Town of Deep River Asset Management Plan

October 2016

Executive Summary

This report has been compiled in accordance with the requirements detailed in *Building Together: Guide for Municipal Asset Management Plans* released by the Ministry of Economic Development, Employment and Infrastructure.

This Asset Management Plan (AMP) will emphasize core infrastructure, water, waste water, storm sewers and roads as required by the Ministry, with some additional focus on other asset groups to allow for a more comprehensive approach.

Introduction

Across Canada, the knowledge that asset management requires long-term proactivity and foresight is becoming more widely accepted and put into practice. Most assets follow a pattern of deterioration whereby repairs can extend the useful life of the asset – and drastically reduce the overall cost - if timed well. In contrast, extensive repairs performed on an asset that is already failing can be of little or no value.

A thorough plan enables the community to see the "bigger picture" in planning and prioritizing asset maintenance, rehabilitation and replacement measures. Risk factors can be identified before they become problematic. Desired levels of service and their costs can be realistically discussed. Most importantly, an idea of what to expect in the future helps to strengthen the quality of long-term planning and decision making.

In 2012 *The Canadian Infrastructure Report Card* was released which estimates a National funding shortfall or Infrastructure Gap for core infrastructure at $171.8 billion or $13,813 per Canadian household. It is important to note that this only addresses the infrastructure that is in poor to very poor condition. Like other Canadian municipalities, the Town of Deep River will face a funding shortfall in the coming decades.

Deep River, a lower-tier municipality in Renfrew County, is home to a population of approximately 4200. It faces a challenge as a planned community largely built in the 1940’s, suggesting that most of its buried assets will reach the end of their estimated lifespans in the next 15 - 20 years.

The *Building Together* Guide requires the Asset Management Plan to include core infrastructure. Of these, the Town of Deep River is responsible for road, water and wastewater networks. This iteration of the Plan also includes fleet and facilities to some extent to allow a more comprehensive approach to planning, as these represent significant capital costs.

The Asset Management Plan provides a basis for both short- and long-term planning and development. The information collected will be valuable as the community expands to accommodate additional housing and services for nearby Canadian Nuclear Laboratories (CNL) and Garrison Petawawa (as outlined in the Official Plan). The AMP, and the data collected to develop it, have been vital to ongoing Public Works operations and to policy updates. The Asset Management Plan ties in closely with Deep River's Strategic Plan mission *To achieve balanced and sustainable socioeconomic prosperity* as well as strategic priority #1, *Ensure that infrastructure is up to date*. It has also been used to inform capital budgeting and yearly water and sewer rate revisions.

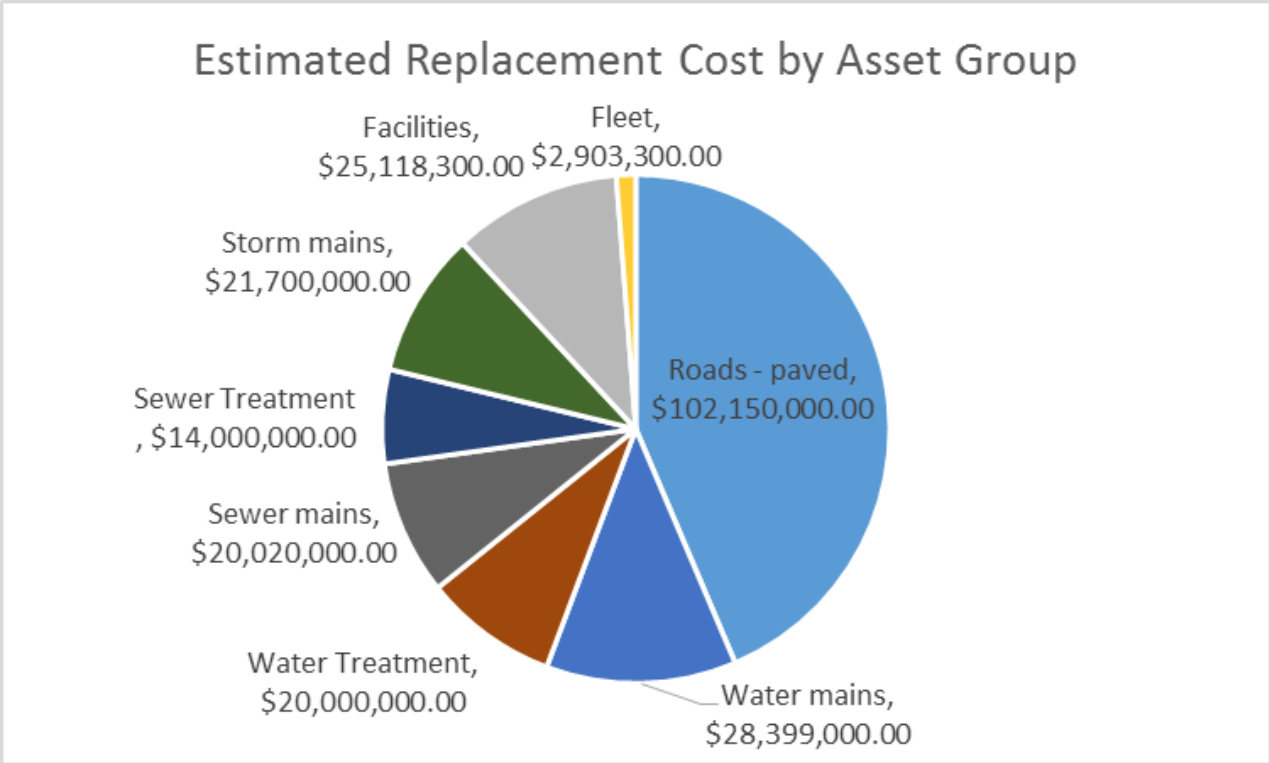
The Town of Deep River's asset management system, developed in-house, continues to grow and to be incorporated into daily operations. Existing historical records have been digitized into the system and detailed inventory data have been collected. Considerable condition data has been collected as well, enabling us to plan further ahead and provide more accurate replacement costing than previously reported. The Plan will be continually updated as more information becomes available. Currently, Deep River's core assets are addressed, including roads, water, storm, and sewer. Facilities and fleet are considered as well, with the intent of fully incorporating them as the Plan is refined. The detailed strategy and financial plan covers the next 10 year period, and replacement costing has been obtained for core assets over their lifetime.

State of local infrastructure

To determine current condition rating for our core assets we used a variety of condition assessment tools. In order to simplify their presentation, all core assets are categorized below into good, fair or poor condition groups. Further information about data collection and conditions are available in the "Notes" below.

Asset	Quantity	Net Book	"Good"	"Fair"	"Poor"	NA	Est. Replacement	Notes
Roads - paved	37.25 km	$1,478,500	22%	33%	40.5%	4.5%	$102,150,000	{3.1}
Roads - unpaved	5.7 km		100%					{3.2}
Street lights	623		100%					{3.3}
Signs	283		62.9%	14.8%	22.3%			{3.4}
Water mains	40.6km	$2,608,250				100%	$28,399,000	{3.5}
Valves	274		99%		1%			{3.6}
Hydrants	238				10%	90%		{3.6}
Water Treatment	1						$20,000,000	{3.9}
Sewer mains	27.9 km	$1,989,400	24.5%	4.5%	11.5%	60.6%	$20,020,000	{3.7}
Manholes	469					100%		
Sewer Treatment	1						$14,000,000	{3.9}
Storm mains	13.9km	$732,600				100%	$21,700,000	{3.8}
Catch basins	366				100%			
Outlets	13					100%		
Facilities		$3,898,000				100%	$25,118,300	{3.9}
Fleet	30	$704,900				100%	$2,903,300	{4.0}

Estimated Replacement Cost by Asset Group



Roads: paved

Altogether, the Town of Deep River contains approx. 42 linear kilometers of roads (84 lane kilometers). However, the Highway, Ridge Rd., and Deep River Rd. are the responsibility of MTO and Renfrew County. These lengths are excluded from the totals above as we are not responsible for their replacement.

To gauge road conditions in a relatively uniform way, the Pavement Condition Index (PCI) tool was used. The PCI factors in the existence, density and severity of defects such as potholes, various types of cracks, distortion etc. to assign each segment of road (from one intersection to another) a condition rating between 0 - 100, with 0 being worst condition and 100 being the best. The condition ratings above reflect the percentages by total road length.

Concerns have been raised since completing the PCI road condition assessment that the tool may be too subjective. Repeating our assessment on several roads to gauge its effectiveness produced significantly lower ratings than the first time. Our previous condition ratings performed at a high level by Public Works staff assigned "Poor" ratings

to more areas than the PCI; however, the PCI identified more roads in "Fair" condition rather than "Good".

The PCI may still be valuable in determining road conditions relative to one another to help prioritize work. However, they may not be useful in forecasting performance from year to year as they do not appear to be consistent over time. Issues not captured by the PCI matrix have also been identified (for instance, issues with water pooling that may contribute to faster road degradation). Moving forward, staff will aim to capture these issues in the system for a more complete outlook on road conditions.

Roads: unpaved

Unpaved roads are grouped into two condition categories: Good or Poor (needs replacement/rehab). Deep River has two types of unpaved roads: gravel and surface treatment. Grading is currently performed on gravel roads every three weeks or as needed.

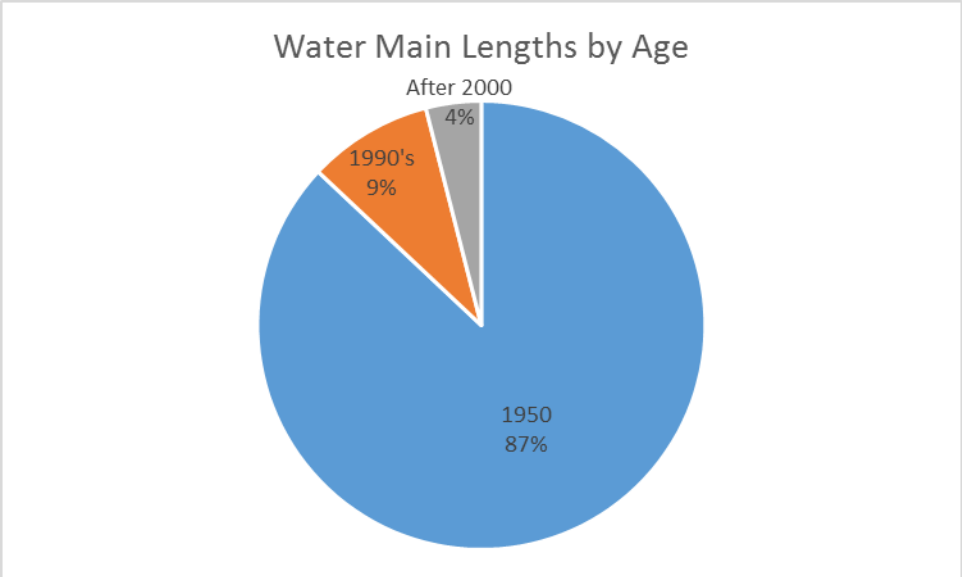
Streetlights

The majority of Deep River's high pressure sodium street lights were replaced by the end of 2015 with higher efficiency LED lights. For this reason, we have assumed that all streetlights will be in good condition. We anticipate that the small balance of HPS lights will be changed by the end of 2016.

Signs

Sign conditions are assessed yearly by a third party and routinely by staff using minimum road standards road inspections. Most of our signs are in good physical condition as issues are fixed upon discovery. However, 67 do not pass the legal requirements for reflectivity and need to be replaced.

Water mains



As discussed in the introduction, Deep River's buried assets have little variation in age. 87% of water mains were installed in 1950; 9% were added during the 90s and another 4% after 2000. Water mains constructed before 1990 are composed of ductile iron while the newer ones are PVC. Ductile iron pipes are generally estimated to last 80 to 100 years, but it is unknown how well PVC pipes will perform.

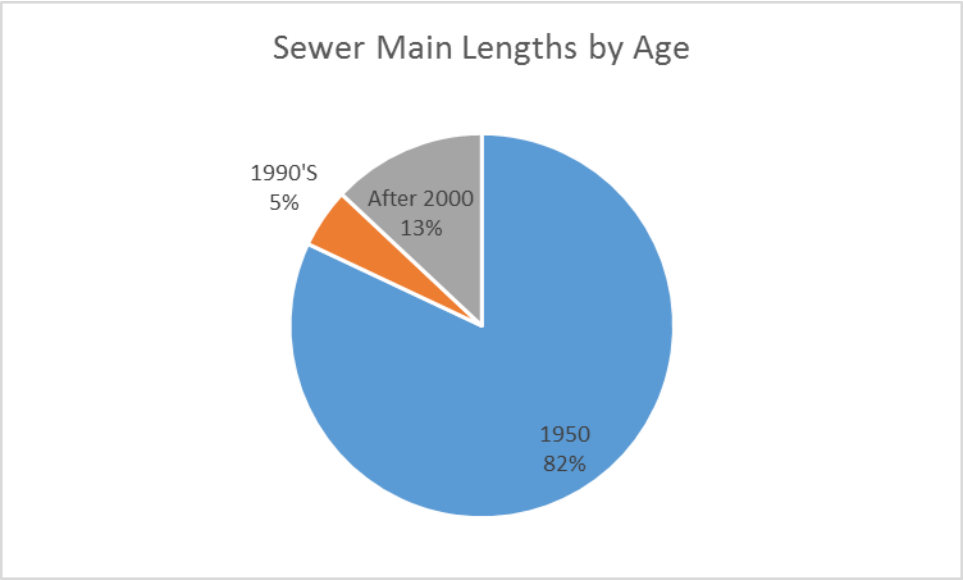
Because it would be too costly and disruptive to test the condition of water mains, we don't believe inspection would be a good use of present resources. While prioritizing projects, the number of water main breaks in that area will be a large consideration. Sanitary sewer is much less disruptive to inspect, and accompanying water mains are typically the same age. For this reason, a combination of sanitary sewer condition, road condition, and risk level of the water main will drive prioritization for replacing sections of road, water and sewer. Some lengths of water main do not have accompanying roads and/or sewer, so these may warrant the costs of inspection in the future – especially for higher risk lengths such as the 16” watermain that runs from the Water Tower to the Treatment Plant.

Through discussions with OCWA we have determined that existing brown water issues can likely be solved through chemical means rather than replacing the infrastructure.

Valves & Hydrants

Valve and hydrant condition data is monitored by OCWA. Discussions are currently taking place re: integrating this information with our system. OCWA has identified a list of 24 hydrants and 2 valves in need of repair or replacement.

Sewers



Most sanitary mains (82%) were constructed in 1950 of cement or clay. Another 5% were installed in the 90's and 13% after 2000 using PVC. Estimates generally place life span from 80 - 100 years, giving the majority of our sanitary mains another 15 - 35 years of expected useful life.

XSite collected sewer main camera data in 2014 and produced Quick Structural Ratings (QSR) and Quick Maintenance Ratings (QMR). These ratings, developed by the National Association of Sewer Service Companies (NASSCO), denote the location and severity of structural and maintenance issues. Because these ratings are standardized they will enable us to track deterioration over time if sewers are inspected on a regular basis. Higher ratings denote more severe issues.

To simplify, QSR ratings were standardised into "poor" (severe defects present; already collapsed or likely to collapse within 5-10 years); "fair" (some defects present; unlikely to fail within next 5-10 years) and "good" (no structural defects found).

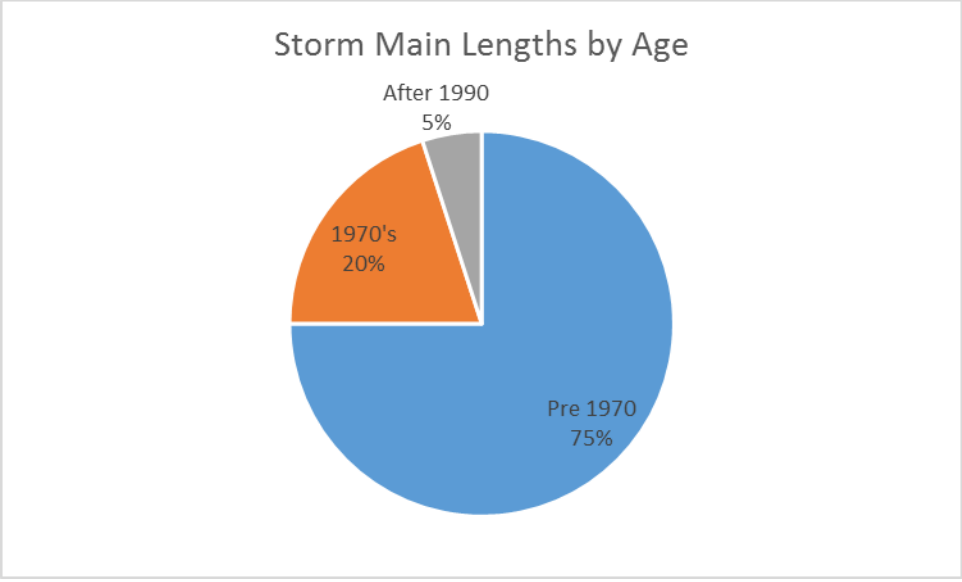
Many issues identified are not causing problems currently, but are at risk of degrading further. The QMR ratings do not contribute to our condition assessments in the table above, but are considered in maintenance plans outlined in the Asset Management Strategy section. Maintenance issues include root growth, deposits, and infiltration; if not addressed, these can cause blockages and structural damage.

Storm

It is important to note that most storm mains have not been inspected. Jp2g estimates useful life at 80 years for these linear assets.

Inspection via CCTV is recommended to provide useful condition data. In 2009, Jp2g identified areas of the storm system that are currently adequate for a 2-year event, while adequacy for a 5-year event is recommended. Staff has reviewed the report and does not believe these issues to be pressing, but should be considered when storm mains and outlets are to be replaced.

Staff estimates of age appear below.



Facilities

Our facility inventory consists of the Town Hall, waterfront, Arena, Community Centre, Grouse Park, Keys Property, Lamure Beach, Pool, Public Works yard, Marina, Library, and Woodworking Club.

The Ontario Clean Water Agency (OCWA) maintains Deep River's water and wastewater treatment facilities and oversees the distribution/collection systems. The Sewage Treatment Plant was built in 2002, and the Water Treatment Plant in 2007, with estimated useful lifespans of 80 years each for the purpose of this report.

Estimated replacement values are obtained from insured values (construction and equipment).

Fleet

Fleet includes Police and Fire vehicles, Public Works heavy equipment and other medium and light duty vehicles owned by the Town. Historical cost is used as a basis for replacement cost and inflated to today’s dollars at a rate of 1.3%. Starting in 2016 we began tracking maintenance costs by vehicle number, which over time will represent condition data.

Data collection, storage & verification

Initial GIS data was collected by Public Works summer students using a handheld GPS unit guaranteed to be accurate within 5 meters. Generally we have found the collected GPS data to be accurate within 1-2 meters. To aid data accuracy, each component was compared to multiple data sources where available, including historical maps and data tables, satellite imagery, third party data, other data collected by staff and staff experience. Spot checks were also performed to test consistency. Ideally, as data is used more during day to day operations this will provide another level of accuracy checking. Data is currently stored in a spatial database and managed via Quantum GIS software.

Accounting Valuation

To determine the value of our existing assets we first looked towards the mandatory Public Sector Accounting Board (PSAB) reporting which attempts to use historical data to determine the original cost of an asset and then depreciates that asset over time to determine the net book value or remaining value of that asset.

Many accounting values are not available due to lack of historical information. These figures do not reflect today's cost of replacing these assets or their disposal cost.

Replacement Valuation

Jp2g Engineering Consultants provided an Opinion of Probable Lifecycle Costs (over 80 years) as of November 2015 for linear assets and treatment plants. We have determined that replacement value is the best or most relevant value to place on our existing assets as it will give us a “forward looking” assessment of our financial liabilities as it relates to infrastructure. As we move forward with our AMP it will be vital to track all of the rehabilitation, maintenance and replacement costs so that a net book value approach will be an effective tool to be used in determining the effectiveness of our capital interventions and to act as a key indicator for capital investment levels.

Levels of service

Levels of service reflect the overall performance of asset groups. The chart below depicts various key performance indicators (KPI's) currently used for each asset group and how they are performing in these areas.

Component	Performance Measures	Regulatory Requirements	Current performance	Recommended Inspection Schedule
Roads - paved	PCI ratings, Rideability, Safety	Ontario Provincial Standards (OPS)	Large variation from poor to good	Every 3 years - Staff
Roads - unpaved	Safety, rideability		Good	Ongoing during grading
Street lights	Outages/year		Good - improved with switch to LED	Ongoing via reports
Signs	Visibility, Condition	Reflectivity	NI - to meet legal requirements	Yearly by 3rd party
Water mains	Brown water incidents/year, Break rates	Canadian Drinking Water Guidelines	Fair	Ongoing via reports, events
Valves	Operational		Good	Ongoing - OCWA
Hydrants	Adequate Pressure		Fair - some repairs, replacements	Ongoing - OCWA
Sewer mains	QSI, Infiltrations, Collapses	Wastewater regulations	Fair - Sinkholes experienced in 2016	Recommended 20-25%/year
Manholes	Accessible, flush with roads		Unknown	

Component	Performance Measures	Regulatory Requirements	Current performance	Recommended Inspection Schedule
Storm mains	Proper drainage		Fair – some unprepared for 5yr event	Recommended 20-25%/year
Catch basins	Clear of debris		Good	1/year during cleaning
Outlets	Meet engineer recommendations		Fair – some unprepared for 5yr event	
Facilities	Provide continuous service	Accessibility, Building & Fire Codes	To be incorporated with AMP	Ongoing via work orders
Fleet	Safe, operational	CVOR Safety	Good	Ongoing

Many items inspected on an "ongoing" basis rely on complaints submitted by residents or staff. These tend to be either "working" or "not working".

External trends & issues

Climate

Weather is known to have a large effect on levels of service. Particularly cold winters and heavy rain experienced in Deep River cause stress on the roads and stormwater collection system. Major snowfall events can lead to damage to curbs, etc. by snow removal machinery.

Asset Management Strategy

Strategy and Recommendations

The below table summarizes planned and recommended actions broken down by asset group. Actions that imply additional spending are marked with a ($) and included in the Financing Strategy.

Asset	Inspection	Maintenance	Rehabilitation or Replacement
Roads - paved	Identify priority sections for rehab & replacement - in house. Issues with water pooling should be captured in the system	Continue patching as needed (in house). Staff has discussed testing different crack sealing approaches and shouldering to develop an effective yearly program. ($)	Recommend establishing a reserve for major road work ($)
Roads - unpaved	Informal during routine grading	Routine grading believed to be adequate	
Sidewalks	Capture into system		
Street lights	Ongoing staff & resident reports	Maintenance performed by Hydro One	Retrofitted with LED in 2016.
Signs	Currently performed yearly (third party)		Replace signs that fail retro reflectivity ($)
Water mains	Not recommended at this time due to cost and service disruption.	Routine flushing performed by OCWA	Replace alongside sewers where feasible. User rates were revised in 2014-16 to provide for reserves.
Valves			4 valves identified by OCWA ($4,000) as being in "poor"

Asset	Inspection	Maintenance	Rehabilitation or Replacement
			condition. May be opportunities for repair instead
Hydrants		Routine flushing performed by OCWA	25 hydrants identified by OCWA ($112,500) as being in "poor" condition. Historically we have replaced 3 hydrants per year. Manpower is a bigger issue than cost in this case.
Sewer mains	Inspect remaining 60% in 2017 and 20% per year - ongoing ($). Capture laterals into the system as these are a costly part of the inventory.	Root removal can be performed in house. Routine flushing - continual inspections will help to see whether flushing may be damaging pipes.	Some lengths have been flagged for priority replacement due to structural issues. User rates were revised in 2014-16 to provide for reserves.
Manholes	Not currently inspected. Potential to create Inspection program, but staff resources are limited		
Storm mains	Begin inspecting 20% yearly - XSite ($)		Some lengths identified as being under capacity for a 5yr event. Consider upgrading when mains are replaced. Reserves recommended as 5.62km reach end of est. useful life in 15 years.

Asset	Inspection	Maintenance	Rehabilitation or Replacement
Catch basins	Recommended that staff records inspections during cleaning etc.	Routine cleaning	Moving forward, replace in lieu of frequent repairs (to be addressed in operating budget).
Outlets	Inspections to be performed annually in house moving forward	Routine cleaning	Potential to convert some outlets from a 2yr event to a 5yr (Jp2g recommendations)
Facilities	Structural assessment may be needed (3rd party) and staff inspections are to be captured in system	Maintenance performed by staff as needed	Perform review of long term needs - in house
Fleet	Inspected by staff on routine basis. Maintenance costs are to be tracked more precisely to determine when replacement is a better option.	Recommend doing rust control on light duty vehicles in addition to heavy & med duty as this is a main threat to service life.	Due to low mileage, useful life of vehicles tends to be higher than average. Needs will be revisited yearly.

Options

The option that has the largest effect on total lifecycle cost of assets is whether to continue to maintain assets or to replace them. Knowing the extent of the estimated replacement costs detailed in the State of local infrastructure section, it makes sense to use assets to the full extent of their lifespan in situations where the consequences of failure are low, and to adopt measures of lifecycle extension.

Realistically, despite having defects, assets are still performing and the current level of reactive maintenance could be considered acceptable. Current asset performance places the Town in a good position to build reserves to be better prepared when assets become problematic, an important consideration given the average age of our assets.

An example of reactive maintenance that is acceptable in the short term is water main breaks. While 12 breaks were recorded in 2014, only 5 breaks were recorded in each of 2015 and 2016. It is important to keep in mind that generally as assets age, they increasing levels of maintenance.

Approximately 24km of roads are flagged as being good candidates for proactive maintenance. These roads may be relatively new or have not yet degraded to the point where more expensive interventions are needed. The condition of the underlying sewer is also taken into account when recommending particular roads for maintenance procedures to avoid maintaining a road that will soon be renewed.

Crack sealing cost estimates were obtained suggesting that 8km of roads in good to fair condition can be crack sealed for $7,000. Generally crack sealing can extend the life of roads from 3-5 years if applied at the right time. Overlays are more expensive at $25,000 per road kilometer (i.e, 2 lane kilometers), but aim to seal the entire surface and can improve drainage, raveling, minor wheel track rutting and other issues. Overlays will likely be necessary to restore roads that are in poor condition. Staff has discussed doing trials of different procedures beginning in 2017 to develop a road maintenance strategy that will be most cost effective in the long term. Shouldering, ditching and manhole ramping will also be incorporated into road maintenance plans moving forward, as edge degradation is an issue for many streets.

Another area where lifecycle extension can be considered is relining sanitary mains. This can be a more cost effective and less disruptive approach than excavating and replacing mains altogether. A budgetary estimate for relining sewers given by Jp2g Consultants in October 2016 indicates that relining costs approximately $307,700 per km - less than half a sewer replacement cost of $700,000 per km. Relining is not appropriate in all situations, but can protect mains from further degradation.

Finally, ongoing inspections are an option that can impact lifecycle costs. Inspecting the remainder of the sewers and maintaining an inspection schedule of 20% of the network per year will add an estimated $28,120 yearly to spending on sanitary sewers, but may be acceptable given that sewer main conditions are one of the main factors currently used to prioritizing large linear network projects.

Although each of these options involves a separate analysis, for the purpose of this report two broad options are considered:

1) “Unlimited Funding” option: the entirety of the backlog detailed in the Infrastructure Gap section is addressed, bringing all assets that are currently known to be in poor condition into good condition. The cost of this option is provided only for reference, as it is prohibitively expensive.
2) Recommendations option: explores the additional financial implications of the recommendations outlined in the Strategy and Recommendations section. This option does not address the entire infrastructure gap, but it places the Town in a better position to address assets as they become problematic and to take advantage of cross sectional replacement when it is most cost effective. These implications are detailed in the Financing Strategy section.

Strategy Risks & Challenges

Data Gaps

As summarized in the State of local infrastructure, not all condition data is currently known. It's likely that further costs will be uncovered through routine inspections.

Because there is a cost associated with obtaining data (such as contracting third parties to do inspections), some condition data is not considered beneficial enough to pursue at this time.

The Asset Management Plan should be considered a "living document" as it will be updated with new developments, opportunities and unforeseen events.

Maintenance

Public Works staff expressed concerns that manpower is somewhat limited and may become further stretched if reactive maintenance needs increase with aging infrastructure. To monitor and mitigate this risk, reactive maintenance such as attending to water main breaks and sinkholes is tracked so it can be compared from year to year. Discussions have also taken place between Public Works and Finance about distinguishing reactive maintenance in the financial system so that the financial impact of maintenance can be better compared to the cost of replacement.

Procurement

The Town of Deep River Procurement Policy, outlined in by-law 33-2010, can be accessed at this link. If the link is not available, the policy is located on the official website under Council > By-Laws.

Financing Strategy

In the past, capital projects have been funded by a combination of existing reserves, general taxation, water and sewer billing, provincial and federal funding, and debt. Leveraging partnerships on joint projects such as with Canadian Nuclear Laboratories on the Algonquin Street/CNL Water main extension project or the MTO Highway 17 project has also given us purchasing power in the past. It is clear that in the interests of keeping tax rates reasonable, external sources of funding will be vital to addressing the infrastructure gap. This is true for most municipalities in Canada.

While the *Building Together* Guide allows only confirmed revenue to be listed in the Asset Management Plan, provincial and federal funding (ex. OCIF, SCF) will be actively pursued as a funding strategy. Projects identified in the asset management system as being high priority for consideration when funding is available are detailed in the Priorities section.

In 2014-2016, the water and sewer rates were revised to establish a reserve fund for the linear network and treatment plants. We recommend inspecting the remaining 60% of sewers as soon as possible as this will help us to understand whether the reserves and replacement schedule set out in the rate review will be adequate over the long term. As described in the State of local infrastructure section, sewer conditions are one of the most useful indicators we currently have in prioritizing linear network projects.

We also recommend that reserves be set aside for the road and storm networks. The payment schedule of suggested reserves is detailed on the next page. Inflation is assumed to be 1.3% and reserves are assumed to earn 2%. In this scenario, road replacement is driven by underlying sewer conditions as established in the Water and Sewer Rate Review.

While the suggested amounts will not address all assets that are currently in poor condition, they will put Deep River in a better position to fund projects when assets become problematic, and to combine road, water and sewer replacement when reasonable to save on overall costs.

Suggested Reserves – Storm and Roads

			2016	2021	2026	2031	2036	2041	2046	2056	
			Year	5	10	15	20	25	30	60	
Municipal Service	Length (km)	Current Replace-ment Cost	Total	Re(Construct)						Re (Construct)	Total
Storm	14	$1,125,000	15,750,000			6,322,500			9,427,500		15,750,000
Roads	37.25	$1,000,000	37,250,000	1,417,744	1,681,726	408,472	681,765	160,550	6,764,761	26,134,981	37,250,000
Total replacement costs in 2016 dollars				1,417,744	1,681,726	6,730,972	681,765	160,550	16,192,261	26,134,981	53,000,000
Future Dollars with 0.013 Inflation				1,512,324	1,913,593	8,169,951	882,722	221,741	23,855,629	56,726,882	93,282,843
Annual Payment to Reserve				290,606	174,762	472,431	36,330	6,923	588,039	497,379	2,066,471

Existing Reserves – Water and Sewer

			2016	2021	2026	2031	2036	2041	2046	2051	2056	
			Year	5	10	15	20	25	30	40	60	
Municipal Service	Length (km)	Current Replace-ment Cost	Total	Re(Construct)						Major Renovations	Re (Construct)	Total
Water	40.57	$700,000	28,399,000	992,421	1,177,208	285,930	477,236	112,385	4,735,333		20,618,487	28,399,000
Sewer	27.6	$700,000	19,320,000	992,421	1,177,208	285,930	477,236	112,385	4,735,333		11,539,487	19,320,000
Facility Assets												
Water Treatment Plant										3,000,000		3,000,000
Sanitary Sewer Treatment Plant										4,000,000		4,000,000
Total replacement costs in 2016 dollars				1,984,841	2,354,416	571,861	954,471	224,770	9,470,666	7,000,000	32,157,974	54,719,000
Future Dollars with 0.013 Inflation				2,117,254	2,679,031	694,116	1,235,810	310,438	13,952,881	11,734,804	69,799,996	102,524,331
Annual Payment to Reserve				390,903	223,139	34,665	41,501	7,454	248,781	123,491	293,289	1,363,222

Infrastructure Gap

The infrastructure gap attempts to summarise the historical backlog of work that will be a concern within the next 5 – 10 years. It describes the “Unlimited Funding” scenario: how much it would cost to restore all assets currently known to be in poor condition to good condition.

Asset	Backlog	Est. Cost
Core	Cross sectional projects identified	$ 5,130,200
Sewer	Sewer only projects identified	$ 538,700
Water	25 hydrants assessed as poor condition	$ 112,500
	4 valves in poor condition	$ 4,000
Roads	24km eligible for crack sealing	$ 24,000
	15km eligible for resurfacing	$ 1,500,000
Fleet	Past or at end of est. useful life in 2017	$ 350,650
	Total known infrastructure gap	**$ 7,660,050**

The above estimate does not capture the full extent of the gap for several reasons:

a) 60% of the sewer network and most of the storm network have not yet been inspected, as well as facilities. Further needs will likely be uncovered. If the same percentage of uninspected lengths are in poor condition, this will add an additional $3,600,000 in anticipated sewer replacement costs alone. This is likely to be the case as many uninspected lengths were installed in the 1950’s. Further, many of the roads in this area of Town have identified defects such as aggregate loss and surface deformation that could make them good candidates for cross sectional replacement.

b) Dollar estimates are produced using an average number of lateral connections, hydrants, valves, etc. Highly populated areas will incur higher per kilometer costs than less populated ones, so costs will vary from project to project.

Actual Expenditures

Capital items requested for 2017 are included for reference purposes. These items have NOT been approved by Council.

Project by Asset Group and Expenditure Type	2014	2015	2016	2017 - PROPOSED	Grand Total
Contingency				**$ 100,000.00**	**$ 100,000.00**
Facilities	**$ 556,853.90**	**$ 754,169.86**	**$ 1,172,436.00**	**$ 468,540.00**	**$ 2,951,999.76**
Rehabilitation	**$ 288,586.02**	**$ 397,251.69**	**$ 1,165,336.00**	**$ 219,540.00**	**$ 2,070,713.71**
Building Improvements - Town Hall	$ 97,526.07				$ 97,526.07
Water Tower		$ 330,118.13			$ 330,118.13
Marina renos	$ 116,717.81				$ 116,717.81
Arena upgrades	$ 74,342.14				$ 74,342.14
Sewage Treatment Plant - energy efficiency retrofit		$ 53,141.56			$ 53,141.56
Arena women's washroom renovations		$ 13,992.00			$ 13,992.00
Pool Restructuring			$ 1,165,336.00		$ 1,165,336.00
Pool - Main Entrance Renovation				$ 69,540.00	$ 69,540.00
Accessible Campus Playground				$ 150,000.00	$ 150,000.00
Replacement		**$ 119,094.34**		**$ 151,000.00**	**$ 270,094.34**
Arena Chiller				$ 60,000.00	$ 60,000.00
Arena Hot Water				$ 18,000.00	$ 18,000.00
Sewage Treatment Plant - generator		$ 42,057.96			$ 42,057.96
Water Treatment Plant - generator		$ 17,290.55			$ 17,290.55
Condenser and Cooling System		$ 59,745.83			$ 59,745.83
HVAC				$ 18,000.00	$ 18,000.00
Town Hall - Police Station Roof				$ 55,000.00	$ 55,000.00
Maintenance			**$ 7,100.00**		**$ 7,100.00**
Keys Property			$ 100.00		$ 100.00
Library			$ 3,000.00		$ 3,000.00
Town Hall			$ 4,000.00		$ 4,000.00
Disposal				**$ 18,000.00**	**$ 18,000.00**
Forest Management Plan - Tree Removal				$ 18,000.00	$ 18,000.00
Expansion	**$ 268,267.88**	**$ 237,823.83**		**$ 80,000.00**	**$ 586,091.71**
Solar Panels - Installed on various facilities	$ 210,235.94				$ 210,235.94
Ambulance Building CIP	$ 58,031.94	$ 229,744.09			$ 287,776.03
Gazebo		$ 8,079.74			$ 8,079.74

Project by Asset Group and Expenditure Type	2014	2015	2016	2017 - PROPOSED	Grand Total
Marina Docks Phase 4				$ 80,000.00	$ 80,000.00
Fleet	**$ 904,523.74**	**$ 100,676.34**	**$ 15,000.00**	**$ 270,000.00**	**$ 1,290,200.08**
Replacement	**$ 904,523.74**	**$ 100,676.34**		**$ 298,000.00**	**$ 1,303,200.08**
2013 Pierce Freightliner Pumper	$ 355,572.80				$ 355,572.80
2014 Charger	$ 30,258.49				$ 30,258.49
2014 International Cab and Dump Body	$ 121,372.21				$ 121,372.21
2014 Ford F150	$ 31,450.30				$ 31,450.30
John Deere Backhoe Loader	$ 126,792.96				$ 126,792.96
2012 John Deere Grader	$ 239,076.98				$ 239,076.98
2015 Chev Tahoe		$ 100,676.34			$ 100,676.34
Plow Truck				$ 210,000.00	$ 210,000.00
Zero Turn				$ 18,000.00	$ 18,000.00
1 Tonne Truck with Dump Box Sander				$ 70,000.00	$ 70,000.00
Maintenance			**$ 15,000.00**		**$ 15,000.00**
Fire Budgeted			$ 7,000.00		$ 7,000.00
Police Budgeted			$ 8,000.00		$ 8,000.00
Disposal				**-$ 36,000.00**	**-$ 36,000.00**
½ Ton Recreation (2002 Ford 150)				-$ 1,000.00	-$ 1,000.00
Freightliner FL80 Pumper 1997				-$ 35,000.00	-$ 35,000.00
Expansion				**$ 8,000.00**	**$ 8,000.00**
One way plow for Komatsu				$ 8,000.00	$ 8,000.00
Roads		**$ 345,459.86**	**$ 137,857.60**	**$ 462,500.00**	**$ 945,817.46**
Replacement		**$ 318,095.68**	**$ 106,996.60**	**$ 462,500.00**	**$ 887,592.28**
OIPC Ridge Road Loan Repayment			$ 6,338.60		$ 6,338.60
Algonquin Road Reconstruction		$ 27,364.18			$ 27,364.18
LED Street Lights		$ 290,731.50	$ 5,620.00		$ 296,351.50
Deep River Road & Algonquin Street			$ 95,038.00		$ 95,038.00
Brockhouse Way Cross Section - if OCIF is successful				$ 462,500.00	$ 462,500.00
Maintenance			**$ 30,861.00**		**$ 30,861.00**
Transport Services Budgeted			$ 30,861.00		$ 30,861.00
Expansion		**$ 27,364.18**			**$ 27,364.18**
Algonquin Road Reconstruction Design fees		$ 27,364.18			$ 27,364.18
Sewer		**$ 113,277.85**	**$ 515,814.20**	**$ 974,175.00**	**$ 1,603,267.05**

Project by Asset Group and Expenditure Type	2014	2015	2016	2017 - PROPOSED	Grand Total
Rehabilitation				**$ 426,675.00**	**$ 426,675.00**
Parkdale, Huron - CWWF				$ 426,675.00	$ 426,675.00
Replacement		**$ 113,277.85**	**$ 515,814.20**	**$ 497,500.00**	**$ 1,126,592.05**
BNS Loan Repayment			$ 216,000.00		$ 216,000.00
OIPC Ridge Road Loan Repayment			$ 12,677.20		$ 12,677.20
Deep River Road & Algonquin Street			$ 287,137.00		$ 287,137.00
Troyes Street Sanitary				$ 35,000.00	$ 35,000.00
Brockhouse Way Cross Section - if OCIF is successful				$ 462,500.00	$ 462,500.00
Highway 17 near Deep River Rd.		$ 113,277.85			$ 113,277.85
Maintenance				**$ 50,000.00**	**$ 50,000.00**
Major maintenance				$ 50,000.00	$ 50,000.00
Storm				**$ 462,500.00**	**$ 462,500.00**
Replacement				**$ 462,500.00**	**$ 462,500.00**
Brockhouse Way Cross Section - if OCIF is successful				$ 462,500.00	$ 462,500.00
Water	**$ 545,981.96**	**$ 136,201.66**	**$ 418,986.32**	**$ 512,500.00**	**$ 1,613,669.94**
Rehabilitation	**$ 246,653.59**				**$ 246,653.59**
Water Tower	$ 246,653.59				$ 246,653.59
Replacement			**$ 418,986.32**	**$ 462,500.00**	**$ 881,486.32**
OIPC Loan Repayment			$ 259,370.12		$ 259,370.12
OIPC Ridge Road Loan Repayment			$ 12,677.20		$ 12,677.20
Deep River Road & Algonquin Street			$ 146,939.00		$ 146,939.00
Brockhouse Way Cross Section - if OCIF is successful				$ 462,500.00	$ 462,500.00
Maintenance				**$ 50,000.00**	**$ 50,000.00**
Major maintenance				$ 50,000.00	$ 50,000.00
Expansion	**$ 299,328.37**	**$ 136,201.66**		**$ -**	**$ 435,530.03**
AECL Extension		$ 116,303.07			$ 116,303.07
Thomas Street Watermain project		$ 19,898.59			$ 19,898.59
AECL Extension	$ 299,328.37				$ 299,328.37
Grand Total	**$ 2,007,359.60**	**$ 1,449,785.57**	**$ 2,260,094.12**	**$ 3,250,215.00**	**$ 8,967,454.29**

Ten-Year Expenditure Forecast

The ten-year expenditure forecast summarizes the financial implications of the recommendations outlined in the Asset Management Strategy section. It is assumed that current spending will continue: these figures detail the additional spending implied by the recommendations of this report. These figures do not include the reserve schedule which is instead laid out earlier in this report. It is also important to note that the plan laid out below does not attempt to close the entire infrastructure gap. Road, water and sewer projects would be spaced out after 2021, but for simplicity's sake, they are shown as a lump sum as provisioned for in the 2016 Water and Sewer Rate Review.

Project by Asset Group & Expenditure Type	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	Grand Total
Fleet	$ 290,650.00	$ 51,308.45	$ 286,488.73			$ 307,965.12	$ 98,516.42	$ 184,070.27	$ 146,025.39	$ 227,574.95	$ 1,592,599.33
Roads											
Replacement											
Replace signs - reflectivity	$ 16,750.00										$ 16,750.00
Replacing alongside sewer - water/sewer plan					$ 1,512,597.78					$ 1,913,905.30	$ 3,426,503.08
Replacement Total	$ 16,750.00				$ 1,512,597.78					$ 1,913,905.30	$ 3,443,253.08
Maintenance											
Crack sealing and patching	$ 45,000.00	$ 45,585.00	$ 46,177.61	$ 46,777.91	$ 47,386.03	$ 48,002.05	$ 48,626.07	$ 49,258.21	$ 49,898.57	$ 50,547.25	$ 477,258.69
Maintenance Total	$ 45,000.00	$ 45,585.00	$ 46,177.61	$ 46,777.91	$ 47,386.03	$ 48,002.05	$ 48,626.07	$ 49,258.21	$ 49,898.57	$ 50,547.25	$ 477,258.69
Roads Total	$ 61,750.00	$ 45,585.00	$ 46,177.61	$ 46,777.91	$ 1,559,983.80	$ 48,002.05	$ 48,626.07	$ 49,258.21	$ 49,898.57	$ 1,964,452.55	$ 3,920,511.77
Sewer											
Inspection											
Xsite inspections	$ 35,000.00	$ 35,000.00	$ 25,000.00	$ 25,325.00	$ 25,654.23	$ 25,987.73	$ 26,325.57	$ 26,667.80	$ 27,014.48	$ 27,365.67	$ 279,340.48
Inspection Total	$ 35,000.00	$ 35,000.00	$ 25,000.00	$ 25,325.00	$ 25,654.23	$ 25,987.73	$ 26,325.57	$ 26,667.80	$ 27,014.48	$ 27,365.67	$ 279,340.48
Replacement											
Replacement as per w/s plan					$ 1,339,515.50					$ 347,058.00	$ 1,686,573.50
Replacement Total					$ 1,339,515.50					$ 347,058.00	$ 1,686,573.50
Sewer Total	$ 35,000.00	$ 35,000.00	$ 25,000.00	$ 25,325.00	$ 1,365,169.73	$ 25,987.73	$ 26,325.57	$ 26,667.80	$ 27,014.48	$ 374,423.67	$ 1,965,913.98
Storm											
Inspection											
Xsite inspections		$ 12,500.00	$ 12,662.50	$ 12,827.11	$ 12,993.86	$ 13,162.79					$ 64,146.26
Inspection Total		$ 12,500.00	$ 12,662.50	$ 12,827.11	$ 12,993.86	$ 13,162.79					$ 64,146.26
Storm Total		$ 12,500.00	$ 12,662.50	$ 12,827.11	$ 12,993.86	$ 13,162.79					$ 64,146.26
Water											
Replacement											
Replace 25 Hydrants in poor condition	$ 112,500.00										$ 112,500.00
Replace 4 Valves in poor condition	$ 4,000.00										$ 4,000.00
Replacing alongside sewer as per w/s plan					$ 1,339,515.50					$ 347,058.00	$ 1,686,573.50
Replacement Total	$ 116,500.00				$ 1,339,515.50					$ 347,058.00	$ 1,803,073.50
Water Total	$ 116,500.00				$ 1,339,515.50					$ 347,058.00	$ 1,803,073.50
Grand Total	$ 503,900.00	$ 144,393.45	$ 370,328.84	$ 84,930.03	$ 4,277,662.89	$ 395,117.68	$ 173,468.06	$ 259,996.28	$ 222,938.44	$ 2,913,509.17	$ 9,346,244.84

Notes to expenditure forecast

- An inflation rate of 1.3% per year is assumed.
- OCIF formula funding is planned to be used for crack sealing, patching, and other road revitalization.
- Due to low mileage, Deep River is able to use vehicles for longer than average. The Statistics Canada publication *An Update on Depreciation Rates for the Canadian Productivity Accounts* was originally referenced to estimate years until replacement, with adjustments made to accommodate low mileage and Deep River's historical replacement trends. The Deep River estimated years are used to plan for vehicle replacement in the expenditure forecast. Vehicle needs will be revisited yearly.

Type of Vehicle	**Deep River Est. Years**	**Statistics Canada Estimate**
Police Vehicles	4	
Light duty trucks	10	7.5
Medium duty trucks	15	10.5
Heavy trucks	17	14.4
Fire trucks & heavy equipment	20	14.4

Yearly Revenues

	2014 - Actual	2015 - Actual	2016 - Budgeted
Taxation	2,840,587	4,840,126	3,959,669
Payments in Lieu	2,736,899	1,070,262	2,360,919
Grants	639,500	383,700	436,900
Solar Program	4,660	10,143	0

Priorities – Major Linear Network Projects

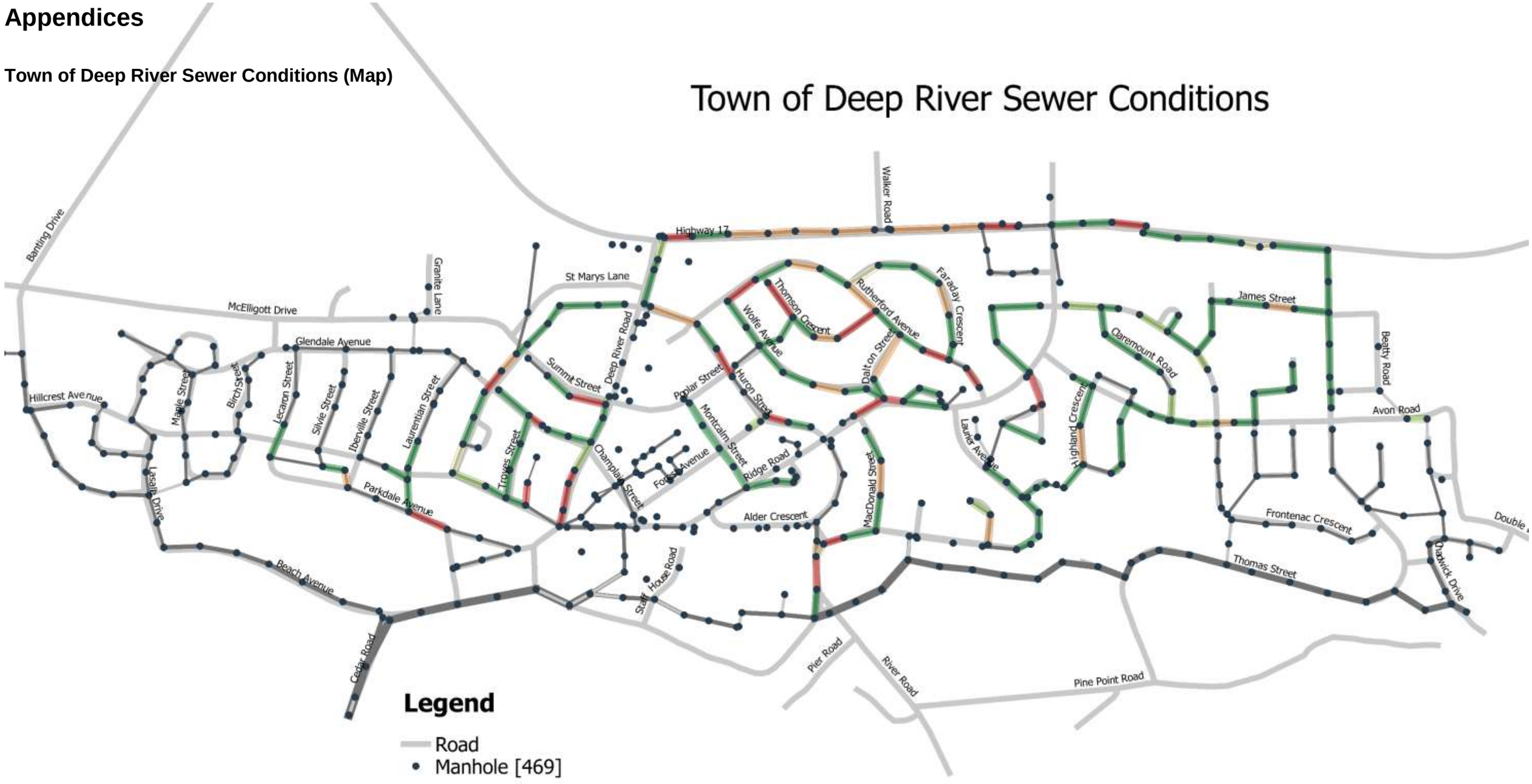
The following rehabilitation and replacement projects have been flagged in the system to consider as priority when funding is available. These projects are driven largely by sanitary sewer conditions, so will likely change when the rest of the sewer network is inspected. As discussed in the previous section, defects could degrade further within the next 10 years, but assets are currently performing to a reasonable standard.

Road	Meters	Project Description	Recommendation	Est. Cost
Deep River	139	The part of the sewer main in poor condition is located under sidewalk downtown.	Reline	$ 42,800.00
Highway	916	Defects are not as severe as others on this list but could become a concern within 10 years. Recommended to reline, and to coordinate replacement with road lifecycle (est. to be replaced in 20-40 years). MTO is responsible for the road.	Reline	$ 281,900.00
Algonquin	117	Road and sewer in this area are in poor condition. Sewer crosses Glendale as well.	Replace Cross Section	$ 280,000.00
Huron Lower	110	Reline proposed in 2017 (CWWF funding).	Reline	$ 33,900.00

Road	Meters	Project Description	Recommendation	Est. Cost
Huron Upper	266	Defects are not as severe as others on this list - could be a concern within 10 years. However this area collects waste from the Highway, so impact of failure would be high.	Reline	$ 81,900.00
Cabot	189	Top of pipe starting to fall in. This section is deep and road is not in poor condition making this a good candidate for relining if feasible.	Reline	$ 58,500.00
Ridge	129	Partially under road with some sections under grass. The County is responsible for the road.	Reline	$ 39,700.00
Rutherford	850	Road and sewer conditions are poor and water main breaks have occurred here.	Replace Cross Section	$ 2,040,000.00
Thompson	268	Road and sewer conditions are poor.	Replace Cross Section	$ 864,000.00
Brockhouse	77	Proposed in 2017 (if OCIF funding is obtained). Cost estimate includes fixing drainage issues as they are causing premature cracking and wear on the road. Good candidate for cross sectional replacement because sewer, road and storm are known to be in poor condition, and 65+ year old water main would have high impact in the event of failure.	Replace Cross Section	$ 1,850,000.00
Glendale	40	Road has structural issues as well, consider cross sectional replacement.	Replace Cross Section	$ 96,000
Summit	88	Sewer is off road, but road is also in poor condition. Water main is also 65+ years old. Consider cross section replacement.	Replace Cross Section	$ 211,200.00
Parkdale	99	Cross sectional replacement proposed in 2017.	Replace Cross Section	$ 165,000.00

Appendices

Town of Deep River Sewer Conditions (Map)



Town of Deep River Water Mains (Map)

Roads: Priority for Crack Sealing

Roads: Aggregate Loss & Surface Deformation