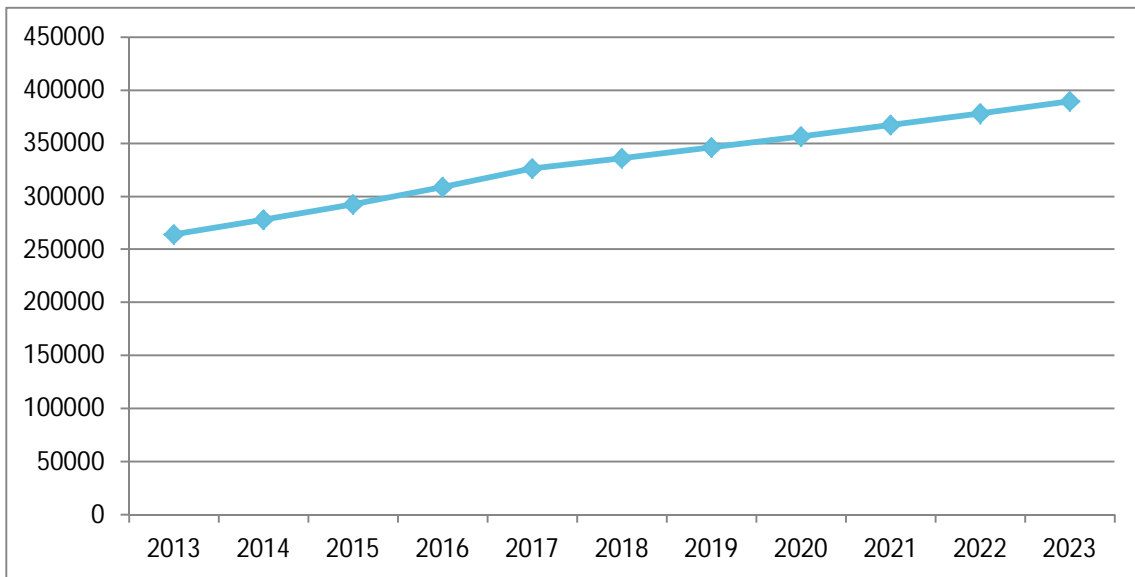
The Operating and Maintenance costs included in this analysis do not include capital-related costs (debt-related costs, capital reserve transfers, etc.). A breakdown of the of the Town’s current budgeted operating costs is presented in Table 4.5-1.

**Table 4.5-1: Budgeted Water Operating Costs**

Expenditures	2012 (actual)	2013 (budget)
Wages & Benefits (applied 25% of one labourer)	\$72,600.00	\$75,650.00
Materials & Supplies	\$15,350.00	\$32,800.00
Utilities	\$54,800.00	\$56,800.00
Contracted Services	\$135,000.00	\$99,000.00
<b>Total Expenditures</b>	<b>\$277,750.00</b>	<b>\$264,250.00</b>

The costs included in this analysis do not include capital-related costs (debt-related costs, capital reserve transfers, etc.).

Projected O&M costs were developed considering an expected increase in cost of 3% annually. Costs are expected to increase from an actual cost of \$264,250 in 2013 to an expected cost of \$389,378 in 2023 as highlighted in Figure 4.5-1. The increase to utility rates of 40% has been included to reflect the anticipated increase over the next 4 years.



**Figure 4.5-1: Operating and Maintenance Cost**

## 4.5.2 Water Infrastructure Strategy

### 4.5.2.1 Distribution System

The municipality will continue to maintain their water system by completing hydrant flushing, valve turning and reducing water usage. These costs are included in their operating and maintenance costs indicated in Table 4.5-1. To ensure assets are replaced at the end of their estimated life the municipality will budget funds to be held within a



water system replacement reserve. The yearly budgeted amount to be placed in this reserve will be equal to the 2013 cost to replace the system divided by the remaining useful life of the particular asset. The Town of Englehart has a backlog of Distribution system work (projects are planned every two years and will coincide with a sanitary project) that requires reconstructing over the next 10 year planning period, with an approximate value of \$455,000 which will require a commitment by the Town of \$45,000.00 per year. The Town will also be required to contribute \$185,000.00 to build their reserves to address the longer term priorities.

The annual funding requirement would be \$230,000 annually for the next 10 years and then declining to approximately \$200,000 annually (plus 1%-2% for inflation) after that to take into account the second replacement of infrastructure currently in backlog. Once the 10 year planning period for this document is complete the Town should review the backlog of work to confirm the money being placed into reserve is correct.

#### 4.5.2.2 Water Treatment Plant

Since 1914 when the water treatment plant was originally constructed, the Town has upgraded various assets within the system when they were determined to be at their expected life. Although the municipality does not have an exact listing of the assets age or condition, the information provided herein will be a good starting point and can be updated as the Municipality proceeds with asset management. The Town realizes that their water treatment plant requires upgrading due to THM problems and capacity issues and will need to put \$220,000.00 into reserve to pay for their portion of the costs required by the Small Rural and Northern Municipal Infrastructure Fund. This amount also represents the amount the Town will need to put into reserve to pay for the next upgrade or replacement of their plant at the end of its 17 year estimated life (the exact estimated life of their WTP can be determined once more information of the existing individual pieces of equipment is compiled).

#### 4.5.2.3 Reservoir

The reservoir was upgraded when the water treatment plant was reconstructed and is estimated to have a similar remaining life of 17 years. The Town should place \$70,000.00 annually into reserves for the eventual replacement of this asset at the end of its expected life. The exact estimated life of the reservoir can be determined once more information of the existing individual pieces of equipment within the reservoir is compiled.

### 4.5.3 Water Infrastructure Renewal, Rehabilitation and Replacement

Sections of the Town's water distribution system is considered old and is nearing or at its estimated service life. With that knowledge they have been reconstructing different sections of watermain adjacent to their trunk sanitary sewer which was considered the most critical asset that required replacement immediately.

#### 4.5.3.1 Water Distribution System

Various sections of watermain are at their estimated service life throughout the Town and are considered very poor based on the age of the pipe installation. Replacement of these watermain sections should be planned with the similar aged sanitary main due to the location in the narrow back lane right of way. A planned 10 year replacement program is needed to reduce the inventory of very poor to poor watermain (150mm Cast iron pipe) as summarized in Table 4.5-2. The costs below only represent the water section and the sanitary sewer portion should be added to cost estimate. Locations where watermain is below existing roads (prices include laneway restoration), the road restoration cost is included with the transportation cost.

**Table 4.5-2: Watermain replacement Capital Expenditure**

Year	Section	Name	From	To	Size	Length	Estimated Year installed	Cost to Replace Watermain (2013 \$)	Cost to Replace Hydrant (2013 \$)	Cost to Replace Valves (2013 \$)	Cost to Replace Services (2013 \$)	Total Cost (2013 \$)
2017	63	Lane 6-7	River Rd	First St	50	207.0	1930	\$82,800	\$0	\$1,100	\$32,000	\$115,900
2017	140	River road	Lane 7-8	Lane 6-7	100	110.0	1930	\$55,000	\$0	\$0	\$2,000	\$57,000
2017	57	Lane 8-9	First St	River	150	200.0	1946	\$112,000	\$6,500	\$1,600	\$38,000	\$158,100
2018	51	Prince St	First St	East End	38	100	1935	\$37,500	\$0	\$1,000	\$16,000	\$54,500
2018	52	King St E	First St	East End	38	100.0	1935	\$37,500	\$0	\$1,000	\$12,000	\$50,500
2018	54	Queen St	First St	East End	50	95.0	1935	\$38,000	\$0	\$1,100	\$8,000	\$47,100

As watermains and sanitary sewers are reconstructed, the Town should insert additional sections to the end of the list. If additional money is found within the budget or additional funding is available for the various level of government numerous water and sewer sections could be completed under one contract and should be based on their location to each other.

#### 4.5.3.2 Water Treatment Plant

The Town's Water system has a noted capacity issue and problems with high THM. A report concluded that several problems exist and replacement of various components is required as summarized in Table 4.5-3.

**Table 4.5-3: Water Treatment Plant Capital Expenditure**

Year	Description	Estimated Cost
2016-2020	Operational Optimization	\$104,000.00
	Process Improvements	\$235,000.00
	Provide additional reservoir capacity	\$2,100,000.00
	Water Source – GUDI Investigation	\$26,000.00
	Hydrogeological Study	\$100,000.00
	Develop New Production Well No. 4	\$200,000.00
	Rehabilitate existing wells No. 2 & 3	\$80,000.00
	Remove High Lift Pumps and install 3 new VFD Pumps	\$225,000.00
	Remove Existing Electrical and Replace	\$100,000.00
	Replace old Control System	\$100,000.00
	Improve Chemical Feed System	\$85,000.00
	Project Contingencies	\$100,000.00
	Engineering	\$325,000.00
		Total

#### 4.5.3.3 Water Reservoir

The water reservoir adjacent to the water treatment plant had minor upgrades completed in 2004 but was not sized to provide fire flow, equalization storage, emergency storage and primary disinfection volume as per MOE guidelines.

## 4.6 Sanitary System

### 4.6.1 Sanitary System Infrastructure Operations and Maintenance

The Goals of the Town’s Operation and Maintenance (O&M) Activities are as follows:

- Ensure infrastructure assets are being maintained in a reliable and sustainable manner that supports customer satisfaction.
- Support collection and treatment of wastewater that meets or exceeds regulatory requirements.
- Reducing the risk of failure which is directly related to meeting regulatory requirement and customer satisfaction.
- Maximize value by determining lowest sustainable cost alternatives for maintenance over asset lifecycles.

The Town does not currently track maintenance activities in such a way that they can be attributed to individual assets. As discussed in previous sections, after the Town develops a comprehensive asset hierarchy, O&M activities should be tracked according to asset and asset component.

For the purposes of this study, current O&M practices and budgets are assumed to be adequate to meet the Town’s needs.

The Town’s Operation Budget outlines the anticipated costs for the following:

- Operation and maintenance of their lagoon;
- Operation and maintenance of their pumping station;
- Sewer collection system flushing and cleaning
- Flow monitoring, control and recording
- Process Control sampling and testing
- Wastewater sample collection compliance testing
- Analyzing microbiological effectiveness
- Sewer main and lateral locates for contractors and residents
- Investigation of complaints regarding lateral blockages and odours
- Building maintenance
- Ensuring that biosolids are spread on receiving field in conformance with NASM plans as issued by the Ministry of Environment
- Various other duties involving resident inquiries and complaints that are directed to this service area.

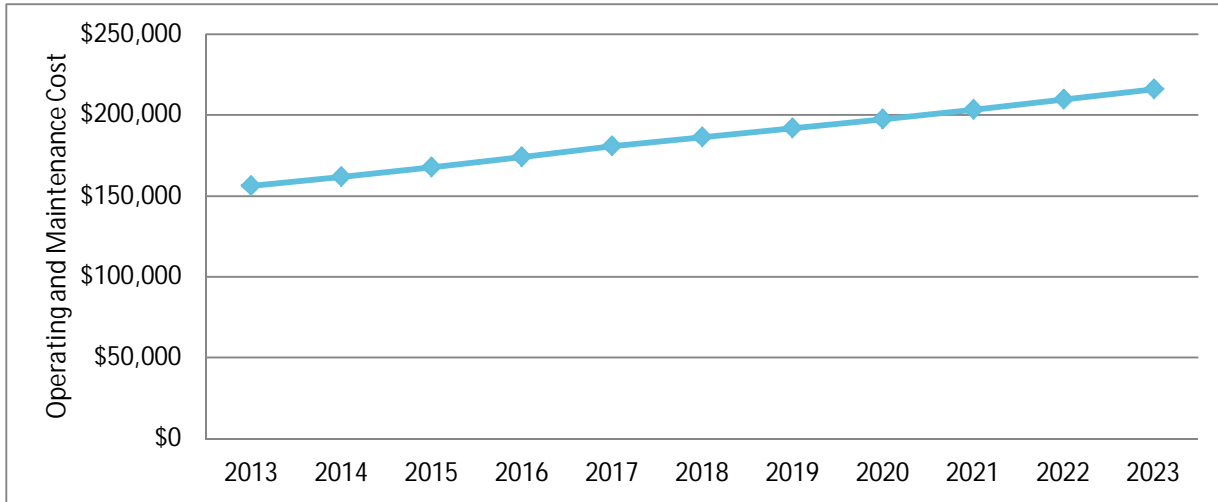
The Operating and Maintenance costs included in this analysis for 2012 and 2013 do not include capital-related costs (debt-related costs, capital reserve transfers, etc.). A breakdown of the of the Town’s current budgeted (2013 & 2014) operating costs is presented in Table 4.6-1.

**Table 4.6-1: Englehart Sanitary Sewer Operating Costs**

Expenditures	2012 (Actual)	2013 (Budget)
<b>Wages &amp; Benefits</b>	\$17,450.00	\$17,800.00
<b>Materials &amp; Supplies</b>	\$2,000.00	\$2,250.00
<b>Utilities</b>	\$8,000.00*	\$10,000*
<b>Contracted Services</b>	\$65,000.00	\$126,000.00
<b>Total Expenditures</b>	<b>\$92,450.00</b>	<b>\$156,050.00</b>

\*Estimated electricity usage at pumping station and lagoon

Projected O&M costs were developed considering an expected increase in cost of 3% annually. The following Figure 4.6-1 presents forecasted O&M costs for the sanitary system.



**Figure 4.6-1: Sanitary Operating and Maintenance Costs**  
 The operations and maintenance costs for the Town sanitary system is expected to increase from \$156,050 in 2013 to \$215,748 in 2023.

#### 4.6.2 Sanitary Infrastructure Strategy

##### 4.6.2.1 Collection System

The municipality will maintain their sewage system by completing inspections of their structures and CCTV inspections. This cost should be included in their operating and maintenance costs indicated in Table 4.5-1. To ensure assets are replaced at the end of their estimated life the municipality will budget funds to be held within a sewage system replacement reserve. The yearly budgeted amount to be placed in this reserve will be equal to the 2013 cost to replace the collection system divided by the remaining useful life of the particular asset. The Town of Englehart has a backlog of collection system work (projects are planned every two years and will coincide with a watermain project) that requires reconstructing over the next 10 year planning period, with an approximate value of \$1,800,000 which will require a commitment by the Town of \$180,000.00 per year. The Town will also be required to contribute \$140,000.00 to build their reserves to address the longer term priorities.

The annual funding requirement would be \$320,000 annually for the next 10 years and then declining to approximately \$150,000 annually (plus 1%-2% for inflation) after that to take into account the second replacement of infrastructure currently in backlog. Once the 10 year planning period for this document is complete the Town should review the backlog of work to confirm the money being placed into reserve is correct.

##### 4.6.2.2 Pumping station

The pumping station pumps were recently upgraded and should last the estimated service life. To determine a strategy for this overall asset the condition of the wet well and the other various components needs to be determined. For this first asset management plan an estimated service life of 20 years will be used for the entire pumping station resulting in a yearly budget of \$45,000.00 (plus 1%-2% for inflation), for the replacement and

rehabilitation of the asset. The exact estimated life of the pumping station can be determined once more information of the existing individual pieces of equipment within the station is compiled.

#### 4.6.2.3 Wastewater Treatment Lagoon

The Town has upgraded various assets within the lagoon system when they were determined to be at their expected life and although the municipality does not have an exact listing of the assets age or condition, the information provided herein will be a good starting point and can be updated as the Municipality proceeds with asset management. Using the lagoon's remaining estimated service life of approximately 50 years, the municipality should budget yearly for the replacement and rehabilitation of various lagoon assets at approximately \$36,000.00.plus 1%-2% for inflation. The exact estimated life of the lagoon can be determined once more information of the existing individual pieces of equipment within the lagoon system is compiled.

#### 4.6.3 Wastewater System Infrastructure Renewal and Rehabilitation and Growth

The following Table 4.6-2 presents the sanitary sewer replacement profile for the next 10 years and reflects the work required on the sewage system within the narrow right of ways. The costs below only represent the sewage sections and the watermain portion should be added to cost estimate. Locations where sanitary sewer is below existing roads (prices include laneway restoration), the road restoration cost is included with the transportation cost.

**Table 4.6-2: Sanitary System - Work Program**

Year	Section	Name	From	To	Size	Sewer Length	Estimated Year installed	Cost to Replace San Sewer (2013 \$)	Cost to Replace Structure (2013 \$)	Cost to Replace Services (2013 \$)	Total Cost (2013 \$)
2017	62	Lane 6-7	River Rd	First St	200	195	1930	\$97,500	\$6,000	\$32,000	\$135,500
2017	56	Lane 8-9	First St	Second St	250	200	1946	\$102,000	\$12,000	\$36,000	\$150,000
2018	50	Prince St	First St	East End	200	100	1935	\$50,000	\$6,000	\$16,000	\$72,000
2018	51	King St E	First St	East End	200	100	1935	\$50,000	\$6,000	\$12,000	\$68,000
2018	53	Queen St	First St	East End	200	100	1935	\$50,000	\$6,000	\$6,000	\$62,000

As watermains and sanitary sewers are reconstructed, the Town should insert additional sections to the end of the list. If additional money is found within the budget or additional funding is available from the various levels of government, numerous water and sewer sections could be completed under one contract and should be based on their location to each other.

### 4.7 Road and Drainage Systems

These infrastructure systems are being combined at this point due to their associated nature. Work on any particular roadway will require the drainage infrastructure to be included in any future rehabilitation or construction project.

#### 4.7.1 Road and Drainage System Infrastructure Operations and Management

The Goals of the Town's Operation and Maintenance (O&M) Activities are as follows:

- Ensure infrastructure assets are being maintained in a reliable and sustainable manner that supports customer satisfaction.
- Reducing the risk of failure which is directly related to meeting regulatory requirements and customer satisfaction.

- Maximize value by determining lowest sustainable cost alternatives for maintenance over asset lifecycles.

The following Roads Services Operations and Maintenance items were identified in the Towns' operating budget and are assumed to be necessary for the Town's Roads and Drainage infrastructure.

- Hard Top Maintenance - Slurry Seal; patching; line striping and durable pavement markings.
- Loose Top Maintenance – Grading; dust control; patching and washouts; gravel resurfacing.
- Winter Control – Snow ploughing and snow removal; sanding and salting; culvert thawing.
- Roadside Maintenance – ditching; debris and litter removal and vegetation/weed control.
- Traffic Safety Devices – Signage, guide rail and guide wire, line striping; pavement markings.
- Drainage – Storm sewer and road crossing culverts..
- Sidewalk maintenance – very minimal
- Roadway Maintenance – 10.06 kilometers.
- Fleet management - Road Services including fuel storage, handling, dispensing of fuel
- Garbage and Recycling
- Street lights including maintenance and repair.

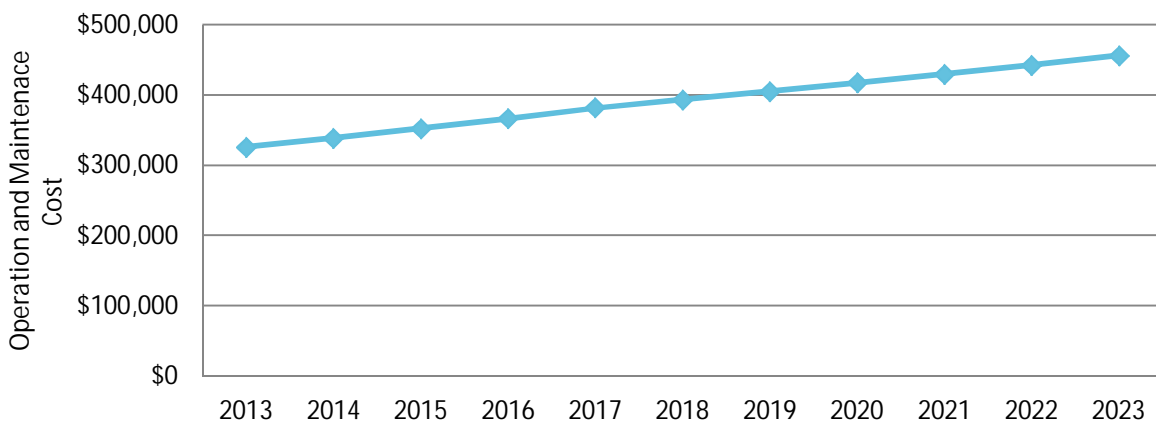
Although the Town currently tracks operations and maintenance according to various asset categories, the Town does not currently track assets in such a way that they can be attributed to an individual asset. After the Town develops a comprehensive asset hierarchy, O&M activities can be assigned to an asset component. For the purposes of this first iteration of the Town's Asset Management Plan, future O&M needs are estimated based on budgeted amounts and the assumption that O&M costs for Roads Services would increase at a rate of 3% per year.

A breakdown of the of the Town's current budgeted (2012 & 2013) operating costs is presented in Table 4.7-1.

**Table 4.7-1 2013 Town of Englehart Roads Services (includes Drainage) Operating Costs**

Expenditures	2012 (Actual)	2013 (Budget)
<b>Wages &amp; Benefits</b>	\$189,450.00	\$205,600.00
<b>Materials &amp; Supplies</b>	\$99,800.00	\$70,100.00
<b>Utilities</b>	\$25,225.00	\$30,125.00
<b>Contracted Services</b>	\$21,000.00	\$20,000.00
<b>Total Expenditures</b>	\$334,675.00	\$325,825.00

Operating costs are forecasted to increase from \$143,228.51 in 2013 to \$456,046 in 2023 and highlighted in Figure 4.7-1.



4.7.2 Road and Drainage Infrastructure Strategy

Figure 4.7-1: Operation and Maintenance Projected Cost

The Municipality has indicated that all existing Town roads will be reconstructed and rehabilitated with an asphalt surface and maintenance upgrades at the 5 and 10 year anniversary to extend the roads estimated service life. At the end of the 50 year estimated service life for roads in Englehart the Town would need to reconstruct the road. A graphic of this option is provided in Figure 4.7-2.

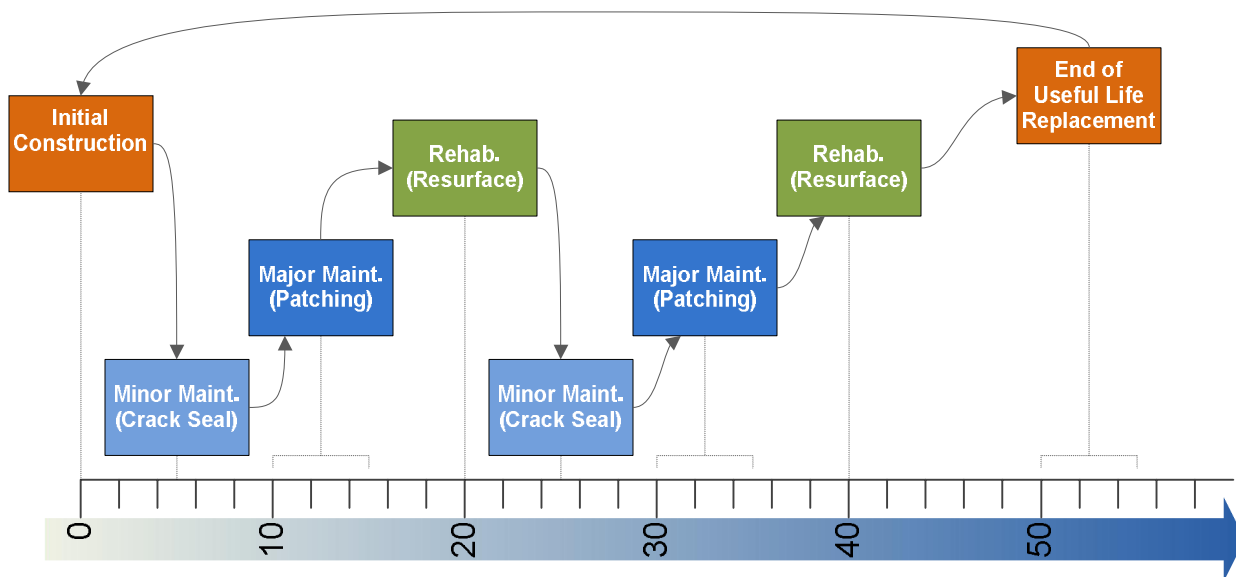


Figure 4.7-2: Graphic of Road Life Cycle

The estimated extended service life for municipal roads, especially with the low expected traffic counts, for this option is 50 years. Without taking into account any existing municipal reserves set aside for capital work on roads the municipality will need to generate \$550,000.00 per year with a 1%-2% increase every year for inflation in addition to the budgeted operational and maintenance costs detailed above.

4.7.3 Roads Infrastructure Renewal, Rehabilitation and Replacement

The visual road condition identified numerous roads that are considered poor and reflect the end of service life for an asphalt / surface treatment road. The Town has previously completed a reconstruction of roads as part of their recent projects that required underground infrastructure to also be replaced. For roads that are considered very poor to poor and do not have infrastructure within the right of way, will be rehabilitated to town standards comprised of pulverizing the existing asphalt, adding 75m additional granular base, grade base to obtain proper cross fall (2%) and repaved with 50mm hot mix hot laid asphalt. Gravel roads that are identified as having a very poor to poor condition will have additional granular material added to the base, graded to obtain the proper cross fall and paved with 50mm hot mix asphalt. Gravel roads will be completed after existing asphalt roads requiring rehabilitation are completed.

**Table 4.7-2: Road Asset - Work Program**

Year	Section	Name	From	To	Length (m)	Visual Condition Rating	Type of Improvement	Road Cost	Drainage Cost	Total Cost
2017	107	Third St	Seventh Ave	Sixth Ave	108.2	poor	Now Rehab	\$30,500.00	\$32,300	\$62,800.00
	116	Fourth St	Fourth Ave	Third Ave	104.9	Poor	Now Rehab	\$29,600.00	\$40,700	\$70,300.00
	117	Fourth St	Third Ave	Second Ave	62.0	Poor	Now Rehab	\$17,500.00	\$13,100	\$30,600.00
2018	50	Prince St	First St	East End	101.2	Very Poor	Reconstruct	\$58,800.00	\$25,700	\$84,500.00
	10	Ninth Ave	River Road	First St	237.9	Poor	Rehabilitate	\$67,100.00	\$92,200	\$159,300.00
	11	Ninth Ave	First St	Second St	199.5	Poor	Rehabilitate	\$56,200.00	\$71,600	\$127,800.00
2019	15	Eighth Ave	Second St	Third St	202.6	Poor	Rehabilitate	\$57,100.00	\$85,200	\$142,300.00
	20	Seventh Ave	Third St	Fourth St	198.0	Poor	Rehabilitate	\$55,800.00	\$153,200	\$209,000.00
	21	Sixth Ave	East End	First St	148.7	Poor	Rehabilitate	\$41,900.00	\$62,200	\$104,100.00
2021	25	Sixth Ave	Fourth St	Fifth St	201.5	Poor	Rehabilitate	\$56,800.00	\$73,700	\$130,500.00
	30	Fifth Ave	Fifth St	Sixth St	201.3	Poor	Rehabilitate	\$56,700.00	\$106,300	\$163,000.00
2023	34	Fourth Ave	Fourth St	Fifth St	200.6	Poor	Rehabilitate	\$56,500.00	\$171,000	\$227,500.00
	35	Fourth Ave	Fifth St	Sixth St	201.8	Poor	Rehabilitate	\$56,900.00	\$196,400	\$253,300.00
2024	42	Second Ave	Fourth St	Fifth St	197.9	Poor	Now Rehab	\$55,800.00	\$56,900	\$112,700.00

As roads are rehabilitated, the Town should insert additional road sections to the end of the list from the roads needs study. If additional money is found within the budget or additional funding is available for the various level of government numerous road sections could be completed under one contract and should be based on their location to each other.

**4.8 Procurement Methods**

Standard procurement methods for the Town are based on council decision but generally follow the standard method with thresholds indicated in Table 4.8-1

**Table 4.8-1 Purchase Method Purchase Threshold**

Low Cost Purchase	< \$10,000
Informal Request for Quote / Request for Proposal	Over \$10,000 up to \$25,000
Informal RFP for Consulting & Professional Services	Over \$25,000 up to \$75,000
Formal RFP for Consulting & Professional Services	>\$75,000
Formal RFQ / RFP	Over \$25,000 up to \$200,000
Request for Tender	>\$200,000



Other methods of procurement exist for various special cases. One case that can significantly cut costs are cooperative purchasing, accomplished through partnering with other municipalities in order to obtain the benefits of volume purchasing and the reduction in administrative efforts and cost.

## 4.9 Risk

The Town's overall Asset Management Strategy is founded on available data, anticipated service levels, growth expectations and other assumptions. Assumptions in these items introduce some unavoidable risk that the overall strategy may change over time as the Town evolves and develops more complete data and processes. Recognizing these uncertainties, the Town is developing strategies to address each source of risk so that the Asset Management Strategy can evolve over time. Risk mitigation strategies for each of the following are discussed below:

- Data quality
- Levels of Service
- Growth – expected vs. actual
- Assumptions

### Data quality

The data provided and collected for the report for various aspects were given only reflecting a very high level of the asset components, and did not accurately reflect the service life's of the necessary components of the assets (i.e. a water treatment plant was assessed at a facility level and did not have age, conditional, performance, or maintenance data for any of the facilities components (i.e. SCADA system, pumps, etc.). Given the high level of the data, significant risk exists in the component asset life reaching the end of their respective service lives before the facility has reached the end of the facility life. This introduces significant difficulty to establish a yearly budget that accurately would reflect the required asset replacement / rehabilitation cost required.

Strategy to address:

It is suggested an inspection program of assets should be established to utilize the new workflow structure and build the existing database. With a newly built database, the report should be reviewed and see if the new data produces significant changes to the asset management strategy.

### Levels of Service

The levels of service present a risk, since no previous levels of service were established for the Town. The Levels of Service therefore have never been measured in previous years and the expectation of each level of service has not been established. Adjustment is expected in the early years of levels of service to better reflect the level of commitment from the Town, but risk exists if a level of service is set at a higher expectation than what is possible at the current levels of funding.

Strategy to address:

It is suggested that to address this source of risk, the targets established in the first year of utilizing the Levels of Service should be reviewed along with the cost to provide the levels of service. If the cost of the level of service is too high to maintain the target should be adjusted or alternative strategies to accomplish the level of strategy should be investigated.

### Growth Levels

Growth forecasts are not guaranteed, and while effort has to be made to ensure that services are provided if the growth is met, growth can be greater or lesser than the expected forecast. This can potentially create a surplus or deficit of funding available.

**Strategy to address:**

It is suggested that the growth of the Town should be reviewed on a yearly basis to determine if the forecast is accurate, and if possible the budgets should be adjusted accordingly.

**Assumptions**

Assumptions have been made in the report to fill data gaps and have been noted where undertaken. As with any assumption, risk exists in that the assumption made not account for a large enough percentage of the assets and could potentially results in unexpected costs if not corrected (i.e. year of installation assumed, when the asset is past its expected service life, and due to the degradation of the asset, effecting surrounding assets).

**Strategy to address:**

It is suggested that an inspection program should be developed utilizing the information provided herein to eliminate the largest assumptions. The new findings should then be used to adjust the report findings, correcting the asset management strategy if required.

## 5. Financing Strategy

***Having a financial plan is critical for putting an asset management plan into action. In addition, by having a strong financial plan, municipalities can demonstrate that they have made a concerted effort to integrate asset management planning with financial planning and budgeting and to make full use of all available infrastructure financing tools.***

### 5.1 Non-Infrastructure Solutions

As described in Section 4.1, there are a number of non-infrastructure solutions – actions or policies that can lower costs or extend asset life – that would greatly benefit the Town as they plan to sustainably manage their infrastructure assets. The forecasted costs of these recommended initiatives are presented in the following Table 5.1-1.

**Table 5.1-1: Non-Infrastructure Solution Estimated costs**

Program	Estimated Cost	Timeline	Notes
Water Conservation Plan	\$1,000	2014	Savings will be realized from less water pumped
Leak Detection Program	\$20,000	2014	Constant due diligence will minimize the water lost and savings from less pumped water
CCTV Inspection Program	\$3,000	2016	Constant video inspection will result in refining the preventative maintenance program
Drainage Maintenance Program	\$3,000	2015	Reinstalling ditch where its location was filled in by homeowner
Road Maintenance Plan	\$1,500	2014	Various road maintenance items to repair surface
Data Verification	\$12,000	2015	Obtain additional asset data and add other assets to the plan
Water Facility Inspections	\$4,000	2015	Review individual assets and determine existing age and estimated life
Sewage Treatment and Pumping Station Inspection	\$4,000	2015	Review individual assets and determine existing age and estimated life
<b>TOTAL</b>	<b>\$ 48,500</b>		

The timeline for these programs are indicated as occurring within the next 2-3 years but could be adjusted to suit any priorities the municipality determines to be more critical. Some of these tasks should occur annually and could be included with the annual operation and maintenance budget (i.e. Road maintenance plan).

## 5.2 Sustainable Asset Management

The Town realizes that to best manage its infrastructure assets, a financial plan is critical. The following section presents the Town’s forecast expenditures, summarizes the recommended funding to sustainably manage assets, and identifies their infrastructure funding shortfall.

Table 5.2-1 indicates the amount of money that should be going into the Towns reserves each year (plus 1%-2% for inflation) in preparation for rehabilitation while being used and reconstruction of each system at the end of the assets life expectancy. The amount indicated for the water distribution system and the sanitary collection system can be reduced to \$200,000 and \$150,000, respectively, after the 10 year plan of backlog work is complete. The values presented in Table 5.2-1 do not reflect any existing reserve money for each of the assets that the Town may have already accumulated.

**Table 5.2-1: Annual Asset Funding Needs – 10 Year Plan**

System	Asset	Amount per year	Total per year
<b>Water</b>	Water Distribution System	\$230,000.00	\$520,000.00
	Water Treatment Plant	\$220,000.00	
	Water Reservoir	\$70,000.00	
<b>Sanitary</b>	Sewage Collection System	\$320,000.00	\$401,000.00
	Sewage Pumping station	\$45,000.00	
	Sewage Lagoon	\$36,000.00	
<b>Roads and Drainage</b>	Roads	\$550,000.00	\$550,000.00
<b>Total</b>			\$1,471,000.00

The total amount of funds needed to maintain the existing Englehart infrastructure does not take into account and money already placed into reserve. The amount of money the Town needs to put into reserve each year to rehabilitate and /or reconstruct various assets as indicated above is beyond the capabilities of the Town and their tax base. To continue to maintain the level of service the rate payers have come to expect, the town will require putting aside the maximum funds it can into reserve and obtain additional funding sources from provincial or federal agencies. Undertaking construction using loans at minimal interest is also an option but is not desirable to the Town.

The Town will need to plan for rehabilitation and reconstruction of their assets and typical funding sources are indicated in Table 4.7-4.

**Table 5.2-2: Expenditure Funding Sources**

Expenditure Type	Description	Funding Source
<b>Operational</b>	Activities which have no effect on asset condition but are necessary to keep the asset utilized appropriately (i.e. power costs, Labour, etc.	Towns annual budget, user fees (i.e. water rates) and revenue (hook-up fees, etc.)
<b>Maintenance</b>	The ongoing day to day work required to keep assets operating at a required service level (i.e snow plowing, repairs, etc.)	Towns annual budget, user fees and revenues
<b>Rehabilitation and/or Replacement</b>	Significant work that restores or replaces an existing asset towards its original size, condition or capacity.	Towns annual budget, user fees, revenues, provincial & federal grants and loans
<b>New Capital Work</b>	Work to create a new asset, or to upgrade an existing asset beyond its original capacity or performance, in response to changes in usage, customer expectations, or anticipated future needs.	Towns annual budget, user fees, revenues, provincial & federal grants and loans

**Appendix A**

**Transportation System  
Inventory**

# Englehart Transportation System - January 2016

Section	Name	From	To	Roads Length (m)	Visual Condition Rating	Time for improvement years	Road Cost/m	Rehabilitation Road Cost	Road Replacement Cost
7	Tenth Ave E	Ninth Ave	First St	200.7	Fair	1-5	\$282	\$56,600.00	\$116,546.49
8	Tenth Ave W	First St	Second St	199.5	Fair	1-5	\$282	\$56,200.00	\$115,849.65
9	Tenth Ave W	Second St	Third St	201.0	Fair	1-5	\$282	\$56,700.00	\$116,720.70
10	Ninth Ave	River Road	First St	237.9	Poor	Now Rehab	\$282	\$67,100.00	\$138,148.53
11	Ninth Ave	First St	Second St	199.5	Poor	Now Rehab	\$282	\$56,200.00	\$115,849.65
12	Ninth Ave	Second St	Third St	202.6	Fair	1-5	\$282	\$57,100.00	\$117,649.82
13	Eighth Ave	River Road	First St	197.3	Fair	1-5	\$282	\$55,600.00	\$114,572.11
14	Eighth Ave	First St	Second St	201.0	Fair	1-5	\$282	\$56,700.00	\$116,720.70
15	Eighth Ave	Second St	Third St	202.6	Poor	Now Rehab	\$282	\$57,100.00	\$117,649.82
16	Eighth Ave	Third St	Fourth St	199.9	Fair	1-5	\$282	\$56,400.00	\$116,081.93
17	Seventh Ave	River Rod	First St	199.8	Fair	1-5	\$282	\$56,300.00	\$116,023.86
18	Seventh Ave	First St	Second St	201.8	Fair	1-5	\$282	\$56,900.00	\$117,185.26
19	Seventh Ave	Second St	Third St	201.0	Fair	1-5	\$282	\$56,700.00	\$116,720.70
20	Seventh Ave	Third St	Fourth St	198.0	Poor	Now Rehab	\$282	\$55,800.00	\$114,978.60
21	Sixth Ave	East End	First St	148.7	Poor	Now Rehab	\$282	\$41,900.00	\$86,350.09
22	Sixth Ave	First St	Second St	200.6	Fair	1-5	\$282	\$56,500.00	\$116,488.42
23	Sixth Ave	Second St	Third St	203.1	Fair	1-5	\$282	\$57,300.00	\$117,940.17
24	Sixth Ave	Third St	Fourth St	197.5	Fair	1-5	\$282	\$55,700.00	\$114,688.25
25	Sixth Ave	Fourth St	Fifth St	201.5	Poor	Now Rehab	\$282	\$56,800.00	\$117,011.05
26	Fifth Ave	First St	Second St	198.4	Fair	1-5	\$282	\$55,900.00	\$115,210.88
27	Fifth Ave	Second St	Third St	204.2	Fair	1-5	\$282	\$57,600.00	\$118,578.94
28	Fifth Ave	Third St	Fourth St	198.2	Fair	1-5	\$282	\$55,900.00	\$115,094.74
29	Fifth Ave	Fourth St	Fifth St	203.2	Fair	1-5	\$282	\$57,300.00	\$117,998.24
30	Fifth Ave	Fifth St	Sixth St	201.3	Poor	Now Rehab	\$282	\$56,700.00	\$116,894.91
31	Fifth Ave	Sixth St	West End	88.8	Fair	1-5	\$282	\$25,000.00	\$51,566.16
32	Fourth Ave	Second St	Third St	197.7	Fair	1-5	\$282	\$55,700.00	\$325,888.68
33	Fourth Ave	Third St	Fourth St	203.4	Fair	1-5	\$282	\$57,300.00	\$335,284.56
34	Fourth Ave	Fourth St	Fifth St	200.6	Poor	Now Rehab	\$282	\$56,500.00	\$116,488.42
35	Fourth Ave	Fifth St	Sixth St	201.8	Poor	Now Rehab	\$282	\$56,900.00	\$117,185.26
36	Fourth Ave	Sixth St	Seventh St	199.2	Poor	Now Rehab	\$282	\$56,200.00	\$115,675.44
37	Fourth Ave	Seventh St	Hwy 11	116.9	Fair	1-5	\$282	\$33,000.00	\$67,883.83
38	Third Ave	Railroad Rd	Fourth St	201.2	Fair	1-5	\$282	\$56,700.00	\$116,836.84
39	Third Ave	Fourth St	Fifth St	199.7	Fair	1-5	\$282	\$56,300.00	\$115,965.79
40	Third Ave	Fifth St	Sixth St	202.7	Fair	1-5	\$282	\$57,100.00	\$117,707.89
41	Third Ave	Sixth St	Seventh St	199.5	Fair	1-5	\$282	\$56,200.00	\$115,849.65
42	Second Ave	Fourth St	Fifth St	197.9	Poor	Now Rehab	\$282	\$55,800.00	\$114,920.53
43	Second Ave	Fifth St	Sixth St	201.0	Poor	Now Rehab	\$282	\$56,700.00	\$116,720.70
44	Second Ave	Sixth St	Seventh St	200.9	Poor	Now Rehab	\$282	\$56,600.00	\$116,662.63
45	Second Ave	Seventh St	Hwy 11	237.7	Poor	Now Rehab	\$282	\$67,000.00	\$138,032.39
46	King St W	Fifth St	Sixth St	203.6	Poor	Now Rehab	\$282	\$57,400.00	\$118,230.52
47	King St W	Sixth St	Seventh St	196.7	Poor	Now Rehab	\$282	\$55,400.00	\$114,223.69
48	Diamond St	Fifth St	West End	114.5	Fair	1-5	\$282	\$32,300.00	\$66,490.15
49	Second Ave E	First St	East End	102.6	Poor	Now Rehab	\$282	\$28,900.00	\$59,579.82
50	Prince St	First St	East End	101.2	Very Poor	Now Recon	\$581	\$58,800.00	\$58,766.84
51	King St E	First St	East End	101.7	Fair	1-5	\$282	\$28,700.00	\$59,057.19
52	Lagoon Rd	First St	Lagoon	833.8	Poor	Now Rehab	\$39	\$32,400.00	\$484,187.66
53	Queen St	First St	East End	86.8	Poor	Now Rehab	\$282	\$24,500.00	\$50,404.76
84	First St	Hwy 11	Tenth Ave W	95.5	Poor	Now Rehab	\$282	\$26,900.00	\$55,456.85
85	First St	Tenth Ave W	Tenth Ave E	21.7	Poor	Now Rehab	\$282	\$6,100.00	\$12,601.19
86	First St	Tenth Ave E	Ninth Ave	89.4	Fair	1-5	\$282	\$25,200.00	\$51,914.58
87	First St	Ninth Ave	Eigth Ave	99.8	Fair	1-5	\$282	\$28,100.00	\$57,953.86
88	First St	Eight Ave	Seventh Ave	105.8	Excellent	10 - 18	\$282	\$29,800.00	\$61,438.06

89	First St	Seventh Ave	Sixth Ave	106.4	Excellent	10 - 18	\$282	\$30,000.00	\$61,786.48	
90	First St	Sixth Ave	Fifth Ave	105.9	Excellent	10 - 18	\$282	\$29,900.00	\$61,496.13	
91	First St	Fifth Ave	Second Ave W	265.4	Fair	1-5	\$282	\$74,800.00	\$154,117.78	
92	First St	Second ave W	Prince St	57.1	Fair	1-5	\$282	\$16,100.00	\$33,157.97	
93	First St	Prince St	King St E	96.9	Fair	1-5	\$282	\$27,300.00	\$56,269.83	
94	First St	King St E	Quenn St	100.7	Fair	1-5	\$282	\$28,400.00	\$58,476.49	
95	First St	Queen St	N Town Limit	551.5	Fair	1-5	\$282	\$155,500.00	\$320,256.05	
96	Second St	Hwy 11	Tenth Ave	126.8	Good	6-10	\$282	\$35,700.00	\$73,632.76	
97	Second St	Tenth Ave	Ninth Ave	107.1	Fair	1-5	\$282	\$30,200.00	\$62,192.97	
98	Second St	Ninth Ave	Eighth Ave	103.7	Poor	Now Rehab	\$282	\$29,200.00	\$60,218.59	
99	Second St	Eight Ave	Seventh Ave	105.2	Poor	Now Rehab	\$282	\$29,700.00	\$61,089.64	
100	Second St	Seventh Ave	Sixth Ave	106.0	Poor	Now Rehab	\$282	\$29,900.00	\$61,554.20	
101	Second St	Sixth Ave	Fifth Ave	102.6	Poor	Now Rehab	\$282	\$28,900.00	\$59,579.82	
102	Second St	Fifth Ave	Fourth Ave	106.7	Poor	Now Rehab	\$282	\$30,100.00	\$61,960.69	
103	Third St	Hwy 11	Tenth Ave	106.0	Poor	Now Rehab	\$282	\$29,900.00	\$61,554.20	
104	Third St	Tenth Ave	Ninth Ave	105.3	Good	6-10	\$282	\$29,700.00	\$61,147.71	
105	Third St	Ninth Ave	Eighth Ave	105.0	Fair	1-5	\$282	\$29,600.00	\$60,973.50	
106	Third St	Eight Ave	Seventh Ave	50.0	Fair	1-5	\$282	\$14,100.00	\$29,035.00	
106	Third St	Eight Ave	Seventh Ave	53.6	Poor	Now Rehab	\$282	\$15,100.00	\$31,125.52	
107	Third St	Seventh Ave	Sixth Ave	108.2	Poor	Now Rehab	\$282	\$30,500.00	\$62,831.74	
108	Third St	Sixth Ave	Fifth Ave	104.2	Fair	1-5	\$282	\$29,400.00	\$171,763.28	
109	Third St	Fifth Ave	Fourth Ave	102.2	Poor	Now Rehab	\$282	\$28,800.00	\$168,466.48	
110	Third St	Fourth Ave	Third Ave	107.0	Poor	Now Rehab	\$282	\$30,200.00	\$176,378.80	
111	Fourth St	Ninth Ave	Eighth Ave	91.8	Fair	1-5	\$282	\$25,900.00	\$53,308.26	
112	Fourth St	Eight Ave	Seventh Ave	103.1	fair	1-5	\$282	\$29,100.00	\$59,870.17	
113	Fourth St	Seventh Ave	Sixth Ave	105.6	Fair	1-5	\$282	\$29,800.00	\$61,321.92	
114	Fourth St	Sixth Ave	Fifth Ave	106.7	Poor	Now Rehab	\$282	\$30,100.00	\$61,960.69	
115	Fourth St	Fifth Ave	Fourth Ave	101.5	Poor	Now Rehab	\$282	\$28,600.00	\$58,941.05	
116	Fourth St	Fourth Ave	Third Ave	104.9	Poor	Now Rehab	\$282	\$29,600.00	\$60,915.43	
117	Fourth St	Third Ave	Second Ave	62.0	Poor	Now Rehab	\$282	\$17,500.00	\$36,003.40	
118	Fifth St	Hwy 11	Sixth Ave	300.3	Fair	1-5	\$282	\$84,700.00	\$174,384.21	
119	Fifth St	Sixth Ave	Fifth Ave	104.4	fair	1-5	\$282	\$29,400.00	\$60,625.08	
120	Fifth St	Fifth Ave	Fourth Ave	103.7	Excellent	10 - 18	\$282	\$29,200.00	\$60,218.59	
121	Fifth St	Fourth Ave	Third Ave	105.4	Excellent	10 - 18	\$282	\$29,700.00	\$61,205.78	
122	Fifth St	Third Ave	Second Ave	61.9	Excellent	10 - 18	\$282	\$17,400.00	\$35,945.33	
123	Fifth St	Second Ave	King St W	103.7	Excellent	10 - 18	\$282	\$29,200.00	\$60,218.59	
124	Fifth St	King St W	Diamond St	70.0	Excellent	10 - 18	\$282	\$19,700.00	\$40,649.00	
125	Sixth St	Fifth Ave	Fourth Ave	102.4	Poor	Now Rehab	\$282	\$28,900.00	\$59,463.68	
126	Sixth St	Fourth Ave	Third Ave	104.2	Good	6-10	\$282	\$29,400.00	\$60,508.94	
127	Sixth St	Third Ave	Second Ave	61.5	Fair	1-5	\$282	\$17,300.00	\$35,713.05	
128	Sixth St	Second Ave	King St W	102.4	Fair	1-5	\$282	\$28,900.00	\$59,463.68	
129	Sixth St	King St W	North End	54.1	Fair	1-5	\$282	\$15,300.00	\$31,415.87	
130	Seventh St	Lane 4-5	Fourth Ave	53.7	poor	Now Rehab	\$282	\$15,100.00	\$31,183.59	
131	Seventh St	Fourth Ave	Third Ave	101.6	Poor	Now Rehab	\$282	\$28,600.00	\$58,999.12	
132	Seventh St	Third Ave	Second Ave	58.5	Fair	1-5	\$282	\$16,500.00	\$33,970.95	
133	Seventh St	Second Ave	King St W	102.9	Poor	Now Rehab	\$282	\$29,000.00	\$59,754.03	
134	Seventh St	King St W	North End	53.3	Fair	1-5	\$282	\$15,000.00	\$30,951.31	
135	River Rd	Ninth Ave	Eighth Ave	254.5	Fair	1-5	\$282	\$71,700.00	\$147,788.15	
136	River Rd	Eighth Ave	Seventh Ave	107.0	Fair	1-5	\$282	\$30,200.00	\$62,134.90	
137	River Rd	Seventh Ave	Lane 6-7	52.6	Fair	1-5	\$282	\$14,800.00	\$30,544.82	
								15418.6	\$4,174,100.00	\$9,716,452.67

**Appendix B**

**Drainage System Inventory**



# Englehart Drainage System January 2016

Section	Name	From	To	Roads Length (m)	Visual Condition Rating	Drainage	Storm Sewer	Structure	Ditch inlet Catch Basin	Ditching Length (m)	Total Cost to Reconstruct	Drainage Needs Cost
7	Tenth Ave E	Ninth Ave	First St	200.7	Fair	Swale				401.4	\$47,900	\$47,900
8	Tenth Ave W	First St	Second St	199.5	Fair	Storm/Ditch			1.0	399.0	\$55,800	\$55,800
9	Tenth Ave W	Second St	Third St	201.0	Fair	Storm/Ditch			3.0	402.0	\$72,400	\$72,400
10	Ninth Ave	River Road	First St	237.9	Poor	Ditch			2.0	475.8	\$92,200	\$92,200
11	Ninth Ave	First St	Second St	199.5	Poor	Ditch			1.0	399.0	\$71,600	\$71,600
12	Ninth Ave	Second St	Third St	202.6	Fair	Ditch			5.0	405.2	\$104,700	\$104,700
13	Eighth Ave	River Road	First St	197.3	Fair	Storm/Ditch			5.0	394.6	\$94,400	\$94,400
14	Eighth Ave	First St	Second St	201.0	Fair	Storm/Ditch			4.0	402.0	\$99,500	\$99,500
15	Eighth Ave	Second St	Third St	202.6	Poor	Storm/Ditch			3.0	405.2	\$85,200	\$85,200
16	Eighth Ave	Third St	Fourth St	199.9	Fair	Storm/Ditch			4.0	399.8	\$70,900	\$70,900
17	Seventh Ave	River Rod	First St	199.8	Fair	Storm/Ditch			3.0	399.6	\$97,400	\$97,400
18	Seventh Ave	First St	Second St	201.8	Fair	Storm/Ditch			5.0	403.6	\$110,900	\$110,900
19	Seventh Ave	Second St	Third St	201.0	Fair	Storm/Ditch			4.0	402.0	\$96,300	\$96,300
20	Seventh Ave	Third St	Fourth St	198.0	Poor	Storm/Ditch	150.0		3.0	396.0	\$153,200	\$153,200
21	Sixth Ave	East End	First St	148.7	Poor	Storm/Ditch			2.0	297.4	\$62,200	\$62,200
22	Sixth Ave	First St	Second St	200.6	Fair	Storm/Ditch	44.0		1.0	401.2	\$106,400	\$106,400
23	Sixth Ave	Second St	Third St	203.1	Fair	Storm/Ditch			3.0	406.2	\$88,500	\$88,500
24	Sixth Ave	Third St	Fourth St	197.5	Fair	Storm/Ditch	190.0		2.0	395.0	\$158,700	\$158,700
25	Sixth Ave	Fourth St	Fifth St	201.5	Poor	Storm/Ditch			2.0	403.0	\$73,700	\$73,700
26	Fifth Ave	First St	Second St	198.4	Fair	Storm/Ditch			2.0	396.8	\$57,500	\$57,500
27	Fifth Ave	Second St	Third St	204.2	Fair	Storm/Ditch			4.0	408.4	\$81,100	\$81,100
28	Fifth Ave	Third St	Fourth St	198.2	Fair	Storm	200.0		2.0	396.4	\$179,500	\$179,500
29	Fifth Ave	Fourth St	Fifth St	203.2	Fair	Ditch			8.0	406.4	\$126,100	\$126,100
30	Fifth Ave	Fifth St	Sixth St	201.3	Poor	Storm/Ditch			6.0	402.6	\$106,300	\$106,300
31	Fifth Ave	Sixth St	West End	88.8	Fair	Ditch			2.0	177.6	\$40,000	\$40,000
32	Fourth Ave	Second St	Third St	197.7	Fair	Storm	190.0		6.0	395.4	\$156,600	\$156,600
33	Fourth Ave	Third St	Fourth St	203.4	Fair	Storm	200.0	7.0		406.8	\$167,500	\$167,500
34	Fourth Ave	Fourth St	Fifth St	200.6	Poor	Storm	200.0	4.0		401.2	\$171,000	\$171,000
35	Fourth Ave	Fifth St	Sixth St	201.8	Poor	Storm/Ditch	200.0		4.0	403.6	\$196,400	\$196,400
36	Fourth Ave	Sixth St	Seventh St	199.2	Poor	Storm/Ditch	200.0		8.0	398.4	\$209,700	\$209,700
37	Fourth Ave	Seventh St	Hwy 11	116.9	Fair	Ditch				233.8	\$28,200	\$28,200
38	Third Ave	Railroad Rd	Fourth St	201.2	Fair	Storm/Ditch			2.0	402.4	\$54,800	\$54,800
39	Third Ave	Fourth St	Fifth St	199.7	Fair	Ditch				399.4	\$69,800	\$69,800
40	Third Ave	Fifth St	Sixth St	202.7	Fair	Storm/Ditch			1.0	405.4	\$81,500	\$81,500
41	Third Ave	Sixth St	Seventh St	199.5	Fair	Storm/Ditch			1.0	399.0	\$81,000	\$81,000
42	Second Ave	Fourth St	Fifth St	197.9	Poor	Storm/Ditch				395.8	\$56,900	\$56,900
43	Second Ave	Fifth St	Sixth St	201.0	Poor	Storm/Ditch				402.0	\$48,000	\$48,000
44	Second Ave	Sixth St	Seventh St	200.9	Poor	Storm/Ditch				401.8	\$51,000	\$51,000
45	Second Ave	Seventh St	Hwy 11	237.7	Poor	Ditch				475.4	\$60,100	\$60,100
46	King St W	Fifth St	Sixth St	203.6	Poor	Storm/Ditch			4.0	407.2	\$77,800	\$77,800
47	King St W	Sixth St	Seventh St	196.7	Poor	Storm/Ditch			2.0	393.4	\$73,000	\$73,000
48	Diamond St	Fifth St	West End	114.5	Fair	Ditch				229.0	\$30,900	\$30,900
49	Second Ave E	First St	East End	102.6	Poor	Ditch				205.2	\$25,900	\$25,900
50	Prince St	First St	East End	101.2	Very Poor	Swale				202.4	\$25,700	\$25,700
51	King St E	First St	East End	101.7	Fair	Swale				203.4	\$25,800	\$25,800
52	Lagoon Rd	First St	Lagoon	833.8	Poor	Ditch				1667.6	\$155,500	\$155,500
53	Queen St	First St	East End	86.8	Poor	Swale				173.6	\$13,900	\$13,900
84	First St	Hwy 11	Tenth Ave W	95.5	Poor	Ditch			2.0	191.0	\$34,800	\$34,800
85	First St	Tenth Ave W	Tenth Ave E	21.7	Poor	Ditch			1.0	43.4	\$24,300	\$24,300
86	First St	Tenth Ave E	Ninth Ave	89.4	Fair	Ditch				178.8	\$14,300	\$14,300
87	First St	Ninth Ave	Eighth Ave	99.8	Fair	Ditch			1.0	199.6	\$33,600	\$33,600
88	First St	Eighth Ave	Seventh Ave	105.8	Excellent	Ditch			2.0	211.6	\$36,400	\$0
89	First St	Seventh Ave	Sixth Ave	106.4	Excellent	Ditch				212.8	\$17,000	\$0
90	First St	Sixth Ave	Fifth Ave	105.9	Excellent	Ditch			1.0	211.8	\$28,200	\$0
91	First St	Fifth Ave	Second Ave W	265.4	Fair	Ditch				530.8	\$48,800	\$48,800
92	First St	Second Ave W	Prince St	57.1	Fair	Ditch				114.2	\$15,400	\$15,400
93	First St	Prince St	King St E	96.9	Fair	Ditch				193.8	\$34,400	\$34,400
94	First St	King St E	Queen St	100.7	Fair	Ditch				201.4	\$38,200	\$38,200
95	First St	Queen St	N Town Limit	551.5	Fair	Ditch				1103.0	\$167,000	\$167,000
96	Second St	Hwy 11	Tenth Ave	126.8	Good	Ditch				253.6	\$26,600	\$0
97	Second St	Tenth Ave	Ninth Ave	107.1	Fair	Storm/Ditch				214.2	\$29,700	\$29,700
98	Second St	Ninth Ave	Eighth Ave	103.7	Poor	Storm/Ditch				207.4	\$32,400	\$32,400
99	Second St	Eighth Ave	Seventh Ave	105.2	Poor	Storm			2.0	210.4	\$36,300	\$36,300
100	Second St	Seventh Ave	Sixth Ave	106.0	Poor	Storm				212.0	\$26,500	\$26,500
101	Second St	Sixth Ave	Fifth Ave	102.6	Poor	Storm			2.0	205.2	\$26,400	\$26,400
102	Second St	Fifth Ave	Fourth Ave	106.7	Poor	Storm			2.0	213.4	\$27,100	\$27,100

103	Third St	Hwy 11	Tenth Ave	106.0	Poor	Ditch			212.0	\$23,300	\$23,300	
104	Third St	Tenth Ave	Ninth Ave	105.3	Good	Storm/Ditch		3.0	210.6	\$44,400	\$0	
105	Third St	Ninth Ave	Eighth Ave	105.0	Fair	Storm/Ditch		3.0	210.0	\$47,600	\$47,600	
106	Third St	Eighth Ave	Seventh Ave	50.0	Fair	Storm/Ditch		1.0	100.0	\$25,600	\$25,600	
106	Third St	Eighth Ave	Seventh Ave	53.6	Poor	Storm/Ditch		2.0	107.2	\$28,100	\$28,100	
107	Third St	Seventh Ave	Sixth Ave	108.2	poor	Storm		1.0	2.0	216.4	\$32,300	\$32,300
108	Third St	Sixth Ave	Fifth Ave	104.2	Fair	Storm		2.0	208.4	\$26,700	\$26,700	
109	Third St	Fifth Ave	Fourth Ave	102.2	Poor	Storm		6.0	204.4	\$46,400	\$46,400	
110	Third St	Fourth Ave	Third Ave	107.0	Poor	Storm		2.0	214.0	\$27,100	\$27,100	
111	Fourth St	Ninth Ave	Eighth Ave	91.8	Fair	Ditch			183.6	\$14,700	\$14,700	
112	Fourth St	Eighth Ave	Seventh Ave	103.1	fair	Storm		4.0	206.2	\$55,400	\$55,400	
113	Fourth St	Seventh Ave	Sixth Ave	105.6	Fair	Storm/Ditch		4.0	211.2	\$49,500	\$49,500	
114	Fourth St	Sixth Ave	Fifth Ave	106.7	Poor	Storm/Ditch			213.4	\$32,900	\$32,900	
115	Fourth St	Fifth Ave	Fourth Ave	101.5	Poor	Storm/Ditch		3.0	203.0	\$40,700	\$40,700	
116	Fourth St	Fourth Ave	Third Ave	104.9	Poor	Storm/Ditch		1.0	209.8	\$40,700	\$40,700	
117	Fourth St	Third Ave	Second Ave	62.0	Poor	Ditch			124.0	\$13,100	\$13,100	
118	Fourth St	Hwy 11	Sixth Ave	300.3	Fair	Storm/Ditch			600.6	\$57,500	\$57,500	
119	Fifth St	Sixth Ave	Fifth Ave	104.4	fair	Ditch	100.0	1.0	208.8	\$90,600	\$90,600	
120	Fifth St	Fifth Ave	Fourth Ave	103.7	Excellent	Ditch	100.0	1.0	207.4	\$90,500	\$0	
121	Fifth St	Fourth Ave	Third Ave	105.4	Excellent	Storm/Ditch	100.0	1.0	1.0	210.8	\$83,200	\$0
122	Fifth St	Third Ave	Second Ave	61.9	Excellent	Storm/Ditch	60.0	3.0	123.8	\$58,100	\$0	
123	Fifth St	Second Ave	King St W	103.7	Excellent	Storm/Ditch			207.4	\$19,800	\$0	
124	Fifth St	King St W	Diamond St	70.0	Excellent	Ditch			140.0	\$14,400	\$0	
125	Sixth St	Fifth Ave	Fourth Ave	102.4	Poor	Storm/Ditch		1.0	204.8	\$37,200	\$37,200	
126	Sixth St	Fourth Ave	Third Ave	104.2	Good	Storm/Ditch			208.4	\$26,200	\$0	
127	Sixth St	Third Ave	Second Ave	61.5	Fair	Storm/Ditch			123.0	\$19,300	\$19,300	
128	Sixth St	Second Ave	King St W	102.4	Fair	Storm/Ditch			204.8	\$29,000	\$29,000	
129	Sixth St	King St W	North End	54.1	Fair	Ditch			108.2	\$8,700	\$8,700	
130	Seventh St	Lane 4-5	Fourth Ave	53.7	poor	Swale		2.0	107.4	\$24,900	\$24,900	
131	Seventh St	Fourth Ave	Third Ave	101.6	Poor	Storm/Ditch			203.2	\$22,600	\$22,600	
132	Seventh St	Third Ave	Second Ave	58.5	Fair	Ditch			117.0	\$18,900	\$18,900	
133	Seventh St	Second Ave	King St W	102.9	Poor	Ditch		2.0	205.8	\$36,000	\$36,000	
134	Seventh St	King St W	North End	53.3	Fair	Ditch		1.0	106.6	\$19,800	\$19,800	
135	River Rd	Ninth Ave	Eighth Ave	254.5	Fair	Storm/Ditch			509.0	\$43,900	\$43,900	
136	River Rd	Eighth Ave	Seventh Ave	107.0	Fair	Storm/Ditch			214.0	\$20,300	\$20,300	
137	River Rd	Seventh Ave	Lane 6-7	52.6	Fair	Swale			105.2	\$17,900	\$17,900	
				15418.6						\$ 6,178,100	\$5,733,300	

**Appendix C**

**Water System Inventory**

# Englehart Water System

## January 2016

Section	Name	From	To	SIZE	LENGTH	MATERIAL	Estimated Year installed	Estimated Life of Asset	Age (to 2013)	Remaining Useful Life	Date to Replace	Total Cost (2013 \$)
4	Hwy 11	Third St	Fifth St	150	225.0	PVC	1955	100	58	42	2055	\$132,400
7	Tenth Ave E	Ninth Ave	First St	100	208.0	Cast Iron	1950	100	63	37	2050	\$121,700
8	Tenth Ave W	First St	Second St	150	203.0	Cast Iron	1950	100	63	37	2050	\$143,280
9	Tenth Ave W	Second St	Third St	150	206.0	Cast Iron	1950	100	63	37	2050	\$146,960
10	Ninth Ave	River Road	First St	150	388.0	Cast Iron	1950	100	63	37	2050	\$255,780
17	Eighth Ave	Fourth St	Fifth St	50	220.0	Copper	1955	100	58	42	2055	\$88,000
43	Second Ave	Fourth St	Fifth St	150	202.0	PVC	2016	100	-3	103	2116	\$161,720
44	Second Ave	Sixth St	Sixth St	50	150.0	Copper	1946	100	67	33	2046	\$73,100
45	Second Ave	Sixth St	Seventh St	50	201.0	Copper	1946	100	67	33	2046	\$98,600
46	Second Ave	Seventh St	Hwy 11	100	305.0	Ductile Iron	1982	100	31	69	2082	\$165,900
49	Diamond St	Fifth St	West End	100	110.0	Cast Iron	1946	100	67	33	2046	\$57,000
51	Prince St	First St	East End	38	100.0	Copper	1935	100	78	22	2035	\$54,500
52	King St E	First St	East End	38	100.0	Copper	1935	100	78	22	2035	\$50,500
54	Queen St	First St	East End	50	95.0	Copper	1935	100	78	22	2035	\$47,100
55	Lane 9-10	First St	Second St	150	203.0	Cast Iron	1958	100	55	45	2058	\$149,780
56	Lane 9-10	Second St	Third St	150	214.0	Cast Iron	1958	100	55	45	2058	\$157,940
56	Lane 8-9	First St	Second St	150	199.0	Cast Iron	1946	100	67	33	2046	\$159,940
57	Lane 8-9	First St	River	150	200.0	Cast Iron	1946	100	67	33	2046	\$158,100
58	Lane 8-9	Second St	Third St	150	210.0	Cast Iron	1946	100	67	33	2046	\$155,200
59	Lane 7-8	River Rd	First St	150	199.0	PVC	2016	100	-3	103	2116	\$153,540
60	Lane 7-8	First St	Second St	150	200.0	PVC	2007	100	6	94	2107	\$151,600
61	Lane 7-8	Second St	Third St	150	208.0	PVC	2007	100	6	94	2107	\$158,580
62	Lane 7-8	Third St	Fourth St	150	195.0	PVC	2009	100	4	96	2109	\$154,900
63	Lane 6-7	River Rd	First St	50	207.0	Copper	1930	100	83	17	2030	\$115,900
64	Lane 6-7	First St	Second St	150	194.0	PVC	2007	100	6	94	2107	\$152,340
65	Lane 6-7	Second St	Third St	150	204.0	PVC	2007	100	6	94	2107	\$163,940
66	Lane 6-7	Third St	Fourth St	150	206.0	PVC	2007	100	6	94	2107	\$156,160
67	Lane 5-6	First St	Second St	300	202.0	PVC	2007	100	6	94	2107	\$184,650
68	Lane 5-6	Second St	Third St	150	203.0	PVC	1990	100	23	77	2090	\$154,880
69	Lane 5-6	Third St	Fourth St	150	202.0	PVC	2016	100	-3	103	2116	\$136,320
70	Lane 5-6	Fourth St	Fifth St	150	224.0	PVC	2009	100	4	96	2109	\$155,040
71	Lane 5-6	Fifth St	West End	150	265.0	Cast Iron	1970	100	43	57	2070	\$176,500
72	Lane 4-5	Second St	Third St	250	205.0	PVC	2007	100	6	94	2107	\$161,400
73	Lane 4-5	Third St	Fourth St	150	199.0	PVC	2007	100	6	94	2107	\$155,340
74	Lane 4-5	Fourth St	Fifth St	150	203.0	Cast Iron	1916	100	97	3	2016	\$142,880
75	Lane 4-5	Fifth St	Sixth St	150	204.0	Cast Iron	1946	100	67	33	2046	\$157,740
76	Lane 4-5	Sixth St	Seventh Ave	150	201.0	Cast Iron	1976	100	37	63	2076	\$114,160
77	Lane 3-4	Third Ave	Fourth St	150	202.0	Cast Iron	1916	100	97	3	2016	\$167,720
78	Lane 3-4	Fourth St	Fifth St	150	200.0	PVC	2016	100	-3	103	2116	\$140,000
79	Lane 3-4	Fifth St	Sixth St	150	203.0	unknown	1955	100	58	42	2055	\$155,380
80	Lane 3-4	Sixth St	Seventh Ave	150	199.0	unknown	1955	100	58	42	2055	\$151,640
79	Lane 3-4	Seventh St	End	150	150.0	unknown	1955	100	58	42	2055	\$100,200
81	Lane King-2	Fifth St	Sixth St	150	203.0	Ductile Iron	1980	100	33	67	2080	\$139,380
82	Lane King-2	Sixth St	Seventh St	250	197.0	Ductile Iron	1982	100	31	69	2082	\$163,680
83	Lane Clair-King	Fifth St	Sixth St	150	200.0	Ductile Iron	1978	100	35	65	2078	\$138,100
84	Lane Clair-King	Sixth St	Seventh St	150	200.0	Ductile Iron	1978	100	35	65	2078	\$137,700
85	First St	Hwy 11	Tenth Ave W	50	250.0	Copper	1950	100	63	37	2050	\$104,000
86	First St	Tenth Ave W	Tenth Ave E	150	10.0	Cast Iron	1950	100	63	37	2050	\$17,700
87	First St	Tenth Ave E	Ninth Ave	150	87.5	Cast Iron	1950	100	63	37	2050	\$60,300
88	First St	Ninth Ave	Eighth Ave	150	42.0	Cast Iron	1946	100	67	33	2046	\$25,120
89	First St	Eight Ave	Seventh Ave	150	58.0	PVC	2013	100	0	100	2113	\$40,580
90	First St	Seventh Ave	Sixth Ave	150	105.0	PVC	2013	100	0	100	2113	\$68,500
91	First St	Sixth Ave	Fifth Ave	150	80.0	PVC	2013	100	0	100	2113	\$54,500
92	First St	Fifth Ave	Second Ave W	150	220.0	Ductile Iron	1972	100	41	59	2072	\$147,100
93	First St	Second ave W	Prince St	150	56.0	Ductile Iron	1972	100	41	59	2072	\$43,460
94	First St	Prince St	King St E	150	95.0	Ductile Iron	1972	100	41	59	2072	\$59,200
95	First St	King St E	Quenn St	150	109.0	Ductile Iron	1972	100	41	59	2072	\$79,140
96	First St	Queen St	N Town Limit	150	452.0	Ductile Iron	1972	100	41	59	2072	\$323,720
96.1	First St	Queen St	N Town Limit	50	150.0	Copper	1972	100	41	59	2072	\$79,600
97	Second St	Hwy 11	Tenth Ave	150	62.0	unknown	1950	100	63	37	2050	\$41,220
102	Second St	Sixth Ave	Fifth Ave	200	52.0	PVC	1986	100	27	73	2086	\$31,200
103	Second St	Fifth Ave	Fourth Ave	200	52.0	PVC	1986	100	27	73	2086	\$31,200
102	Second St	Fifth Ave	Fourth Ave	100	54.0	PVC	1986	100	27	73	2086	\$27,000
104	Third St	Hwy 11	Tenth Ave	150	106.0	Cast Iron	2009	100	4	96	2109	\$59,360
105	Third St	Tenth Ave	Ninth Ave	150	105.0	PVC	2009	100	4	96	2109	\$70,700

106	Third St	Ninth Ave	Eighth Ave	150	105.0	PVC	2009	100	4	96	2109	\$68,900
107	Third St	Eight Ave	Seventh Ave	150	55.0	PVC	2009	100	4	96	2109	\$40,900
108	Third St	Seventh Ave	Sixth Ave	150	108.0	unknown	1987	100	26	74	2087	\$68,580
109	Third St	Sixth Ave	Fifth Ave	150	104.0	unknown	1987	100	26	74	2087	\$58,240
110	Third St	Fifth Ave	Fourth Ave	150	102.0	unknown	1987	100	26	74	2087	\$65,220
111	Third St	Fourth Ave	Third Ave	150	50.0	unknown	1987	100	26	74	2087	\$29,600
	Third St	Fourth Ave	Third Ave	100	49.0	unknown	2009	100	4	96	2109	\$24,500
112	Fourth St	Ninth Ave	Eighth Ave	150	91.0	PVC	2009	100	4	96	2109	\$52,560
113	Fourth St	Eight Ave	Seventh Ave	150	103.1	PVC	2009	100	4	96	2109	\$77,636
114	Fourth St	Seventh Ave	Sixth Ave	150	105.6	PVC	2009	100	4	96	2109	\$71,236
115	Fourth St	Sixth Ave	Fifth Ave	150	50.0	PVC	2009	100	4	96	2109	\$36,100
117	Fourth St	Fourth Ave	Third Ave	100	55.0	PVC	2009	100	4	96	2109	\$27,500
118	Fourth St	Third Ave	Second Ave	100	60.0	PVC	2009	100	4	96	2109	\$30,000
119	Fifth St	Hwy 11	Sixth Ave	100	115.0	PVC	2009	100	4	96	2109	\$57,500
118	Eighth Ave	Fifth St	fourth St	100	214.0	Cast Iron	1978	100	35	65	2078	\$113,400
120	Fifth St	Sixth Ave	Fifth Ave	150	56.0	PVC	2009	100	4	96	2109	\$43,460
121	Fifth St	Fifth Ave	Fourth Ave	150	104.0	PVC	2009	100	4	96	2109	\$70,340
122	Fifth St	Fourth Ave	Third Ave	150	105.0	PVC	2009	100	4	96	2109	\$68,900
123	Fifth St	Third Ave	Second Ave	150	62.0	PVC	2009	100	4	96	2109	\$46,820
124	Fifth St	Second Ave	King St W	150	104.0	PVC	2009	100	4	96	2109	\$63,840
125	Fifth St	King St W	Diamond St	150	42.0	PVC	2009	100	4	96	2109	\$31,620
128	Sixth St	Third Ave	Second Ave	100	61.0	Ductile Iron	1974	100	39	61	2074	\$39,600
129	Sixth St	Second Ave	King St W	100	96.0	Ductile Iron	1974	100	39	61	2074	\$55,800
131	Seventh St	Lane 4-5	Fourth Ave	100	58.0	unknown	1955	100	58	42	2055	\$29,000
131	Seventh St	Lane 4-5	Fourth Ave	100	58.0	unknown	1955	100	58	42	2055	\$29,000
132	Seventh St	Fourth Ave	Third Ave	100	102.0	unknown	1955	100	58	42	2055	\$60,100
133	Seventh St	Third Ave	Second Ave	100	58.5	unknown	1955	100	58	42	2055	\$29,250
134	Seventh St	Second Ave	King St W	100	103.0	unknown	1955	100	58	42	2055	\$65,800
135	Seventh St	King St W	North End	100	54.0	unknown	1955	100	58	42	2055	\$27,000
136	River Rd	Ninth Ave	Eighth Ave	150	80.0	unknown	1955	100	58	42	2055	\$51,300
137	River Rd	Eighth Ave	Seventh Ave	150	90.0	unknown	1955	100	58	42	2055	\$58,500
138	Lane 8-9	First St	Second St	150	214.0	Cast Iron	1946	100	67	33	2046	\$155,840
139	Railroad Rd	Fourth Ave	Third St	100	150.0	Cast Iron	1946	100	67	33	2046	\$76,300
140	River road	Lane 7-8	Lane 6-7	100	110.0		1930					\$57,000

14433.7

\$9,617,912

**Appendix D**

**Sanitary System Inventory**

# Englehart Sanitary System January 2016

Section	Name	From	To	Size	Length	Estimated Year installed	Cost to Replace San Sewer (2013 \$)	Cost to Replace Structure (2013 \$)	Cost to Replace Services (2013 \$)	Total Cost (2013 \$)
7	Tenth Ave E	Ninth Ave	First St	200	148	1950	\$74,000	\$12,000	\$10,000	\$96,000
10	Ninth Ave	River Road	First St	200	218	1950	\$109,000	\$18,000	\$22,000	\$149,000
16	Eighth Ave	Fouth ST	Fifth St	150	221	1970	\$110,500	\$0	\$8,000	\$118,500
42	Second Ave	Fourth St	Fifth St	300	193	1946	\$100,360	\$0	\$34,000	\$134,360
50	Prince St	First St	East End	200	100	1935	\$50,000	\$6,000	\$16,000	\$72,000
51	King St E	First St	East End	200	100	1935	\$50,000	\$6,000	\$12,000	\$68,000
53	Queen St	First St	East End	200	100	1935	\$50,000	\$6,000	\$6,000	\$62,000
54	Lane 9-10	First St	Second St	250	200	1958	\$102,000	\$18,000	\$28,000	\$148,000
55	Lane 9-10	Second St	Third St	250	200	1958	\$102,000	\$12,000	\$30,000	\$144,000
56	Lane 8-9	First St	Second St	250	200	1946	\$102,000	\$12,000	\$36,000	\$150,000
56.1	Lane 8-9	River	First St	250	200	1946	\$102,000	\$6,000	\$38,000	\$146,000
57	Lane 8-9	Second St	Third St	250	202	1946	\$103,020	\$12,000	\$38,000	\$153,020
58	Lane 7-8	River Rd	First St	200	196	1930	\$98,000	\$12,000	\$32,000	\$142,000
59	Lane 7-8	First St	Second St	200	187	2007	\$93,500	\$6,000	\$34,000	\$133,500
60	Lane 7-8	Second St	Third St	200	213.5	2007	\$106,750	\$6,000	\$34,000	\$146,750
61	Lane 7-8	Third St	Fourth St	200	195.7	2009	\$97,850	\$6,000	\$36,000	\$139,850
62	Lane 6-7	River Rd	First St	200	195	1930	\$97,500	\$6,000	\$32,000	\$135,500
63	Lane 6-7	First St	Second St	200	196.8	2007	\$98,400	\$6,000	\$36,000	\$140,400
64	Lane 6-7	Second St	Third St	200	223.5	2007	\$111,750	\$6,000	\$40,000	\$157,750
65	Lane 6-7	Third St	Fourth St	200	204	2007	\$102,000	\$6,000	\$36,000	\$144,000
66	Lane 5-6	First St	Second St	200	200	2007	\$100,000	\$12,000	\$36,000	\$148,000
67	Lane 5-6	Second St	Third St	200	202	1990	\$101,000	\$6,000	\$38,000	\$145,000
68	Lane 5-6	Third St	Fourth St	300	198	1946	\$102,960	\$12,000	\$34,000	\$148,960
69	Lane 5-6	Fourth St	Fifth St	300	201	2009	\$104,520	\$6,000	\$28,000	\$138,520
70	Lane 5-6	Fifth St	West End	200	263	1970	\$131,500	\$12,000	\$28,000	\$171,500
71	Lane 4-5	Second St	Third St	200	201	2007	\$100,500	\$0	\$28,000	\$128,500
72	Lane 4-5	Third St	Fourth St	300	200	2007	\$104,000	\$12,000	\$36,000	\$152,000
73	Lane 4-5	Fourth St	Fifth St	300	201.2	1916	\$104,624	\$6,000	\$28,000	\$138,624
74	Lane 4-5	Fifth St	Sixth St	300	201.2	1946	\$104,624	\$6,000	\$26,000	\$136,624
75	Lane 4-5	Sixth St	Seventh Ave	200	200	1976	\$100,000	\$6,000	\$40,000	\$146,000
76	Lane 3-4	Third Ave	Fourth St	200	202	1916	\$101,000	\$12,000	\$28,000	\$141,000
77	Lane 3-4	Fourth St	Fifth St	200	196	1916	\$98,000	\$12,000	\$28,000	\$138,000
78	Lane 3-4	Fifth St	Sixth St	200	203	1955	\$101,500	\$6,000	\$32,000	\$139,500
79	Lane 3-4	Sixth St	Seventh Ave	200	209	1955	\$104,500	\$12,000	\$24,000	\$140,500
79	Lane 3-4	END	Seventh Ave	200	150	1955	\$75,000	\$12,000	\$0	\$87,000
80	Lane King-2	Fifth St	Sixth St	200	203	1980	\$101,500	\$12,000	\$16,000	\$129,500
81	Lane King-2	Sixth St	Seventh St	200	203	1982	\$101,500	\$6,000	\$26,000	\$133,500
82	Lane Clair-King	Fifth St	Sixth ST	200	205	1978	\$102,500	\$12,000	\$18,000	\$132,500
83	Lane Clair-King	Sixth St	Seventh St	200	194	1978	\$97,000	\$18,000	\$16,000	\$131,000
85	First St	Tenth Ave W	Tenth Ave E	200	10	1950	\$5,000	\$12,000	\$0	\$17,000
87	First St	Ninth Ave	Eigth Ave	250	50	1946	\$25,500	\$12,000	\$2,000	\$39,500
91	First St	Fifth Ave	Second Ave W	200	197	1972	\$98,500	\$12,000	\$2,000	\$112,500
92	First St	Second ave W	Prince St	200	58	1972	\$29,000	\$0	\$2,000	\$31,000
93	First St	Prince St	King St E	200	105	1972	\$52,500	\$6,000	\$8,000	\$66,500
94	First St	King St E	Quenn St	200	98	1972	\$49,000	\$6,000	\$12,000	\$67,000
95	First St	Queen St	N Town Limit	200	380	1972	\$190,000	\$30,000	\$54,000	\$274,000
104	Third St	Tenth Ave	Ninth Ave	200	105	2009	\$52,500	\$6,000	\$0	\$58,500
105	Third St	Ninth Ave	Eigth Ave	200	105	2009	\$52,500	\$6,000	\$0	\$58,500
106	Third St	Eight Ave	Seventh Ave	200	55	2009	\$27,500	\$6,000	\$0	\$33,500
108	Third St	Sixth Ave	Fifth Ave	200	104	1987	\$52,000	\$6,000	\$4,000	\$62,000
109	Third St	Fifth Ave	Fourth Ave	200	55	1987	\$27,500	\$6,000	\$0	\$33,500
112	Fourth St	Eight Ave	Seventh Ave	250	103	2009	\$52,530	\$18,000	\$0	\$70,530
113	Fourth St	Seventh Ave	Sixth Ave	300	106	2009	\$55,120	\$6,000	\$4,000	\$65,120
114	Fourth St	Sixth Ave	Fifth Ave	300	51.5	2009	\$26,780	\$6,000	\$0	\$32,780
119	Fifth St	Sixth Ave	Fifth Ave	375	55	2009	\$31,350	\$6,000	\$0	\$37,350
120	Fifth St	Fifth Ave	Fourth Ave	375	105	2009	\$59,850	\$6,000	\$0	\$65,850
121	Fifth St	Fourth Ave	Third Ave	375	105	2009	\$59,850	\$6,000	\$0	\$65,850

122	Fifth St	Third Ave	Second Ave	375	62	2009	\$35,340	\$0	\$0	\$35,340
123	Fifth St	Second Ave	King St W	375	104	2009	\$59,280	\$6,000	\$2,000	\$67,280
138	ONR Tracks	Diamond St	Lagoon Road	525	131	2013	\$379,900	\$30,000	\$2,000	\$411,900
139	Lagoon Rd	ONR Tracks	Pumping station	525	104	2013	\$65,520	\$6,000	\$0	\$71,520
					10,465.4		\$5,283,878	\$540,000	\$1,160,000	\$6,983,878