	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
General Government							
Administration							
Salary Review	-	-	50	50	-	-	-
Destination Marketing Plan	-	-	50	-	-	-	-
Tourism Strategy	50	51	-	-	-	-	-
Economic Development Readiness	-	15	-	-	-	-	-
Promotion	-	32	-	-	-	-	-
Stores- Shelving	-	-	-	10	-	-	-
CCBF-911 Emergency Services	-	29	-	124	-	-	-
	50	127	100	185	-	-	-

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Information Technology							
Network Upgrades	25	24	25	25	25	25	30
GIS Enhancements	50	32	40	40	44	40	40
Server and Storage Replacements	30	33	40	40	45	50	56
Desktop Telephone Replacement	-	10	-	-	-	-	-
Satellite Imagery	-	-	60	60	-	-	-
Communication Infrastructure	-	521	5	270	10	25	25
Security Cameras	20	18	-	-	25	20	35
Secondary Site & Data Replication	20	13	20	27	20	20	20
Library Public Access	-	-	-	-	20	-	-
MED In-Car Computer	10	8	10	11	-	-	-
MED In-Car Cameras	-	-	-	-	30	-	-
MED Web Applications	-	5	-	-	-	-	-
Website/ Service Enhancements	15	23	11	11	20	15	25
Website Redesign	35	30	-	5	-	-	-
Server Room Upgrades	-	-	25	25	20	-	-
Server Room UPS	35	36	-	-	-	-	-
Core Switch Upgrades	25	13	60	60	-	-	-
Inventory Bar Coding	-	3	-	15	-	-	-
Virtualization	40	32	100	108	100	25	25
One-Stop Shopping	-	128	-	53	-	-	-

(cont'd...)

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Information Technology (con't)							
Wireless Authentication/ Authorization	-	2	-	-	-	-	-
Document Management	-	-	-	25	-	-	-
Email Management	-	-	-	40	-	-	-
Door Access Controls	-	72	10	10	20	20	20
Meeting Automation	-	89	-	11	-	-	-
Development and Building Permit Automation	-	6	-	-	-	-	-
Human Resources System Automation	-	5	-	25	-	-	-
GeoWare Standardization	-	7	-	-	-	-	-
Voice Radio Support Equipment	-	-	-	75	-	-	-
Multi-function Devices and Printers	50	59	50	93	50	50	50
Social Media	-	-	-	5	-	-	-
Automated Ticket Writer	20	-	-	23	-	-	-
Digital Signatures	30	-	-	30	-	-	-
Client Access Switches	50	63	-	-	-	-	-
Open Data	25	9	-	-	-	-	-
Computer Aided Dispatch	125	97	20	48	-	-	75
Automatic Vehicle Location	25	14	-	11	-	-	-
Teleconferencing	30	-	-	-	-	-	-
Webcasting	-	22	-	-	-	-	-
Equipment Cameras	35	35	-	-	-	-	-
Emergency Operations Centre Equipment	-	-	20	20	-	-	-
Wireless Controllers	-	-	-	-	55	-	-
	695	1,409	496	1,166	484	290	401

		2016 Budget Recommended ($000s)	IT Reserve ($000s)
General Government	**Page**		
Information Technology			
Network Upgrades	145	25	25
GIS Enhancements	148	44	44
Server and Storage Replacements	150	45	45
Communication Infrastructure Renewal	152	10	10
Security Cameras	154	25	25
Secondary Site & Data Replication	156	20	20
Library Public Access	164	20	20
MED In-Car Cameras	165	30	30
Website/ Service Enhancements	158	20	20
Server Room Upgrades	167	20	20
Virtualization	169	100	100
Door Access Controls	160	20	20
Multi-function Devices and Printers	162	50	50
Wireless Controllers	172	55	55
Subtotal		484	484

Department/Division Corporate Services / Information Technology
Project Network Upgrades

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	25,000	25,000	30,000	80,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	25,000	25,000	30,000	80,000

Purpose
To continue the City's planned and incremental investment in its network.

Background
The City's Information Technology infrastructure is essential for effective service delivery and the network that provides connectivity among its computers, laptops, servers, printers, cameras, mobile devices, telephones, and voice radios is vital to the City's operations.

The City's network employs Ethernet, leased and city-owned fiber, and wireless and microwave technologies to create connections among thirteen sites.

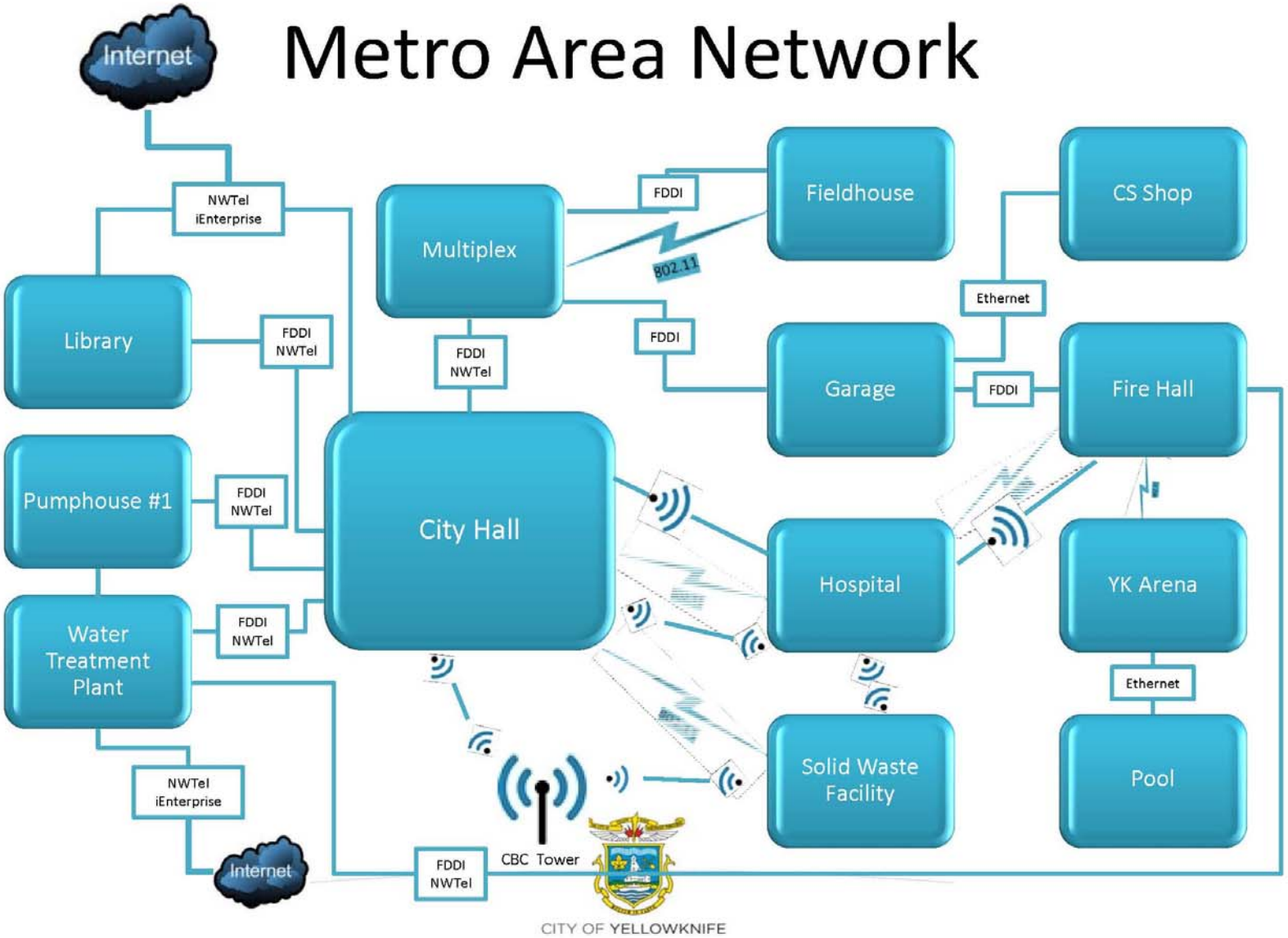
Within each site, the network connects numerous devices, ensuring that staff, citizens, and stakeholders have consistent and reliable access to applications, data, printers, and the internet.

The network also plays a key role in protecting the City's information technology infrastructure. Its firewalls and other protective mechanisms routinely deny more than 100 unauthorized access attempts per minute while its spam filter rejects an average of 85% of the emails directed at the organization.

As employees and stakeholders increasingly turn to technology to maintain and enhance service levels, demands and reliance on the network continue to grow. For example, in recent years the City has implemented Computer-Aided Dispatch; adopted enterprise solutions such as CityWorks, CityView, and CityExplorer; launched industry-standard communications infrastructure, introduced traffic cameras; extended online service offerings; deployed mobile solutions; provided public internet access; and enhanced its Customer Service function. All of these data-intense applications create increasingly heavy demands on the network, both in terms of capacity and reliability.

It is therefore critical that network capacity and reliability keep expanding at a comparable pace through regular, ongoing enhancements. This incremental approach has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments.

In 2016, the City's wireless network controllers will be enhanced to expand capacity to keep pace with demands and to introduce redundancy in the face of increased reliance on the service. In 2017 and 2018, the focus will be on security enhancements as threats – both internal and external – continue to grow and evolve, making it ever-more challenging to adequately protect the City's infrastructure.


Metro Area Network
Internet
NWTel iEnterprise
Multiplex
FDDI
802.11
Fieldhouse
CS Shop
Ethernet
Library
FDDI NWTel
FDDI NWTel
FDDI
Garage
FDDI
Fire Hall
Pumphouse #1
FDDI NWTel
City Hall
Hospital
YK Arena
Water Treatment Plant
FDDI NWTel
Ethernet
Solid Waste Facility
Pool
NWTel iEnterprise
Internet
FDDI NWTel
CBC Tower
CITY OF YELLOWKNIFE

If this project does not proceed, it will negatively impact the organization's ability to maintain and grow its network. In the short term, network congestion could reduce service delivery levels to staff, citizens, and stakeholders, and there will be no opportunity to expand services to meet new requirements. Over time, there will be increasingly frequent service disruptions when equipment fails. These failures could negatively impact most aspects of City operations, including internal staff activities and external citizen and stakeholders services.

Triple Bottom Line

This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Provide secure, high-availability network services
- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner
- Adopt increasingly stringent industry-standard security and data protection practices and procedures
- Grow mobile workforce opportunities to improve employee productivity and provide more effective service delivery

Economic

The incremental approach reflected in this budget allocation has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments. The overall costs of regular, planned improvements are substantially lower than expenditures generated by system failures, outages, and urgent replacements.

Operational Impacts

The City's network is vital to its operations and even short service interruptions can have significant impacts on service delivery and employee productivity. It will be more cost effective – and present a lower risk to the City – to replace this equipment in a planned and orderly fashion than to experience problems that require excessive troubleshooting and repair or failures that create service outages.

Department/Division Corporate Services / Information Technology
Project GIS Enhancements

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	43,600	40,000	40,000	123,600
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	43,600	40,000	40,000	123,600

Purpose
To continue the City's planned and incremental investment in its Geographic Information Systems.

Background
CityExplorer – the City's geographic information system (GIS) – is a powerful and popular tool for both staff and citizens. Based on the principal that most information has a spatial component, it provides single-window access to diverse data from across the organization and is a dynamic, evolving entity.

To sustain and grow the value of this system the data must be current, accurate and relevant; this requires ongoing investments of both time and money. Similarly, the more staff and citizens utilize the system, the more potential they identify; dedicated people and financial resources are needed to develop and implement the enhancements to meet this potential.

As with many other infrastructure components, the Information Technology Division has developed a strategy of sustained investment in this system, its data and its capabilities. This investment and growth are dictated and directed by the needs and requirements of staff, citizens, and stakeholders. This project reflects the necessity of the regular, predictable expenditures that are essential to the upkeep and growth of CityExplorer.

Over the next three years, major initiatives include migrating the City's GIS infrastructure to the Canadian Municipal Data Model, enhancing the City's data library with the creation of new datasets, expanding internal GIS utilization within the organization, and introducing new functionality to CityExplorer to allow for the distribution of public data.

Enhancement plans also include:

- Fine-tuning security and permission settings on the City's spatial database so that internal clients can take ownership of the data they originate and assume responsibility for routine and regular updates. This will improve the quality of the data as it is maintained by those who are the most knowledgeable about it.
- Establishing a GIS User Community comprised of City staff, citizens, contractors, and federal and territorial government employees to share knowledge and collaborate on solutions and training initiatives.

- Developing a Land Lease application that includes an editing environment in CityExplorer so that Planning and Lands staff can maintain both spatial and tabular lease data in one environment.

- Expanding data collection capabilities. This will build on the success of 2015's CLEM (Cart Location Editing Matrix) deployment and further streamline data capture and processing. Asset inspection data will be a prime candidate as there are considerable advantages to having the crews capture the data in the field during the inspection process and then integrating this information directly into CityExplorer (for asset management) and CityWorks (for work management). Similarly, it will be beneficial for maintenance crews to capture fixed asset data in the field and update the City's GIS database in real time.

- Enhancing the City's 3D data offerings by adding 3D versions of building information and facility floor plans, and introducing Geodesign capability to support integrated processes for planning built and natural environments.

- Enabling more of the City's fleet with Automatic Vehicle Location (AVL) services that not only track location but also monitor factors such vehicle speeds, engine data, and fuel consumption to help improve overall fleet management.

If this project does not proceed, the associated enhancements will not be implemented and the resulting benefits will not be realized. This will adversely affect the clients who have identified the needs for additional data and features.

Triple Bottom Line

This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Support the efficient and effective operation of all information systems
- Provide efficient, effective, and timely geomatics services to citizens and stakeholders.

It also addresses these Information Technology Division objectives:

- Enhance the capabilities of cityExplorer and further expand its use throughout the organization and among the citizens of Yellowknife by developing further integrations with existing applications and data, responding to client feedback and requests in a structured manner, and adhering to industry-standard practices for collecting and maintaining data
- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Adopt increasingly stringent industry-standard security and data protection practices and procedures
- Grow mobile workforce opportunities to improve employee productivity and provide more effective service delivery

Economic

The incremental approach reflected in this budget allocation has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments.

Operational Impacts

The City's GIS services have been widely embraced by staff, citizens, and stakeholders and they have created efficiencies throughout the organization. Continued investment in this resource will help ensure that data accuracy is maintained and that features and functionality continue to grow to meet expanding demands.

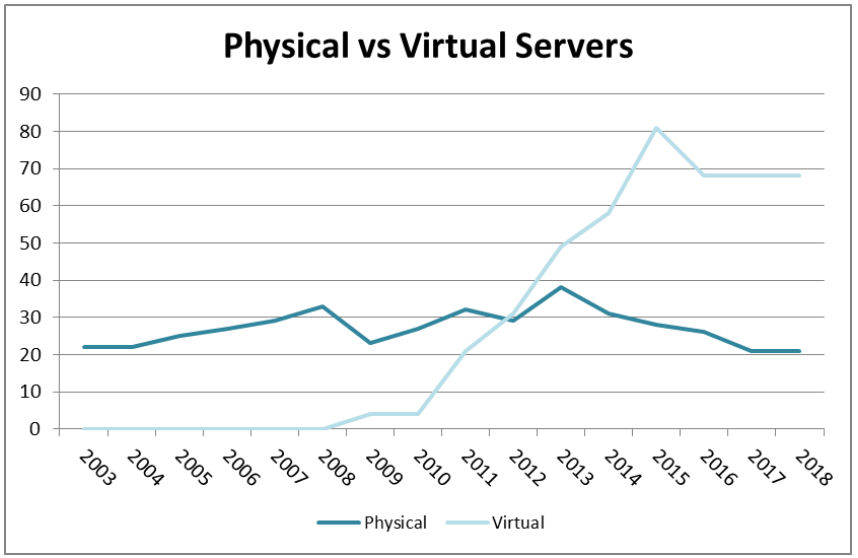
Department/Division Corporate Services / Information Technology
Project Server and Storage Replacement

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	45,000	50,000	55,500	150.500
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	45,000	50,000	55,500	150.500

Purpose
To continue the City's planned and incremental investment in its server fleet and file storage infrastructure.

Background
The Information Technology Division maintains numerous physical and virtual servers to support a wide range of services to staff, citizens, and stakeholders. It also maintains a redundant file storage system to house and protect the City's burgeoning collection of documents and data that are essential to its day-to-day operations.

The City's dependence on its server fleet intensifies with each activity that is automated. In addition to traditional applications such as accounting, payment processing, and payroll, both staff and citizens are adopting increasingly sophisticated solutions to meet diverse needs including mapping, work management, meeting management, elections, transit, permit processing, problem reporting, security cameras, building access, pellet boilers, solar panels, and black/green cart management. In addition, most communications – including email, telephone, websites, and social media – are now electronic and therefore depend on increasingly powerful servers and require rapidly expanding storage space.



The increasing reliance on this infrastructure is evident in the numbers: in the past five years the City's server fleet more than tripled in size, the number of network devices increased by 450%, and data storage requirements grew by nearly 3500%.

To keep pace with these demands, the servers need to remain current and reliable and data storage needs to grow. This requires sustained investment in the server fleet and regular expansion of the storage capacity, with the goal of regular, predictable expenditures,

Over the next three years, the Information Technology Division will continue to maintain and renew the City's server and file storage infrastructure to ensure that the performance and reliability demands of staff and citizens are met. This initiative will replace and redeploy servers that are nearing the end of their life expectancies, sustain a reasonable inventory of spare parts to ensure replacements are readily available when failures occur, and expand the City's file storage capacity.

If this project does not proceed, the Division will not be able to replace end-of-life servers or acquire much-needed additional storage capacity. In the short term, this will negatively impact overall infrastructure performance and thus service delivery to both internal and external clients, and over time it will lead to more frequent system outages and necessitate increased support efforts and costs.

Triple Bottom Line

This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Provide secure, high-availability network services
- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner
- Adopt increasingly stringent industry-standard security and data protection practices and procedures

Financial

The incremental approach reflected in this budget allocation has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments. The overall costs of regular, planned improvements are substantially lower than expenditures generated by system failures, outages, and urgent replacements.

Operational Impacts

It will be more cost effective – and present a lower risk to the City – to replace this equipment in a planned and orderly fashion than to experience problems that require excessive troubleshooting and repair or failures that create service outages.

Department/Division Public Safety
Project Communications Infrastructure Renewal

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	10,000	25,000	25,000	60,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	10,000	25,000	25,000	60,000

Purpose
To implement regular, ongoing maintenance and enhancements of the City's Communications Infrastructure system that provides voice radio services to its emergency personnel.

Background
The City's Communications Infrastructure system was deployed in early 2015. It created a robust, redundant backbone for radio communications and introduced significant improvements to the organization's public safety and emergency communications capabilities. Regular, ongoing maintenance and enhancements will be required to protect the City's investment in this infrastructure and to ensure that it remains effective throughout its life expectancy.

The 2016 allocation request is modest as the equipment is still relatively new and the system is managed under a support contract with the vendor. However, beginning in 2017it is anticipated that some of the original devices will be due for replacement and that process and technology changes will create requirements for a more substantial investment to maintain the infrastructure.

If this project does not proceed, it will not be possible to implement the incremental improvements and repairs necessary to ensure ongoing reliable system performance. This presents considerable risk to the organization. Over time, lack of regular investments will shorten the life expectancy of this system, and necessitate a costly replacement.

Triple Bottom Line
This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Provide secure, high-availability network services
- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner

Social

The Communications Infrastructure provides a vital lifeline for City first-responders as they protect citizens and property and contribute to a safe community.

Economic

The incremental approach reflected in this budget allocation has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments.

Operational Impacts

It will be more cost effective – and present a lower risk to the City – to replace this equipment in a planned and orderly fashion than to experience problems that require excessive troubleshooting and repair or failures that create service outages.

Department/Division Corporate Services / Information Technology
Project Security Cameras

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	25,000	20,000	35,000	80,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	25,000	20,000	35,000	80,000

Purpose
To acquire and install additional and replacement security cameras and to expand the associated back-end support infrastructure.

Background
Security cameras are an integral part of the City's infrastructure as they have proven to be a valuable tool for deterring crime and abuse and for protecting staff, citizens, and property.

City staff members use camera footage for security-related tasks like determining crime timelines, identifying intruders in City facilities, and assessing incidents related to insurance claims. As well, they frequently provide footage to the RCMP to aid them in their investigations. Staff members also use the cameras for operational purposes such as obtaining license plate information at the Gate House, observing baler processes at the Solid Waste Facility, and monitoring membership pass usage at the Fieldhouse.

Despite some growth in the security camera system in recent years, there are significant unmet needs for additional cameras, especially at the Library, Pool, Fieldhouse, Solid Waste Facility, and Water Treatment Plant. Additionally, some of the original devices - which are past their end-of-life - have failed and need to be replaced.

This budget allocation is required to acquire and install additional and replacement cameras and to expand the back-end support infrastructure. An assessment of current needs and acquisitions will be done and those with the highest priority will be addressed. If appropriate, cameras will be re-assigned to obtain the best possible match of equipment and needs; however, these decisions must take into account the high installation costs associated with camera re-locations. Resources will also be utilized to ensure licensing compliance for the software required to run the cameras, and to provide adequate storage space for additional footage generated by a larger camera fleet.

If this project does not proceed, no additional cameras will be purchased. Cameras that fail will be left in place, and camera moves will be put on hold.

Triple Bottom Line
This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Expand and improve the implementation of security cameras throughout the city to protect citizens, staff, and property
- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner

Social
The City's security camera system has proven to be a valuable tool for deterring crime and abuse and for protecting staff, citizens, and property.

Economic
The incremental approach reflected in this budget allocation has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments. The overall costs of regular, planned improvements are substantially lower than expenditures generated by system failures, outages, and urgent replacements.

Operational Impacts
It will be more cost effective – and present a lower risk to the City – to replace this equipment in a planned and orderly fashion than to experience problems that require excessive troubleshooting and repair or failures that create service outages.

Department/Division Corporate Services / Information Technology
Project Secondary Site and Data Replication

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	20,000	20,000	20,000	60,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	20,000	20,000	20,000	60,000

Purpose
To continue the organization's incremental approach to the development and maintenance of a secondary Data Centre site.

Background
The City's Information Technology infrastructure was traditionally centralized at City Hall. However, this singularity presented an unacceptable level of risk to the organization because had the site had been compromised in any way, the organization would not have been able to conduct business. To mitigate this risk, the Information Technology Division undertook to establish a secondary site to run essential services in the event that the primary site becomes unavailable for any reason.

An incremental replace-and-redeploy strategy approach was adopted to alleviate the budget impact. In 2013 physical facility preparations at the secondary site were completed, a server rack was installed, an IBM Blade Center and Storage Area Network (SAN) were deployed and configured, and the Information Technology Division began replicating some data to the site. In 2014, additional blade servers were purchased for use in the City's primary Data Centre and the replaced blades moved to the secondary site, and some networking components were upgraded to improve overall performance. In 2015, additional storage was acquired to accommodate organizational data growth. In 2016, the focus will be on cleaning up legacy rack equipment and associated cabling at the secondary site, and in 2017 and 2018 efforts will be concentrated on shifting more services to the secondary site and fine tuning automated failover processes.

Continued, incremental enhancements of this secondary site are crucial to maintaining an increasingly functional off-site Data Centre capable of resuming and sustaining operations in a timely fashion. If this project does not proceed, it will limit the organization's ability to continue building and maintaining the secondary site, and possibly necessitate a return to reliance on a single Data Centre.

Triple Bottom Line
This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Provide secure, high-availability network services

- Support the efficient and effective operation of all information systems
- Supply technical leadership and support for ongoing information technology projects within the civic organization

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner

Economic

The incremental approach reflected in this budget allocation has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments. The overall costs of regular, planned improvements are substantially lower than expenditures generated by system failures, outages, and urgent replacements.

Operational Impacts

It will be more cost effective – and present a lower risk to the City – to replace this equipment in a planned and orderly fashion than to experience problems that require excessive troubleshooting and repair or failures that create service outages.

Department/Division Corporate Services / Information Technology
Project Website / Service Enhancements

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	19,800	15,000	24,500	59,300
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	19,800	15,000	24,500	59,300

Purpose
To continue the organization's incremental approach to enhancing online service delivery.

Background
Electronic services are an accepted – and expected – way to provide information, conduct business, and engage citizens. The City has established a good foundation with its website content, eServices portfolio, Interactive Voice Response (IVR) services, CityExplorer mapping tools, open data portal, and Click Fix YK and PingStreet applications. Staff and citizens have embraced these service offerings and thus enabled the organization to provide related services more efficiently and effectively.

There are many opportunities to build on this foundation and expand the City's online services, and thereby improve its customer service and streamline its operations. This project seeks to follow the successful approach proven with many other Information Technology components and establish regular, incremental funding to ensure consistent, manageable, and beneficial improvements to the City's online service offerings.

In 2016, the Division will introduce additional PingStreet tiles to provide citizens with mobile access to the Rec Guide, trail information, and current snow removal, road closure, and detour information. It also plans to introduce Suggestions / Community Feedback functionality to obtain citizen input, deploy the Uservoice community engagement tool to create another avenue for stakeholder involvement, implement a Wastewater Calculator to allow residents and businesses to calculate their water consumption, and potentially collaborate with Stanton Territorial Hospital to develop a mutually beneficial Wait Times application.

Plans for 2017 include further expansion of PingStreet functionality to include tiles for News and Public Notices, Business and Contact Directories, Mayor and Council profiles, City Facility information, and potentially a School Bus alerts service developed in cooperation with the City's transit contractor. Other enhancements include the deployment of the eBook module that readily converts City publications like the Rec Guide and brochures to web-friendly formats and possibly the introduction of a Demographic Report Generator to provide easy access to Yellowknife-related census data and the Available Lands and Buildings tool for consolidated real estate marketing.

Potential 2018 enhancements include a Tourism Directory, an Online Donations tool, and Live Chat functionality to augment current Customer Service offerings.

Triple Bottom Line

This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner
- Provide clients with additional tools and resources to enable them to better utilize the City's information technology infrastructure

Social

This project expands the portfolio of electronically delivered services, consistent with the expectations of many Yellowknife citizens and stakeholders.

Economic

The functionality introduced by this initiative will enable the City to provide services and information at a lower cost than traditional delivery methods and in a manner that is attractive and convenient for many citizens and stakeholders.

Environmental

Increased electronic service delivery will reduce the amount of paper used by the City and distributed throughout the community.

Operational Impacts

This project will improve customer service and streamline many operations within the organization.

Department/Division Corporate Services / Information Technology
Project Door Access Controls

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	20,000	20,000	20,000	60,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	20,000	20,000	20,000	60,000

Purpose
To continue the organization's incremental approach to implementing and maintaining electronic door access controls.

Background
Electronic door access controls are used at City Hall, the Fire Hall, the Pool, the Garage, and the Library. They have proven much easier to administer and control than traditional key methods as changes can be made instantaneously, without the need to physically assign and retrieve keys. When an employee joins the organization, their ID card is programmed to provide access related to their position and if responsibilities change, the card can be readily re-programmed to reflect them. More importantly, when an employee leaves or a card is lost, it can be deactivated instantly. In addition, the back-end systems provide valuable reporting capabilities.

The success of the initial implementations has created client demand for additional controls. There is an immediate need for funding, therefore, to expand the number of doors controlled by the system at the Library, Fire Hall, and City Hall. In future years, investment will be required to maintain equipment and to replace it as it reaches the end of its useful life.

Triple Bottom Line
This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Support the efficient and effective operation of all information systems
- Supply technical leadership and support for ongoing information technology projects within the civic organization

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner
- Provide clients with additional tools and resources to enable them to

better utilize the City's information technology infrastructure
- Adopt increasingly stringent industry-standard security and data protection practices and procedures

Economic
The electronic door access system is more economical to operate than the traditional lock-and-key system as it eliminates the requirement to manage physical keys and to re-key locks as roles and responsibilities change.

Operational Impacts
In the short term this project will work towards implementing more electronic door access controls in strategic areas, thus reducing the amount of manual key management required to provide staff with required access while still ensuring that the City's facilities remain secure. In the longer term, it will prove more cost effective – and present a lower risk to the City – to replace this equipment in a planned and orderly fashion than to experience problems that require excessive troubleshooting and repair or failures that create service outages.

Department/Division Corporate Services / Information Technology
Project Multifunction Devices and Printers

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	50,000	50,000	50,000	150,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	50,000	50,000	50,000	150,000

Purpose
To continue the organization's incremental approach to implementing and maintaining multifunction devices throughout the organization.

Background
In 2014, the City issued a request for proposals for multifunction device management and entered into a long-term arrangement with the successful proponent. The vendor conducted an initial inventory and assessment of the City's existing printer/copier/fax/multifunction device fleet and then met with key stakeholders to ascertain current and future user requirements. Based on this information the vendor prepared a multi -year Plan with the goals of reducing costs and realizing maintenance and support efficiencies.

The Plan identifies three tiers of devices with the expectation that all future acquisition choices will be selected from one of these three tiers. The intent is to gradually minimize the variety of devices installed throughout the organization so that usage, support, and consumables management are streamlined.

In 2014, two top-tier printers and one middle-tier multifunction device were acquired and deployed to meet the most pressing needs in City Hall. In 2015, top-tier devices were acquired and deployed at the Fire Hall and Garage, and a middle-tier device was acquired and deployed at the Library. An additional top-tier device will be acquired for City Hall in 2016, along with middle-tier devices for the Pool, City Hall, and Multiplex and lower-tier units for the Pool and Library.

The Plan also identifies end-of-life and high-cost, low-usage devices with the intent of retiring them in favour of lower cost, centralized units. In 2015, fifteen such units were removed from service at City Hall, the Solid Waste Facility, the Fieldhouse, and the Garage.

Another component of the Plan is the reallocation of devices to better meet varied needs within the organization. In 2015, three existing devices were reassigned among the Garage, the Solid Waste Facility, and City Hall.

In late 2016, a follow up analysis will be conducted to ascertain where unmet requirements exist and to identify detailed acquisition, deployment, reallocation, and retirement plans for 2017, 2018, and 2019.

Triple Bottom Line

This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Support the efficient and effective operation of all information systems
- Supply technical leadership and support for ongoing information technology projects within the civic organization

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Acquire and deploy new and replacement components in a timely and cost effective manner
- Provide clients with additional tools and resources to enable them to better utilize the City's information technology infrastructure
- Adopt increasingly stringent industry-standard security and data protection practices and procedures

Economic

The incremental approach reflected in this budget allocation has proven highly effective as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments. The overall costs of regular, planned improvements are substantially lower than expenditures generated by system failures, outages, and urgent replacements.

Operational Impacts

It will be more cost effective – and present a lower risk to the City – to replace this equipment in a planned and orderly fashion than to experience problems that require excessive troubleshooting and repair or failures that create service outages.

Department/Division Community Services / Public Library
Project Library Public Access

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	20,000			20,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	20,000			20,000

Purpose
To replace the existing public access equipment at the Library.

Background
The City provides eight workstations for public use at the Library. These units were acquired in 2012 and are heavily utilized. In 2014 these stations provided 28,969 Internet sessions. They deliver a valuable public service supporting a variety of literacy goals; however, they have a limited lifespan and should be replaced in 2016. This schedule aligns with the four-year rotation for City workstations which has been mandated by Council.

If regular refreshes are not sustained, increasing equipment failure rates will negatively impact service levels and require additional IT troubleshooting and repair resources.

Triple Bottom Line
Social
Yellowknife is a diverse a socially inclusive city that respects its heritage and the arts. The Public Access Equipment is used by people from diverse backgrounds, especially those challenged economically. They are often used to achieve artistic and expressive goals, to research heritage, and to foster literacy, which increases the likelihood of achieving other goals.

Economic
The Public Access Equipment provides Yellowknifers access to meaningful employment opportunities and the ability to achieve individual economic well-being. The computers are often used to research job opportunities, prepare resumes, find housing and information about Yellowknife's services and amenities; therefore should be seen as an investment into Yellowknife's capital.

Environmental
Replacing the workstations will provide an opportunity to look for more energy efficient computers. As well, using public computers has the potential to reduce solid waste as they provide people more opportunities to communicate and conduct business electronically (rather than with paper) and decreases the need for computers in the home (that eventually end up in the landfill).

Department/Division Public Safety / Municipal Enforcement Division
Project In-Car Camera Equipment

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	30,000			30,000
O&M Expenses				
Total:	30,000			30,000
IT Reserve	30,000			30,000
Grants				

Purpose
To purchase new in-car camera equipment for Municipal Enforcement Vehicles that is used to record traffic stops, other investigations or Officers conduct during an incident.

Background
The City of Yellowknife Municipal Enforcement Division has 4 vehicles that patrol approximately 120 km of municipal maintained roads and approximately 30 km of territorial highways that are within our municipal boundaries (in accordance with the GNWT Motor Vehicles Act). The original in-car camera equipment was purchased for the four patrol vehicles in 2007 with scheduled replacement at year four in 2011.

The cameras are an integral piece of equipment used by all officers in their daily duties. The cameras record both audio and video of any traffic stops and other important incidents. They are used to gather video evidence of infractions and are extensively used to investigate complaints about an officer's conduct.

Under the City's Evergreen Policy, computer equipment is scheduled to be replaced every four years. As the system has been working fairly well for the past four years, the decision was made to extend the scheduled replacement to five years. During this fifth year of service, several of the cameras have been experiencing operating issues which have resulted in the loss of video during some highlighted events and numerous hours spent trouble-shooting the equipment from Corporate Services (Information Technology Division). This can affect public confidence and the integrity of the Division as the footage is utilized by Administration, the Mayor's office and in Territorial Court proceedings and may also assist towards any possible litigation.

Triple Bottom Line
Social
This new equipment will ensure no interruption in essential emergency services to the residents of the City of Yellowknife, contributing to a safe community and a City of strong neighbourhoods (through patrols or investigations).

Economic
This project is a strategic investment in MED's essential equipment. Improvement and maintenance of our mobile equipment is vital to continued provision of essential services to our residents and those agencies or organizations that request our services (Other City Divisions, RCMP, School Boards).

Environmental
Allowing the in-car camera replacement will assist in land protection, for violations from littering on the road to incident investigations under the Unsightly Lands By-law or other municipal by-laws.

Operational Impacts

Aging technology (infrastructure) costs have a higher operational cost as they get older. In the case of electronic equipment operating at a range of temperatures in the vehicles, the down-time of the equipment will adversely affect MED and Corporate Services staff. This project should result in less operational time spent by Corporate Service staff trouble-shooting this equipment.

Department/Division Corporate Services / Information Technology
Project Server Room Upgrades

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	20,000			20,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	20,000			20,000

Purpose
To carry out electrical upgrades required to properly support the current and anticipated complement of equipment housed within the Data Centre.

Background
The City Hall server room is the organization's primary Data Centre and houses all centralized components of the City's Information Technology infrastructure. The space was allocated almost thirty years ago to accommodate a single IBM System/34 mini-computer: its contents now include two main distribution frames; three full cabinets of servers, file storage systems, and appliances; three environmental control units; a fire suppression system; and multiple power management systems.

The most significant growth has mirrored rapid information technology adoption and reliance throughout the organization. In the past five years the City has implemented Computer-Aided Dispatch; adopted enterprise solutions such as CityWorks, CityView, and CityExplorer; launched industry -standard communications infrastructure, introduced traffic cameras; extended online service offerings; deployed mobile solutions; provided public internet access; and enhanced its Customer Service function. In the same time period, data storage requirements have increased nearly 3500% (from three terabytes to 100 terabytes), the number of servers has more than tripled (from 31 to 109), and the number of core network device numbers has by 450% (from six to 27). All of these items consume Data Centre space, generate heat, and increase power requirements. The facility is now at capacity – there is no more physical space for additional equipment, and cooling and electrical systems are operating at or past their maximum.

This project is the next step in ongoing efforts to incrementally adapt the Data Centre to meet expanding demands and potentially extend its life expectancy. If it does not proceed, it will not be possible to add any more equipment – servers, file storage, or network components – to the Data Centre.

Triple Bottom Line
This project helps to ensure that the necessary infrastructure is in place to provide the tools and services that City staff require as they work towards achieving Council's Goals It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Provide secure, high-availability network services

- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively

Economic

This project reflects a necessary investment in the City's infrastructure and is thus an expenditure that must be made if the organization is to continue relying on technology.

Operational Impacts

This project indirectly impacts all Departments; without the ability to add more equipment and devices to the Data Centre, the Information Technology Division's ability to meet new requirements is severely restricted.

Department/Division Corporate Services / Information Technology
Project Virtualization

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	100,000	25,000	25,000	150,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	100,000	25,000	25,000	150,000

Background

The Information Technology Division implemented server virtualization several years ago. This technique essentially partitions one physical server into several virtual servers, so instead of buying and maintaining several small servers, funds are invested in acquiring and supporting large, powerful units that are in effect "divided up" as requirements dictate. One large server takes up less space than that required for multiple smaller devices and typically consumes less energy and produces less heat, which in turn requires less air conditioning. The concept is somewhat analogous to an apartment-style condominium complex: multiple families can live in less overall space than would be required to house them in detached homes, and cost savings can be realized because they share the roof and external walls, and possibly infrastructure such as heat, water, or air conditioning.

At the time the decision to proceed with this technology was made, the Citrix family of products was the best virtualization solution for the City and until recently it provided the anticipated benefits. It enabled the Information Division to meet the organization's burgeoning application requirements with fewer physical devices than under traditional approaches, thus conserving scarce data centre space, reducing electricity use, and generating less heat. It also provided a way to centrally serve up applications used throughout the organization, which streamlined deployments and upgrades as the installations only needed to be done once on the central server, instead of multiple times on individual workstations and laptops. This created efficiencies for the Information Technology Division because the work was only done once, and improved services to clients because they were not interrupted while software was installed on their computers. The technology also allowed infrequently-used programs to be shared from a single location. This enabled the Information Technology Division to meet sporadic requirements throughout the organization without purchasing licenses that would be rarely used or performing numerous installs and uninstalls to meet migrating needs.

In recent years, the Information Technology Division found that changes in licensing, technology and the software market were making the Citrix environment increasingly difficult and costly to manage and maintain. In addition, many software vendors stopped supporting products running on this platform, reducing its potential benefits to the City.

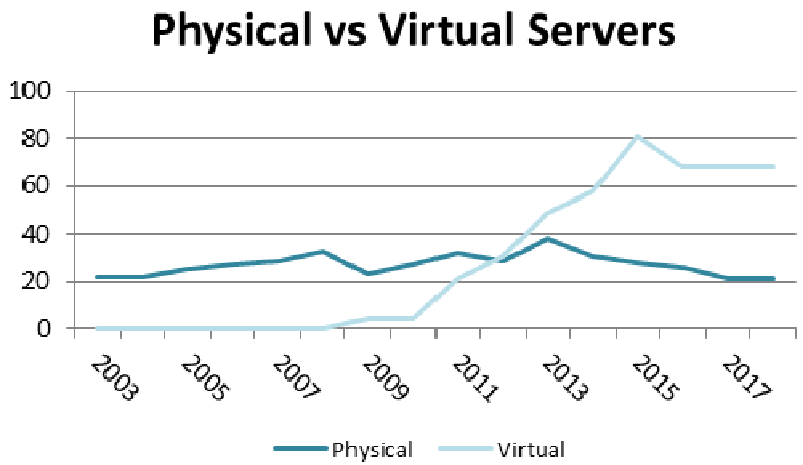
In 2014 the Division researched possible alternatives and confirmed that the VMware environment, which has emerged as the industry leader for

virtualization and become the standard for businesses worldwide, would be a good fit for the City's needs. The Division recommended that capital budget allocations be made in 2015, 2016, and 2017 to proceed with this migration.

The 2015 budget allocation enabled the Division to implement the basic VMware environment and to migrate many key services to VMware. This provided solid proof-of-concept that the environment is well-suited to the City's current needs. The 2016 allocation will be used to migrate the remaining functionality from Citrix to VMware, with an emphasis on improving and enhancing redundancy of essential services to meet current and future requirements.

Given the Information Technology Division's experience to-date with the VMWare environment, it is recommended that the $25,000 initially allocated to complete the platform migration in 2017 be considered the first of a recurring investment in the virtualized environment, recognizing the value of ongoing, planned, incremental expenditures to protect the City's Information Technology infrastructure.

If this project does not proceed to completion the organization will be straddling both environments and facing excessive support and maintenance requirements and costs (stemming from the need to license, maintain, and support two environments) without truly benefitting from the advantages of either one. Returning to a non-virtualized environment is not realistic, due to the significant growth in demand for servers in recent years.



Triple Bottom Line

This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them. It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Provide secure, high-availability network services
- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively

More specifically this project is associated with the Division's long-term plan to virtualize the City's Information Technology infrastructure as part of its efforts to manage more with less: virtualization helps to centralize server administration tasks, improves scalability and overall hardware resource utilization, and reduces space and energy requirements.

Economic

A fully-implemented virtualization paradigm costs less to operate, maintain, and support than a stand-alone server environment thus resulting in cost savings to the organization.

Environmental

One large server takes up less space than that required for multiple smaller devices and typically consumes less energy and produces less heat, which in turn requires less air conditioning.

Operational Impacts

The City's information technology infrastructure is facing growing reliability expectations because staff and citizens increasingly rely on all services being available at all times. Along with these expectations come more significant impacts if outages do occur. For example, if the City's core financial application was not available it would impede all revenue collection and financial tracking activities throughout the organization, and if the program registration program were to go down it would negatively impact service delivery at City Hall, the Pool, the YK Arena, the Multiplex, the Fieldhouse, the Library, and online. If a more centralized function, such as the database server, were to fail all services at all facilities would be interrupted. Therefore it is increasingly important to have redundancy, particularly for key, or central, services. The VMware solution provides tools for creating, managing, and maintaining this essential redundancy.

Department/Division Corporate Services / Information Technology
Project Wireless Controllers

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total Estimated Cost $
Capital Cost	55,000			55,000
O&M				
FTE				
Other O&M Expenses				
Total:				
IT Reserve	55,000			55,000

Purpose

To upgrade wireless controller hardware and software to provide the increased functionality, scalability, redundancy, and capacity required to meet current and foreseeable needs.

Background

The Information Technology Division provides wireless network services for City employees at six locations: City Hall, the Multiplex, the Fieldhouse, the Public Works garage, the Fire Hall, and the Library. As well, wireless Internet access is provided for citizens at City Hall, the Multiplex, the Fieldhouse, the Library, and the Somba K'e Civic Plaza.

Utilization of these services has increased significantly in recent years and it is anticipated that there will be continued future growth in both utilization and the number of sites where service is required. Existing wireless services are managed by a single high-capacity wireless controller at City Hall that governs wireless services at all facilities other than the Library, and two lower-capacity controllers at the Library. These are in turn managed by a Wireless Control System, which provides for security, accounting, monitoring, and reporting.

There is no redundancy for the City Hall device so if there are problems with it, wireless services at all City facilities (except the Library) are disrupted.

All of the controllers are at, or approaching, their licence limits for the number of registered access points so it is not possible to add new access points at current or new locations. As well, the current hardware and software are approaching the end of their life expectancy and cannot interface with the new wireless protocols that are on the horizon.

This project will acquire and deploy dual controllers with automatic failover at City Hall and upgrade the Library controllers and the Wireless Control System. This will establish redundancy for the City-wide wireless functions, allow for additional access points to expand services, and ensure compatibility with future protocols.

All departments and many citizens rely on the existing wireless services. If this project does not proceed, it will preclude any expansion of the current services and, in the event of equipment failures, impede staff and public access to them.

Triple Bottom Line

This project helps to ensure that the necessarily infrastructure is in place to provide the tools and services that employees throughout the organization require as they work towards achieving them.
It does so by contributing to the following Information Technology Division goals:

- Provide focused, reliable, and sustainable information technology infrastructure that is responsive to current City requirements and proactive in anticipation of future requirements
- Provide secure, high-availability network services
- Support the efficient and effective operation of all information systems

It also addresses these Information Technology Division objectives:

- Supply ongoing leadership to support and sustain the City's information technology infrastructure
- Provide City employees with the appropriate hardware and software tools to enable them to do their jobs efficiently and effectively
- Adopt increasingly stringent industry-standard security and data protection practices and procedures
- Enhance transparent and accountable network visibility, management and reporting
- Grow mobile workforce opportunities to improve employee productivity and provide more effective service delivery

Social

The wireless services at City Hall, the Multiplex, the Fieldhouse, the Library, and the Somba K'e Civic Plaza are well-utilized by visitors to these facilities; maintaining and expanding them are meeting needs within the community.

Economic

This project reflects a necessary investment in the City's infrastructure in order to sustain existing wireless network services and to meet an anticipated growth in demand for these services.

Operational Impacts

The existing wireless services are at capacity and lack redundancy. This project is necessary to expand the coverage to meet demands and to deploy additional equipment necessary to ensure reliability.

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Community Services							
YKCA Ice Plant Replacement & Heat Recovery Installation	600	221	1,200	1,725	-	-	-
YKCA Upgrades -Wiring	-	-	20	20	-	-	-
Multiplex Upgrade	-	-	-	42	-	-	-
Multiplex Façade Repair	-	29	-	27	-	-	-
Multiplex Multi-use Flooring	-	-	-	-	-	50	-
Fieldhouse Track Access Door	-	-	-	-	-	-	90
Fieldhouse Landscaping	75	71	-	-	-	-	-
	675	321	1,220	1,814	-	50	90
Library							
Washroom Development	-	-	-	-	57	-	-
Expansion / Renovations	-	48	-	-	-	-	-
	-	48	-	-	57	-	-

(cont'd ...)

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Community Services (con'd)							
Parks/Trails							
Lakeview Cemetery Expansion/Irrigation	-	32	-	3	105	340	-
Fencing - Cemetery and Ballparks	-	15	-	-	-	-	-
Playground Equipment Replacement	-	1	-	30	60	-	-
Fritz Theil Upgrade	-	19	-	-	-	-	-
Moyles Park - Multi-use Sport Pad	-	-	-	-	-	30	-
Ball Diamonds Upgrade	-	-	-	-	-	-	45
Sport & Multi-use Fields Upgrade	-	6	-	7	-	-	-
Old Aiprort Road Multipurpose Trail	-	5	-	-	-	-	-
Trail Development - Tin Can Hill	100	29	-	97	-	-	-
Yellowknife Rotary Park - Trail Extension	20	27	20	20	20	20	20
Tommy Forrest Ball Park	-	-	60	60	-	-	-
Surfacing of Niven Lake Trail	-	-	-	-	-	210	-
Trash Containers & Butt Canisters	66	45	-	20	-	-	-
Outdoor Recreation Facility	-	26	-	-	-	-	3,383
Tennis Court re-surfacing	-	-	-	-	-	100	-
"United in Celebration" Sculture Painting	-	-	45	45	-	-	-
	186	206	125	282	185	700	3,448

(cont'd ...)

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Community Services (con'd)							
Pool							
Generator	-	18	-	-	-	-	-
Pool Upgrade	200	191	100	192	-	230	575
	200	208	100	192	-	230	575
Wildcat Café							
Structural Repair	-	(17)	-	-	-	-	-
City Hall							
Upgrades	-	-	-	45	50	-	-
Building Renovations	-	818	-	-	-	-	-
Boiler Replacement	-	275	-	-	-	-	-
	-	1,075	-	45	50	-	-
Total	1,061	1,858	1,445	2,333	292	980	4,113

		2016 Budget Recommended ($000s)	Formula Funding ($000s)	Grants ($000s)
Community Services	**Page**			
Library				
Washroom Development	178	57	57	
Parks/Trails				
Lakeview Cemetery Irrigation	180	105	25	80
Doornbos Park Playground Equipment Replacement	181	60	60	
Yellowknife Rotary Park -Trail Extension	183	20	20	
City Hall				
Upgrades	184	50	50	
Subtotal		292	212	80

Department/Division Community Services/Library Division
Project Washroom Development

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total
Capital Cost	57,000			57,000
O&M Expenses				
Total:				
Formula Funding	57,000			57,000
Grants				

Purpose
As required by the new Occupational Health and Safety Regulation 75 (1), this project proposes to install one washroom for staff use.

Background
Over the past few years the Occupational Health and Safety (OHS) Regulations were reviewed, updated and adopted by Workers' Safety and Compensation Commission.

New Occupational Health and Safety Regulations in effect as of June 1st, 2015 mandate the provision of one staff washroom in a workplace employing between one and ten workers. The library currently employs 7.26 fulltime staff therefore this project will involve construction of one staff washroom adjacent to the current staff room at the Library.

New OHS Regulations in effect as of June 1st, 2015 mandate as follows:

> "75. (1) An employer shall, to the extent that is reasonably possible, ensure that suitable and readily accessible toilet facilities for workers
> (a) are provided at a work site, maintained and kept clean;
> (b) are sufficient in number for the number of workers at the work site at any one time; and
> (c) have adequate provision for privacy, heat, light and ventilation.

"(2) Subject to subsections (3) to (5), the minimum number of toilet facilities required under subsection (1) is set out in Schedule K.

"(3) If toilet facilities are likely to be used by individuals other than workers, an employer shall provide additional toilets in a number that is proportionate to the number set out in Schedule K and, if use by those other individuals is substantial and frequent, the employer shall provide separate toilet facilities for those other individuals.

"(4) If there are more than 10 workers and both male and female workers who work at a work site, an employer shall provide separate toilet facilities for workers of each sex in numbers that are proportionate to the numbers of male and female workers present."

Schedule K sets out the appropriate number of toilets based on the number of workers as follows:

"SCHEDULE K (Subsections 75(2), (3) and (5)

Minimum Number of Toilet Facilities at Work Site

Number of Workers	Number of Toilets
1 to 10	1
11 to 25	2
26 to 50	3
51 to 75	4
76 to 100	5

Add one toilet for each additional unit of 30 workers"

Triple Bottom Line

Social

The City of Yellowknife seeks to ensure a safe environment for citizens and staff through the provision of quality facilities and will comply with the OHS Regulations.

Economic

The City of Yellowknife will strategically invest in infrastructure to maximize the lifecycle of facilities and to properly manage facilities.

Environmental

N/A

Operational Impact

There will be no increase or decrease to the O&M budget for this project.

Department/Division Community Services/Facilities Division
Project Lakeview Cemetery Irrigation

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	105,000			105,000
O&M				
Other O&M Expenses				
Total:				
Formula Funding	105,000			105,000
Grants				

Purpose
To purchase of a single stage centrifugal pump with a maximum capacity of 67L/sec. In addition, 900 feet of four-inch piping will be required to make it possible to water the cemetery on a regular basis.

Background
Lakeview Cemetery has been in existence since the late 1940s and today covers an area of approximately 17,500 square meters. To irrigate the Cemetery and its greenspaces, we require a pump to provide water from Jackfish Lake.

Without an adequate water supply, the Department is unable to perform the necessary care and maintenance of this Class A Facility. Having access to a dedicated pump for the facility will allow the Division the ability to maintain the facility at a continuous high standard and reduce care and maintenance costs.

It is the goal of the Department to maintain the Cemetery and its's green space as a Class A facility. This project will allow the City to manage its assets wisely by strategically investing in infrastructure to optimize function and service.

Triple Bottom Line
Social
The cemetery is a place of respect and reflection for the residents of Yellowknife and as such should be kept in a condition that is warranted for such a facility.

Economic
The management of public and corporate assets are optimized and based on continuous improvement.

Environmental
By having efficient use of a water supply will enhance maintenance and preservation of green spaces within the facility.

Operational Impact
No operational impact.

Department/Division Community Services
Project Doornbos Park Playground Equipment Replacement

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	60,000			60,000
O&M Expenses				
Total:				
Formula Funding	60,000			60,000
Grants				

Purpose
In 2016, it is proposed to replace the playground equipment at Doornbos Park which does not meet the Canadian Playground Standards.

Background
Playgrounds have a lifespan of about 15 to 20 years and need to be replaced on an ongoing basis to serve the community. There have been multiple code changes and advances in play equipment over the past 20 years. Today's equipment is mostly hard plastic and powder-coated aluminum that stands up well to our northern climate. This Asset Management project includes addressing park infrastructure to ensure the City's parks are maintained to a safe and high standard of care.

This playground was installed 1991 and consists of wooden and steel structures. New playground apparatus that is being installed is comprised of durable plastic and powder-coated aluminum for safety, longevity, and ease of maintenance. Each piece of equipment is designed to attract a specific age group through its design and colours. A rejuvenated play park will be more attractive to the target group of young children and help promote an active and healthy lifestyle. The closest playground to this neighborhood is the St Pat's School Playground which is 605 meters away.

Excerpt from the 2012 General Plan:
1. a. (ii) All residents within the Residential Community, Mixed-use and Downtown designations should be within 250 m of a Neighbourhood Park;
(iii) No crossing of an Arterial Road will be required to access a Neighbourhood Park.

The current equipment is a combination of steel and wooden structures that have deteriorated over the years have surpassed their anticipated life span and for safety reasons should be replaced. If the structure is not replaced soon it may have to be removed for safety reasons.

It is the goal of the Department to have all of our playgrounds and structures as the highest level possible to provide a safe and enjoyable environment. All of the City's playgrounds in the past ten years have been replaced and upgraded. The only playground remaining is Doornbos Park.

This project will allow the City to manage its assets wisely by strategically investing in infrastructure to optimize function, service and safety.

Triple Bottom Line

Social

Yellowknife has a natural and built system that contributes to physical, social, and mental well-being of its residents.

Economic

The management of public and corporate assets are optimized and based on continuous improvement.

Environmental

By managing our assets properly we will be able to optimize the use and longevity of the park.

Operational

There will be no operational impact.

Department/Division: Community Services – Facilities Division
Project: Yellowknife Rotary Park - Trail Extension

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	20,000	20,000	20,000	60,000
O&M				
Other O&M Expenses				
Total:				
Formula Funding	20,000	20,000	20,000	60,000
Grants				

Purpose
This Community Partnership project permits the City of Yellowknife to continue its ongoing 11-year partnership with the Yellowknife Rotary Club in the development of the boardwalk.

Background
In 2003, the Yellowknife Rotary Club and the City collaborated to build the Yellowknife Rotary Centennial Waterfront Park, off School Draw Avenue. In 2005, a picnic shelter was completed and the boardwalk expanded. In 2006, a bandstand was added to the park, and, in 2008, a further extension to the boardwalk was completed. In 2010, the walkway in the park was paved and a ramp installed to increase accessibility. From 2010 through to 2015 the Rotary Club has continued to expand the walkway which now covers approximately 310 meters.

This project will continue to enhance the Great Slave Lake waterfront and provide additional opportunities for our residents and visitors to access and view the waterfront. By not continuing to support this project will only delay its completion as the Rotary Club depends on materials from the City to complete the project.

By working with the Rotary Club on this project the Department is realizing a savings of approximately $5,000 in labor costs annually

Triple Bottom Line
Social
This project will provide for and sustain the Rotary Club's ambition to complete this project with the City through the use of volunteers for the betterment of the community.

Economic
Yellowknife's high quality of life and attractive physical environment makes it a desirable place to live, work and invest.

Environmental
The Rotary Park plays a major role as one of the core outdoor recreational facilities within the City. The City strives to maintain quality green spaces so that they remain accessible to all.

Operational Impact
There will be no operational impact as the Rotary Park and Trail are already serviced by the Department.

Department/Division Community Services/Facilities Division
Project City Hall Upgrades

Expenditures & Funding Sources	2016	2017 $	2018 $	Total $
Capital Cost	50,000			50,000
O&M Expenses				
Total:				
Formula Funding	50,000			50,000

Purpose
To upgrade various parts of City Hall with regards to the flooring, washrooms and window partitions of the facility.

Background
2016
City Hall was built in 1975 as the administrative center of the City of Yellowknife. Since that time there have been very few upgrades to the lower level floor. As well, general repair and maintenance is required in various segments of the building.

Flooring:
This lower level of the facility still has the same flooring that was installed during construction in 1975. It is proposed to replace the flooring with new Mapei Planipatch 10 kg material, the same product which is currently in use in the downstairs foyer.

Age and wear have damaged the flooring to such an extent that it can no longer be properly maintained.

Washrooms
The washrooms in City Hall, except for the one in the upstairs lobby, were built during construction in 1975. It is proposed to replace the washroom partitions, install hand dryers, and apply a fresh coat of paint.

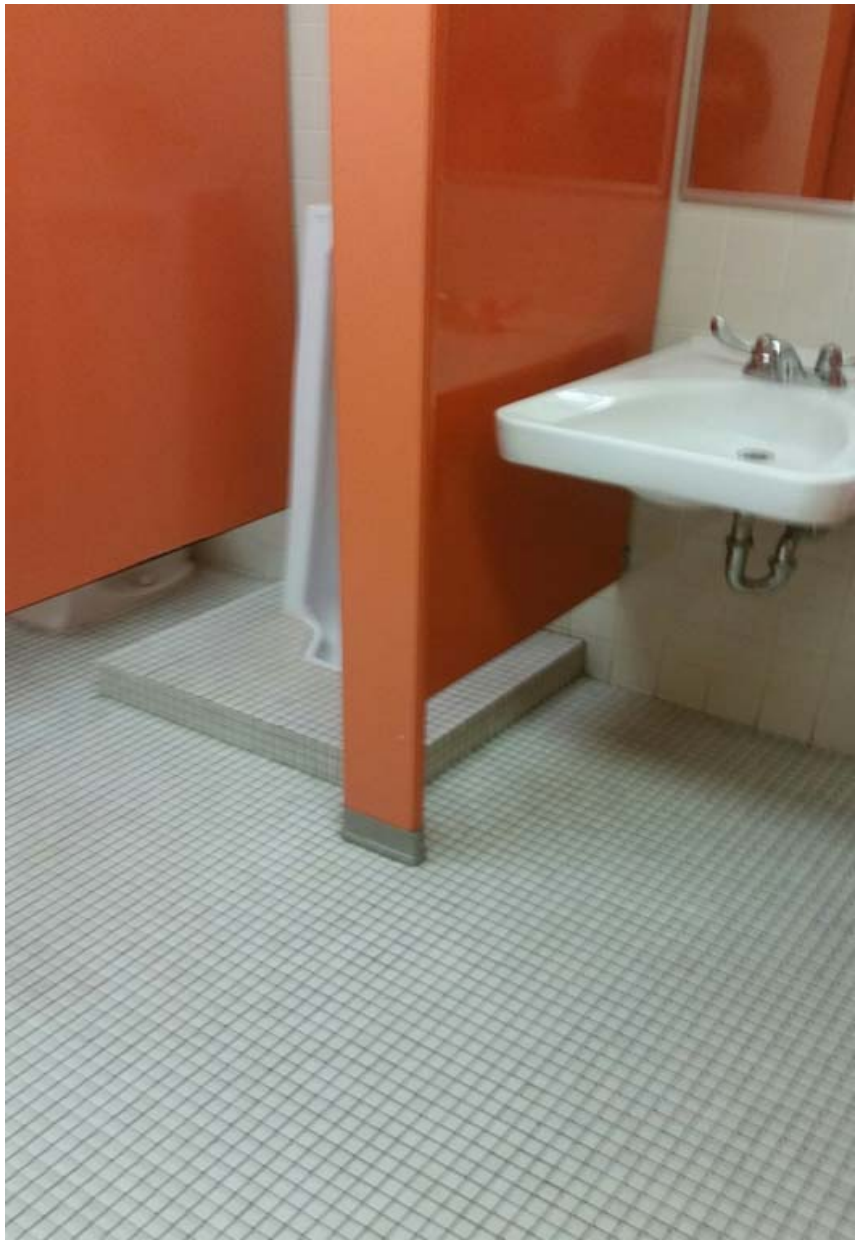
Window upgrades/Painting
It is proposed to repair and upgrade window partitions, add interior windows and do some painting throughout the building.

Triple Bottom Line
Social
This project will enhance the work environment at City Hall as well improve the building aesthetics..

Economic
The management of public and corporate assets are optimized and based on continuous improvement.

Environmental
The upgrades to this asset will enhance the maintenance and preservation of the facility.

Operational Impact
There will be no additional operational costs associated with this project.



	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Public Safety							
Directorate							
Wildland Fire Mitigation -Emergency Measures	-	-	100	100	125	125	150
Municipal Enforcement							
Communication Equipment Replacement	-	5	-	85	-	-	-
New Parking Meters	-	-	92	92	92	-	-
Radar Equipment Replacement	-	-	5	5	10	5	-
	-	5	197	282	227	130	150
Fire & Ambulance							
Air Conditioning for Fire Hall	-	-	60	60	-	-	-
Aggressor Jackets	-	-	40	40	-	-	-
Repairs to Air Make-up System	-	-	20	20	-	-	-
Fire Division Master Plan	-	-	-	-	110	-	-
Fire Safety House	-	-	-	-	-	100	-
Fire Extinguisher Trainer	-	-	-	-	-	12	-
Paving and Foundation Repairs	-	-	-	-	80	-	-
Storage Facility	50	43	-	-	-	-	-
Powered Parking Stalls	-	-	-	-	-	-	25
Front Ramps and Site Improvement	-	35	-	50	-	-	-
Emergency Medical Services Training Manikin	-	-	-	-	-	115	-
Propane Fueled Fire Trainer	-	-	-	-	-	90	-
Live Fire Training Structure	-	12	-	-	-	-	-
Thermal Imaging Cameras	25	24	-	-	-	-	-
FDM Software (Apparatus Maintenance Module)	30	-	-	30	-	-	-
	105	114	120	200	190	317	25

		2016 Budget Recommended ($000s)	Formula Funding ($000s)
Public Safety	**Page**		
Directorate			
Wildland Fire Mitigation -Emergency Measures	188	125	125
Municipal Enforcement			
New Parking Meters	190	92	92
Radar Equipment Replacement	191	10	10
		227	227
Fire & Ambulance			
Fire Division Master Plan	193	110	110
Paving and Foundation Repairs	194	80	80
		190	190
Subtotal		417	417

Department/Division Public Safety
Project Wildland Fire Mitigation – Emergency Measures

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total
Capital Cost	118,000	110,000	135,000	**363,000**
O&M Expenses	7,000	15,000	15,000	**37,000**
Total:	**125,000**	**125,000**	**150,000**	**400,000**
Formula Funding	**125,000**	**125,000**	**150,000**	**400,000**
Grants				

Purpose
This project is the continuation of emergency mitigation, started in 2015. Specifically, the project is intended to protect residential neighbourhoods in the southern portion of our City from the risk of wildland fire.

Background
Starting in 2010, the Government of the Northwest Territories Department of Environment and Natural Resources (ENR) began to conduct assessments for territorial communities in relation to the risk of wildfire. The GNWT-ENR Department completed the "Yellowknife Community Wildfire Protection Plan" in 2012 for the City, and this report has become the basis for the City's wildland fire mitigation strategy.

The 2014 forest (or wildland) fire season in the Northwest Territories was the worst ever recorded in the territory. The 2015 fire season was difficult elsewhere in northern Canada, as well, and new climate models indicate low water levels and minimal precipitation in the years to come. Wildland (forest) fires are often large and difficult to control or subdue; therefore, work that reduces the risks from wildland fire is important to ensure the safety of our residents.

Based upon recommendations from ENR regarding "fire-smarting" in Yellowknife, this phased approach will start to deal with the most serious threats first.

Work in 2016 will provide for the following:

1. Additional emergency structure protection kits, as suggested by officials from ENR - Each kit includes hoses, connections and sprinklers that could be deployed in neighbourhoods threatened by approaching wildland fires (multiple neighbourhoods facing the south).
2. Brush-clearing in specific areas of the city as part of an overall "fire-smarting" project - For more information on fire-smarting, visit; www.firesmartcanada.ca. In 2015, no additional equipment was needed for the areas where work was completed. In 2016 and beyond, however, City crews will continue to review equipment requirements to assist with work.

If the City of Yellowknife does not continue with this project, there is a risk that those properties near the forested areas of the southern-side of the City may be exposed to a wildland fire. As the City only has 24 full-time firefighters, mitigating the risks to the City will assist in dealing with any potential emergency in the future as the City has limited mutual aid (Town of Hay River, Town of Fort Smith) and any 'available' resources (personnel or equipment) from ENR.

Triple Bottom Line

Social

By conducting emergency mitigation for those neighbourhoods towards the south, the City is enhancing the safety of our residents in the event of a future wildland fire. As part of the work, fire-smart activities will open up the area and clear underbrush and could allow for more activity in those areas through established or ad hoc trails in the area (An active city).

Economic

This project is an investment in the City's emergency response capabilities. It is a proactive solution to ensure that emergency responders are utilized in the best possible manner and have the appropriate equipment to deal with an eventual wildland fire risk. This strategic investment in infrastructure is similar to what other communities in southern Canada have done to mitigate emergencies. Such projects often save 3-4 times their cost in future potential damages (e.g., City of Winnipeg flood mitigation, 1959 to present; City of Calgary flood, 2013).

Environmental

Fire-smart activity opens spaces up and helps protect them from fire by removing ground-source fuels that could be ignited by an ember storm. This work, along with the deployment of sprinkler kits by City personnel, will limit the ability of wildland fires to spread into adjacent neighborhoods.

Operational Impacts

As stated earlier, the strategic investment in infrastructure will allow emergency responders to better assess, handle and control a potential wildland fire approaching the City. Staff from Community Services has performed the majority of the work in 2015, with input from Public Safety and Planning and Development. This will continue in 2016 and, depending on resources, the City may employ outside contractors to assist in the work. Brush that has been cleared will be given to Public Works or Community Services for departmental use (e.g., planting, ground cover at landfill).

Department/Division Public Safety/Municipal Enforcement Division
Project New Parking Meters

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	92,000			92,000
O&M Expenses				
Total:	92,000			92,000
Formula Funding	92,000			92,000
Grants				

Purpose
To add approximately 124 new parking meters to the Central Business District as per Council Motion #0189-14.

Background
In 2014 the City of Yellowknife conducted a parking study of the Central Business District and adjacent areas. Several non-metered areas were identified for potential parking meter installation. Based on that information, Municipal Services Committee recommended an additional 328 parking meters be installed on streets adjacent to the current metered streets over a 3-year period.

This plan was approved on April 28, 2014 (Council Motion #0189-14) to be phased in over three years. Eighty new parking meters were installed in 2014; 124 new parking meters were installed in 2015; and another 124 new parking meters are planned for installation in 2016.

Triple Bottom Line
Social
The addition of meters in the central business district will allow for further 9-hour meters for those people who work in the downtown core to park all day. The alternative to driving into the downtown core is for people to become active or take public transportation.

Economic
The addition of parking meters will allow for businesses in the downtown core to have additional parking spaces in front of their establishment and should encourage additional people to own and operate in the downtown of our City.

Environmental
Additional meters in other areas within the downtown core will allow those people to park further away, but also pay all day and lessen the impact on those streets and areas near downtown businesses.

Operational Impacts
The addition of additional meters requires operational resources from Public Works to install the base and the poles within the Central Business District. The actual meter-heads, programming and installation will be conducted by Public Safety, Municipal Enforcement Division Officers.

Department/Division Public Safety / Municipal Enforcement Division
Project Radar Equipment Replacement

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	10,000	5,000		15,000
O&M Expenses				
Total:	10,000	5,000		15,000
Formula Funding	10,000	5,000		15,000
Grants				

Purpose
To purchase new radar equipment (two in 2016 and one in 2017) for Municipal Enforcement Vehicles to allow the continued enforcement of speed limits within the City of Yellowknife.

Background
The City of Yellowknife Municipal Enforcement Division (MED) has 4 vehicles that patrol approximately 120 km of municipal maintained roads and approximately 30 km of territorial highways that are within our municipal boundaries. MED operates four patrol cars to enforce City by-laws and the GNWT *Motor Vehicles Act*. Each vehicle is equipped with a mobile radar unit that can measure the speed of vehicles to the front and rear of the patrol car. A substantial amount of time is spent enforcing speeding infractions, as this is one of the most serious risks to public safety on our roadways.

One of the radar units was replaced during the 2015 budget by City Council. The remaining three radar units currently in use are more than seven years old and, while they are still operating properly, they require increased maintenance. Radar units have to be sent to Edmonton for service, which means it can take weeks until they are returned and put back in operation.

Radar technology has advanced since these older radar units were purchased. The existing units require officers to toggle back and forth from the front and rear radar antennas, depending on where an offending vehicle is in relation to the patrol vehicle. Newer units display speeds from both antennas at the same time, allowing an officer to focus more on the road. If new radar units are purchased, the old units will be kept for use as backup when a unit is out for service, ensuring uninterrupted radar enforcement. The City does not have any backup units for service at this point in time.

Triple Bottom Line
Social
This new equipment will ensure no interruption in essential emergency services to the residents of the City of Yellowknife, contributing to a safe community.

Economic
This project is a strategic investment in MED's essential equipment. Improvement and maintenance of our mobile equipment is vital to continued provision of essential services to our residents.

Environmental
The use of mobile radar equipment in MED vehicles ensures that fewer people speed and should result in less collisions and the effect those accidents have on our roadways and eco-system (chemical/fuel spills).

Operational Impacts

Aging technology (infrastructure) costs have a higher operational cost as they get older. In the case of electronic equipment operating at a range of temperatures in the vehicles, the down-time of the equipment will adversely affect MED staff and their enforcement activities.

Department/Division Public Safety / Fire and Ambulance Division
Project Master Plan

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	110,000			110,000
O&M Expenses				
Total:	110,000			110,000
Formula Funding	110,000			110,000
Grants				

Purpose
To complete a City of Yellowknife Fire Division master plan document to look at present services and assist the Fire Division in planning for the future growth (commercial and residential) within the City.

Background
The City of Yellowknife Fire Division continuously measures its delivery of emergency services against industry standards or best practices. Most emergency services (Fire & Rescue or Police Services) have established Mater Plans with a 5 or 10 year horizon. The primary goal of a Fire Master Plan is to allow the Yellowknife Fire Division to respond to the needs and service requests of a growing community (July 1, 2015 population of 20,637)

The fire master plan will address the current level of fire protection and rescue services for residents of Yellowknife and the surrounding area (Ingraham Trail) that require services. The plan may also assist in determining the most appropriate delivery model for fire emergency services and will also look at trends in the fire service and our community to ensure we provide the best service to our residents. The fire master plan will assist the Fire Chief and Administration forecast larger expenses so that the community's changing needs can be met in a timely fashion.

Triple Bottom Line
Social

The fire master plan will ensure that we continue to have a safe city with the proper provision of fire, rescue and ambulance services that meet the needs of residents or visitors to our City.

Economic
The fire master plan for the Yellowknife Fire Division is similar to Planning and Development's General Plan – assisting the emergency response agency (YKFD) to review current services and to continue to plan for future growth within the City (new neighbourhoods, developments or commercial properties). The fire master plan will also provide guidance on future strategic investments in infrastructure for services (Yellowknife Fire Division has a vast array of apparatus and small equipment for any emergency situation).

Environmental
This project ensures the efficient planning of emergency resources and will ensure the City continues with current land stewardship and protection.

Operational Impacts
As stated earlier, the fire master plan will assist the Yellowknife Fire Division in planning for future growth within the City. This work will impact Public Works who have the responsibility for fleet and should work in conjunction with any existing and future work from Planning and Development towards General Plan updates.

Department/Division Public Safety / Fire and Ambulance Division
Project Foundation and Paving Repairs

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	80,000			80,000
O&M Expenses				
Total:	80,000			80,000
Formula Funding	80,000			80,000
Grants				

Purpose
To repair both the foundation and surrounding pavement adjacent to the fire hall to reduce future maintenance costs and further damage to the building.

Background
The City's Fire Hall was built in 1989 and opened in 1991. Since that time, there has been one expansion (addition) in 2012 and minor retrofits of some of the operating systems within the facility.

The building envelope itself is situated approximately 3 meters away from the bedrock (at back of building) and is not pinned to bedrock but is a floating slab. Consequently, the ground around the Fire Hall has started to shift and has begun to lift the foundation of the building causing damage to the walls. There has been no damage yet to the floor area of the facility. The YKFD has not been able to take care of these ongoing concerns within the current O&M budget, therefore, the Division requires this capital project in order to address the concerns before the damage begins to impact operations.

Triple Bottom Line
Social
The improvements to the fire hall will ensure no interruption in essential emergency services to the residents of the City of Yellowknife, contributing to a safe community.

Economic
This project is a strategic investment in Yellowknife's only fire hall and ensures the provision of emergency services within our community. Improvement and maintenance of our facilities is vital to continued provision of essential services to our residents.

Environmental
Preventative work now will ensure that no additional structural work is required in the future, possibly preventing additional energy use to heat the building in the future.

Operational Impacts
Aging infrastructure costs have a higher operational cost as they age. This project may have a minimal impact of Public Works if the work is done in conjunction with other paving work in the area (to help offset costs).

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Planning & Development							
Housing & Affordability Strategy/ Eco Housing	-	38	-	93	-	-	-
50th Street Revitalization & Business Incubation	-	-	-	175	-	-	-
50th Street Revitalization	-	-	-	-	-	2,100	1,400
Harbour Plan & Smart Growth Improvements	100	460	350	350	-	-	-
Streetscaping Initiatives	750	744	250	644	-	-	-
	850	1,242	600	1,262	-	2,100	1,400

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Public Works & Engineering							
Fleet Replacement	1,378	1,266	1,126	1,295	1,089	1,090	1,119
Community Energy Plan (CEP)							
CEP Energy Coordinator	90	112	95	115	100	100	100
CEP Energy Efficiency Projects	320	501	205	804	1,235	1,477	1,000
	410	613	300	919	1,335	1,577	1,100
Engineering & Garage							
New Mobile Equipment Hoist	-	-	-	-	25	-	-
Traffic Lights Communications & Video Detection Equipment	75	51	40	30	200	80	80
Diagnostic Equipment & Specialty Tools For Mechanics	20	-	20	20	-	-	-
Survey Equipment & AutoCad Software	75	58	-	18	-	-	-
City Garage Building and Yard Improvements	50	-	-	-	-	-	-
	220	108	60	68	225	80	80
Roads & Sidewalks							
Road Rehabilitation	3,500	3,141	2,350	2,159	2,850	2,400	4,075
Intersection Widening & New Traffic Light Installation	-	-	-	-	-	500	-
Drainage Improvements and Storm Sewer Repairs	50	50	50	50	-	-	-
McMeekan Causeway Abutment Stabilization	100	10	-	-	-	-	-
	3,650	3,201	2,400	2,209	2,850	2,900	4,075

(cont'd...)

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Road Rehabilitation							
Latham Island Area:							
Otto Drive (Hearne Hill Park to Morrison Drive)							700
Raccine Road, Ingraham Drive & Doornbos Lane	450	239					
Central Business District:							
50 St (52 Ave to 51 Ave)	500		700	78			
52 Ave. (49 St. to 56 St.)	1,500	1,755	450	1,026			
52 St (overlay from 52 Ave to 51 Ave)							575
Franklin Ave. (41 St. to Wiley Rd.)					2,000		
Northlands							1,300
Old Airport Road Overlay							1,500
Kam Lake Industrial:							
Kam Lake Road (Finlayson Drive to Deh Cho Boulevard)						1,750	
Deh Cho Boulevard		397					
Cameron Rd. (Kam Lake Industrial Park)	250				350		
Etthen Drive, Taltheilei Drive			1,200	1,055	500		
Highway #4 Improvement						650	
Niven Lake:							
de Weerdt Drive, Driscoll Rd. & Haener Drive	800	750					
	3,500	3,141	2,350	2,159	2,850	2,400	4,075

(cont'd...)

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Solid Waste Management							
Landfill/Baler							
Landfill Expansion/New Landfill Cell Construction	250	57	-	50	3,500	-	-
Baling Facility Mechanical Upgrades	25	-	25	50	-	25	25
Site Restoration Liability	150	-	-	-	-	-	-
Ban Commercial Cardboard	-	-	-	25	-	-	-
Recycling Depot Paving	-	-	-	-	-	-	50
Recycling Depot Fencing	-	-	-	5	-	-	-
Centralized Composting Project/ Program	510	1,521	825	515	750	700	150
Transfer Station Phase 1	150	-	-	-	-	-	-
Baling Facility Roof Repairs	-	-	-	-	100	-	-
Baling Facility Concrete Floor Repairs	-	-	-	-	-		100
Solid Waste Facility Trash Fencing	-	-	-	-	-	-	100
Office/Break Room/ Washroom for Solid Waste Facility	-	20	-	-	-	-	-
	1,085	1,598	850	645	4,350	725	425

(cont'd...)

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Water & Sewer							
Pumphouses (PHs)/Liftstations(LSs)/Forcemains							
Water Treatment Plant/Reservoir Expansion	6,227	24,685	8,321	5,000	150	-	-
Capital Upgrades	65	59	65	65	-	-	65
Potable Water Reservoir Flushing & Cleaning	25	-	-	-	-	-	25
Pump Replacement Program	100	100	100	100	-	-	100
Monitoring & Controls Maintenance and Upgrading	75	127	75	75	-	-	75
PH#3 Pipe Replacement	300	10	-	-	-	-	-
LS#5 Pipe Replacement	-	-	-	-	-	-	300
	6,792	24,982	8,561	5,240	150	-	565
Other							
Water Meter Replacement & Upgrade	-	-	15	15	-	-	15
Potable Water Submarine Pipe Inspection	30	27	-	-	30	-	30
Water & Sewer Service Repairs					250		
PH & LS - Genset Installation	175	76	175	125	-	-	200
Fire Hydrant Maintenance	30	30	-	-	-	-	-
Lagoon Control Structure Replacement	150	-	-	-	-	-	-
Rebuilding of Trappers Lake Flow Control Structures	150	-	-	-	-	-	-
Water Licence Study & Report Requirements	60	60	-	-	-	-	-
PH#4 Sodium Hypochlorite Generation	-	385	-	-	-	-	-
	595	579	190	140	280	-	245

(cont'd...)

	2014 Budget ($000's)	2014 Actual ($000's)	2015 Budget ($000's)	2015 Forecast ($000's)	2016 Budget Approved ($000's)	2017 Budget ($000's)	2018 Budget ($000's)
Water & Sewer Infrastructure Replacement:							
(includes repavement and concrete)							
Central Business District:							
52nd Avenue		445					
Taylor Road Area:							
Franklin Avenue (2014 Water & Sewer & Paving)	2,600	2,602					
Lanky Court (2014 Water & Sewer & Paving)	1,350	1,632		56			
Reservoir Road (Paving)	60	26					
LS#5/ Public Works Garage/ Fire Hall (Water & Sewer)	400						
Forrest Drive Area:							
Con Road - Rycon to 54 St. (2016 Water & Sewer, 2017 Paving)					2,300	700	
Forrest Dr - Burwash Dr. to 51A Ave.(2015 Water & Sewer & 2016 Paving)		65	750	753	500		
Frame Lake South:							
Horton Crescent (2015 Water & Sewer, 2016 Paving)			2,045	2,986	700		
Williams Avenue (2017 Water & Sewer & Paving)						2,850	
Dagenais Drive (2018 Water & Sewer, 2019 Paving)							3,500
Knutsen Court (2013 Water & Sewer, 2014 Paving)	400	360					
Bromley Drive & Bromley Court (2013 Water & Sewer, 2014 Paving)	900	1,292					
	5,710	6,422	2,795	3,795	3,500	3,550	3,500

(cont'd...)

		2016 Budget Recommended ($000s)	M.E.R. Reserve ($000s)
Public Works & Engineering	**Page**		
Fleet Management	203		
1004-06 F-150		36	36
1005-06 F-150		35	35
1166-06 E-150 Leak Detection		39	39
1188-11 Zero Turn Exmark Mower		20	20
1195-11 Crown Victoria		64	64
2099-02 Freightliner FC70 Road Sweeper		341	341
2012-10 John Deere 304J		155	155
2101-03 LT9500 Sterling (Mercedes)		168	168
2104-04 LT9500 Sterling (Cat)		169	169
T010-65 45' High Boy Trailer		42	42
T011-80 45 Ton Low Boy Trailer		20	20
		1,089	1,089

		2016 Budget Recommended ($000s)	Formula Funding ($000s)
	Page		
Community Energy Plan (CEP) Initiatives	206		
Energy Coordinator		100	100
Interior LED Lighting		160	160
Centralized Boiler System		1,075	1,075
		1,335	1,335

(cont'd...)

		2016 Budget Recommended ($000s)	Formula Funding ($000s)	Gas Tax Rebate ($000s)	MACA Capital Grant ($000s)
Engineering & Garage	**Page**				
New Mobile Equipment Hoist	215	25	25		
Traffic Lights Communications & Video Detection Equipment	217	200			200
Roads & Sidewalks					
Road Rehabilitation	220	2,850	950		1,900
		3,075	975	-	2,100
Solid Waste Management	**Page**				
Landfill					
New Landfill Cell Construction	225	3,500	1,727	1,773	
Centralized Composting Program	228	750	640		110
Baling Facility Roof Repairs	230	100	100		
		4,350	2,467	1,773	110

(cont'd...)

		2016 Budget Recommended ($000s)	Formula Funding ($000s)	Water & Sewer User Fees ($000s)	M.E.R. Reserve ($000s)	Gas Tax Rebate ($000s)	MACA Capital Grant ($000s)
Pumphouses/Liftstations (PHs/LSs)	**Page**						
Water Treatment Plant	232	150		150			
Other							
Potable Water Submarine Pipe Inspection	234	30		30			
Water & Sewer Service Repairs	235	250		250			
Water & Sewer Infrastructure Replacement	236	3,500				3,500	
		3,930	-	430	-	3,500	-
PW Subtotal		**13,779**	**4,777**	**430**	**1,089**	**5,273**	**2,210**

Department/Division Public Works & Engineering/Fleet Management
Project Fleet Replacements (& Additions)

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	1,089,000	1,090,000	1,119,000	3,298,000
Total:				
M.E.R. Reserve	1,089,000	1,090,000	1,119,000	3,298,000
Grants				

Purpose
To continue to replace aging pieces of the City's mobile equipment fleet in accordance with standard fleet management practices.

Background
The mobile equipment fleet has a replacement value of $17.7 million and must be maintained to meet the service levels expected by residents. The City has a fleet of 154 various pieces of mobile equipment that support Fire and Ambulance, Road Maintenance, Water and Sewer Maintenance, Solid Waste, Parks, Arenas and Administrative functions, plus 26 stationary engines for emergency power generation and fire pumping capacity.

The replacement vehicles listed have passed their useful lives according to City polices. In addition, they are recommended for replacement according to a mechanical assessment carried out by mechanics. In the 2006 Infrastructure Needs Assessment by FSC Architects and Engineers, now Stantec, it was noted that nearly half of the City's fleet is beyond its anticipated life span.

In 2015, Public Works & Engineering reviewed the City's fleet management policies and compared to other jurisdictions. In most cases, other orders of government replace their equipment on a more frequent basis than the City of Yellowknife currently does. For example, light duty trucks are generally replaced around the eight year mark based on findings, where the City of Yellowknife has extended this particular replacement to replacement after ten years. City staff will go one step further, if a piece of equipment is due for replacement but is low in hours/ kilometers and is not experiencing increased maintenance costs, we will defer the replacement of this unit until maintenance and repairs become prevalent. For example, in 2016 there are six units scheduled for replacement. These were reviewed and replacement has been deferred.

Impacts
Social
This ongoing project allows the City of Yellowknife to replace aging pieces of mobile equipment which provide essential services to residents. Older equipment is prone to breakdowns and extended periods of inactivity, which directly impacts the City's ability to perform work such as snow removal or the timely repair of water and/or sewer breaks, thus affecting the overall quality of life of Yellowknife residents.

Economic
The consistent and ongoing replacement of fleet equipment reduces operational, maintenance and staffing costs associated with aging units. Specific pieces of equipment, such as graders which are essential for snow removal, are replaced more often and therefore retain a trade-in value which benefits the City as the equipment is always in excellent condition with relatively no downtown, and at a reduced purchase price.

Environmental
This project allows the City to replace aging equipment with newer equipment that is more fuel efficient and reduces greenhouse gas emissions.

Operational
This project can have significant operational impacts. Not replacing equipment on a planned and scheduled basis allows equipment to fall into a state of increased breakdowns and repairs. These repairs would have to be repaired by City mechanics or contractor depending on the nature and severity of the repair or the need of the specific piece of equipment.

Description:	Units:	Examples:
Small Equipment	30	Riding mower, ground thaw, line painter, snowmobiles, ATVs, etc.
Light Duty	41	Cars, vans, half ton trucks, 3/4 ton trucks.
Medium Duty	8	One ton to 5 ton trucks, includes zambonis.
Heavy Duty	15	Trucks/ Trailers used for sanding, snow removal, waste removal, etc.
Heavy Equipment	10	Loaders, dozers, excavators, backhoes, plows, etc.
Mobile Tractors	9	Heavy rollers, sander bodies, steamers, etc.
Municipal Enforcement	4	Cars, trucks, SUV ("sport utility vehicles").
Emergency Equipment	10	Fire trucks, tankers, aerial ladder, ambulance, etc.
Seasonal Vehicles	18	Any vehicle replaced but still serviceable, summer trucks, etc.
Stationary Engines	26	Used to pump water, sewage, produce emergency power.
Specialty Equipment	9	Graders, street sweepers, vactor trucks, etc.

2016 Fleet Replacement Schedule

Unit #:	Description:	Year:	Class:	Replace. Year:	Estimated Budget:	Estimated Current Value:	Hours	Kilometers	End Use:
1004-06	F-150	2006	2	2016	35,580.00	-	8,062.00	104,724.00	Low priority role.
1005-06	F-150	2006	2	2016	35,580.00	-	7,188.00	121,299.00	Low priority role.
1166-06	E-150 Leak detection	2006	2	2016	38,910.00	-	9,820.00	86,847.00	Low priority role.
1188-11	Zero Turn Exmark Mower	2011	1	2016	19,620.00	-	1,428.00	N/A	Auction.
1095-11	Crown Vitoria	2011	7	2015	64,260.00	-	6,681.00	111,687.00	Low priority role.
2099-02	Freightliner FC70 Road Sweeper	2002	6	2014	340,700.00	-	406.00	41,391.00	Trade in.
2012-10	John Deere 304J	2010	6	2016	154,600.00	-	5,501.00	N/A	Trade in.
2101-03	LT9500 Sterling (Mercedes)	2003	5	2016	168,400.00	-	11,735.00	191,150.00	Trade in.
2104-04	LT9500 Sterling (Cat)	2004	5	2016	168,400.00	-	11,033.00	181,763.00	Trade in.
T010-65	45' High Boy Trailer	1965	4	2015	42,400.00	-	N/A	N/A	Auction.
T011-80	45Ton Low Boy Trailer	1980	4	2012	20,000.00	-	N/A	N/A	Auction.
					1,088,450.00	**0.00**			**1,088,450.00**
									Net cost to the City.

Units Reviewed and Defered for Replacement

Unit #:	Description:	Year:	Class:	Replace. Year:	Estimated Budget:	Estimated Current Value:	Hours	Kilometers	End Use:
1163-06	F-150	2006	2	2016	35,580.00	-	3,763.00	64,372.00	Low priority role.
1165-06	F-250	2006	2	2016	46,700.00	-	1,090.00	25,333.00	Low priority role.
1193-12	Polaris snowmobile S12BA6NSL	2012	1	2016	15,260.00	-	N/A	2,552.00	Low priority role.
1194-12	Polaris snowmobile S12BA6NSL	2012	1	2016	15,260.00	-	N/A	2,518.00	Low priority role.
1190-11	Can Am ATV	2011	1	2016	15,000.00	-	139.00	1,432.00	Low priority role.
2121-08	CAT 246C SKID STEER	2008	6	2016	72,970.00	-	3,130.00	N/A	Trade in.
					200,770.00				**200,770.00**
									Not replaced in 2016 budget

City of Yellowknife Fleet Replacement Cycle Guidelines Summary:

Class	Description:	Examples:	Life Cycle:
1	Small Equipment	Riding mower, ground thaw, line painter, snowmobiles, ATVs, etc.	Different replacement cycles dependant on use.
2	Light Duty	Cars, vans, half ton trucks, 3/4 ton trucks.	Review after 7 years, replace after 10 years.
3	Medium Duty	One ton to 5 ton trucks, includes zambonis.	Review after 6 years or 100,000 kms, replace after 10 years.
4	Heavy Duty	Trucks/ Trailers used for sanding, snow removal, waste removal, etc.	Review after 6 years or 6000 hrs, replace after 12 years.
5	Heavy Equipment	Loaders, dozers, excavators, backhoes, plows, etc.	Review after 8 years or 10,000 hrs, replace after 12 years.
6	Mobile Tractors	Heavy rollers, sander bodies, steamers, etc.	Review after 8 years or 10,000 hrs, replace after 10 years.
7	Municipal Enforcement	Cars, trucks, SUV ("sport utility vehicles").	Replace after 4 years or 100,000 kms.
8	Emergency Equipment	Fire trucks, tankers, aerial ladder, ambulance, etc.	Replaced based on industry standards and NFPA requirements.
9	Seasonal Vehicles	Any vehicle replaced but still servicable, summer trucks, etc.	Not replaced, removed disposed of if repair costs exceed $500.
10	Stationary Engines	Used to pump water, sewage, produce emergency power.	Review after 15 years, replacement after 20 years.
11	Specialty Equipment	Graders, street sweepers, vactor trucks, etc.	Replacement depends on the use of the unit.

Department/Division Public Works & Engineering/
Project Community Energy Plan (CEP) Projects

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	160,000	402,000	400,000	962,000
O&M				
FTE	100,000	100,000	100,000	300,000
Other O&M Expenses				
Total:	**260,000**	**502,000**	**500,000**	**1,262,000**
Formula Funding	260,000	120,000	500,000	880,000
Gas Tax Rebate		382,000		382,000

General Purpose
The Community Energy Plan's multiple projects reduce the cost of the core services offered by the City, reduce greenhouse gas emissions and diversify our energy supply. The CEP makes our community more sustainable and more resilient.

CEP Background
The CEP is a plan adopted under the guidance of the Federation of Canadian Municipalities' Partners for Climate Protection Program. It was first drafted in 2006 with the objective of reducing the City's greenhouse gas emissions. The City has now completed all five milestones of the Plan and is now working on updating its energy strategy for the future, setting new targets for 2025 and 2050.

Ongoing savings from past CEP projects are estimated to have surpassed $650,000 last year. The City also reduced its GHG emissions by more than 1,000 tonnes of CO_2, reaching the targets set in 2005.

Justification & Impacts

2016 Projects
Interior LED lighting

Purpose:
Replace interior lighting fixtures with high efficiency LEDs.

LED tubes replacing T8 fluorescent tubes have decreased in price and increased in efficiency significantly enough to make LEDs cost effective for interior applications. This is also an opportunity to re-evaluate each indoor space and assess if the lighting levels are adequate. Historically, buildings have been over-lit, not making use of the natural light that comes into them. This capital project would see the installation of automated light dimmers in rooms where windows are present, and the installation of standard LED tubes in other indoor locations.

In 2014, a pilot project was completed in which auto-dimming lights were installed in a windowed room. The dimming function decreased the power consumed by an average of 40%, in addition to the efficiency improvement. The overall reduction in power use was 90%.

Capital required: $160,000

Environmental Impacts:
GHG emissions reduction: 73 tonnes or 1.7%

LEDs do not contain mercury and last longer, reducing risks to health and waste production.

Socio-Economic Impact:
Project's Return on Investment: 15% ($24,000 first year savings, increasing with time)
Permanent savings as percentage of tax revenue: 0.09%

Construction job creation: 0.56 FTE[1]
Indirect permanent job creation: 0.27FTE[2]

[1]Calculated using the NWT Bureau of Statistics 2012 construction economic impact multiplier on construction costs
[2]Calculated using NWT Bureau of Statistics 2012 household spending economic impact multiplier on cost savings

Energy Coordinator

Purpose
The Energy Coordinator is responsible for implementing and drafting CEP policies and was made a permanent position in 2009. The Energy Coordinator's primary duties include:

- Identifying funding opportunities to support the implementation of the CEP and assist in the application process
- Briefing Administration and Council on the energy and emissions implications of their decisions when deemed applicable
- Providing quarterly updates to the CEP Implementation Advisory Committee on the progress of the CEP
- Working with facilities and operations managers to identify and implement energy efficiency projects
- Working with City departments to ensure purchases give consideration to energy efficiency
- Working with other levels of government and the private sector to support the implementation of the CEP
- Working to develop a centralized boiler system for City facilities
- Communicating with the general public and City staff on activities and projects related to the CEP
- Coordinate the completion of the renewal of the CEP and its implementation.

In addition to coordinating the implementation of capital projects, the Energy Coordinator undertakes energy monitoring and issues recommendations on facility operations. Such collaboration with other departments is estimated to have saved the City $60,000 in the last 12 months at the Yellowknife Community Arena and Multiplex. Energy monitoring enabled the early detection of outages in pellet boilers and the identification of energy use trends that were then improved.

Capital Required $100,000

2016 Total Budget:	**$260,000**
Total Annual Savings	**$24,000**

2017 Projects

Heat Pipe from PH1 to WTP

Purpose
The 520kW pellet boiler at Pumphouse #1 would have surplus capacity during shoulder season and would be able to supply additional heat for the Water Treatment Plant without adding boiler capacity.

Capital required: $150,000

Environmental Impacts:
GHG emissions reduction: 52 tonnes

Socio-Economic Impacts:
Project's Return on Investment: 9.3% ($14,000 first year savings)
Construction job creation: 0.53 FTE
Indirect permanent job creation: 0.17 FTE

Solar Panels

Purpose
Install approximately 27.5kW of solar panels, producing 27,500kWh of renewable solar electricity at a lower cost than purchases from the electricity grid.

Capital Required: $110,000

Environmental Impacts
In 2014, 30% of Yellowknife's power supply came from diesel generation. Each kWh used caused the emission of 0.7kg of CO_2.

GHG emissions reduction: 16 tonnes

Socio-Economic Impacts:
Project's Return on Investment: 7.7% average ($4,500 savings in first year, increasing with time).

This project builds local expertise and capacity for other future local installations. Also, installing solar panels on City facilities reduces our exposure to the risk of low water levels and the resulting increase in costs to produce power through diesel generation. As this system would operate in a load displacement configuration (only replacing a facility's internal power use and not feeding the grid), this eliminates the political risks linked to a reduction in diesel generation subsidies or other unknown risks.

Reduction in the use of diesel for power generation reduces the risk of exposure to diesel fumes and therefore reduces the risks of adverse health effects to Yellowknife's population.

Community Outreach

Purpose:
Outreach includes public consultation activities required for future projects.

Communication interventions have been shown to reduce energy use by 5% to 20% in studies[3]. Triple bottom line impact assessment assumes a one percent reduction in energy use within the community could be achieved, which would yield significant economic and environmental impacts.

Capital Required: $20,000

Environmental Impacts:
Yellowknifers emitted 200,450 tonnes of CO_e in 2013
GHG emissions reduction: 2,005 tonnes

Socio-Economic Impact:
Yellowknifers used 144 million dollars' worth of energy in 2013.

Indirect Permanent Job Creation: 17.18FTE

[3]Calculated Achieving energy efficiency through behavior change: what does it take?" (EEA 2013)

Yellowknife's Community Energy Plan also outlined some areas where providing information to the public would be the most beneficial to the community. This would include sharing successful energy saving projects that may be applicable to residences and businesses, and going into schools to educate youth on the importance of using more renewable energy and less fossil fuel.

Interior LED lighting

Purpose
(See 2016 CEP capital project)
Capital required: $110,000

Environmental Impacts:
GHG emissions reduction: 50 tonnes

Socio-Economic Impacts
Project's Return on Investment 16% ($17,600 first year savings)
Construction job creation: 0.39 FTE
Indirect permanent job creation: 0.21 FTE

Air Source Heat Pumps

Purpose
(See 2016 CEP capital project)
Capital required: $12,000

Environmental Impacts:
GHG emissions reduction: 20 tonnes

Socio-Economic Impacts:
Project's Return on Investment: 17% ($2,000 first year savings)
Construction job creation: 0.04 FTE

Energy Coordinator
Capital Required $100,000
Purpose: (See 2016 CEP capital project)

2017 Total Budget $502,000
Total New Annual Savings $38,100

2018 Projects

Solar Panels

Purpose
(See 2017 CEP capital project)

Capital required: $150,000

Environmental Impacts:
GHG emissions reduction: 21 tonnes

Socio-Economic Impacts:
Project's Return on Investment: 8.6% average, $7,000 first year savings
Construction job creation: 0.53FTE
Indirect permanent job creation: 0.08FTE

Community Outreach
Capital required: $20,000
(See 2017 CEP capital project)

Interior LED lighting

Purpose: (See 2016 CEP capital project)
Capital required: $100,000

Environmental Impacts:
GHG emissions reduction 45 Tonnes

Socio-Economic Impacts:
Project's Return on Investment: 18%, $18,000 first year savings
Construction job creation: 0.35 FTE
Indirect permanent job creation: 0.21 FTE

Design of City Hall Centralized Boiler System

Purpose:
City Hall uses approximately 55,000 liters of oil per year. This consumption level is not high enough to make a large commercial-size biomass boiler cost-effective for the City. By designing a system that would connect nearby government buildings, economies of scale can be achieved, making the project feasible.

Third party building managers have been consulted and are interested in the project. Written agreements would be sought if budgets are approved.

Capital required: $130,000

Environmental Impacts:
Future project's GHG emissions reduction: 128 Tonnes

Socio-Economic Impacts:
Future project's Return on Investment: 10% target
Consulting job creation: 0.86FTE[4]

Energy Coordinator
Capital Required $100,000
(See 2016 capital project)

2018 Total Budget: $500,000
Total New Annual Savings $25,000

Operating Cost Impact

2016 savings	$ 24,000 (0.09% of tax base)
2017 savings	$ 38,100 (0.15% of tax base)
2018 savings	$ 25,000 (0.10% of tax base)
Total Additional Savings	**$ 87,100 (0.34% of tax base)**

[4]Calculated using NWT Bureau of Statistics 2012 economic impact multiplier for Professional, Scientific and Technical Services.

Projects' Impact on Other Departments
O&M cost reductions would apply to the Public Works, Community Services and public Safety Buildings

CEP projects help achieve the following goals and objectives of Council:

Goal #1: BUILDING A SUSTAINABLE FUTURE
Realize Opportunities to Encourage Economic Growth and Diversity.
Goal #2: STEWARDS OF OUR NATURAL AND BUILT ENVIRONMENT
Develop Smart and Sustainable Approaches to Energy, Water and Sewer, Waste Management and Building Systems.

Other Implications
Territorial and Federal funding programs exists to finance green energy projects. Funding levels averaged above $100,000 per year in the last ten years, larger projects usually receiving more funds.

Department/Division Public Works & Engineering/
Project CEP Biomass Projects

Expenditures & Funding Sources	Total Estimated Cost $	Prior Year Funding $	2016 $	2017 $	2018 $
Capital Cost	2,750,000		1,075,000	1,075,000	600,000
O&M					
FTE	213,316		28,636	90,080	94,600
Other O&M Expenses	(360,300)		(23,800)	(157,000)	(179,500)
Total Capital:	**2,750,000**		**1,075,000**	**1,075,000**	**600,000**
Formula Funding	2,110,000		1,075,000	435,000	600,000
Gas Tax Rebate	640,000			640,000	

General Purpose
Heating facilities with renewable, low emissions energy that is 40% the cost of oil.

CEP Background
The CEP is a plan adopted under the guidance of the Federation of Canadian Municipalities' Partners for Climate Protection Program. It was first drafted in 2006 with the objective of reducing the City's greenhouse gas emissions. The City has now completed all five milestones of the Plan and is now working on updating its energy strategy for the future.

Ongoing savings from past CEP projects are estimated to have surpassed $650,000 last year.

The City also reduced its GHG emissions by more than 1,000 tonnes of CO_2, reaching the targets set in 2005.

Justification & Impacts

2016

Centralized Biomass Boiler System -Phase 1

Purpose
Phase one of a centralized boiler system in the Multiplex area will see the installation of a 520kW wood pellet boiler for the Multiplex and Fieldhouse. Wood Pellets are approximately 45% of the price of oil and are made from renewable, carbon neutral wood residues.

Capital required: $1,075,000
(Biomass projects are not included in 2016 Budget and Council has to determine the source of funding. If it is financed by transfers from the General Fund, this will be equivalent to a temporary tax increase of 4.2%)

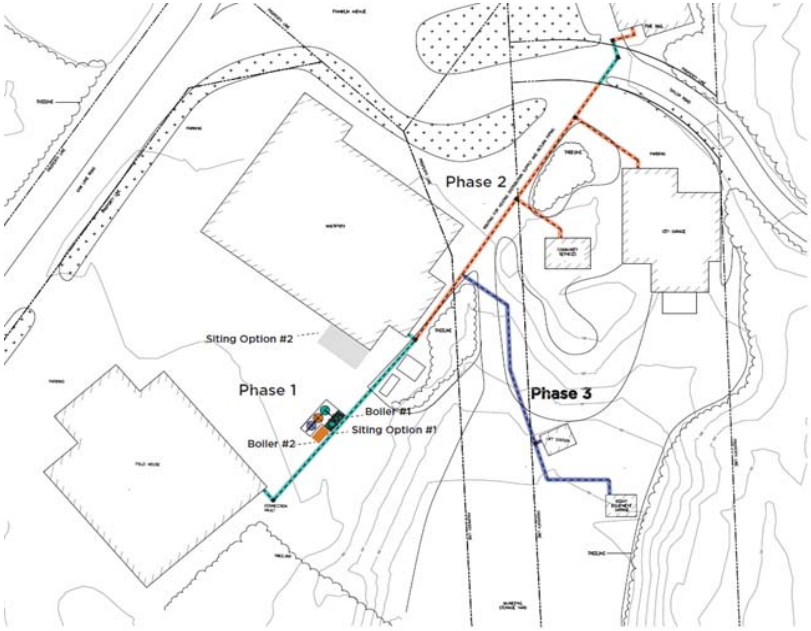
Environmental Impacts:
GHG reduction: 700 tonnes (17% of City emissions)
This project would also greatly reduce our reliance on non-renewable fossil fuels and reduce our risk exposure to price fluctuations.

(cont'd ...)

Socio-Economic Impacts:
Fuel savings: $145,000
Return on Investment: 10.5% average ($90,000 savings during the first full year of operation, increasing with time.[1]
Permanent savings as a percentage of tax revenue: 0.44%

Even at reduced total costs, the use of biomass requires more spending in the local economy than oil, stimulating and diversifying the local economy.
Construction job creation: 3.77 FTE[2]
Direct permanent job creation: 0.5 FTE
Indirect permanent job creation: 1.07 FTE[3]

Design Report - All phases shown



Phasing details

[1]Assumes a 50% cost sharing with phase 2.
[2]Calculated using NWT Bureau of Statistics 2012 construction economic impact multiplier on construction costs
[3]Calculated using NWT Bureau of Statistics 2012 household spending economic impact multiplier on cost savings

2017

Centralized Biomass Boiler System – Phase 2

Purpose
Phase 2 of the project brings similar kinds of benefits as Phase 1 for the Public Works Garage, Fire Hall and Community Services warehouse. We anticipate that a northern supply of wood chips from areas burnt during the 2014 and 2015 fire seasons will become available by 2017. This would reduce the O&M cost of operating the biomass boiler. Adding a second boiler also adds redundancy to the system, eliminating the need to have two oil-fired boilers in each facility and reducing future capital expenditures to replace an oil-fired boiler.

Capital required: $1,075,000

Environmental Impacts
GHG reduction: 260 tonnes (6.3% of City emissions).

Socio-Economic Impacts
Return on Investment: 4.5% average on wood pellets, 6.1% average with wood chips (Minimum $48,000 savings)

Construction job creation: 3.76 FTE
Indirect permanent job creation: 0.57 FTE

2018

Design and Build Second Pellet Boiler at Pumphouse 1

Purpose
Once a heat distribution pipe is installed between Pumphouse #1 and the Water Treatment Plant, boilers in both facilities can share their space heating loads. The remaining heat load of approximately 150,000 liters of oil, not covered by the capacity of the single biomass boiler, would need to be supplied by a second boiler installed in the system. GHG reduction of 390 tonnes or 9.6%

Capital Required: $600,000

Environmental Impacts:
Return on Investment: 15%($90,000 first year savings)

Socio-Economic Impacts:
Construction job creation: 2.1 FTE
Indirect permanent job creation: 1.07 FTE

Operating Cost Impact

2016 savings	$ 15,000 (0.06% of tax base)
2017 savings	$ 66,600 (0.26% of tax base)
2018 savings	$ 120,100 (0.47% of tax base)
2019 savings	$ 187,600 (0.73% of tax base)

Projects' Impact on Other Departments
Cost savings are distributed between Community Services, Public Works and Public Safety.

CEP Biomass projects help achieve the following goals and objectives of Council:

Goal #1: BUILDING A SUSTAINABLE FUTURE
Realize Opportunities to Encourage Economic Growth and Diversity.
Goal #2: STEWARDS OF OUR NATURAL AND BUILT ENVIRONMENT
Develop Smart and Sustainable Approaches to Energy, Water and Sewer, Waste Management and Building Systems.

Other Implications
Territorial and Federal funding programs exist to finance green energy projects. Funding levels averaged above $100,000 per year in the last ten years, with larger projects usually receiving more funds.

Department/Division Public Works & Engineering / City Garage
Project New Mobile Equipment Hoist

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	25,000			25,000
Total:				
Formula Funding	25,000			25,000
Grants				

Purpose
To purchase and install a new mobile equipment hoist used for the maintenance of the City's mobile equipment fleet.

Background
The City Garage has two equipment hoists required for the repairs and maintenance on various units in the City's mobile fleet. One of the current hoists, the smaller of the two, was installed in 1994 and is in need of replacement. The existing hoist is 12,000 lbs, is 192 inches long, and has one jacking lift of 6,000 lbs. This is to be replaced with a new hoist that will be able to accommodate larger equipment. It will be 18,000 lbs, 230 inches long, and has two jacking lifts of 9,000 lbs.

Due to the age of the existing hoist, it is becoming increasingly difficult to locate parts for the unit. Rees Inspection Services out of Grand Prairie is continually noting deficiencies such as replacing cables as well as various hydraulic parts.

Triple Bottom Line
Social
Provides City Staff the equipment they need to make necessary repairs to the City's fleet, which is needed for the provision of essential services for residents of Yellowknife.

Economic
The older, existing hoist needs additional repairs each year due to its age, and parts are getting harder to source for the repairs.

Environmental
There are minimal positive or negative environmental impacts of this project.

Operational Impacts
This project will provide the mechanic staff with a new and fully functional equipment hoist which will create a more efficient work flow.


LIFT

Department/Division Public Works & Engineering / Roads and Sidewalks
Project Traffic Lights Communications and Video Detection Equipment

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	**200,000**	**80,000**	**80,000**	**360,000**
Carry Over	90,600			90,600
Total:	**290,600**	**80,000**	**80,000**	**450,600**
Formula Funding		**80,000**	**80,000**	**160,000**
MACA Capital Grant	**200,000**			**200,000**
Prior Year Funding	**90,600**			**90,600**

Purpose

To re-establish electronic communications with the City's traffic light system and provide video detection equipment at actuated intersections.

Background

There are 18 intersections in Yellowknife which rely on properly functioning traffic lights to coordinate and provide efficient traffic flow and vehicle detection. In order to ensure the lights are working properly, the Public Works department must be able to connect to each intersection controller and monitor the traffic lights.

Historically, communication has been achieved through 'two-pair' telephone lines, in conjunction with dial up modems located in each traffic cabinet and City Hall. This infrastructure has failed and is currently inoperable. The technology in place is too antiquated to attempt any repairs as dial up modems are non-existent with current technologies.

As the City has already invested in and moved forward with a citywide wireless communication system, it is important to include the traffic light infrastructure in this system. Once operational, the wireless communication system will allow Public Works to remotely access each traffic light controller to view issues at the intersection, update traffic controller information and, at intersections where video detection equipment has been installed, view and download information on traffic counts and view traffic at an intersection in real-time.

Once communication to each intersection has been re-established, Public Works will continue to install video detection equipment at individual intersections based on a priority system. Video detection equipment is the new standard in detection and data collection, and is easy to install and program. This equipment has a proven field detection accuracy of 98% according to the manufacturer's specifications; this also includes motorcycles and bicycles. The cameras can also capture traffic data, such as counts of cars, trucks and pedestrians, as well as vehicle speeds. Vehicle speed data, however, can only be used for design purposes and not for enforcement of speed limits.

The City of Yellowknife has historically relied solely upon wire loops in the asphalt surface of intersections to detect vehicle presence and subsequently give a call to change the traffic lights in that particular direction. Traffic loops can be troublesome in the winter under snowy conditions. They are expensive to install and maintain and susceptible to damage from road conditions and construction activity. Over 35% of the loops currently in use require some measure of repair. This can cause

major inefficiencies in traffic flow and timing patterns, as well as increasing driver frustrations.

Most intersections would require four cameras, one for each direction of traffic. Intersections along Franklin Avenue use vehicle detection for cross streets only, which would require the installation of only two cameras per intersection. Additional cameras could be installed along Franklin Avenue for data collection.

In a 2013 pilot project, cameras were installed at the intersection of Norseman Drive and Franklin Avenue to determine their effectiveness for vehicle detection under Yellowknife conditions. The cameras operated well for this purpose during the trial period and, in 2014, additional cameras were installed at the intersections of Franklin Avenue and Matonabee Street, and Old Airport Road at Borden Drive North. The cameras at Borden Drive North have proven to be effective at detecting traffic turning left from Old Airport Road onto Borden Drive, and providing that traffic with the advance left-turn signal.

The approximate cost for traffic light communications and video camera detection equipment is $35,000 per intersection (four-way), including approximately $5,000 for installation costs. The budget allocations requested in 2017-2018 will provide video detection equipment for two intersections per year. With this investment, all intersections could be equipped with video detection in approximately 7 years.

	Carryovers	2016	2017	2018
Communications	90,600	200,000	-	-
Video Detection	-	-	80,000	80,000

(cont'd ...)

Three Year Traffic Light Infrastructure Plan

A total of $290,600 will be needed in 2016. However, there are carry over amounts and contributions from other projects as follows:

2014 Carryover	$30,000
2015 Carryover	$600
IT Communications Project Carryover	$60,000
	$90,600

Triple Bottom Line

Social

This project provides essential upgrades to the traffic light system that creates a controlled traffic environment that allows for safe passage of pedestrians and vehicular traffic. It will also allow real time changes to traffic patterns which will reduce resident frustrations.

Economic

The described upgrades will allow City staff to control and manipulate traffic data from work stations at City Hall. Currently, there is no means to connect to the system without standing at an actual traffic cabinet with a laptop. This upgrade is a significant investment in the City's traffic light infrastructure that is vital to allowing efficient and effective traffic control throughout Yellowknife.

Environmental

This project will allow City staff to monitor and program a more efficient traffic light system that will reduce idling times and promote a better flow of traffic.

Operational Impacts

This project will allow City staff to make changes to the traffic light software/system from one central location rather than having to visit all 18 intersections to make a small timing change. The video detection will also collect data such as traffic counts which would otherwise need a person counting vehicles and pedestrian traffic.

Department/Division Public Works & Engineering / Roads & Sidewalks
Project Road Paving and Rehabilitation

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	2,850,000	2,400,000	4,075,000	9,325,000
Total:				
Formula Funding	950,000		1,865,000	2,815,000
MACA Capital Grant	1,900,000	1,760,000	2,210,000	5,870,000
Gas Tax Rebate		640,000		640,000

Purpose
To repair or replace asphalt, concrete and other appurtenances on City streets as required, including storm water infrastructure.

Background
The typical design life of pavement is generally between 20 and 25 years, but will vary significantly due to various factors such as traffic volumes, vehicle types, geotechnical conditions, construction practices, and adequate maintenance. The design life of 20 to 25 years applies to most city streets, except for the Kam Lake Industrial Subdivision where the roads were historically paved with no base reconstruction. This construction practice has changed and all roads in Yellowknife receive the same base preparation prior to paving.

The construction of new roads generally coincides with the development of new subdivisions. The replacement of roads generally follows the replacement of water and sewer infrastructure. Otherwise, paving is scheduled for reconstruction when a road is in poor condition and may be a danger to the public or when maintenance and repairs are no longer cost-effective. The paving of roads may be done in the same year as water and sewer infrastructure replacement or may be delayed a year or two to allow for settlement, depending on the ground conditions.

As streets are reconstructed, the City works with Northland Utilities Limited to ensure that street lighting levels are evaluated and increased to comply with national standards. Additional underground ductwork is being coordinated in this work with Northland Utilities Ltd., NorthwesTel Inc. and NorthwesTel Cable Inc. to answer present and future needs.

2016 Road Paving/Reconstruction Projects
Franklin Avenue (41 Street to Wiley Road)
The bottom of the Franklin Avenue hill into Old Town has several major dips and other areas of concern. The section of roadway by Fritz Theil Park has subsided, creating a safety concern. Reconstruction of this area will include provision for on-street, painted bike lanes. Public Works will undertake a geotechnical investigation and will employ road stabilization methods to halt this type of settlement in the future.

Etthen Drive, Taltheilei Drive (Kam Lake Industrial Park)
This will nearly complete the paving in the Kam Lake area, with the exception of the Enterprise Drive extension which was constructed in 2011, and Cameron Road scheduled for 2018.

Cameron Rd. (Kam Lake Industrial Park)
It has been the Department's objective to attempt to pave at least one Kam Lake street per year. Cameron Road between Nahanni Drive and Taltheilei Drive was originally scheduled to be paved in 2014 but was removed due to changing priorities and budget restrictions. It has been scheduled for paving in 2016.

2017 Road Paving/Reconstruction Projects

Kam Lake Road (Finlayson Drive to Deh Cho Boulevard)
This section of Kam Lake Road is riddled with potholes, bumps and dips which will be addressed during road reconstruction. Combined with this work, there will be upgrades at the Finlayson Drive and Kam Lake Road intersection.

Highway # 4 Improvements
The City of Yellowknife is scheduled to assume responsibility of Highway #4 from 49 Avenue to the Giant Mine Boat launch in 2017. Ongoing discussions with Council and residents indicate the need for safe pedestrian walkways and crossings along this section of road in the form of sidewalks and cross walks.

2018 Road Paving/Reconstruction Projects

Otto Drive (Hearne Hill Park to Morrison Drive)
Otto Drive has major dips in some areas, and is subject to movement due to unstable ground conditions. Upgrading of the street will address these concerns as well as any drainage issues in the area.

Northlands
In 2016 the City will take ownership of the roads in the Northlands Trailer Park, following a joint project with Yellowknife Condo Corp. #8 to replace the water and sewer infrastructure in the park. These roads were finished with gravel for numerous reasons, including project costs. As the upkeep on gravel roads is significantly higher than paved roads, and the underground infrastructure has had some time to settle, paving of the roadway is necessary. As well, Norseman Drive is part of the Yellowknife Transit System, and it sees significant traffic daily.

Overlay Program - Old Airport Road
Public Works has resurfaced sections of Yellowknife's major roadways (Franklin Avenue, Old Airport Road, Kam Lake Road) by applying a layer of asphalt over the existing road surface where rutting and potholes have occurred. Overlays are an effective resurfacing method that works well in areas that have no differential settlement, and are substantially less costly than the typical road construction method of completely removing the roadway infrastructure (surface, roadbed, sidewalks) before rebuilding the roadway. Using the overlay method will allow large sections of poor asphalt to be fixed in a single season.

Overlay Program – 52nd Street, 51st Street
Public Works will continue the overlay method of road construction by applying it to downtown streets that have no movement problems, but where concrete sidewalks are severely deteriorated. Prime examples of this are sections of 52nd and 51st streets, between 51st Avenue and 52nd Avenue. Instead of completely removing all asphalt and concrete materials, only the dilapidated structures, such as sidewalks, will be removed while the asphalt roadway is left intact. New concrete appurtenances will then be installed and an overlay of asphalt will be applied to resurface the road.

This method will save time and money by not completely removing the road surface and roadbed. It will also save on materials by not importing new aggregate to rebuild the road base, which is in relatively good condition.

Street	Year	Paving Estimate
Franklin Ave (41st Street to Wiley Road)	2016	$2,000,000
Etthen Drive, Taltheilei Drive (Kam Lake Industrial Park)	2016	$500,000
Cameron Rd. (Kam Lake Industrial Park)	2016	$350,000
Kam Lake Road (Finlayson Drive to Deh Cho Boulevard)	2017	$1,750,000
Highway #4 Improvements	2017	$650,000
Otto Drive (Hearne Hill Park to Morrison Drive)	2018	$700,000
Northlands	2018	$1,300,000
Old Airport Road Overlay	2018	$1,500,000
52nd Street (overlay from 52nd Avenue to 51st Avenue)	2018	$575,000
TOTAL		**$9,325,000**

Impacts

Social

This project focuses on providing Yellowknife neighbourhoods with quality pedestrian sidewalks, multi-use paths, and driving surfaces.

Economic

This project is a strategic investment in Yellowknife's road and storm water infrastructure. It is a proactive approach to address the infrastructure deficit that was identified in an infrastructure needs assessment. Continuous improvement is vital to ensuring the provision of essential services to residents.

Environmental

Replacing failing road and storm water infrastructure removes standing water from City streets which can accumulate and cause operational and resident concerns.

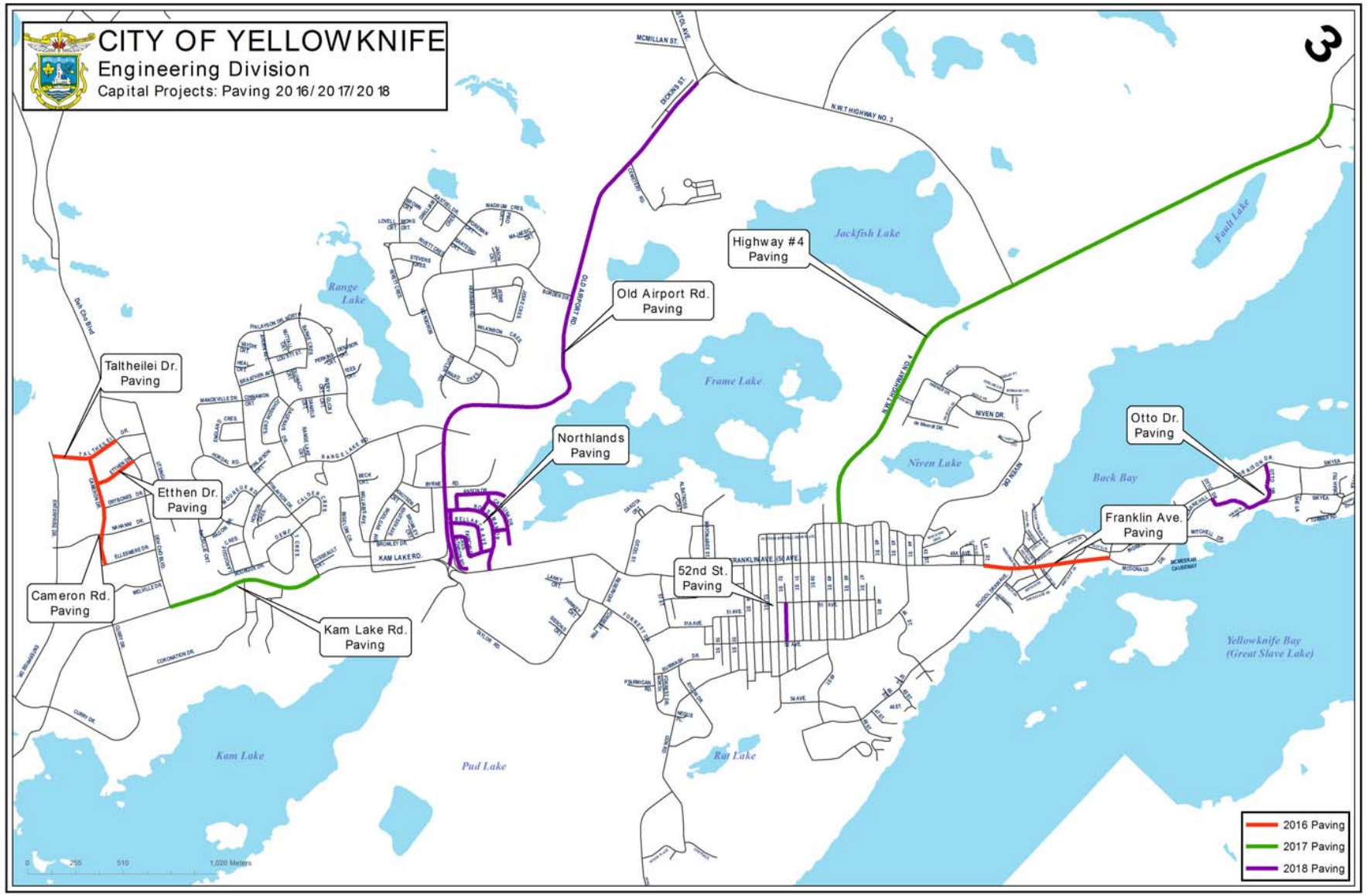
Operational

Aging infrastructure has an operational cost somewhere between 2-4% of replacement costs. By replacing this infrastructure, it allows the department to focus operational and maintenance activities on other roads, sidewalks and storm water appurtenances in the City.

This project will have minimal impact on other City departments as there are no landscaping requirements in the upcoming three-year plan.

However, there will be increased operational costs due to the City taking over the section of Highway #4 from the GNWT. These costs are estimated to be approximately $55,000 annually for various maintenance activities as well as $60,000 in added equipment (ie plow wing for grader) necessary for snow removal.

(cont'd ...)


CITY OF YELLOWKNIFE
Engineering Division
Capital Projects: Paving 2016/2017/2018
3
Highway #4 Paving
Old Airport Rd. Paving
Northlands Paving
Taltheilei Dr. Paving
Etthen Dr. Paving
Cameron Rd. Paving
Kam Lake Rd. Paving
52nd St. Paving
Franklin Ave. Paving
Otto Dr. Paving
Jackfish Lake
Range Lake
Frame Lake
Niven Lake
Back Bay
Yellowknife Bay (Great Slave Lake)
Kam Lake
Pud Lake
Rat Lake
2016 Paving
2017 Paving
2018 Paving

Department/Division Public Works & Engineering / Solid Waste Management
Project New Landfill Cell Construction

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	3,500,000			3,500,000
Total:				
Formula Funding	1,727,000			1,727,000
Gas Tax Rebate	1,773,000			1,773,000

Purpose
To construct a new solid waste landfill cell for the disposal of residential municipal waste.

Background
The City of Yellowknife has ceased major landfill operations in what is known as the "old landfill site". It currently accepts some construction waste that is completing the final stage of landfilling prior to close out procedures. This construction waste is unable to be baled and is the best use of material.

Due to new regulatory requirements a new second-generation landfill cell (Cell A) was built in 2011, in the quarry adjacent to the old landfill site as the next site for City landfilling operations. The cell includes a leachate collection and containment system consisting of a liner system overlaid with collection pipes, which direct liquids to a sump pit located in a utility manhole. The City's water licence requires that Cell B include groundwater monitoring wells to be established upstream and downstream of the site to ensure the integrity of the liners in the cells. These wells will be installed as part of this project.

The design and construction of Cell A took close to two years to complete due to the unique problems involved with building and using a landfill cell in an active quarry.

The location and design of the next cell (Cell B) will also pose unique engineering problems which will require careful consideration during the design and construction process, including how Cell B will connect with the existing Cell A. Discussions will take place with the quarry lessee in order to determine a suitable location for the cell that will allow quarry operations to continue. It is anticipated that the life of Cell B will be seven years. Land restrictions and the location of historic and existing landfill operations, makes this the most economical method of solid waste management for Yellowknife at this time.

The City of Yellowknife is attempting to maximize as much diversion from landfilling solid waste as possible through programs such as increased recycling and composting initiatives. This will enable the City to extend the useful life of these cells as long as physically possible.

Impacts
Social
This project provides the residents of Yellowknife with a safe and controlled means of waste disposal as well as recycling and composting initiatives.

Economic
This project is a necessary investment in the City's solid waste management operations and provides an essential area for the landfilling of municipal solid waste.
Environmental

(cont'd ...)

The design and installation of a second-generation landfill ensures the capture and management of solid waste leachate. The City also employs a baling method of waste compaction, this allows operations to maximize the amount of material that can be placed in the landfill cells by eliminating and voids that could occur with historical methods of waste disposal.

Operational

An accounting liability line item will need to be added to the Solid Waste Fund budget similar to the other two areas of the landfill, the old landfill area and Cell A. This is to ensure funding is in place for close out procedures, and will be an added cost to the fund which will require an increase in revenues to accommodate the increase.

The overall impact on operations and other City departments will be minimal as Cell A will be closed and the new Cell B will be in use.

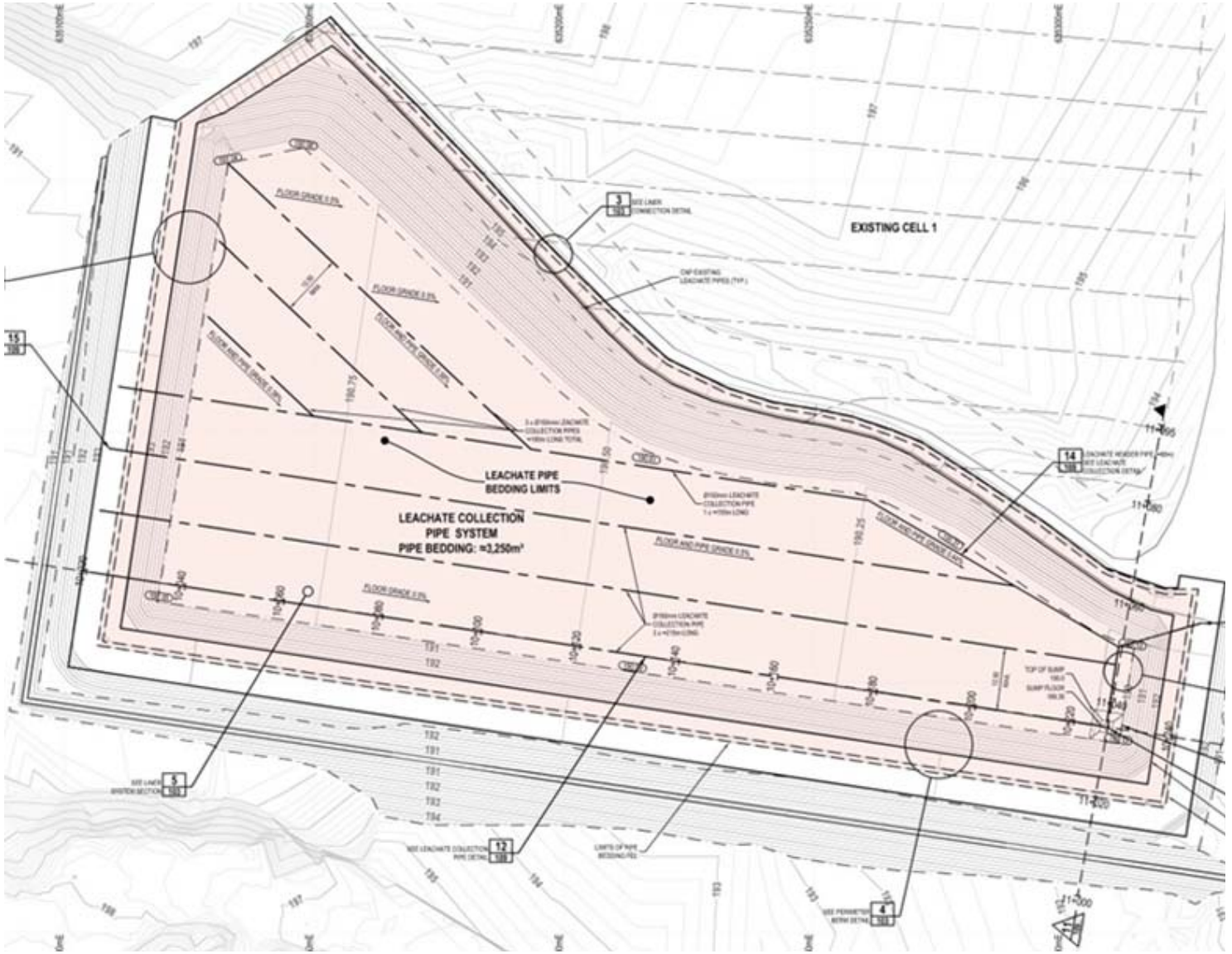


Photo: Design drawing of the new Cell B adjacent to the existing Cell A, noted as “Cell 1” on the drawing.

Department/Division Public Works & Engineering / Solid Waste Management
Project Centralized Composting Program

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	750,000	700,000	150,000	1,600,000
Total:				
Formula Funding	640,000		150,000	790,000
MACA Capital Grant	110,000			110,000
Gas Tax Rebate		700,000		700,000

Purpose
To continue the phased approach of implementing a city-wide centralized composting program.

Background
In July 2007, Gartner Lee conducted a waste audit at the Solid Waste Facility. The Waste Composition Study showed that 2,100 tonnes of food waste were disposed of by the residential and commercial sectors in 2006, accounting for 26% of the total waste stream. The study recommended a significant diversion of food waste from the various sectors, which would require the development of a centralized organic waste processing facility.

Between 2009 and 2012, the City of Yellowknife carried out a Centralized Composting Pilot Project to learn about the composting process and evaluate the feasibility of expanding composting efforts to involve a greater number of participants and sectors of the community. The project focused on the commercial and institutional sectors in order to gain the most organic material from the smallest number of participants. During the pilot project the City, in partnership with Ecology North, was able to evaluate windrow composting from the initial collection of organics to the end result of finished compost.

In 2013, the City began working on the design, construction costs, water board regulatory approval, and program logistics for expansion into a citywide composting program. City Staff in conjunction with Ecology North and pilot project participants devised a multi-year, phased approach for city wide implementation. It was determined that this would be the most cost effective way of implementation because it spreads costs out over several budget seasons while minimizing resident frustration by concentrating on specific neighborhoods each year. It also allows time for consultation and engagement on how to incorporate large multi-family dwellings and "Industrial, Commercial and Institutional" (ICI) into the program.

Triple Bottom Line
Social
This project provides the residents and businesses of Yellowknife to participate in a city-wide initiative that will contribute to extending the useful life of the City's landfill cells. It will also produce a compost material that will be available for gardening or landscaping activities and helps us to move toward a more sustainable society.

Economic
Compost is a diversion tactic that will remove organics from the City's waste stream. The cost of landfilling waste has historically been estimated at $150/cu.m. The City believes that this has dramatically increased with

The table below outlines the overall anticipated costs and phases of the project:

2014 Expenditures	$1,521,000	Retention pond and pad construction, city wide black bins, and Range Lake green bins.
2015 Expenditures	$500,000	Pad extension and Niven/Old Town green bins.
2016 Budget	$750,000	Pad extension and Frame Lake green bins.
2017 Budget	$700,000	Pad extension and Downtown green bins.
2018 Budget	$150,000	Multi-family residential and ICI sector collection.
Total Project Costs	**$3,621,000**	

the necessary construction of new landfill cells, and will be completing a desktop study internally to update this per cubic meter cost. This project will also produce a finished material used to fertilize gardens and landscaping.

Environmental

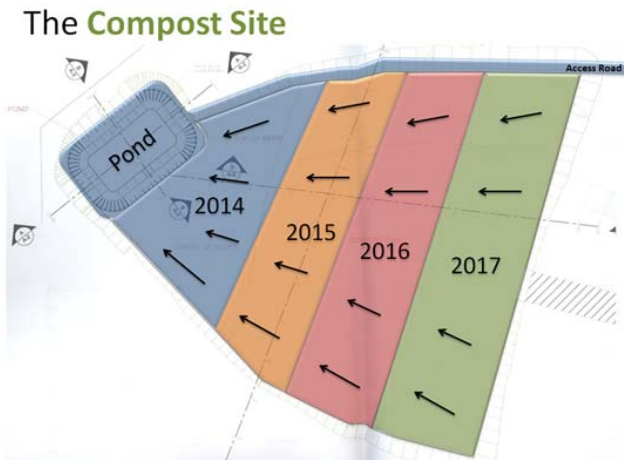
Every cubic meter of material that can be diverted from the landfill will save money, extend the life of the landfill cells, reduce greenhouse gas emissions associated with the production of methane from the breakdown of organic matter, and will reduce the attractiveness of the landfill to birds and other wildlife.

Operational Impacts

Changing the composting operation to a permanent program will increase the overall O&M for the Solid Waste Facility. Time will be required for maintaining the compost piles, including turning the piles, mixing feedstocks upon arrival at the facility and adding moisture to composting material, as well as maintenance associated with the fencing, pond liner system and compost pad.

However, diverting waste from the main waste stream will reduce the amount of waste being baled and added to the landfill site, which will in turn reduce the amount of staff time needed for baling activities. The overall impact on operations should be minimal as work required for composting will balance with less time required for baling waste.

There are indications that additional technical expertise may be required for the long-term care of the facility should there be less involvement from Ecology North. This is currently being evaluated by City staff in conjunction with Ecology North.



Planned phasing of the project.

Department/Division Public Works & Engineering / Solid Waste Management
Project Bailing Facility Roof Repairs

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	**100,000**			**100,000**
CEP Contribution	50,000			
New Funding	50,000			
Total:				
Formula Funding	**100,000**			**100,000**
Grants				

Purpose
To complete Bailing Facility roof repairs that currently is leaking and losing heat.

Background
The Baling Facility is the key piece of infrastructure at the Solid Waste Facility. It houses the baler, as well as the site's mobile equipment during winter months. Residential garbage and recyclables are baled here year-round.

The Baling Facility was built in 1992 and, over the past 21 years, birds have had a considerable impact on the building, particularly on the ceiling insulation and the exterior of the roof. The birds have pecked at the interior insulation to the point that insulation is completely missing in numerous locations, resulting in high heat loss. The acidic nature of bird feces has compromised the roofing material, causing multiple indoor leaks that constitute a slip-and-fall safety risk for the staff.

In general, the life cycle of any facility is estimated at 50 years. By 2016, the Baling Facility will have reached the half-life of the building. Investing in the roof, along with other parts of the infrastructure, will ensure that the life cycle is fully achieved and even extended beyond what is anticipated. It will also help reduce the operation costs associated with the facility.

Impacts
Social
This project will provide City staff and contractors with a better working environment inside the Bailing Facility.

Economic
Repairing and insulating the roof structure will lower operating costs in the area of fuel and energy consumption.

Environmental
Reducing fuel consumption will lower operational cost and reduce environmental impacts associated with fuel use.

Operational
These repairs should reduce fuel requirements under operational costs for the Solid Waste Facility.

Photo: Photo of the Bailing Facility and Gatehouse at the Solid Waste Facility.

Department/Division Public Works & Engineering / Water and Sewer
Project Water Treatment Plant

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	150,000			150,000
Total:				
Water & Sewer User Fees	150,000			150,000
Grants				

Purpose
To complete the final phase and commissioning process of the newly constructed Water Treatment Plant.

Background
The City obtains its potable water from the Yellowknife River. Pump House #2, located at the Yellowknife River, delivers water to Pump House #1 via an eight-kilometre submarine pipeline in Yellowknife Bay. Pump House #1, located at the end of 48th Street toward Yellowknife Bay, is the water treatment/distribution and computer monitoring/control centre for the City.

In 2009, the Government of the Northwest Territories adopted the Canada Drinking Water Guidelines as legislation, thus requiring the City of Yellowknife to comply with the new guidelines. The new guidelines state the following: waterworks systems that use a surface water source or a groundwater source under the direct influence of surface water should filter the source to meet the turbidity limits.

Since the City obtains its water from the Yellowknife River, a surface water source, there is always a potential for high turbidy events such as what occurred during the summer of 2004 as well as 2015. A boil-water advisory was issued during both these events because the high level of silt in the Yellowknife River exceeded the guidelines. Due to these circumstances and the adopted legislation, the City of Yellowknife was ordered to begin the process of building a water treatment plant that addresses these drinking water parameters.

Impacts
Social
The Water Treatment Plant ensures that the City of Yellowknife provides residents with a safe and high quality potable drinking water that adheres to the *Public Health Act* and Canadian Drinking Water Guidelines.

Economic
This project showed investment in the City's potable water infrastructure and continued well-being of residents.

Environmental
The Water Treatment Plant facility and processes were designed with environmental sustainability taken into consideration. Specifically on waste residuals handling, energy efficient design and equipment specifications.

Operational
It is estimated that the Water Treatment Plant will consume 333,000 litres of fuel and 2,041,000 kWh of electricity per year. The net operating costs for the new facility will be $500,000 annually; this includes the reduction of staff and other fuel and power reductions at Pump House #1.Since this is the final phase of the project, all operational costs and impacts were accounted for in previous year's budgets. Since this is the final phase of the project, all operational costs and impacts were accounted for in previous year's budgets.

Photo: Outside, front view of the Water Treatment Plant.

Photo: View of water supply pumps on the main floor, with beige filtration racks in the background.

Department/Division Public Works & Engineering / Water and Sewer
Project Potable Water Submarine Pipe Inspection

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	30,000		30,000	60,000
Total:				
Water & Sewer User Fees	30,000		30,000	60,000
Grants				

Purpose
To complete a submarine pipeline inspection by qualified divers/ inspectors necessary to ensure the operation of the City's potable water system.

Background
The City obtains all of its potable water from the Yellowknife River. Pump House #2, located at the Yellowknife River just upstream of the bridge, delivers water via a 400-mm welded steel underwater pipeline, over 8km in length to Pump House #1 and then pumped to the new water treatment plant which is the water distribution centre for the City.

The existing submarine pipeline was installed in 1968, and is now 47 years old. It was constructed using internally and externally coated steel pipe. The pipe sections were field butt-welded and the welds were externally covered with heat shrink sleeves. It was installed due to the presence of mining operations in and around Yellowknife. The pipeline allows potable water to be drawn from Yellowknife River which is upstream of all historical mining operations, thus avoiding potential contamination at that time.

In 1993, a study on the conditions of the pipeline commissioned by the City concluded that the internal weld surfaces of the pipeline had corroded and there was a reduction in the wall thickness of the weld material.

Impacts
Social
This project helps to ensure the safe and secure provision of potable drinking water to Yellowknife residents by inspection and evaluation of the pipe infrastructure.

Economic
The project allows staff to evaluate the structural integrity of the pipeline which is an essential part of an investment in the City's water infrastructure.

Environmental
This project has minimal environmental impacts.

Operational
This project has minimal operational impacts as the inspection is contracted out to qualified personnel.

(cont'd ...)

Department Public Works & Engineering
Division Water & Sewer
Project Water and Sewer Service Repairs

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	250,000			250,000
Total:				
Water & Sewer User Fees	250,000			250,000

Purpose
To increase the amount of water and sewer service repairs that can be carried out annually.

Background
During the 2016 Budget Deliberations, City Council allocated additional funding to complete more repairs on water and sewer services that may have bleeders, or that are in need of replacement.

Triple Bottom Line
Social
This additional funding will enable Public Works to complete additional repairs to services that would have to wait until more funding was available in following budget cycles. Residences that have a service repair on a waiting list may have their service replaced sooner than expected.

Economic
It will allow the department to eliminate service repairs that are overdue.

Environmental
This will allow the department to address additional bleeders that may be active for freeze protection purposes.

Operational Impacts
This project will have minimal impact on other City departments.

Department/Division Public Works & Engineering / Water & Sewer
Project Water and Sewer Infrastructure Replacement

Expenditures & Funding Sources	2016 $	2017 $	2018 $	Total $
Capital Cost	**3,500,000**	**3,550,000**	**3,500,000**	**10,550,000**
W&S Paving	1,200,000	1,450,000	-	2,650,000
W&S	2,300,000	2,100,000	3,500,000	7,900,000
Total:				
Gas Tax Rebate	**3,500,000**	**3,550,000**	**3,500,000**	**10,550,000**
Grants				

Purpose
To replace failing underground water and/or sewer infrastructure on a planned and prioritized basis to reduce reactive maintenance costs.

Background
In the late 1940s, the City began providing piped water and sewer services in the present downtown area. Pump House #1 was constructed during this time to draw water from Great Slave Lake and distribute it to the downtown residents of Yellowknife. By 1977, the sewer mains had degraded to the point of failing entire sections of the city's piped system. The water and sewer mains were comprised of cast iron and corrugated metal pipe (CMP) respectively, and were predominantly uninsulated. The pipe material, combined with no insulation in the freeze/thaw layer, resulted in high maintenance and repair costs that the City continues to deal with today.

The City has since changed pipe material standards to insulated, ductile iron pipe. With these changes to City standards, the life expectancy of water and sewer mains can be as much as 50 years. However, prevailing ground conditions and permafrost presence can impact the life span of pipe installation.

Currently included in annual Water & Sewer Infrastructure Replacement is the following:

1. Replacement of existing corrugated metal pipe sewer mains with ductile iron pipe;
2. Replacement of concrete sewer manholes;
3. Replacement of existing cast iron water mains with appropriately sized insulated ductile iron pipe;
4. Replacement of in-line hydrants and valves with hydrants and valves located in insulated concrete vaults with manhole access;
5. Replacement of individual lot water and sewer services where deemed necessary;
6. Road stabilization and reconstruction with crushed rock backfill;
7. Completion of the project with concrete sidewalks and a paved roadway.

2016 Water and Sewer Projects
Con Road (Rycon Drive to 54th Street)
This is an older section of CMP that is scheduled to be replaced. The Rycon Drive loop was replaced in 2004. The remaining CMP in this section of Con Road should be replaced simultaneously with the planned redevelopment of the Shaganappy/Ptarmigan area in order to provide local residents with a high quality finished product.

Horton Crescent Paving (from 2015 W&S replacement)
This street was excavated and replacement of water and sewer infrastructure occurred in 2015. It is scheduled to be resurfaced with asphalt and concrete in 2016.

Forrest Drive Paving (from 2015 CMP replacement)
This street was excavated and replacement of water and sewer infrastructure occurred in 2015. It is scheduled to be resurfaced with asphalt and concrete in 2016.

2017 Water and Sewer Replacement Projects

Williams Avenue
This is one of the last streets to have sewer mains upgraded from CMP to ductile iron. The remaining section runs from Range Lake Road to approximately 70 meters past Bigelow Crescent and services a number of multi-family units. Replacement of asphalt and concrete for this area will be done immediately following the water and sewer replacement.

Con Road Paving (from 2016 CMP replacement)
This street was excavated in preparation for the 2016 CMP replacement program. It is scheduled to be resurfaced with asphalt and concrete in 2017.

2018 Water and Sewer Replacement Projects

Dagenais Drive
There is significant differential settlement on this street which indicates problems with underground infrastructure. The surface conditions are worse each season, which also means that the underground infrastructure is being stressed and could be reaching the point of failure.

Tentative 3-Year Water and Sewer Replacement Plan

Street	Replacement	W&S Estimate	Paving Estimate	Total Estimate
Forrest Drive	2015/2016		$500,000	$500,000
Horton Crescent	2015/2016		$700,000	$700,000
Con Road	2016/2017	$2,300,000	$700,000	$3,000,000
Williams Avenue	2017	$2,100,000	$750,000	$2,850,000
Dagenais Drive	2018/2019	$3,500,000		$3,500,000
TOTAL		**$7,900,000**	**$2,650,000**	**$10,550,000**

These priorities are subject to change from year to year, depending on failures and deteriorating pipe conditions. The section which has the highest probability of failure based on inspections will therefore be placed higher in the priority queue. This is reviewed and evaluated on an annual basis.

Triple Bottom Line

Social
This project provides safe and reliable water and sewer infrastructure necessary for quality of life of our residents.

Economic
This project is a strategic investment in Yellowknife's water and sewer infrastructure. It is a proactive approach to address the infrastructure deficit that was identified in an infrastructure needs assessment. Continuous improvement is vital to ensuring the provision of essential services to residents.

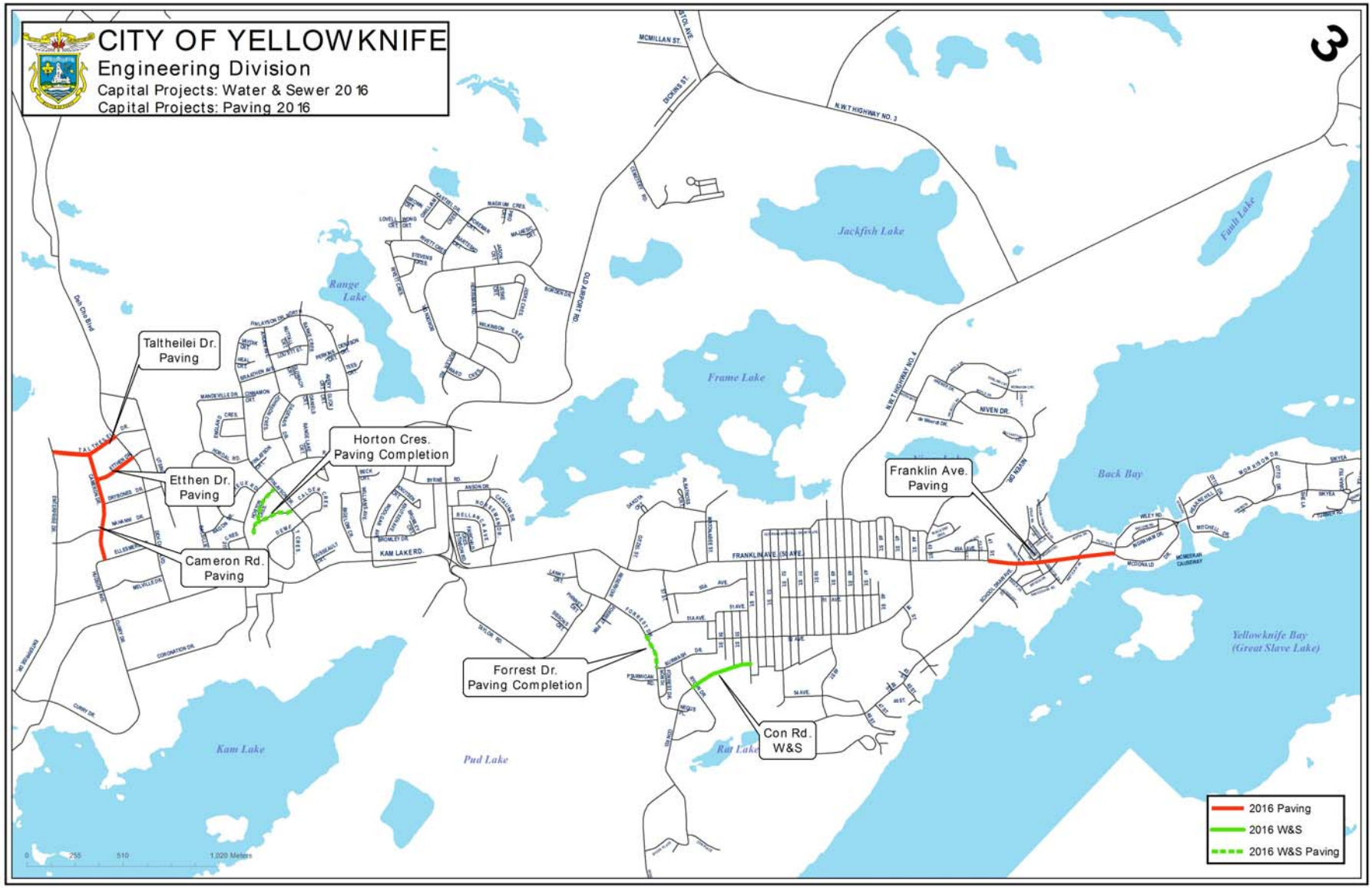
Environmental
This project replaces old and potentially failing infrastructure in Yellowknife neighbourhoods with new and reliable assets. This removes the possibility of ground and property contamination due to main breaks or blockages.

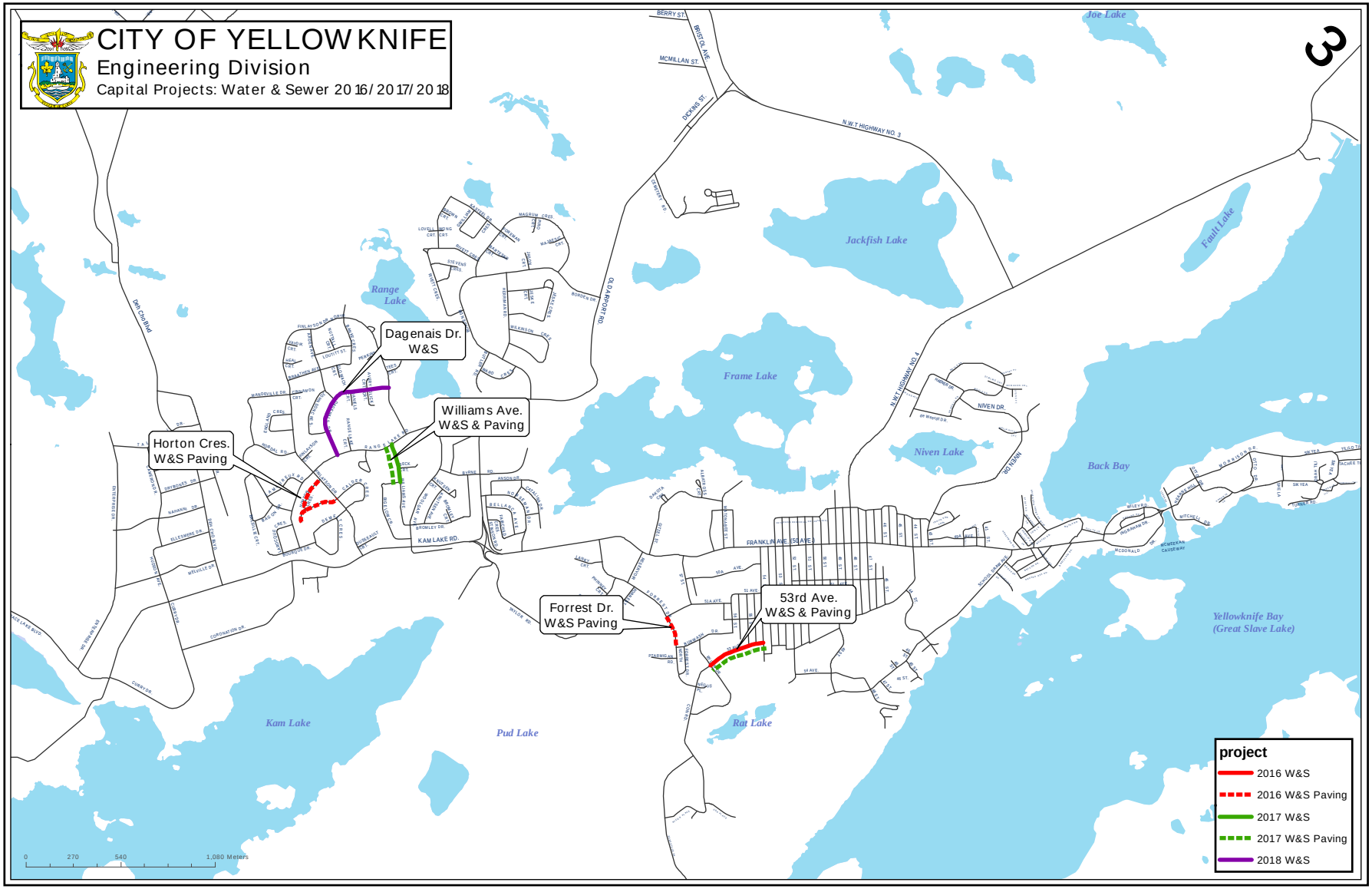
Operational Impacts

Aging infrastructure has an operational cost somewhere between 2-4% of replacement costs. By replacing this infrastructure, it allows the department to focus operational and maintenance activities on other areas of the water and sewer systems.

This project will have minimal impact on other City departments.

Photo: Failed CMP sewer main showing no bottom left in the pipe.


CITY OF YELLOWKNIFE
Engineering Division
Capital Projects: Water & Sewer 2016
Capital Projects: Paving 2016
3
Taltheilei Dr. Paving
Etthen Dr. Paving
Cameron Rd. Paving
Horton Cres. Paving Completion
Forrest Dr. Paving Completion
Con Rd. W&S
Franklin Ave. Paving
Jackfish Lake
Range Lake
Frame Lake
Back Bay
Yellowknife Bay (Great Slave Lake)
Kam Lake
Pud Lake
Rat Lake
2016 Paving
2016 W&S
2016 W&S Paving


CITY OF YELLOWKNIFE
Engineering Division
Capital Projects: Water & Sewer 2016/2017/2018
3
Dagenais Dr. W&S
Williams Ave. W&S & Paving
Horton Cres. W&S Paving
Forrest Dr. W&S Paving
53rd Ave. W&S & Paving
Joe Lake
Jackfish Lake
Fault Lake
Range Lake
Frame Lake
Niven Lake
Back Bay
Yellowknife Bay (Great Slave Lake)
Kam Lake
Pud Lake
Rat Lake
N.W.T HIGHWAY NO. 3
N.W.T HIGHWAY NO. 4
DAGENAIS DR.
KAM LAKE RD.
FRANKLIN AVE. (49 AVE.)
NIVEN DR.
project
2016 W&S
2016 W&S Paving
2017 W&S
2017 W&S Paving
2018 W&S
0
270
540
1,080 Meters