	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
General Government							
Administration							
Communication and Outreach Plan	40	17	40	88	-	-	-
Tourism Strategy	-	-	-	-	50	-	-
Branding Strategy	-	-	-	-	-	50	-
Tourism Kiosk in Old Town	-	-	-	-	-	-	50
Stores- Shelving	-	-	12	11	-	-	-
CCBF-911 Emergency Services	-	-	-	2	-	-	-
	40	17	52	101	50	50	50
Community Energy Plan (CEP)							
CEP District Energy Studies	-	-	-	134	-	-	-
CEP Energy Coordinator	85	81	85	85	90	90	90
CEP Implementation/Study	-	509	-	-	-	-	-
CEP Energy Efficiency Projects	415	219	415	284	320	410	410
	500	808	500	503	410	500	500

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Information Technology							
Network Upgrades	25	28	25	25	25	25	25
GIS Enhancements	50	47	50	50	50	50	50
Server Replacement	25	17	25	25	30	30	30
Online Permit Tracking	-	-	-	20	-	-	-
Desktop Telephone Replacement	-	-	10	10	-	-	-
Satellite Imagery	-	-	75	75	-	85	-
Communication Infrastructure	150	213	225	1,000	-	25	25
Security Cameras	20	13	20	20	20	20	20
Secondary Site & Data Replication	20	21	50	50	20	20	20
Library Public Access Expansion / Stations	-	16	-	-	-	-	20
MED In-Car Computer	-	-	-	-	10	30	-
MED In-Car Cameras	-	-	-	-	-	35	-
MED Web Applications	-	-	-	8	-	-	-
Website Enhancement	15	15	15	15	15	15	15
Website Redesign	-	-	-	-	35	-	-
Server Room Upgrades	-	-	25	25	-	-	25
Server Room UPS	-	-	-	-	35	-	-
Exchange & Office 2007	-	10	-	-	-	-	-
Asset Management	50	50	-	4	-	-	-
Core Switch Upgrades	-	-	-	-	25	75	-
Email Management	-	-	-	40	-	-	-
Inventory Bar Coding	-	-	-	25	-	-	-
Virtualization	40	40	40	40	40	30	20
Layer Three Access Switches	20	20	-	-	-	-	-
One-Stop Shopping	20	17	200	200	-	-	-

(cont'd...)

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Information Technology (cont'd)							
Wireless Authentication/ Authorization	25	25	-	-	-	-	-
Document Management	-	-	25	25	-	-	-
Mapping	-	-	27	27	-	27	-
Key Fobs	-	-	150	150	-	-	-
Wireless Standardization	-	-	20	20	-	-	-
Meeting Automation	100	-	-	-	-	-	-
Development and Building Permit Automation	75	56	50	70	-	-	-
Human Resources System Automation	100	-	-	-	-	-	-
Status Keeping Software	35	27	-	-	-	-	-
Smart Boards	-	-	25	25	-	-	-
GeoWare Standardization	-	-	20	20	-	-	-
OptiView Tablet	-	-	25	25	-	-	-
Multi-function Devices and Printers	-	-	50	50	50	50	50
Social Media	-	-	5	5	-	15	15
Automated Ticket Writer	-	-	-	-	20	20	-
Digital Signatures	-	-	-	-	30	-	-
Client Access Switches	-	-	-	-	50	-	-
Open Data	-	-	-	-	25	20	15
Computer Aided Dispatch	-	-	-	-	125	20	10
Automatic Vehicle Location	-	-	-	-	25	-	-
Teleconferencing	-	-	-	-	30	-	-
Equipment Cameras	-	-	-	-	35	-	-
Information Technology Strategic Plan	-	-	-	-	-	75	-
Client Access Management	-	-	-	-	-	-	25
Wireless Controllers	-	-	-	-	-	-	55
	770	614	1,157	2,049	695	667	420

		2014 Budget Recommended ($000s)	Formula Funding ($000s)	Grants ($000s)	CCBF ($000s)	IT Reserve ($000s)
General Government	**Page #**					
Tourism Strategy	225	50	-	50		
		50	-	50	-	-
Community Energy Plan (CEP) Initiatives	226					
CEP Implementation		90	90			
Energy Efficiency Projects		320	320			
		410	410	-	-	-
Information Technology						
Network Upgrades	228	25				25
GIS Enhancements	230	50				50
Server Replacement	231	30				30
Security Cameras	233	20				20
Secondary Site & Data Replication	234	20				20
MED In-Car Computers	235	10				10
Website Enhancements	236	15				15
Website Redesign	237	35				35
Server Room UPS	238	35				35
Core Switch Upgrades	239	25				25
Virtualization	240	40				40
Multi-function Devices and Printers	241	50	50			
Automated Ticket Writer	242	20	20			
Digital Signatures	243	30				30
Client Access Switches	244	50				50
Open Data	245	25	25			
Computer Aided Dispatch	246	125			125	
Automatic Vehicle Location	247	25	25			
Teleconferencing	248	30	30			
Equipment Cameras	249	35	35			
		695	185	-	125	385
Subtotal		1,155	595	50	125	385

DEPARTMENT COMMUNICATIONS AND ECONOMIC DEVELOPMENT

DIVISION COMMUNICATIONS AND ECONOMIC DEVELOPMENT

PROJECT Tourism Strategy

COST $50,000

STATUS New

PHASE 1

DESCRIPTION While the initial approach was to combine the Economic Development Strategy and the Tourism Strategy, Council moved to separate these two strategies in 2012. The Tourism Strategy will be the first time the City reviews its critical role (currently none) in the tourism industry as it directly impacts Yellowknife. There are key partners involved in the strategy, namely the Northern Frontier Visitors Association, the North Slave Regional ITI Office, as well as the hotels, event coordinators and local outfitters.

As in the Economic Development Strategy, the Tourism Strategy will be directed at reviewing and creating a framework for moving forward in the next five years. The strategy is focused on identifying measurable actions, indicators and opportunities as highlighted during Council's Strategic Planning process. Without a clear plan for the future the City will be challenged to define success and allocate resources in the most efficient manner. In addition to these key items, it is time for the City to establish its position in the tourism industry and determine the most importation role and most effective way of supporting tourism in Yellowknife.

This project will be financed by funding from the Canadian Northern Development Agency. It works toward Council's Goal #1[1], Objective #1(a)[2], and Actions #1.1[3], and 1.2[4].

O&M IMPACT There is no O&M Impact. This project can be undertaken with existing O&M resources. Recommendations from the strategy may impact future O&M deliberations.

1 Building a sustainable future.
2 Realize opportunities to encourage economic growth and diversity.
3 Develop an Economic Development Strategy.
4 Develop a Tourism Strategy.

DEPARTMENT CORPORATE SERVICES

DIVISION PROCUREMENT & RISK MANAGEMENT

PROJECT Community Energy Plan Funding

COST 2014: $410,000
2015: $500,000
2016: $500,000

DESCRIPTION This project addresses issues related to energy security, environmental sustainability and responsible and innovative management of resources. The City has developed a Community Energy Plan (CEP) designed to support the community in its effort to reduce emissions and ensure the City leads by example. The CEP has set emission reduction targets of 6% by the community and 20% by the City by 2014 over 2004 levels. The CEP is the visionary strategy of how to achieve emission reductions in Yellowknife. In addition to reducing Yellowknife's emissions, the CEP provides a framework for reducing the cost of energy use within both City operations and the community. The City and community are spending over $2.8 and $114 million respectively every year on energy, and forecasts predict a 19% increase in energy expenditures over the next ten years. As energy prices continue to rise, the CEP provides an important plan for reducing the City's reliance on non-renewable energy, thus increasing its energy security, economic and environmental sustainability.

2014 - $500,000

Energy Coordinator Position - $90,000

The Energy Coordinator is responsible for implementing the CEP 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 operational managers to identify and implement energy efficiency projects
- Working on a "continuous improvement" policy
- 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 district energy system in the downtown area
- Communicating with the general public and City staff on activities and projects related to the CEP.

Light Emitting Diodes (LED) Retrofits - $50,000

The use of LED lighting maintains levels of lighting while reducing the amount of electricity required to produce that light. LED fixtures also have a prolonged life which reduces the staff time required to maintain them and the amount of waste being produced during their life-cycle. LED lighting is currently the most efficient form of exterior lighting and will be used to replace exterior Low Pressure Sodium and High Pressure Mercury lamps at various City facilities.

Ruth Inch Memorial Pool Roof Insulation Upgrade - $65,000

The pool's roof membrane is scheduled to be replaced in 2014. The CEP contribution will serve to increase the insulation levels and reduce the energy use in this facility. Until the new roof system is designed, the exact energy savings will be uncertain. However, a similar project at the Public Works Garage in 2009 added insulation of 30 R-Value, for cost savings of approximately $15,000 per year.

Detailed Designs for Centralized Boiler System for City Facilities – $150,000

Following a feasibility assessment, designs will be completed to prepare a business case for connecting seven of the City's facilities with a Centralized Pellet

Boiler. The City's other pellet boilers have replaced more than 85% of the oil use in the facilities where they have been installed. The facilities included in the designs are the Multiplex, Fieldhouse, Public Works garage, a warehouse, a heavy equipment garage, a sewer liftstation and the Fire Hall. The total oil use for those buildings currently averages 375,000 liters of oil per year.

Other Energy Retrofits and Continuous Improvements - $55,000
The City continuously seeks to improve the energy performance of its facilities, leveraging the CEP budget to secure external funding, with most projects qualifying for matching dollars. Facility managers can use these funds to support energy efficiency projects in their facilities, of which CEP funding could represent a portion of the total project amount. The funding amount is determined based on a number of criteria including the level of energy savings the project would produce and the environmental benefit. A number of energy-saving opportunities have been identified in previous audits, including upgrading the hot water systems, improving lighting efficiency and increasing insulation.

2015 – $500,000
Energy Coordinator Position - $90,000

Renewing the Community Energy Plan – $90,000
Renewing the Community Energy Plan will serve to guide future capital projects aiming to reduce greenhouse gas emissions, energy costs and the use of non-renewable resources. This renewal includes community engagement, energy use inventories and forecasting. The completion of this new plan will produce new targets and define action areas that will ultimately make Yellowknife more sustainable.

Energy Retrofits and Continuous Improvements - $120,000
The City continuously seeks to improve the energy performance of its facilities, leveraging the CEP budget to secure external funding, with most projects qualifying for matching dollars. Facility managers can use these funds to support energy efficiency projects in their facilities, of which CEP funding could represent a portion of the total project amount. The funding amount is determined based on a number of criteria including the level of energy savings the project would produce and environmental benefit. A number of energy-saving opportunities have been identified in previous audits, including upgrading the hot water systems, improving lighting efficiency and increasing insulation.

Yellowknife Community Arena Ice Plant Efficiency Upgrade - $200,000
As the Yellowknife Community Arena is slated to replace its ice plant in 2015, the additional waste heat recovery capability will greatly improve the energy efficiency of the Arena and Curling Rink. Please see Community Services Capital Projects for details.

2016 –$500,000
Energy Coordinator Position - $90,000
Energy Retrofits and Continuous Improvements - $410,000

The CEP projects support City Council's Objective #2(c)[1] through Action Item #2.3[2].

O&M IMPACT The project will support a net reduction of greenhouse gases and costs to the City, residents, and businesses.

[1] Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems
[2] Continue to explore alternative energy solutions.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Network Upgrades

COST

2014	$25,000
2015	$25,000
2016	$25,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION The City's Information Technology infrastructure is essential for effective service delivery, and the network that provides connectivity among its diverse computers, servers, printers, cameras, and mobile devices is vital to the City's operations. As employee and stakeholder demands and reliance on the network continue to grow, it is critical that network capacity and reliability keep pace through regular ongoing enhancements. This incremental approach has proven highly effective in recent years as it minimizes service disruptions, enables the exploitation of technological improvements, and maximizes the City's return on its investments.

This initiative will continue the organization's ongoing network enhancements to increase capacity and improve redundancy, security, and integrated monitoring and reporting. A major emphasis over the next three years will be to grow the network capacity to meet burgeoning requirements. This will be done by concentrating on one area or improvement each year.

In 2014, the focus will be on expanding switch capacity throughout the network. The City's network infrastructure is a hub-and-spoke model: City Hall serves as the hub, with spokes to eleven other physical facilities. Each facility has one or more multiport access switches to connect clients and devices to the hub and spoke backbone. As more devices connect and more applications are offered via network services, increasing volumes of data must be transferred through these switches. In order to accommodate this growth in data traffic and provide clients with acceptable network performance, the access switches must have appropriate speed capability on all ports. As well, an increasing number of devices such as security cameras are able to draw electrical power from their network connections to Power-Over-Ethernet (POE) switches. POE switches advantages include flexibility of device placement, efficient power consumption, and reduced electrical infrastructure footprint and cost. Therefore, over the upcoming year the City will upgrade its switches to gigabytes devices, with POE where appropriate.

In 2015, the major initiative will be to upgrade the backbone between the City's Main Distribution Form (MDF) and its Intermediate Distribution Form (IDF). All of the organization's network services, functions, data access, communications, internet traffic and email pass through the MDF, or core switch, at City Hall. These data must communicate with application servers and resources located in the IDF. Data demands and formats are changing and expanding, with increasingly larger data models and retrievals being seen in applications such as Great Plains, cityExplorer, CityView, CityWorks, streaming media, and virtual appliances and desktops. In order to handle present data demands and foreseeable growth over the next ten years, the backbone will be upgraded from the current two gigabits per second (Gbps) capacity to 10 Gbps.

In 2016, the City's wireless network controllers will be addressed. The City currently provides wireless network services for employees and citizens at City Hall, the Multiplex, Fieldhouse, and Public Library. It also supplies wireless network services for its staff at the

Public Works Garage and the Fire Hall. There is one high capacity wireless controller at City Hall, which serves all the wireless sites with the exception of the Library. For technical, logistical, and redundancy reasons IT also maintains two lower capacity controllers for Public Library internet access. All controllers are in turn managed by a Wireless Control System (WCS) which provides security, accounting, monitoring and reporting.

The number of sites and devices requiring wireless service and the number of clients accessing these services is expected to grow at a steady rate. Known growth areas include employee use for mobility, citizen use for internet and city services, Public Works use for traffic cameras and vehicle diagnosis, and Fire Hall use for vehicle communications. However, the controllers are approaching their license limit for the number of registered access points and will not be able to support this anticipated growth. As well, all wireless services depend on the single controller at City Hall and if it goes offline, all wireless services across the City are unavailable. Therefore, the City will upgrade its wireless controllers to provide larger client capacity and redundancy.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT

This project does not directly impact O&M expenditures. However, if network maintenance and enhancements are diminished, the network will soon be unable to meet the increasing demands being placed on it. Resulting service delays, interruptions, and outages will negatively impact staff productivity throughout the organization and severely limit the organization's ability to provide citizen services.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT GIS Enhancements

COST

2014	$50,000
2015	$50,000
2016	$50,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION cityExplorer – the City's geographic information system (GIS) – is a powerful and popular tool for both staff and citizens. It provides intuitive, single window access to diverse data from across the organization and is a dynamic, evolving entity that can continue to grow and expand in response to user requirements.

In order to maintain and grow the value of this system, the data must be current, accurate and relevant. This requires an ongoing investment of both people and financial resources. Likewise, expenditures are necessary to ensure the system remains responsive to its users. To achieve this, the Information Technology Division has developed a strategy of sustained investment in the system, its data and its capabilities. This project reflects the requirement for the regular, predictable expenditures that are essential to ensure the upkeep and growth of cityExplorer.

Over the next three years, major initiatives include migrating the City's GIS infrastructure to the ESRI Local Government database schemas, expanding internal GIS utilization within the organization, and introducing new functionality such as mapping Citizen Engagement efforts, linking Citizen Service Requests from cityWorks, enhancing document management, CAD, and record drawing integration, and improving online data editing capabilities. As well, the City's Global Positioning System (GPS) data collection will be standardized to achieve "on-the-fly" centimetre precision.

This project helps ensure that the appropriate information technology infrastructure and tools are in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project does not directly impact O&M expenditures, but does enable City staff to work more efficiently and provide improved services.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Server Replacement

COST
2014 $30,000
2015 $30,000
2016 $30,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION The Information Technology Division maintains numerous servers to support a wide range of services to citizens and staff. These computers host all data and applications across the enterprise and are therefore essential to the operations of the City: it is crucial that the City's investment in this equipment be adequately protected and leveraged.

The Division has standardized the City's server platform to reduce the diversity and complexity involved in supporting and maintaining its server fleet, and has begun to implement virtualization as a way to adopt a more environmentally responsible approach and streamline support requirements even further. It has also recognized the limited life span of this equipment and developed an effective strategy for replacing and redeploying servers to obtain maximum benefit to the City. This strategy is continually evolving to make the most of technological advances and to attain more efficient and greener service delivery.

The City's reliance on its server fleet is intensifying rapidly as more and more activities are automated. In addition to the traditional applications such as finance, payment processing, and payroll, both staff and citizens are adopting increasingly sophisticated solutions to meet diverse needs including mapping, work management, meeting management, and permit processing. In addition, most communications – including email, telephone, websites, and social media – are now electronic and thus server-dependent. These servers need to be current, reliable, and capable of handling rising processing and data demands. This requires sustained investment in the server fleet, 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 infrastructure to ensure the performance and reliability demands of staff and citizens are met. This initiative will sustain a reasonable inventory of spare parts to ensure replacements are readily available when failures occur, and replace and redeploy servers that are nearing the end of their life expectancies.

In 2014, the spam filter is slated for replacement. The City's spam filter scans all incoming emails to block unsolicited and unwanted email and prevent viruses and other malicious content from entering the organization's system. In 2012, there were approximately 4.3 million incoming messages sent to City email addresses; the spam filter rejected over 90% of them.

The City's Interactive Voice Response (IVR) system, which offers citizens the option of payment parking tickets and utility bills over the telephone, and Traffic Light Control systems co-exist on a single server due to unique hardware configurations. This server is nearing the end of its useful life and will be replaced in 2015. As well, the server that manages backups for all enterprise data will be replaced in 2015. The following year, the City's database servers will be replaced.

This project helps ensure that the appropriate information technology infrastructure is in place to

support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project does not directly impact O&M expenditures; however, if regular refreshes are not sustained, there will be increased equipment failure rates and degraded system performance levels, both of which will negatively impact productivity. In the event of a server failure, there could be service interruptions to both staff and citizens.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Security Cameras

COST
2014 $20,000
2015 $20,000
2016 $20,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION

The City's security camera infrastructure has expanded drastically over the last several years to meet the organization's need for improved site security. The system has aided law enforcement officials in many investigations and has proven to be a valuable tool in deterring crime and abuse and protecting staff, citizens, and property.

The Information Technology Division currently manages over 50 Axis IP security cameras. Along with these cameras, the Division also maintains multiple servers required for dynamic digital analysis of the video footage. Digital footage is stored on several storage area network (SAN) devices, currently providing a total storage capacity of 8.2 terabytes. Based on the current demand for increased facility security and safety, it is anticipated that an additional 15 cameras will be added to the system over the next three years. As well, parts of the infrastructure will reach their end of life during this time period, necessitating timely replacements.

Several new cameras are deployed every year, often in response to security issues. For example, earlier this year new wooden display cases were installed in a facility and within days both cabinets were vandalized. The Information Technology Division installed security cameras at the site, and the cabinets were repaired; no subsequent damage has occurred. The Division also conducts general maintenance throughout the year. This includes replacing failed cameras, which can be an expensive undertaking due to the high cost of aerial lift rentals, and enhancing the backend infrastructure to ensure it can support the growing demands being placed on it.

In 2014, additional server resources will be required for camera data processing at the City's secondary site to replace aging hardware and improve camera frame rates and image quality at the Fieldhouse, Garage and Multiplex. The additional resources will also enable the Information Technology Division to route more camera data to the secondary site to relieve the traffic pressure on the City's fibre optic connection between City Hall and the Multiplex.

In 2015, additional server resources will be required at City Hall to replacing aging infrastructure and handle increased processing demands generated by growing numbers of cameras capable of higher-quality image captures.

By 2016, additional storage will be required to support the higher resolution cameras that will be deployed. This will allow the City to store critical camera footage longer and more reliably.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT There will be minor increases in software maintenance costs as additional licensing is obtained; however, if regular refreshes are not maintained, outages could escalate security risks and increase troubleshooting and support time and repair costs.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Secondary Site and Data Replication

COST

2014	$20,000
2015	$20,000
2016	$20,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION The City's IT infrastructure is currently centralized at City Hall. If this location becomes compromised due to a security breach, disaster or fire, the organization will not be able to conduct business as it does today. To mitigate this risk, the IT Division is establishing a secondary site that can run essential services in the event that the primary site becomes unavailable for any reason.

In 2013, physical facility preparations at the secondary site were completed with the addition of a sound-proof wall and the installation of an appropriate air conditioning system. A new server rack was acquired and installed, an IBM Blade Center and Storage Area Network (SAN) were deployed and configured, and some data have been successfully replicated to the site.

In 2014, additional blade servers will be purchased for use in the City's primary Blade Center. The replaced blades will then be moved to the secondary site for improved performance of essential services. Networking components will also to be upgraded to improve overall performance. This replace-and-redeploy strategy will be employed on an ongoing basis to populate the secondary site as cost-effectively as possible.

In 2015, additional storage will be required to accommodate organizational data growth. An expansion shelf for the City's existing Storage Area Network (SAN) device will be acquired. It will hold an additional 24 hard drives, providing up to 20 terabytes of additional storage.

In 2016, additional blade servers will be purchased for use in the City's primary Blade Center. The replaced blades will then be moved to the secondary site for improved performance of essential services. Networking components will also be upgraded to improve overall performance. These upgrades will be ongoing as additional hardware is deployed to support two sites.

Continued, incremental enhancements of this secondary site will be crucial to maintaining an increasingly functional off-site data centre capable of resuming and sustaining operations in a timely fashion, should the need arise.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This expenditure will not directly impact O&M but will significantly decrease the City's risk exposure.

DEPARTMENT CORPORATE SERVICES / PUBLIC SAFETY

DIVISION INFORMATION TECHNOLOGY / MUNICIPAL ENFORCEMENT

PROJECT MED In-Car Computers

COST
2014 $10,000
2015 $30,000

STATUS Replacement

PHASE 1 of 1

DESCRIPTION The Municipal Enforcement Division operates four patrol cars in which the officers spend most of their day. The officers rely heavily on computers to document occurrences or to retrieve information such as motor vehicle information checks. In 2010, computers were installed in the four patrol cars allowing officers to be more efficient and spend more time on the street instead of in the office. Under the City's evergreen policy, these computers are due for replacement after four years of service. These computers, unlike office computers, are operated in extreme conditions and are prone to malfunction. In the last two years, these computers have seen an increase in the amount of downtime due to malfunction.

Good, reliable computers are important for officer safety. The patrol vehicles are all equipped with GPS tracking devices and require a reliable computer to operate these systems which are a primary tool for officer safety, They allow officers to have immediate access to information on dangerous individuals, dogs, stolen vehicles, etc. which allows them to take proper precautions when dealing with these situations. Officers also rely heavily on these computers to access motor vehicle information on persons and vehicles during traffic stops, which is a large component of their workday.

This project works toward City Council's Goal #3(c)[1].

O&M IMPACT This project will not directly impact O&M expenditures, but will help Officers work more efficiently and safely.

[1] Ensure transparency, accountability and reporting.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Website Enhancements

COST

2014	$15,000
2015	$15,000
2016	$15,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION The City's website is an established component of the organization's communication and engagement strategies, and technological advances and expanding expectations are creating opportunities for more effective and efficient uses of this tool. Internally, Departments are always seeking new ways to engage with residents and businesses, and the use of the City's website for this purpose is increasing.

Ongoing enhancements are essential to the viability and growth of the City's website, and these require sustained and predictable investments. By allocating funds for continuous improvement, the City can exploit new technologies to more effectively and efficiently provide improved information and services to its clients. Plans for the upcoming three years include the following enhancements:

2014

- The development of an application to show real-time arrivals at City bus stops. This information will be accessible via smartphones, tablets and the City's website.
- The introduction of email distribution of publications such as the *Capital Update*. Citizens will be able to subscribe to this service through the City's website on any device.
- The installation of a webcam at Bush Pilot's Monument. This will be accessible via the City's website.

2015

- The development of a Frequently Asked Question (FAQ) section, which will be accessible via the City's website and a smartphone/tablet application.
- The installation of a webcam above a downtown traffic light. This camera will be viewable on the City's website.
- The implementation of Search Engine Optimization (SEO) and Search Engine Marketing (SEM) functionality to promote the City by making the organization's website as visible as possible in search engine result pages.
- The implementation of Google Webmaster Tools. The Language Translator tool will make the City's website content available in over 60 languages, and the AdWords capabilities will help the City target its offerings locally, nationally, and internationally.

2016

- The deployment of a smartphone and tablet application to provide additional access options to the City's Recreation Guide. Citizens will also be able to sign up to receive email, Twitter, or calendar reminders and alerts about various City operations such as Council meetings, or special events.
- The installation of a webcam on City Hall roof overlooking Somba K'e Civic Plaza. This camera will be viewable via the City's website.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project may result in a small increase in software maintenance costs but it enables City staff to work more efficiently, communicate more effectively, and provide improved services.

DEPARTMENT CORPORATE SERVICES / COMMUNICATIONS AND ECONOMIC DEVELOPMENT

DIVISION INFORMATION TECHNOLOGY

PROJECT Website Redesign

COST $35,000

STATUS Replacement

PHASE 1 of 1

DESCRIPTION Over the past year residents and businesses have provided unsolicited feedback on the usability of the City's website. The City has received complaints that the website is hard to navigate, documents are difficult to find, , and the search engine is frustrating. These comments are anticipated since the last major overhaul to the City's website was done in 2009. Since that time, technology and citizen expectations have changed significantly. Therefore it is appropriate to periodically review the current website functionality and services vis-à-vis current service expectations and technological capabilities and to implement appropriate changes and enhancements to ensure the City is providing the best possible services.

In 2014, this improvement will be accomplished with a thorough website redesign to create a brand new look that truly represents Yellowknife and provides more intuitive navigation to improve the user's experience and make it very easy for visitors to find information quickly. The redesign will introduce responsive web design (RWD) and a new content management system (CMS).

Potential website visitors expect to be able to use a growing number of devices, platforms, and browsers to access the City's site. In order to accommodate this, the City's current website paradigm would require the organization to develop and maintain a separate site for each platform. However, website redesign will implement an RWD strategy to create and manage a single site that is accessible by all platforms (including desktop computers, tablets, and smartphones). The technology will automatically detect the type of device a visitor is using and change the site's behavior accordingly to deliver the best possible user experience, regardless of device type.

The CMS component will incorporate powerful new website content management tools to make it easier for web content providers to enter, edit, and manage content. It will also allow the organization to create customized page layouts without relying on the vendor, and to easily integrate content with various social media tools.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project will not have a direct impact on the O&M budget, but it will improve the City's communication capabilities and create a richer and more interactive experience for the organization's website visitors.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Server Room UPS

COST $35,000

STATUS Replacement

PHASE 1 of 1

DESCRIPTION The City Hall Server Room is the core operations center for Information Technology services throughout the city. The room is dense with high-end power-dependent equipment that needs to be protected from power surges, brown outs and black outs. Therefore all equipment in the room must obtain power through an uninterruptable power supply (UPS) to condition the power supply and provide a transitional supply when a power outage occurs.

Currently the facility has two UPS control units with two battery banks to deliver off-grid power and provide a smooth power flow transition from the main grid to the generator when necessary. These UPS units are at least ten years old and in 2012, after several years of problematic performance, one unit failed completely. All City business applications, email and internet communications, security cameras and technology servers went offline, negatively impacting staff productivity and inconveniencing citizens attempting to do business with the City.

These services have since been transitioned to the single remaining UPS. However it is now overloaded and due to its age is no longer supported by the manufacturer. This leaves the City extremely vulnerable in the event of even a brief power interruption. Therefore it is critical that a modern power backup system be installed in the server room to protect equipment and ensure IT service availability. This project will obtain and deploy a suitable unit.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project will not directly impact O&M expenditures. However, if it is not undertaken there is a growing likelihood of system outages.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Core Switch Upgrades

COST 2014 $25,000
2015 $75,000

STATUS Replacement

PHASE 1 of 2

DESCRIPTION The City's network undergoes regular, incremental improvements to sustain its functionality. This strategy has proven to be an effective way to grow and expand the network to meet increasing demands and expectations. However, there remains the occasional need for a more significant investment to enhance the infrastructure. By 2015 the City's core network switches will be eight years old (three years beyond the end-of-life specified by the manufacturer) and one such periodic investment will be required to replace them.

The City's network infrastructure is built on a hub-and-spoke model. City Hall serves as the hub, with spokes to eleven other facilities. All of the organization's network services and functions, data access, communications, internet traffic, and email pass through the core switch, or main distribution frame (MDF), at City Hall. These data must also communicate with application servers and resources located in the intermediate distribution form (IDF). The current link, or backbone, between the MDF and IDF has a capacity of two gigabits per second (Gbps).

Data demands and formats are changing and expanding, and the demands on the backbone are growing. For example:

- Increasingly larger data models and retrievals are being seen in applications such as Great Plains (financials), cityExplorer (GIS), CityView (permitting), and CityWorks (work management). By their very nature these applications capture, store, and manipulate huge volumes of data. This growth will continue as the applications are deployed more widely and more data is accumulated and accessed.
- Virtual desktops are being deployed across the organization. They require high-speed backend capabilities to ensure clients have adequate desktop delivery, login, and application performance. The demands will increase as the number of deployments grows.
- The City uses IBM Blade Centre technology, which combines up to 14 individual servers (the "blades") into one housing (the "Centre"). This high concentration of servers creates significant data demands and requires considerable throughput capacity. As the Blade Centres are expanded and updated, the data volumes and traffic will increase.

The current two Gbps capacity will not support this growth. Therefore, the backbone will be upgraded to 10 Gbps. To achieve this, the City will purchase and install two high-end core service switches and associated cabling.

This project will help ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT There will be no direct impact on O&M expenditures; however, when the infrastructure can no longer handle the demands placed on it, bottlenecks will occur, causing delays in system response and, possibly, even system outages.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Virtualization

COST

2014	$40,000
2015	$30,000
2016	$20,000

STATUS New

PHASE 3 of 5

DESCRIPTION

The Information Technology Division maintains numerous servers and computers to support a wide range of services to citizens and staff. It is continually assessing technologies and opportunities for improving the performance of this infrastructure to support more efficient and effective delivery of services.

In 2009, the Division began to explore the potential for virtualization within the City's infrastructure. This technology creates an additional layer that separates the logical and physical levels and thus makes it possible to create multiple logical servers or desktops on a single physical server. This increasingly centralized paradigm means resources can be concentrated: several small servers can be replaced by one larger server, thereby more fully utilizing the resources of that single box, reducing space, power consumption, and cooling requirements, and streamlining support efforts.

The Division identified numerous opportunities where the technology could improve reliability, boost flexibility, and reduce support demands, and in 2011 implemented some server virtualization as a proof-of-concept. Based on the success of this initiative, further server virtualization was deployed and virtual desktops were rolled out to selected clients in 2012.

Virtualization has proven to be a good fit for the City, and the Information Technology Division will continue to exploit it as appropriate. This will require shifting computing power and data storage investments from a distributed model to a more centralized approach. It will also be necessary to invest in appropriate tools and support to ensure the centralized services are properly configured for the City's needs and remain highly available for clients.

As other projects are completed the City will begin to virtualize more physical resources. This will require appropriate hardware to support the growth of the virtual environment while maintaining reliability and performance in the event of hardware failure. In 2014 the Information Technology Division will purchase a second Netscaler to provide a more secure and reliable connection to the organization's virtual environment from outside sources. This device will be deployed at the secondary site and integrated into the existing security appliances. Several servers will be added in 2015 to support the anticipated increase in virtual desktop technology. In 2016 additional storage will be deployed for the virtual environment; it is anticipated that this will be accomplished by adding an upgraded drive to one of the existing storage area network (SAN) devices.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project will not directly impact O&M, but will enable staff to provide more efficient and effective service and support.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Multi-Function Devices and Printers

COST

2014	$50,000
2015	$50,000
2016	$50,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION Printers have traditionally been an important component of the City's information technology infrastructure. Although the organization is steadily reducing its reliance on paper, there remains a requirement for effective preparation of hard copies to serve specific requirements. As well, there is a growing demand for the ability to scan existing paper documents into electronic format for efficient storage and transmission.

In many cases, these divergent needs can be met by large, centralized multi-function devices that offer high processing speeds and lower per-page costs. In others, smaller devices are more appropriate for quick jobs where ready access is important.

This budget allocation will be used to meet both types of requirements. It will provide funds to ensure that large, multi-function devices are maintained and replaced in a cost-effective manner, and acquire and deploy smaller special-purpose units as appropriate.

This project helps ensure that the appropriate equipment and tools are in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project is not expected to have direct impact on O&M expenditures; however, if the various printers and multi-function devices are not properly supplied and maintained, a lack of appropriate availability could disrupt general service provision.

DEPARTMENT CORPORATE SERVICES / PUBLIC SAFETY

DIVISION INFORMATION TECHNOLOGY /
MUNICIPAL ENFORCEMENT

PROJECT Automated Ticket Writer

COST 2014 $20,000
2015 $20,000

STATUS New

PHASE 1 of 1

DESCRIPTION The Municipal Enforcement Division currently utilizes a two-part parking ticket. These tickets are printed by a local printer at a cost of approximately $9.95 per 25 tickets. There are approximately 11,000 tickets issued each year at a cost of $4,400. The officers issuing the tickets hand write the offenders' information on the tickets, which are then given to Municipal Enforcement Clerks. The clerks must manually enter the information from the ticket into the City's Financial Information System. This process is labour-intensive, taking up a significant amount of a clerk's workday. The Automated Ticket Writer would eliminate the need to write tickets as the unit prints the tickets as they are issued and downloads the information directly to the City's Financial Information System, greatly reducing the time the staff spend doing data entry.

This project works toward City Council's Action #4.13[1].

O&M IMPACT This project will reduce O&M expenditures on paper tickets, and ensure ticket data are captured more efficiently and accurately.

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[1] Develop a customer service model of excellence.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Digital Signatures

COST $30,000

STATUS New

PHASE 1 of 1

DESCRIPTION The City is conducting an increasing volume of business electronically. With this move to digital documents comes an increased need to provide electronic verification of document contents and authenticity.

This verification can be provided by a digital signature, which is a mathematical scheme for demonstrating the authenticity of a digital document. It gives the recipient a high level of confidence that the document was created by a known sender and that it was not altered in transit.

An enterprise solution is required to provide standard tools and processes across the organization. As well, the solution must integrate seamlessly with applications already in use at the City.

This project helps ensure that the appropriate tools are in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project will increase annual O&M expenditures by 20% of the software acquisition cost.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Client Access Switches

COST $50,000

STATUS Replacement

PHASE 1 of 1

DESCRIPTION The City's network infrastructure is a hub and spoke model: City Hall serves as the hub, with spokes to eleven other physical facilities. Each facility has one or more multiport access switches to connect clients and devices to the hub-and-spoke backbone. As more devices connect and more applications are offered via network services, increasing volumes of data must be transferred through these switches. For example:

- Security cameras situated at the Solid Waste Facility capture large volumes of data. As more cameras with higher resolution are added, the demands on the switches grow.
- A steady increase in data traffic to and from the Fieldhouse has been observed, due to additional security cameras, public monitors, and public Internet services.
- City staff members situated in various locations outside of City Hall have increasing requirements for access to data-rich applications such as Great Plans (financials), cityExplorer (GIS), Class (program registration and facility booking), and CityWorks (work management).

In order to accommodate this growth in data traffic and provide clients with acceptable network performance, the access switches must have appropriate speed capability on all ports. As well, an increasing number of devices such as security cameras are able to draw electrical power from their network connections to Power-Over-Ethernet (POE) switches. The advantages of POE switches include flexibility of device placement, efficient power consumption, and reduced electrical infrastructure footprint and cost.

There are currently 40 access switches in production throughout the organization. This project will replace ten of them with Layer 2, gigabit speed, POE capable access devices: four at City Hall, and one each at the Solid Waste Facility, Fieldhouse, Fire Hall, Public Works Garage, Community Services Parks Garage, and Multiplex. The devices being replaced have been in service for approximately seven years.

This upgrade will ensure that the client access switches can handle the current and anticipated data loads, and will standardize the City's switches, allowing for more efficient configuration backups, predictability, and performance benchmarks.

This project helps ensure that the appropriate Information Technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project will not directly impact O&M expenditures. However, if routine enhancements are not undertaken, the network will soon be unable to meet the increasing demands being placed on it. Resulting service delays, interruptions, and outages will negatively impact staff productivity throughout the organization and limit the organization's ability to provide citizen services.

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Open Data

COST

2014	$25,000
2015	$20,000
2016	$15,000

STATUS New

PHASE Ongoing

DESCRIPTION An increasing number of municipalities are moving to an Open Data concept to provide external stakeholders access to public data in formats that are useful and meaningful.

The City will introduce this paradigm in 2014, and gradually expand the types and volumes of available data over the coming years.

This project helps ensure that the appropriate equipment and tools are in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project may result in a small increase in software maintenance costs but it enables City staff to work more efficiently, communicate more effectively, and provide improved services.

DEPARTMENT CORPORATE SERVICES / PUBLIC SAFETY

DIVISION INFORMATION TECHNOLOGY / FIRE HALL

PROJECT Computer Aided Dispatch

COST

2014	$125,000
2015	$20,000
2016	$10,000

STATUS New

PHASE 1 of 2

DESCRIPTION The City's dispatch function will be moved from the Pumphouse to the Fire Hall in early 2015. Along with this organizational restructuring, the City will adopt Computer Aided Dispatch (CAD) tools to help ensure that industry standard protocols are followed to protect citizens, staff, and property.

This budget allocation will be used to acquire the information technology infrastructure components required to support CAD. This includes appropriate software licenses to extend the functionality of the FDM product currently in use, implementation and training services associated with this software, and additional hardware required to run the applications. As well, the associated telephone (PRI) lines will be upgraded to provide the services necessary to support the CAD system and the City's Digital Logger will also be upgraded to provide compatibility.

CAD eliminates the usage of punch clocks and punch cards which are currently in place. This current system is inadequate and creates responses times that are not accurate.

CAD will save the Fire and Ambulance Division approximately 700 person hours a year which could be used toward other training or prevention programs.

This project helps ensure that the appropriate information technology infrastructure is in place to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This component of the project will increase annual software expenditures by approximately $12,000. As well, the Information Technology Division on-call support hours will increase by approximately 2,900 hours per year to provide 24/7 coverage for this mission-critical application.

DEPARTMENT	**CORPORATE SERVICES / PUBLIC WORKS**
DIVISION	**INFORMATION TECHNOLOGY / ENGINEERING**
PROJECT	**Automatic Vehicle Location**
COST	**$25,000**
STATUS	**New**
PHASE	**1 of 1**
DESCRIPTION	Automatic vehicle location (AVL) is a powerful tool for managing fleets, including service vehicles, emergency vehicles, construction equipment, and public transport vehicles. In 2014, the Public Works Department will proceed with a proof-of-concept implementation on the City transit system. Transit vehicles are already equipped with GPS devices. This project will collect data from these devices and display it within cityExplorer to provide citizens and staff with real-time bus location information. This project works toward Council's Objective #2(f)[1].
O&M IMPACT	There will be annual software maintenance costs equal to approximately 20% of the software acquisition costs.

[1] Fully implement and sustain a customer service culture

DEPARTMENT CORPORATE SERVICES / ADMINISTRATION

DIVISION INFORMATION TECHNOLOGY / CITY CLERK

PROJECT Teleconferencing

COST $30,000

PHASE 1 of 1

DESCRIPTION The City is seeing an increased demand for services that enable people to connect to City meetings electronically. This is particularly advantageous for Council members who want to participate in Council and Committee meetings when they are away from Yellowknife. The current solution is for these individuals to connect over the telephone but the existing conference phone does not provide a satisfactory resolution, as reception and sound quality are very poor. Therefore it is recommended that the City implement improved teleconferencing services in 2014.

This project works toward Council's Goal #3[1] and Actions #3(c)[2] and #4(c)[3].

O&M IMPACT This project will increase annual O&M expenditures by 20% of the software acquisition cost.

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1 Enhancing communications and community engagement
2 Ensure transparency accountability and reporting
3 Be accountable to residents by ensuring open and accessible information flow and accessible decision-making

DEPARTMENT CORPORATE SERVICES

DIVISION INFORMATION TECHNOLOGY

PROJECT Equipment Cameras

COST $35,200

STATUS New

PHASE 1 of 1

DESCRIPTION The City's growing reliance on its Information Technology Infrastructure means the associated equipment is becoming an increasingly greater risk factor for the organization. This is particularly true of the network equipment which is scattered among twelve diverse sites throughout the City, and often installed in out-of-the way locations where City staff are seldom present.

In order to protect this equipment, and to provide information in the event of problems, it is recommended that security cameras be installed to monitor City network equipment at each location. This will help safeguard the City's investment in the actual hardware and help ensure that network services remain uninterrupted.

The expected cost per camera will be $1,200, plus $200 for software licensing. Additional disk space will also be acquired and installed to accommodate the data associated with capturing and storage the security footage, at an estimated cost of $10,000.

Cameras will be installed as follows:

Location	Number of Cameras
Yellowknife Community Arena	1
Ruth Inch Memorial Pool	1
Fire Hall	2
Stanton Regional Hospital	1
City Hall	2
Solid Waste Facility	2
Pumphouse	1
Multiplex	2
Fieldhouse	2
Library	1
Public Works Garage	2
Community Services Shop	1
Total	**18**

This project helps ensure that the appropriate Information Technology infrastructure is in place.to support the organization as it works toward all City Council Goals, Objectives, and Actions.

O&M IMPACT This project will not impact annual O&M expenditures until 2017, at which time the initial three-year software maintenance contract will have to be renewed at an expected cost of approximately $1,800 per year. There will be a further O&M impact in approximately 2019, at which time the cameras should be replaced.

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Community Services							
Arenas							
YKCA Upgrades	-	86	-	-	-	-	-
YKCA Upgrades - Dehumidifiers	75	-	40	115	-	-	-
YKCA Upgrade - Sprinkler System	100	-	220	220	-	-	-
YKCA Upgrade - Floor Replacement	35	-	-	-	-	-	-
YKCA Upgrades -Wiring	-	-	-	-	-	-	15
YKCA - Ice Plant Bldg., Ice Boards & Ice Plant	-	-	-	-	600	1,000	-
Multiplex - Fall Protection	30	21	-	-	-	-	-
Multiplex Façade Repair	-	-	85	85	-	-	-
Multiplex - Painting DND Gymnasium & Lobby	-	-	70	72	-	-	-
Fieldhouse	-	853	-	2	-	-	-
Fieldhouse Landscaping					75		
Fieldhouse Floor Cover	-	21	-	-	-	-	170
	240	981	415	494	675	1,000	185
Library							
Expansion / Renovations	-	-	-	45	-	-	-
	-	-	-	45	-	-	-

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Parks/Trails							
Back Bay Floatplane Dock	-	57	-	-	-	-	-
Columbarium Park	75	48	-	-	-	-	-
Repair on McMahon Frame Lake Trail	-	31	-	-	-	-	-
Lakeview Cemetery Expansion	-	-	35	35	-	-	300
Fencing - Cemetery and Ballparks	-	-	80	80	-	-	-
Playground Equipment Replacement	115	118	100	100	-	-	-
Relocation of Olexin Park Playground	-	27	-	-	-	-	-
Fritz Theil Upgrade	64	24	-	20	-	-	-
Ball Diamond Upgrade	-	-	-	-	-	-	40
Rental Equipment	32	16	15	22	-	-	15
Sport & Multi-use Fields Upgrade	100	100	180	180	-	-	-
Trail Development - Tin Can Hill	-	-	60	60	100	60	-
Yellowknife Rotary Park - Trail Extension	-	-	30	30	20	20	20
Doornbos Park Playground Equipment Replacement	-	-	-	-	-	-	60
Twin Pine Hill Trail Development	350	-	150	9	-	-	-
Park and Trail Development - Niven Subdivision	-	12	-	-	-	-	-
Trash Containers & Butt Canisters	-	-	-	-	66	-	-
Outdoor Recreation Facility - Design Development	-	-	90	-	-	-	-
Con Mine Remediation	-	-	-	-	-		210
Somba K'e Sculpture	-	-	46	46	-	-	-
Civic Plaza/Somba K'e Park/Library Site Design and Development	-	2	-	-	-	-	-
	736	434	786	581	186	80	645

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Pool							
Generator	-	-	-	172	-	-	-
Pool Upgrade	150	-	100	-	200	100	250
	150	-	100	172	200	100	250
Wildcat Café							
Structural Repair	-	286	-	94	-	-	-
City Hall							
Air Handling Unit Replacement	-	302	-	-	-	-	-
Upgrades	-	20	-	-	-	-	-
Roof Replacement	100	384	-	-	-	-	-
Generator Replacement	-	31	-	-	-	-	-
Renovation Study	-	71	-	-	-	-	-
Building Renovations	-	-	980	980	-	-	-
Boiler Replacement	200	-	40	240	-	-	-
	300	1,094	1,020	1,314	-	-	-
Total	1,426	2,509	2,321	2,607	1,061	1,180	1,080

Community Services	Page #	2014 Budget Recommended ($000s)	Formula Funding ($000s)	Grants ($000s)
Arenas				
YKCA - Ice Plant Bldg., Ice Boards & Ice Plant	254	600	600	
Fieldhouse Landscaping	256	75	75	
Parks/Trails				
Tin Can Hill - Trail Development	257	100	100	
Yellowknife Rotary Park - Trail Extension	258	20	20	
Trash Containers & Butt Canisters	259	66	66	
Pool				
Roof and Skylight Repair	260	100	100	
Locker Replacement Men's Change Room	261	100	20	80
Subtotal		1,061	981	80

DEPARTMENT COMMUNITY SERVICES

DIVISION FACILITIES

PROJECT Yellowknife Community Arena – Ice Plant Building, Boards and Plant

COST

2014	Ice Plant Building & System Design	$ 440,000
	Ice Boards	$ 160,000
	Total	$ 600,000
2015	Ice Plant	$1,000,000
	Total Cost	$1,600,000

STATUS Replacement

PHASE
2014 1 of 2
2015 2 of 2

DESCRIPTION The Yellowknife Curling Club was opened in 1988, and the Yellowknife Community Arena in 1982. Both facilities have served the needs of the community well in those years. In addition to curling, hockey, figure skating, and broomball, they have hosted a number of territorial and national events as well as five Arctic Winter Games.

Both facilities are refrigerant-based R-22 (Freon) systems which are currently being phased out, as R-22 is a greenhouse gas that results in a by-product (HFC-23) that contributes significantly to global warming. As of January 1, 2010, production or import of R-22 has been prohibited except for use in equipment manufactured before that date, with a total phase-out by 2020.

It is proposed that the City install a 150-ton heat recovery refrigeration system that will serve the Curling Club, Ruth Inch Memorial Pool and the Yellowknife Community Arena.

This project will be constructed over a two-year period, with the ice plant structure installed in 2014 and the plant itself installed in the summer of 2015.

2014 – Ice Plant Building & Ice Boards

Due to the Building Code and the size of a new heat recovery refrigeration plant, a new external plant room will be required. The facility will be outside the Yellowknife Community Arena close to the existing mechanical area.

The boards at the Yellowknife Community Arena are old and have exceeded their life expectancy despite ongoing maintenance and several re-builds. They are:

- in a continuous state of disrepair
- higher than the current specifications for ice boards, causing problems for the younger users;
- not fulfilling their purpose as hockey boards (i.e., players cannot be sure the boards will stand up to the rigours of a hockey game.

2015 – Ice Plant

In 2015, the 150-ton Eco-Chill refrigeration system would be installed for the Curling Club, Ruth Inch Memorial Pool and Yellowknife Community Arena. Since this is a heat recovery system equal to the plant currently in use at the Multiplex it will provide low-grade heat to all three facilities, thereby reducing heat costs.

Over the last two years, the average oil consumption for the curling rink, Community Arena and swimming pool has been approximately 53,000 litres, the balance of the heating requirements being provided by the central pellet boiler. This oil consumption caused the emission of 138 tonnes of CO_2 annually.

As demonstrated at the Multiplex, a refrigeration system with heat recovery would be able to cover the remaining heating requirements for this cluster of facilities, saving the City approximately $200,000

annually in oil costs, in effect making these facilities carbon neutral and 100% powered by renewable energy.

This project works toward Council's Goal #2[1] and Objectives #2(a)[2], #2(b)[3], and #2(e)[4].

O&M IMPACT

Since the proposed system will have the same heat recovery capacity as the plant at the Multiplex, the balance of the waste heat recovered would eliminate annual expenditures of $31,000 on pellets and $53,000 on oil, for a total savings of $84,000 annually, The system would also reduce the City's annual emissions of CO_2 by 138 tonnes.

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1 Stewards of our natural and built environment.

2 Maintain, respect, preserve and enhance the natural environment, natural heritage and green space.

3 Improve transit, roads, sidewalks, recreation facilities and trails with an emphasis on active and healthy living choices.

4 Maintain and enhance core services and adapt to changing needs.

DEPARTMENT COMMUNITY SERVICES

DIVISION FACILITIES

PROJECT Fieldhouse – Landscaping

COST $75,000

STATUS New

PHASE 1 of 1

DESCRIPTION The Fieldhouse was opened to the public in the fall of 2010 and is one of the city's major recreation facilities. The original plan called for landscaping around the front perimeter of the Fieldhouse.

It is proposed to enhance the exterior of the facility by landscaping 22,000 square feet with sod. In addition, shrubs, benches and extra bike racks will be installed.

This project works toward Council's Objective #2[1] and Objectives #2(a)[2], #2(b)[3], and #2(e)[4].

O&M IMPACT All O&M impact will be absorbed within the Fieldhouse O&M budget.

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1 Stewards of our natural and built environment.
2 Maintain, respect, preserve and enhance the natural environment, natural heritage and green space.
3 Improve transit, roads, sidewalks, recreation facilities and trails with an emphasis on active and healthy living choices.
4 Maintain and enhance core services and adapt to changing needs.

DEPARTMENT COMMUNITY SERVICES

DIVISION FACILITIES

PROJECT Tin Can Hill – Trail Development

COST

2014	$ 100,000
2015	$ 60,000
Sub-Total	$ 160,000
Less sport grant (2015)	($ 60,000)
Total	$ 100,000

STATUS Upgrade & New

PHASE 1 of 1

DESCRIPTION In 2005, Council adopted the Integrated Parks, Trails and Open Space Development study with the mission of creating an environmentally-friendly park system that beautifies the city, meets the needs of residents, visitors and tourists and encourages people to be active in the outdoors year-round. The study addressed the future needs of the city in terms of parks and trails.

In the fall of 2013, the City initiated a public consultation process that included meetings and an open house to determine what the public would like to see as development within this area. City staff heard that the public wants the area to remain largely undisturbed with minimal upgrades to trails for safety, a parking area, minimal site furnishings and signage.

Tin Can Hill

Tin Can Hill is within easy walking distance of many residents, including those who live in the downtown core. With the completion of the School Draw housing development, there will be an even greater demand to provide recreational facilities in this area.

The Department proposes to develop the trails, taking into account the topography of the area. Interpretative signs, furniture and litter containers will be included in the trail development project.

This project works toward Council's Goal #2[1] and Objectives #2(a)[2], #2(b)[3], and #2(e)[4].

O&M IMPACT The development of trails on Tin Can Hill will result in the allocation of staff and materials. Construction of these trails in 2014 will affect the 2015 O&M budget.

Increases are generally of the following magnitude:

$160 / tree planted
$3.50 / sq. m. of trail developed
$3.00 / sq. m. of Class A green space developed

1 Stewards of our natural and built environment.
2 Maintain, respect, preserve and enhance the natural environment, natural heritage and green space.
3 Improve transit, roads, sidewalks, recreation facilities and trails with an emphasis on active and healthy living choices.
4 Maintain and enhance core services and adapt to changing needs.

DEPARTMENT COMMUNITY SERVICES

DIVISION FACILITIES

PROJECT Yellowknife Rotary Park – Trail Extension

COST
2014 - $20,000
2015 - $20,000
2016 - $20,000
Total = $60,000

STATUS New

PHASE
2014 1 of 3
2015 2 of 3
2016 3 of 3

DESCRIPTION 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.

Residents throughout the city use the park extensively, as it offers a good-quality green picnic area and provides an excellent view of the waterfront.

In 2010, the walkway in the park was paved and a disabled ramp installed to allow access for disabled citizens.

Currently, the trail stops after 500 metres. It is proposed that the boardwalk be extended around the marshlands to connect with an informal trail extending from Ragged Ass Road. This extension will include several lookouts along the trail onto the lake, and the informal trail will be upgraded to provide proper access. Work on this project will be undertaken by the Rotary Club, with materials and supplies provided by the City.

In 2015 and 2016, an annual sport grant of $20,000 will offset part of project cost.

This project works toward Council's Goal #2[1] and Objectives #2(a)[2], #2(b)[3], and #2(e)[4].

O&M IMPACT There would be an annual increase of about $2,000 to maintain this trail system, including staff time and equipment.

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DEPARTMENT COMMUNITY SERVICES

DIVISION FACILITIES

PROJECT Bus Shelters – Garbage Containers & Butt Canisters

COST $66,200

STATUS New

PHASE 1 of 1

DESCRIPTION Of the 26 bus shelters in the City, only five have garbage containers. It is the desire of Council to have garbage containers and canisters for cigarette butts beside all bus shelters. To accomplish this goal, the City must purchase 21 garbage containers and 26 butt canisters.

A garbage container costs $2,530 (including freight) plus $350 for concrete pads, for a total cost of $2,880 per bin X 21 bins = $60,480. A butt canister costs $220 (including freight) X 26 canisters = $5,720. The total capital cost of garbage containers and butt canisters would be $66,200.

This project works toward Council's Goal #2[1] and Objectives #2(a)[2], #2(b)[3], and #2(e)[4].

O&M IMPACT The performance measures allow $600/year for garbage containers. The total cost of maintenance for them would be $600/year X 21 containers = $12,600. The maintenance costs for butt canisters would be $100/year X 26 canisters = $2,600. Total O&M cost of this project would be $15,200.

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DEPARTMENT COMMUNITY SERVICES

DIVISION PROGRAMS

PROJECT Roof and Skylight Repair - Ruth Inch Memorial Pool

COST $100,000

STATUS Replacement

PHASE 1 of 1

DESCRIPTION Ruth Inch Memorial Pool opened its doors to the public in the fall of 1988. The pool continues to be a popular facility among residents and visitors to Yellowknife. In 2010, the City contracted an engineering firm to do a life cycle analysis of the building which identified items that needed to be addressed to ensure the facility meets or exceeds its life expectancy. The roof was identified as one of the exterior projects that needed to be addressed within the next three to five years to ensure that the life expectancy of the building is met. According to the report, the average life expectancy of asphalt rolled roofing is 25 years, which means that the roof has exceeded its life expectancy and should be scheduled for replacement.

A qualified contractor conducted an inspection and noted that the roof itself is in good condition and should last another five to ten years but the skylights need to be repaired. The membrane that connects the skylight to the roof and around the windows has cracked, allowing heat to escape, resulting in moisture building up and freezing. This, in turn, results in constant dripping which damages interior walls of the facility.

The Department recommends that funding be identified for the repair in 2014.

This project addresses Council's Objective #2(b)[1].

O&M IMPACT No immediate impact to O&M can be determined at this time. However the remedial repair ensures the full life expectancy of Ruth Inch Memorial Pool.

1 Improve transit, roads, sidewalks, recreation facilities and trails with an emphasis on active and healthy living choices..

DEPARTMENT COMMUNITY SERVICES

DIVISION PROGRAMS

PROJECT Ruth Inch Memorial Pool - Locker Replacement, Men's Change Room

COST $100,000

STATUS Replacement

PHASE 2 of 2

DESCRIPTION Ruth Inch Memorial Pool opened its doors to the public in the fall of 1988. The pool continues to be a popular facility among the citizens and visitors of Yellowknife. The City of Yellowknife installed coin-operated lockers so that the patrons of the pool would have a place to secure their belongings. Over the course of the last 25 years, the pool environment has taken its toll on the lockers; the mechanisms, hinges, and metal are breaking down and will require replacement. The pool has allocated $10,000 per annum for locker repairs.

The proposed project is to replace the lockers for the facility's change rooms; the women's lockers were scheduled for 2013 and the men's are scheduled to be installed in the fall of 2014. The new lockers will be non-metallic and the coin slots can be changed to accept and return the coin when the key is put back into the lock, so there will be no charge to the patron.

A sport grant of $80,000 will offset part of the cost.

This project works toward City Council's Objective #2(b) [1].

O&M IMPACT The new lockers will have a coin-operated mechanism that returns the coin when the key is re-inserted. Currently, the pool receives $0.25 per use for locker rental which equates to approximately $15,000 in revenue that will be lost with the installation of coin-return lock mechanisms.

[1] Improve transit, roads, sidewalks, recreation facilities and trails with an emphasis on active and healthy living choices.

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Public Safety							
Directorate							
Emergency Supplies	15	25	-	5	-	-	-
Municipal Enforcement							
Communication Equipment Replacement	-	-	90	90	-	-	-
Office Furniture Replacement	-	-	-	1	-	-	-
	15	25	90	96	-	-	-
Fire & Ambulance							
Air Conditioning for Fire Hall Expansion	-	-	-	-	-	-	40
EMS Training Manikin	-	-	-	-	-	-	115
Paving and Foundation Repairs	-	-	-	-	-	140	-
Fire Division Master Plan	-	-	-	-	-	110	-
Storage Facility	-	-	-	-	50	-	-
Self-Contained Breathing Apparatus	-	-	50	50	-	-	-
Fire Hall Expansion	-	626	-	-	-	-	-
Bunker Gear / Safety Compliant Equipment	-	1	-	-	-	-	-
Rescue Equipment Upgrade	-	-	-	5	-	-	-
Bunker Gear Lockers	-	-	60	37	-	-	-
Front Ramps and Site Improvement	-	-	150	39	-	-	-
Zodiac Boat & Motor	-	20	-	-	-	-	-
Installation of Training Hydrant	110	-	80	190	-	-	-
Pavement for NE Side of Ramp	40	-	-	-	-	-	-
Mechanical Controls (Heat & Air Make Up)	25	33	-	-	-	-	-
Training Equipment for Firefighter Workouts	-	6	-	-	-	-	-
Live Fire Training Structure	-	-	-	12	-	-	-
Thermal Imaging Cameras	-	-	-	-	25	-	-
FDM Software (Apparatus Maintenance Module)	-	-	-	-	30	-	-
	175	686	340	333	105	250	155

Public Safety	Page #	2014 Budget Recommended ($000s)	Formula Funding ($000s)
Fire & Ambulance			
Storage Facility	264	50	50
Thermal Imaging Cameras	265	25	25
FDM Software (Apparatus Maintenance Module)	266	30	30
Subtotal		105	105

DEPARTMENT	**PUBLIC SAFETY**
DIVISION	**FIRE AND AMBULANCE**
PROJECT	**Storage Facility**
COST	**$50,000**
STATUS	**New**
PHASE	**1 of 1**
DESCRIPTION	The Fire and Ambulance Division is currently storing equipment and apparatus (Engine 2) outside, exposed to the elements. There is a pressing need for an organized storage facility for efficient and proper care of spare equipment. This project works toward City Council's Goal #2[1] and #2(e)[2].
O&M IMPACT	Minimal.

[1] Stewards of our natural and built environment
[2] Maintain and enhance core services and adapt to changing needs.

DEPARTMENT	**PUBLIC SAFETY**
DIVISION	**FIRE AND AMBULANCE**
PROJECT	**Thermal Imaging Cameras**
COST	**$25,000**
STATUS	**Replacement**
PHASE	**1 of 1**
DESCRIPTION	The Fire Division is currently using thermal imaging cameras that are becoming obsolete in comparison to the technology available today. It is essential that firefighters have the best equipment available to ensure safe and effective rescues. This project works toward City Council's Objective #2(g)[1] and Action #2.18[2].
O&M IMPACT	Minimal.

[1] A sense of personal and community safety.
[2] Create a safer, cleaner and vibrant city.

DEPARTMENT	**PUBLIC SAFETY**
DIVISION	**FIRE AND AMBULANCE**
PROJECT	**FDM Software (Apparatus Maintenance Module)**
COST	**$30,000**
STATUS	**New**
PHASE	**1 of 1**
DESCRIPTION	The Fire Division is currently using FDM software, but would like to upgrade the system to enhance our ability to manage equipment and apparatus. The Asset Management and Preventative Maintenance Modules will allow us to track apparatus and equipment service and maintenance. Currently, Public Works only tracks service of light apparatus. The Fire Division is responsible for heavy apparatus, all small engines and equipment, and ancillary vehicles. The number of daily, weekly, monthly and annual inspections calls for a more sophisticated system to ensure safety and operational readiness. This project works toward City Council's Goal #1[1] and Action #1.5[2].
O&M IMPACT	Minimal.

[1] Building a sustainable future
[2] Implement asset management

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Planning & Development							
Housing & Affordability Strategy/ Eco Housing	-	278	-	50	-	-	-
Old Airport Road / Franklin Ave. Streetscaping	-	54	-	-	-	-	-
Harbour Plan & Smart Growth Development Plan Initiatives	500	964	600	350	100	600	600
Streetscaping Initiatives	500	1,179	500	350	750	500	500
	1,000	2,475	1,100	750	850	1,100	1,100

Planning & Development	**Page #**	**2014 Budget Recommended ($000s)**	**Formula Funding ($000s)**
Harbour Plan & Smart Growth Development Plan Initiatives	268	100	100
Streetscaping Initiatives	269	750	750
Subtotal		850	850

DEPARTMENT PLANNING AND DEVELOPMENT

DIVISION PLANNING AND LANDS

PROJECT Harbour Plan and Smart Growth Development Plan Initiatives

COST

2014	$100,000
2015	$600,000
2016	$600,000

STATUS Ongoing

DESCRIPTION In 2012, City Council adopted the Yellowknife Harbour Plan and the General Plan, and, in 2010, the Smart Growth Development Plan for information. All three plans have a series of recommendations which include initiatives that have attracted interest from federal funding agencies. As part of the 2013 Capital Budget Council allocated $600,000 for the design and development of two parks in Old Town: Pilot's Monument and the Government Dock. The work on these projects will be completed in spring of 2014.

Other Harbour Plan projects identified in the 2013 budget include Wiley Road Park and Otto and Lessard Drive Park. These projects have been deferred to 2014. Other potential projects that could be incorporated within the scope of this initiative include a parcel to which the City has tenure, adjacent to McMeekan Causeway. This would serve as an additional public access node to the waterfront.

Subject to Council approval, Administration will start a public engagement process in early 2014.

In addition to the goals and objectives of the Harbour Plan, General Plan, and the Smart Growth Development Plan, the project achieves Council Goals #1[1] and #2[2].

O&M IMPACT: 0.25 of a PY commencing in 2018.

[1] Building a sustainable future.
[2] Stewards of our natural and built environment.

DEPARTMENT PLANNING AND DEVELOPMENT

DIVISION PLANNING AND LANDS

PROJECT Streetscaping Initiatives

COST
2014 $750,000
2015 $500,000
2016 $500,000

STATUS Ongoing

PHASE 1 of 1

DESCRIPTION The City concluded its partnership arrangement with CanNor for the streetscaping of Old Airport Road in 2012. This work included the entranceway to Old Airport Road and extended to include areas in front of Staples, Stanton Plaza, Walmart, and Extra Foods. In 2013, Phase IV of Old Airport Road was completed (from Byrne Road to Kam Lake Road). A portion in front of Northlands Subdivision was deferred to 2014 until the underground construction was completed. In addition to this area, Administration is proposing the streetscaping of 52nd Avenue which will incorporate improved pedestrian access and cycling facilities. This work would be undertaken in conjunction with the 2014 repaving program and has been endorsed by the Smart Growth Implementation Committee. Finally Administration received direction from Council to proceed with repaving and streetscaping of 50th Street from 51st to 52nd Avenue. This work was initially planned in prior budgets but deferred as a result of funding partnerships to streetscape 52nd Street and Old Airport Road. Approximately $250,000 is allocated to the streetscaping portion of this project.

In addition to the goals and objectives of the General Plan and Smart Growth Development Plan, the project achieves Council Goals #1[1] and #2[2].

O&M IMPACT Administration has mitigated O&M streetscaping costs relating to landscape maintenance through the provision of underground irrigation and the provision of a three-year maintenance period with the contractor. Beyond that, estimates are .10 of a PY.

[1] Building a sustainable future.
[2] Stewards of our natural and built environment.

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Public Works & Engineering							
Fleet Replacement	1,449	1,167	1,035	1,248	1,378	1,399	1,333
	1,449	1,167	1,035	1,248	1,378	1,399	1,333
Engineering & Garage							
New Parking - Garage	150	975	-	-	-	-	-
Traffic Lights Video Detection Equipment & Wireless Communication	-	-	38	32	75	75	75
Diagnostic, Safety Equipment & Specialty Tools For Mechanics	20	1	-	19	20	20	20
Survey Equipment & AutoCad Software	-	96	-	-	75	-	-
Management Operating System	-	23	-	18	-	-	-
Garage - Fire Code & Safety Improvements	50	56	-	-	-	-	-
City Garage Yard and Building Improvements	-	-	-	-	50	50	50
	220	1,151	38	68	220	145	145
Roads & Sidewalks							
Road Rehabilitation	700	622	2,622	3,642	3,500	3,000	3,000
Franklin Ave./Old Airport Road Traffic Lights Upgrade	-	15	-	-	-	-	-
Traffic Lights UPS	60	-	-	-	-	-	-
Drainage Improvements	50	93	50	50	50	50	50
McMeekan Causeway Abutment Stabilization	-	41	-	269	100	-	-
	810	771	2,672	3,960	3,650	3,050	3,050
Transit							
Marketing Plan, New Bus Shelters & Route Posts	20	2	-	-	-	-	-
	20	2	-	-	-	-	-

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Road Rehabilitation							
Morrison Drive			1,000	687			
N'Dilo	600			289			
Raccine Road, Ingraham Drive & Doornbos Lane			322		450		
Central Business District:							
45 St (49 Ave. - Franklin Ave.)						650	
50 St (51 Ave to 52 Ave)					500		
52 Ave. (49 St. - 56 St.)					1,500		
52 St.						675	
School Draw Av. (44 St. to 46 St.)							700
Franklin Ave. (41 St. to Wiley Rd.)							1,950
Racquet Club Area (49 Ave/49A Ave/41A St./41 St.)		252					
Kam Lake Industrial:							
Deh Cho Boulevard			1,300	2,666			
Cameron Rd.(between Nahanni Drive & Taltheilei Drive)					250		
Utsingi Drive /Etthen Dr./ Taltheilei Dr./Drybones Dr.						1,675	
Cemetery Rd.							350
Niven Lake:							
de Weerdt Drive, Driscoll Rd. & Haener Drive					800		
Miscellaneous patching and repairs	100	370					
	700	622	2,622	3,642	3,500	3,000	3,000

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Solid Waste Management							
Landfill/Baler							
Landfill Expansion	200	142	-	58	250	-	3,000
Baling Facility Mechanical Upgrades	25	49	25	32	25	25	25
Site Restoration Liability	150	66	150	50	150	125	125
Landfill Closure	-	30	-	-	-	-	-
Disposal of Liquid Waste	-	12	-	-	-	-	-
Ban Commercial Cardboard	-	-	-	5	-	-	-
Shelter For E-waste	-	20	-	-	-	-	-
Solid Waste Facility Fencing	-	-	25	25	-	-	-
Recycling Depot Fencing	-	-	25	15	-	-	-
Centralized Composting Project/ Program	110	134	750	100	510	600	500
Transfer Station Phase 1	-	-	-	-	150	-	-
Weigh-Out Scale	-	-	-	-	-	250	-
Baling Facility Roof Repairs	-	-	-	-	-	-	100
Scrap Metal Recycling	-	-	-	8	-	-	-
Purchase an Excavator	300	267	-	-	-	-	-
Office/Break Room/ Washroom for Solid Waste Facility	120	-	-	147	-	-	-
	905	721	975	439	1,085	1,000	3,750

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
Water & Sewer							
Pumphouses (PHs)/Liftstations(LSs)/Forcemains							
Water Treatment Plant/Reservoir Expansion	5,823	1,458	9,900	1,400	6,227	8,321	150
Water Booster Station Niven Lake	-	1	-	-	-	-	-
Capital Upgrades	65	9	65	211	65	65	65
Reservoir Flushing, Cleaning & Repairs	25	86	25	93	25	-	25
Pump Replacement Program	100	100	-	-	100	100	100
Monitors & Controls Upgrading	75	122	75	75	75	75	75
Pipe Replacement	325	940	300	555	300	300	300
PH#3 Pipe Replacement	-	-	-	-	-	-	1,000
	6,413	2,716	10,365	2,334	6,792	8,861	1,715
Other							
Water Meter Replacement & Upgrade	15	36	-	66	-	-	-
Water Meter Replacement for PHs & LSs	-	-	-	15	-	-	-
Submarine Line Inspection	-	-	-	-	30	-	30
PH & LS - Genset Installation (Backup Power)	-	167	175	574	175	175	250
Fire Hydrant Maintenance	30	30	30	30	30	30	30
Lagoon Control Structure Replacement	-	-	-	-	150	-	-
Rebuilding of Trappers Lake Flow Control Structures	-	-	-	-	150	-	-
Water Licence Study & Report Requirements	100	156	100	100	60	-	-
PH#4 Sodium Hypochlorite Generation	400	-	-	400	-	-	-
Personal Gas Monitoring Equipment Upgrade	30	4	-	8	-	-	-
	575	392	305	1,194	595	205	310

	2012 Budget ($000's)	2012 Actual ($000's)	2013 Budget ($000's)	2013 Forecast ($000's)	2014 Budget Recommended ($000's)	2015 Budget ($000's)	2016 Budget ($000's)
CMP Replacement Program:							
(includes repavement and concrete)							
Central Business District:							
54th Avenue (2015 Water & Sewer , 2016 Paving)						600	400
Taylor Road area:							
Franklin Avenue (2014 Water & Sewer & Paving)					2,600		
Lanky Court (2014 Water & Sewer & Paving)			1,200		1,350		
Reservoir Road (Paving)					60		
Matonabee Street (2012 Water & Sewer, 2013 Paving)	1,775	3,417	1,100	1,522			
LS#5/ Public Works Garage/ Fire Hall (Water & Sewer)					400		
Forrest Drive area:							
Con Road (2015 Water & Sewer, 2016 Paving)						1,070	710
Forrest Dr - Burwash Dr. to 51A Ave.(2015 Water & Sewer & Paving)			650			1,150	
Frame Lake South:							
Horton Crescent (2016 Water & Sewer, 2017 Paving)							1,750
Williams Avenue (2016 Water & Sewer, 2017 Paving)							1,750
Knutsen Ave.		438					
Knutsen Court (2013 Water & Sewer, 2014 Paving)	450		1,000	1,368	400		
Byrne Road (Paving)			850	470			
Bromley Drive & Bromley Court (2013 Water & Sewer, 2014 Paving)			2,000	2,637	900		
Others:							
LS#5, PH#4 & Northlands Water Tie-ins (PH#4 & Byrne Rd.)				2,268			
	2,225	3,855	6,800	8,265	5,710	2,820	4,610

Public Works & Engineering	Page #	2014 Budget Recommended ($000s)	M.E.R. Reserve ($000s)
Fleet Management	278		
1023-10 Crown Victoria		52	52
1102-04 F-350		41	41
1103-04 E-250		36	36
1168-06 60" Exmark Mower		19	19
2022-08 CAT 140M Grader		320	320
2064-07 LT 8500 Sterling Haul Truck		154	154
3130-04 Zamboni 520		124	124
2118-94 IHC 4900 Rescue		500	500
2171-08 Sidewalk Sweeper		60	60
1122-09 Bush Hog Mower		15	15
T015-96 Tree Spade		57	57
		1,378	1,378

	Page #	2014 Budget Recommended ($000s)	Formula Funding ($000s)	Capital Fund ($000s)	MACA Capital Grant ($000s)
Engineering & Garage					
Traffic Lights Video Detection Equipment & Wireless Communication	282	75	75		
Diagnostic Equipment & Specialty Tools for Mechanics	283	20	20		
Survey Equipment	284	75	75		
City Garage Yard and Building Improvements	285	50	50		
Roads & Sidewalks					
Road Rehabilitation	286	3,500	1,172	118	2,210
Drainage Improvements	290	50	50		
McMeekan Causeway Abutment Stabilization	291	100	100		
		3,870	1,542	118	2,210
Solid Waste Management					
Landfill					
Landfill Expansion (new landfill cell design)	292	250	250		
Baling Facility Mechanical Upgrades	293	25	25		
Site Restoration Liability	294	150	150		
Centralized Composting Program	295	510	500	10	
Transfer Station Phase 1	298	150	150		
		1,085	1,075	10	-

		2014 Budget Recommended ($000s)	Formula Funding ($000s)	Long-Term Debt ($000s)	Water & Sewer User Fees ($000s)	M.E.R. Reserve ($000s)	Capital Fund ($000s)	Gas Tax Rebate ($000s)	MACA Capital Grant ($000s)
Pumphouses/Liftstations (PHs/LSs)	**Page #**								
Water Treatment Plant	299	6,227		6,227					
Capital Upgrades	302	65			65				
Reservoir Flushing, Cleaning & Repairs	303	25			25				
Pump Replacement	304	100			100				
Monitors & Controls Upgrading	305	75			75				
Pipe Replacement	307	300			300				
Other									
Submarine Line Inspection	308	30			30				
PH & LS - Genset Installation (Backup Power)	309	175			175				
Fire Hydrant Maintenance	310	30			30				
Lagoon Control Structure Replacement	311	150			150				
Rebuilding of Trappers Lake Flow Control Structures	312	150			150				
Water Licence Study & Report Requirements	313	60			60				
CMP Replacement Program	314	5,710			1,191			4,519	
		13,097	-	6,227	2,351	-	-	4,519	-
PW Subtotal		**19,430**	**2,617**	**6,227**	**2,351**	**1,378**	**128**	**4,519**	**2,210**

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION FLEET MANAGEMENT

PROJECT Upgrading of Fleet

COST $1,378,000

STATUS Replacement/ New

PHASE Ongoing

DESCRIPTION The mobile equipment fleet has a replacement value of $13.0 million and must be maintained to meet the service levels expected by residents. The City has a fleet of 118 heavy-duty and mobile equipment that support Fire and Ambulance, Road Maintenance, Water and Sewer Maintenance, Solid Waste, Parks, Arenas and Administrative functions, plus 24 stationary engines for emergency power generation and fire pumping capacity.

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

<u>Pickups – 43 units</u>
According to the City of Yellowknife Fleet Management Practices, these vehicles should be reviewed for replacement after five years and replaced after eight years. We currently have 43 pickups and vans in the fleet and two of them are over ten years old. The average age of the fleet is five years. If the policy were followed, the average age of the fleet would be five years. There have been 41 pickups that have been replaced in the last eight years. Replacing the aging fleet will lower the O&M to operate the fleet. Five pickups have to be replaced every year to maintain the fleet to the policy standard. If the standard is not followed, more maintenance staff will have to be hired to maintain the fleet to a safe and operational level and there will be increased costs. Status: Good – meets standards. Note: Replacement increased from 8 to 10 years.

<u>Medium-Duty Trucks – 8 units</u>
According to the City of Yellowknife Fleet Management Practices, these vehicles should be reviewed for replacement after eight years and replaced after ten years. The City currently has eight medium-duty trucks in the fleet, with none of them over ten years old. The average age of the fleet is four years. If the policy were followed, the average age of the medium-duty truck fleet would be five years. Status: Medium - duty trucks meet standard and no replacement medium trucks are planned.

<u>Municipal Enforcement Vehicles – 4 units</u>
These are to be replaced every three years or 100,000 km. The average age of the fleet of four Municipal Enforcement vehicles is three years and one has over 100,000 km. Due to the high usage, Municipal Enforcement vehicles require a high amount of maintenance (nearly five times that of similar vehicles in the fleet). For this reason, it is important to maintain the replacement of the vehicles. One Municipal Enforcement vehicle must be replaced yearly to maintain the City standards and in order to reduce O&M costs and labour requirements. With the replacement of one vehicle this year, the City will meet the practice identified. Status: Good – standard is maintained.

<u>Heavy Trucks – 18 units</u>
The 18 heavy-duty trucks and trailers, includes trailers, tandem tractors, dump trucks, and street sweepers. One of the heavy-duty trucks and trailers is due for replacement. The heavy trucks are to be replaced every

twelve years. Currently, the age of the fleet is ten years old, and if the replacement policy is followed, the average age should be six years old. Trucks are used for City projects and snow removal in the winter. The cost of operating these vehicles over hiring contractors is about half. Each truck is operated for about 1,000 hrs/yr, saving the City $45,000/year each truck it operates rather than contracting out.

Trailers are reviewed when aged out. If practical, the trailer is refurbished and returned to service. The dump trailer (due to more use and normal wear and tear) is replaced when aged out.

As trucks get older, increased maintenance and repairs are required, such as replacing motors and transmissions at costs of $20,000 and $10,000 respectively. Breakdowns inevitably occur when equipment is needed resulting in a cost to the City to engage contractors at a much higher cost than using our own forces. Condition: if replacements continue, heavy duty fleet condition is good.

Heavy Equipment – 10 units

The heavy equipment is to be replaced every 12 years, and two are due for replacement. Currently, the age of the fleet is six years old, and the average age should be six years old. Heavy equipment is used for City projects and snow removal in the winter. The cost of operating our equipment over hiring contractors is about half the cost. Each piece of heavy equipment is operated for about 1,000 hrs/yr, saving the City $45,000 per year for each piece of heavy equipment it operates. As heavy equipment gets older, increased maintenance and repairs are required such as replacing motors and transmissions at a cost of $30,000 and $20,000 respectively. Breakdowns inevitably occur when equipment is needed resulting in a cost to the City to engage contractors.

The City has explored contracting out heavy equipment services and leasing vehicles, but recommends the acquisition of replacement vehicles as the most cost-effective option to the City. Condition: Heavy equipment fleet is in good condition.

Mobile Tractors – 6 units

The average age of the fleet is six years. This includes Zambonis, skid steers, compactors, and forklifts. The anticipated life span is ten years. The average age of fleet if replaced as per the schedule should be five years. This equipment is currently tasked with sidewalk maintenance in the winter. Work in the summer includes sidewalk resurfacing and cold mix patches, Community Services trail repairs, and grounds maintenance. Two are due for replacement. Condition: Good.

Emergency Vehicles – 9 units

This includes fire trucks, ambulances and water trucks. The average age of the fleet is 15 years. Due to increased demand, the replacement life cycle standard has been evaluated by the Public Works and the Fire Department. The standard for replacement was reduced from 30 years to 20 years for most firefighting equipment. This was done after a replacement part was not available for a vehicle that was over 20 years old and a fire truck was out of service for 8 weeks while a part was found at a used car wrecker. Parts are no longer manufactured for vehicles over 20 years old.

Ambulances are now replaced on a 12-year cycle due to the high amount of use and reliability issues with ambulances as they get older. We have three ambulances and one is replaced every four years. The newest is placed on “first out the door” service and the oldest is surplus. Status: Most of the Emergency Vehicles are due for replacement since the re-evaluations of the life cycle. A new piece of Emergency equipment is due scheduled for replacement in 2017 when the new replacement schedule will be realized.

Other Equipment – 34 units

Other equipment includes the miscellaneous equipment required by City departments to do their work. Included are: riding mowers, snowmobiles (Municipal Enforcement Division), All Terrain Vehicles (firefighters), Solid Waste Facility baler, light trailers (Community Services and Public Works), line-painters, crack sealing equipment, trailer mounted water pumps, and ground thawing equipment. Equipment in this group have a varied life expectancy and replacement cost. Status: for the most part, the other equipment group is in good shape and the replacement schedule allows for safe work and consistent work flow.

Stationary Engines 21 Units

Our fleet mechanics also maintain and service 21 stationary engines. These include standby generators for City water and sewer supply and City facilities (City Hall, Fire Hall Multiplex/Fieldhouse). The stationary engines provide standby electricity on water and sewer services in times of power outages or natural disasters. The estimated value of the stationary engines is approximately $4.8 million. Many of the existing engines are older; five are over 30 years old, 12 are over 20 years old, 14 are over 10 years old, and only seven are under 10 years. Parts are often unavailable for engines over 20 years old. Though these engines get little use, even small breakdowns may lead to lengthy repairs.

The mobile reserve fund is not used to replace Stationary engines though the Fleet resources are used to maintain them. It is recommended to departmental managers that the older stationary engines be replaced. Fleet-wide, it is recommended that one engine a year is replaced until all stationary engines are less than 20 years old.

Summer Vehicles (12)

Summer vehicles are vehicles that have been replaced but are still useful in a secondary or low priority role. There are nine light vehicles used mainly by Community Services Park staff in the summer or administration vehicles year-round, and one heavy equipment class dump trailer used in winter as a back-up or with a leased tractor for winter snow removal. If a repair of a summer vehicle exceeds an estimated cost of $500, the vehicle may be removed from service at the discretion of the Works Superintendent.

This project addresses City Council's Goal #1[1] and Objective #1(b)[2].

O&M IMPACT

Maintenance costs will decrease if the City of Yellowknife Fleet Management Practices are followed due to reduced fuel consumption and repair costs. City residents will have a high satisfaction with City services. If the fleet is replaced and a schedule followed, services will be more consistent and not halted due to equipment failure.

1 Building a sustainable future
2 Continue to have a sustainable and practical approach to infrastructure deficit reduction.

2014 Fleet Replacement Schedule

Unit #:	Description:	Year:	Class:	Replace. Year:	Estimated Budget:	Estimated Current Value:	Hours	Kilometers	End Use:
1023-10	Crown Victoria	2010	2	2014	52,000	0	5,815	100,539	Trade in on new MED Vehicle.
1102-04	F-350 W/Service Body	2004	1	2014	41,200	0	2,220	111,251	Trade in.
1103-04	E-250	2004	1	2014	36,050	0	5,426	85,519	Trade in.
1168-06	60" Exmark Mower	2006	0	2014	19,000	0	550	-	Low priority role.
2022-08	CAT 140M Grader	2008	5	2014	320,000	140,000	5,453	-	Trade in.
2064-07	LT8500 Sterling Haul Truck	2007	4	2013	154,500	0	2,971	21,900	Trade in.
3130-04	Zamboni 520	2004	3	2014	123,600	0	5,613	-	Trade in.
2118-94	IHC 4900 Rescue	1994	8	2014	500,000	0	3,286	32,149	Trade in.
2171-08	Sidewalk Sweeper	2008	0	2014	60,000	0			These will be replaced with a single, small-scale loader for Community Services use.
1122-09	Bush Hog Mower	2009	0	2014	15,000	0			
T015-96	Tree Spade	1996	0	2014	56,500	0			
2014 TOTAL					**1,377,850**	**140,000**			**1,237,850**

Net cost to the City.

City of Yellowknife Fleet Replacement Cycle Guidelines:

Class:	Description:	Examples:	Life Cycle:
0	Small Equipment	Push lawn mowers, water pumps, chainsaws, compactors, etc.	Replace when repair costs exceed value.
1	Cars, Vans and Light Trucks	Cars, vans, half-ton trucks, 3/4 ton trucks.	Review after 7 years, replace after 10 years.
2	Municipal Enforcement Vehicles	Cars, trucks, SUV ("sport utility vehicles").	Replace after 4 years or 100,000 kms.
3	Medium Trucks	One-ton to three-ton trucks, includes zambonis.	Review after 6 years or 100,000 kms, replace after 10 years.
4	Heavy Trucks/Graders	Trucks 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, vactor, sweepers, etc.	Review after 8 years or 10,000 hrs, replace after 12 years.
6	Other Equipment	Heavy rollers, sander bodies, trailers, steamers, flushers, etc.	Review after 15 years, replacement after 20 years.
7	Mobile Tractors	Mid-size construction equipment, tractors, skid steers, etc.	Review after 8 years or 10,000 hrs, replace after 10 years.
8	Emergency Equipment	Fire trucks, tankers, aerial ladder, ambulance, etc.	Replaced based on industry standards and NFPA requirements.
9	Surplus 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.	

Note: These are guidelines only and each piece of equipment is evaluated prior to the decision to replace.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION ROADS AND SIDEWALKS

PROJECT Traffic Lights Video Detection Equipment

COST

2014	$75,000
2015	$75,000
2016	$75,000

STATUS Ongoing

PHASE Ongoing

DESCRIPTION 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. They are also susceptible to road conditions and construction activity. Over 35% of loops currently in use require some measure of repair. This can cause major inefficiencies in traffic flows and timing patterns.

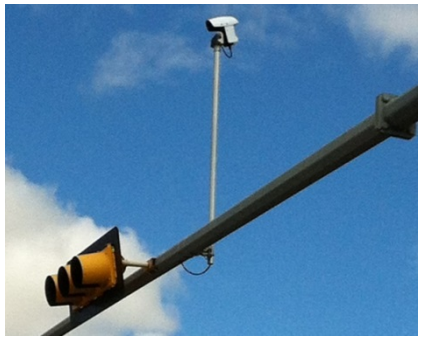
Video detection equipment is the new standard in detection and data collection and is easy to install and program. This equipment has a proven field detection accuracy of 98% according to the manufacturer's specifications; this also includes motorcycles and bicycles. The cameras can also capture traffic data, such as traffic counts of cars, trucks and pedestrians as well as vehicle speeds. However, vehicle speed data can only be used for design methods and not as a method of speed enforcement.

There are 18 intersections which rely on vehicle detection equipment for proper functioning of the traffic lights. Most intersections would require four cameras, one for each direction of traffic. Intersections along Franklin Avenue use detection loops 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 2013 cameras were installed at the intersection of Norseman Drive and Franklin Avenue as a pilot project to determine the effectiveness of the cameras for detection of vehicles under Yellowknife conditions. Depending on their performance, it may be necessary to change the equipment type for future installations.

The approximate cost for camera installation is $35,000 per intersection (four-way). Therefore, with a $75,000 annual investment, two intersections can be completed per year while allowing approximately $5,000.00 for installation costs.

This project works toward City Council's Goal #2[1].



O&M IMPACT The use of cameras for vehicle detection will increase public safety and reduce call-outs for Public Works & Engineering staff.

[1] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION GARAGE (MECHANICS SHOP)

PROJECT Diagnostic Equipment and Specialty Tools for Mechanics

COST
2014 $20,000
2015 $20,000
2016 $20,000

STATUS Ongoing

DESCRIPTION The City's fleet is comprised of 118 pieces of equipment and 24 stationary engines, with a total value of approximately $18 million.

Diagnostic maintenance manuals will help mechanics troubleshoot problems and reduce pollution by providing better maintenance practices. Nearly all new equipment utilizes code readers to troubleshoot electronic and mechanical problems. Each make and model requires specialized equipment to read its codes.

This project works toward City Council's Goal #2[1].

O&M IMPACT The acquisition of diagnostic manuals will greatly reduce O&M and enhance our preventative maintenance program. An increase in fuel efficiency and work output of equipment is expected.

[1] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION ENGINEERING

PROJECT Survey Equipment

COST $75,000

STATUS New

PHASE Initial

DESCRIPTION In 2012, the City created the position of Senior Engineering Technologist. The position required several tools to perform the tasks associated with the position, including complete GPS data collection equipment and AutoCad Civil 3D Design Software. As part of the business case for the Senior Engineering Technologist, the Public Works and Engineering Department is putting forward a request for another Engineering Technologist for 2014. Should this position be approved, an additional set of GPS data collection equipment will be required.

The GPS data collection equipment will need to be very accurate for the specific nature of the work entailed in the capital programs. Accuracy will be paramount for this equipment and, with accuracy, comes more advanced technology and an increase in cost.

In addition to capital projects, this equipment and technician can be used for various other activities and projects where operational requirements permit. Simple topographic surveys can be completed, and general pick -up can be done at a moment's notice rather than at the convenience of a hired consultant. This will dramatically reduce the costs incurred by the City by not having to contract out this work.

This project works toward meeting Council's Goals #1[1] and #2[2].

O&M IMPACT Allowances will have to be made for the replacement of equipment as it becomes obsolete, as well as for training on equipment and software. It is expected that this equipment will be replaced every five to eight years, depending on technology.

Annual costs associated with the survey equipment include equipment maintenance (calibration, malfunctions, etc.) and the use of Sub-Arctic Surveys Ltd. base station.

1 Building a sustainable future
2 Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION GARAGE

PROJECT City Garage Yard and Building Improvements

COST
2014: $50,000
2015: $50,000
2016: $50,000

STATUS New

DESCRIPTION The City garage houses a large portion of the City's fleet, valued at approximately $18 million, on a floor area of 1,971 square metres. The cost of rebuilding the garage is estimated at over $4.52 million. The building is essential to the City's response to both daily and emergency circumstances. The garage is an alternative operations centre for Northland Utilities, should its main office be destroyed.

The City yard includes storage areas and buildings, fuel pumps, energized parking stalls and other items that require upgrades when problems are discovered.

Over the last two years, fire and occupational health and safety upgrades have been done on the building as required by both an occupational health and safety audit and a technical assessment of the building. Repairs and maintenance of a capital nature must continue annually in the future, and projects may increase or decrease in value to meet that need.

This project works toward Council's Objective #2(c)[1].

O&M IMPACT O&M costs will be reduced by addressing problems as they arise and not having to make do with inadequate equipment or buildings until the budget can be found for small projects.

[1] Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION ROADS & SIDEWALKS

PROJECT Road Paving/Rehabilitation

COST
2014: $3,500,000
2015: $3,000,000
2016: $3,000,000

STATUS Replacement

PHASE Ongoing

DESCRIPTION Paving work includes not only new asphalt pavement, concrete curb and sidewalks, but also considers the replacement and future needs of underground infrastructure of water, sewer, storm, traffic communication, power, telephone, cable, fibre optic, etc.

The typical design life of pavement is generally between 20 to 25 years, but will vary significantly. This design life is dependent on 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 paved with no base reconstruction. The paved roads in Kam Lake Industrial Subdivision will likely have a life of only ten years or less. It is important to note that concrete curbs and sidewalks are not installed in downtown alleys or on roadways with rural cross sections. In areas of potential settlement, the City considers asphalt sidewalks as opposed to concrete sidewalks as they are less costly and are easier to maintain or repair should settlement occur.

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 endangering the public or when maintenance and repairs no longer are 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.

There has been concern expressed by the public as to the condition of the sidewalks and roads in the Central Business District (CBD) and Kam Lake Industrial Park. The majority of roads in the CBD are over 30 years in age and are well beyond their life expectancy. The replacement of several downtown streets is scheduled over the next few years. There are several roads in Kam Lake that currently have no form of asphalt surfacing, or are in a very poor state of repair. These streets are also being addressed in upcoming budget seasons.

As streets are reconstructed, the City works with Northland Utilities Limited to ensure that street lighting levels are evaluated and increased, as required by

national standards. Additional underground ductwork is being coordinated in this work with Northland Utilities Ltd., NorthwesTel Inc. and NorthwesTel Cable Inc. for present and future needs.

2014 Road Paving/Reconstruction Projects

Old Town Paving – Raccine Road, Ingraham Drive, and Doornbos Lane
Public Works would like to dedicate a portion of the 2014 paving budget to placing asphalt on the roads on Pilots Monument Hill, which would include Ingraham Drive, Raccine Road and Doornbos Lane.

There are several factors that support this direction. Maintenance of this hill in both summer and winter is problematic. The extreme nature of approach slopes and exiting slopes complicate maintenance, sanding and plowing in the winter, as well as grading and dust control in the summer. Pilot's Monument is also a prominent tourist attraction where people from all over Canada and the world go to view Yellowknife. Paving of these streets will also tie into the Harbour Plan implementation for the area.

Due to the nature of roadways in Old Town, Public Works is unsure if concrete curb, gutter and sidewalk are applicable in this area. This will be investigated and determined through the detailed design process.

52 Ave (Between 49 Street and 56 Street)
Several sections of this street have undergone significant differential settlement. The initial plan was to complete resurfacing block by block but, upon further investigation and taking into consideration the age of the storm water system, it was decided that this full section be completed in one construction season. As part of this reconstruction, the design will include provision for bike lanes.

50 St. (Between 51 Ave. and 52 Ave.)
The condition of the sidewalks and the asphalt road surface is very poor and in need of repair. Several large sections of sidewalk have been patched with asphalt and need replacement. Upgrading of this street will also address several areas of ponding that have occurred due to settlement.

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 is scheduled for 2014 for the section between Nahanni Drive and Taltheilei Drive.

Deweerdt/Driscol/Haener Drive
Paving of the initial portion of Haener Drive was completed in 2010. The remaining section of Haener, along with Driscol and Deweerdt drives was supposed to be surfaced with asphalt and concrete in the summer of 2012. However, upon video inspection of sewer mains and services, 31 of 35 services need to be repaired, and one section of sewer main needs re-grading. Due to strict time constraints in the 2012 season, the water and sewer work was not completed until 2013. This required the asphalt and concrete surfacing of these streets to be delayed until 2014.

2015 Road Paving/Reconstruction Projects

45th Street (Between 49 Avenue and Franklin Avenue)
This street is one of the oldest streets in Yellowknife. The asphalt and concrete have both degraded and are in need of replacing. There are no signs of significant differential settlement of the road bed, so the area should only require replacement of the asphalt and concrete structures.

Utsingi Dr./Etthen Dr./Taltheilei Dr./Drybones Dr. (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.

Downtown Street Overlay Program –52 Street
Public Works has determined a method of road resurfacing that may make construction less invasive and timelier on streets that have no differential settling problems. Many downtown streets have no movement problems, but the concrete sidewalk is severely deteriorated. A prime example of this is a section of 52 Street, between 51 Avenue and 52 Avenue (by Mary Murphy Senior Home). Instead of complete removal of asphalt and concrete materials, the contractor will be required to remove dilapidated structures, such as sidewalks, while keeping intact the asphalt roadway. New concrete appurtenances will then be installed and an overlay of asphalt will be done to resurface the road.

This method will save time and budget 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.

2016 Road Paving/Reconstruction Projects

School Draw Avenue (44 Street to 46 Street)
This area of School Draw Avenue has significant dips and drop-offs in the pavement at the curb line. Reconstruction of this area will fix these problems.

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 bike lanes.

This project works toward Council's Objectives #2(b)[1] and #2(c)[2].

Tentative 3-Year Paving Plan

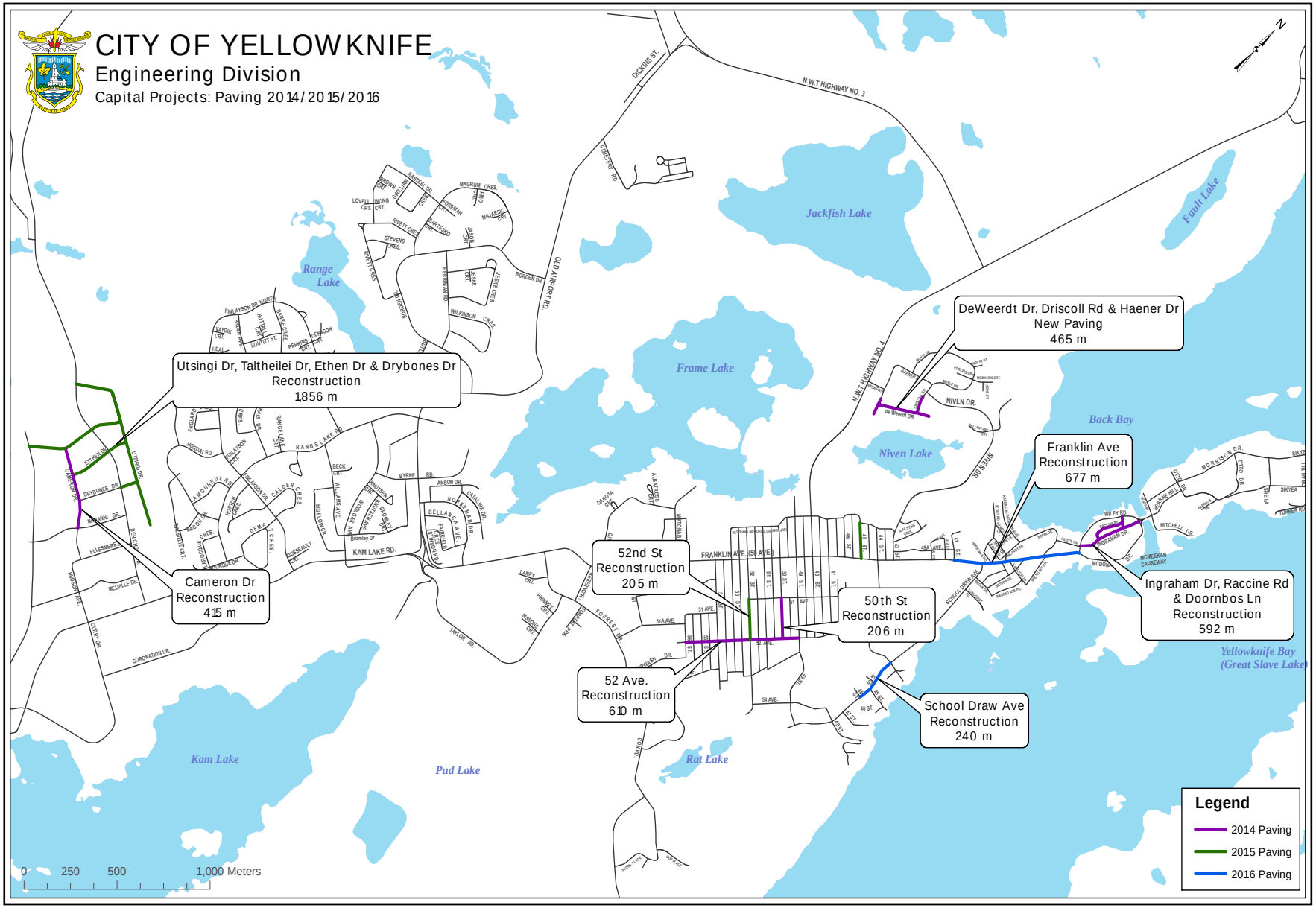
Street	Replacement Year	Paving Estimate
Raccine/Ingraham/Doornbos	2014	$450,000
52 Avenue	2014	$1,500,000
50 Street	2014	$500,000
Cameron Road	2014	$250,000
Deweerdt/Driscol/Haener	2014	$800,000
45 Street	2015	$650,000
Utsingi Drive/Etthen/Taltheilei/Drybones	2015	$1,675,000
52 Street	2015	$675,000
School Draw Avenue	2016	$700,000
Franklin Avenue	2016	$2,300,000
TOTAL		**$9,500,000**

O&M IMPACT

Paving of roads which are currently gravel, as is the case for the older section of the Kam Lake industrial area and the remaining section of Niven Phase VI, eliminates the need for grading and dust control on the streets.

Upgrading streets that have significant surface issues (dips, rough pavement, potholes, etc.) reduces the amount of upkeep required on the roads, and improves safety. It also provides the opportunity to redesign roadways to include items such as multi-use trails and bike lanes.

[1] Improve transit, roads, sidewalks, recreation facilities and trails with an emphasis on active and healthy living choices
[2] Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems.


CITY OF YELLOWKNIFE
Engineering Division
Capital Projects: Paving 2014/2015/2016
Utsingi Dr, Taltheilei Dr, Ethen Dr & Drybones Dr
Reconstruction
1,856 m
Cameron Dr
Reconstruction
415 m
52nd St
Reconstruction
205 m
50th St
Reconstruction
206 m
52 Ave.
Reconstruction
610 m
DeWeerdt Dr, Driscoll Rd & Haener Dr
New Paving
465 m
Franklin Ave
Reconstruction
677 m
Ingraham Dr, Raccine Rd
& Doornbos Ln
Reconstruction
592 m
School Draw Ave
Reconstruction
240 m
Jackfish Lake
Frame Lake
Niven Lake
Back Bay
Fault Lake
Range Lake
Kam Lake
Pud Lake
Rat Lake
Yellowknife Bay
(Great Slave Lake)
N.W.T. HIGHWAY NO. 3
KAM LAKE RD.
FRANKLIN AVE. (50 AVE.)
NIVEN DR.
0 250 500 1,000 Meters
Legend
2014 Paving
2015 Paving
2016 Paving

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION ROADS AND SIDEWALKS

PROJECT Drainage Improvements Including Storm Sewer Repairs

COST

2014	$50,000
2015	$50,000
2016	$50,000

STATUS Existing

PHASE Ongoing

DESCRIPTION Drainage issues take considerable effort to resolve as many locations have not been designed with drainage in mind. This causes significant efforts from City staff as well as from contractors hired by the City to minimize property damage.

Water from the spring freshet can cause serious issues including erosion of roads and flooding of properties. A washed out road creates a hazard to residents since there is no safe way to get off a property. As well, service and emergency vehicles cannot access a property while flooding is occurring.

One ditch in Kam Lake does not drain because it has bedrock that should have been blasted in the past. This has resulted in the property owner having to set up a series of pumps and hoses to resolve what the drainage system should provide.

Along with some ditches that have to be widened or bedrock blasted for drainage, there are several culverts of insufficient size which must be replaced to allow for heavy spring runoff. There are many culverts of sufficient size which are not effective because their elevation is incorrect due to height-of-fill increase from development. These should be re-installed to direct the flow of water away from property.

The City has had a number of requests from concerned residents regarding the storm water drainage along sections of Forrest and Dagenais drives. In both instances settlement of the road has caused significant ponding which either resulted in roadways being undermined or homes being damaged during heavy rainfalls. Since these roads are not scheduled for reconstruction in the near future, the City intends on either extending existing storm sewers in these areas or installing new storm sewers in order to alleviate these problems.

The City continues to require this capital funding to address ongoing drainage concerns or problems that have originated over the years.

This project works towards City Council's Goals #1[1] and #2[2]

O&M IMPACT Improvements to drainage will result in lower pumping costs for residents and the City, greatly reduce flood damage and emergency repairs to roads, and provide continual safe access to property by owners and emergency vehicles.

[1] Building a sustainable future
[2] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION ROADS & SIDEWALKS

PROJECT McMeekan Causeway Abutment Stabilization

COST $100,000

STATUS New

DESCRIPTION Upon inspection in 2010, it was observed that the abutments that support McMeekan Causeway have started to deteriorate. Stabilization methods must be employed to ensure that these abutments remain stable and in good condition.

Investing capital repairs at the onset of a problem will prevent a much more costly and disruptive solution in the future. In 2011 an investigation of the extent of the deterioration was performed and a design completed for stabilization of the abutments. Construction of the designed solution was planned for 2012. However, due to the water level of the lake, construction could not proceed. Revisions were made to the design in 2013 to improve constructability which also increased the cost of the project. The budget for this project is outlined below.

2013 Year to Date	$47,287
2013 Carry Over	$268,600
2014 Budget	$100,000
Project Total	**$415,887**

This works toward Council's Goal #2[1].

O&M IMPACT Stabilization of the embankment will reduce future maintenance requirements associated with soil erosion.

[1] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS AND ENGINEERING

DIVISION SOLID WASTE FACILITY

PROJECT Landfill Expansion

COST 2014: $250,000 (New Landfill Cell Design)
2016: $3,000,000 (New Landfill Cell Construction)

STATUS New

DESCRIPTION In 2011 a new second-generation landfill cell was built in the quarry adjacent to the old landfill site. The cell includes a leachate collection and containment system which consists of a liner system, overlaid with collection pipes, which direct liquids to a sump pit located in a utility hole. It is anticipated the cell will hold approximately five years' worth of baled waste. The design and construction of the cell 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 cell is located in an area that has the least impact on quarry operations.

The location and design of the next cell will pose several unique engineering problems which will require careful consideration during the design and construction process, including how the new cell will connect with the existing cell. Discussions will take place with the quarry lessee in order to determine a suitable location for the cell which will allow quarry operations to continue. It is anticipated the life of the next cell will be seven years.

The City's water licence requires that the new cell include monitoring wells to be established upstream and downstream of the site in order to ensure the integrity of the liners in the cells. These wells will be installed as part of this project.

This project works toward meeting Council's Goals #1[1] and #2[2].

O&M IMPACT To be determined.

[1] Building a sustainable future
[2] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION SOLID WASTE FACILITY

PROJECT Baling Facility Mechanical Upgrades

COST
2014 $25,000
2015 $25,000
2016 $25,000

PHASE Ongoing

DESCRIPTION The Baling Facility was built in 1992 and has served the needs of the community well. Equipment installed at the time of construction now requires various upgrades or replacement to ensure that the handling of solid waste continues in an efficient and cost-effective manner.

In 2003, the main hydraulic ram on the baler failed and had to be replaced. In 2004, two overhead doors had to be replaced as well as the underground electrical conduit operating the fire suppression system. This year, most of the alarms for the fire suppression system will have to be replaced to pass inspection.

Present equipment includes: dust collector unit, HVAC burners, overhead doors, fire pump and sprinkler system, fire alarm system, electrical components, air compressor and boilers for in-floor heating.

On a yearly basis, the boilers for the in-floor heating and air compressor have to pass a GNWT inspection under the Boilers and Pressure Vessels Act. The fire alarm and suppression system have to pass an annual inspection.

In 2006, a City of Yellowknife Internal Audit was conducted at the Baling Facility. During this inspection, it was noted that several items require upgrades, repairs or replacement. These include electrical, plumbing and heating, and signage that will be upgraded.

In 2007, the fire suppression pump had to be replaced, as well as repairs made to the building and modifications made to the air handling units.

Proper maintenance and attention to continued upgrading of equipment ensure a safe work environment for employees of the Baling Facility.

In 2013, the air compressor was replaced as it was 19 years old and worn out.

In 2013, main liners in the baler will be replaced which requires a shutdown over several days.

Operation of the Baling Facility works toward Council's Goal #2(c)[1].

O&M IMPACT O&M costs are increasing yearly due to mechanical breakdowns with equipment that is nearing the end of its lifespan. Adherence to the maintenance schedule of mechanical upgrades will decrease costs greatly since there will be fewer repairs and resultant downtime. Operating efficiency at the Baling Facility will also improve.

[1] Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION SOLID WASTE

PROJECT Site Restoration

COST
2014: $150,000
2015: $125,000
2016: $125,000

STATUS Ongoing

PHASE Ongoing (Final closure in 2017)

DESCRIPTION The City has adopted nationally recommended public sector accounting policies earlier than the Government of the Northwest Territories requires adoption. As part of these policies, the City is required to estimate future landfill closure costs and set aside a portion of these costs.

As of December 31, 2012, the net present value of total closure and post-closure costs are estimated to be $1,705,577. The City has included $1,669,029 (98%) as part of site restoration liability. Of the total capacity of 700,000 cubic metres, 15,000 cubic metres (2%) remain. It is expected that the existing landfill will be closed in 2013, and site restoration completed by 2017.

There is a difference between the net present value of future landfill liabilities and the actual costs that will be incurred. The difference is estimated to be about $750,000. In order to avoid the large difference at the end of landfill closure, it is recommended to accrue the amount over the next five years.

It is anticipated that the City will begin close-out procedures for the existing working landfill in 2014. However, it will continue to be used as a transfer station for all waste, soil remediation, processing of wood products, yard waste and steel waste for recycling and salvaging in the three-cell system.

This project works toward Council's Objective #2(c)[1].

O&M IMPACT A capital funding allocation for future landfill site restoration will reduce the impact on the Solid Waste Management Fund and reduce the need for future solid waste user fee increases.

[1] Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION SOLID WASTE FACILITY

PROJECT Centralized Composting Program (Phased Approach)

COST

2014	$510,000
2015	$600,000
2016	$500,000
2017	$450,000

STATUS Continuation

DESCRIPTION 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 from the residential and commercial sector in 2006, accounting for 26% of the total waste stream. The study recommended a significant diversion of food waste from the various sectors which will 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 to 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 collection of organics to the production of finished compost.

The final report from the pilot project recommended ways to expand composting from a pilot project to a citywide program. The composting facility that was built for the pilot project is already functioning at capacity. In order to expand the program, a larger facility must be built.

2013 Work Completed

Design, construction costs, water board regulatory approval, and program logistics were focused on throughout 2013. It was determined that the 2013 approved budget would cover only the cost of the retention pond due to regulatory requirements and minimal base pad construction. The pond needs to be constructed with materials approved by the Mackenzie Valley Land and Water Board as acceptable for landfill closure requirements.

Highlights of 2013 include:

- Meetings held with regulatory authorities in October 2013 which provided necessary information to move forward with detailed design.
- Design of the compost pad, retention pond, and access road were completed by City Staff.
- Site survey and rough site shaping has been completed by Solid Waste Facility Staff, as well as 50% of the access road construction.
- Program logistics are being developed as recommended in the Pilot Project report. Some 2013 tasks completed were:
  - Streamlining data collection through standardized operator tracking sheets, and windrow monitoring sheets.
  - Held operator training for SWF staff.
  - Implemented site-specific sampling procedures for soil sampling process.
  - Maintained relationships with participant (troubleshooting and support).
  - Drafted “Compost Facility Operations Manual”.
  - Planning compost facility specific “Fire and Incidents Protocol” in line with SWF practices.
  - Implemented occupational health and safety and hazard protocols in line with SWF practices.
  - Increased communications via social media.
  - Increased exposure at public events.
  - Participated in the Annual Canadian Compost Council Conference and Ecology North received Composting Facility Operator Training.

- Prioritized investigation of feedstock as recommended by experts in the compost industry.

2014 Construction and Implementation ($1,150,000)

Construction:
- Finalize design and tender all phases of 2014 construction.
- Completion of access road construction.
- Retention pond construction will be constructed according to regulatory authority requirements and in line with landfill close out procedures to minimize closure costs while at the same time constructing a compost facility.
- Compost pad construction large enough to accommodate the first neighbourhood selected to champion the composting program. There are four major neighbourhoods in Yellowknife: Range Lake North, Frame Lake South (includes Kam Lake area), Downtown (includes Niven Lake area), and Old Town.

Program Development:
- Increased public education and consultation around the expansion of the facility.
- Install yard waste bins onsite (SWF) to more efficiently provide feedstock to compost facility.
- Determine operational costs and increases to collection contracts. The operational costs are expected to be minimal due to the large capital expenditure requirements.
- Neighbourhood champion selection and communications plan.
- Purchase green (compost) and black (garbage) bins for each residence in the first neighbourhood. These will be City of Yellowknife property and attached to each property. Details of ownership and maintenance to be determined prior to deployment.
- Develop and communicate a clear collection schedule (one week compost collection, one week garbage collection) in conjunction with the City's waste collection contractor.
- City Staff training and info packages for public inquiries.
- Continue to use pilot project base pad until the new pad is fully functional, at which point operations will shift to new facility and the pilot project pad will be used for other activities.
- Expand commercial participant base.
- Specify and confirm operational equipment required to operate an efficient and cost-effective compost facility. Tender in late 2014, arrival in 2015.

2015 Expansion ($600,000)

Construction:
- Tender pad expansion to accommodate the second neighbourhood's compost material quantities. Design already complete in 2014 for entire facility.

Program Expansion:
- Operate compost facility for commercial and first phase of curbside collection. Including use and/or sale of any finished compost product.
- Selection of second neighbourhood for expansion of program. Purchase of green and black bins for second area.
- Increased publicity and education campaign.
- Implementation of organics recycling at all public events.
- Continue to increase Industrial, Commercial and Institutional (ICI) sector participation.

2016 Expansion ($500,000)

Construction:
- Tender pad expansion to accommodate the third neighbourhood's compost material quantities.

Program Expansion:
- Operate compost facility for commercial and first two phases of curbside collection. Including use and/or sale of any finished compost product.
- Selection of third neighbourhood for expansion of program. Purchase of green and black bins for third area.

- Continue publicity and education campaign. Implement changes if necessary.
- Continued implementation of organics recycling at all public events.
- Continue to increase Industrial, Commercial and Institutional (ICI) sector participation.

2017 Expansion ($450,000)

Construction:

- Tender pad expansion to accommodate the final neighbourhood's compost material quantities.

Program Expansion:

- Operate compost facility for commercial and first three phases of curbside collection. Including use and/or sale of any finished compost product.
- Purchase of green and black bins for final area.
- Continue publicity and education campaign. Implement changes if necessary.
- Continued implementation of organics recycling at all public events.
- Continue to increase Industrial, Commercial and Institutional (ICI) sector participation.

Expansion to a citywide program will require a phased-in approach as detailed, which will allow for the costs of the program to be spread out over four years, as summarized below:

2013 Carryover	$640,000		Construction
2014 Budget	$510,000	$1,150,000 Total	¼ Implementation
2015 Budget	-	$600,000	¼ Implementation
2016 Budget	-	$500,000	¼ Implementation
2017 Budget	-	$450,000	¼ Implementation
Project Total		**$2,700,000**	

Composting will divert waste from the Solid Waste Facility, reduce greenhouse gas emissions associated with production of methane in the landfill, reduce the attractiveness of the active landfill to birds and other wildlife, and produce a finished product that is in high demand. A centralized composting program is more efficient than the smaller backyard composters, because it reaches higher temperatures, is able to decompose more waste including all food scraps and animal products. It is also worth considering that paper products are required during the process, and contribute to the overall sustainability and increased self-sufficiency of the landfill. It has been proven that finished compost is a highly sought after item in Yellowknife and will be usable for many City projects including cover material for the landfill closure.

This project works toward City Council's Objective #2(c)[1].

O&M IMPACT

Changing the composting facility 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, in turn, will reduce the amount of staff time needed at the baler and increase the overall lifespan of new landfill cells.

[1] Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION SOLID WASTE FACILITY

PROJECT Transfer Station Phase 1

COST $150,000

STATUS New

PHASE 1

DESCRIPTION The City of Yellowknife's Solid Waste Facility (SWF) is undergoing a transition in order to maintain and improve our rates of waste diversion. The facility is also striving to improve our level of service for site users. In order to achieve both of these goals the facility will be moving towards a fully operational Transfer Station.

Phase 1 of the Transfer Station will provide our users with an organized, safe and clean area to dispose of their items. Whether it is recyclable, salvageable or waste, there will be designated areas for all items. Higher rates of diversion will be attained through the use of categorized bins in a central location; we anticipate increased cooperation from our users due to the simple user-friendly design.

Preliminary designs have been completed and presented to the Solid Waste Management Advisory Committee (SWMAC). The committee has provided feedback and suggestions which have resulted in multiple adjustments to the design so that it is better suited for all users.

This project works towards Council's Goal #2(c)[1].

O&M IMPACT The Transfer Station will reduce operational costs at the Solid Waste Facility due to materials being sorted into the categorized bins. Currently a lot of time is spent sorting materials on-site due to improper dumping by users. Higher rates of diversion will improve the life expectancy of new landfill cells.

[1]Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Water Treatment Plant

COST
2013: $13,600,000 (carried over)
2014: $6,227,000
2015: $8,321,000
2016: $150,000

STATUS Ongoing

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

Currently, the City's only water treatment is disinfection using chlorine gas. The water is also fluoridated to assist in reducing dental decay.

In addition to the daily tests at the pumphouse and twice-weekly tests at the hospital laboratory, the City carries out comprehensive water tests annually or semiannually. In 2001, Public Works & Engineering started a comprehensive year-round water testing and analysis program. This program was followed by an assessment of the water quality and recommendation for improvements to meet more stringent guidelines.

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. As well, increased water quality criteria that are more stringent than the current drinking water quality guidelines are expected to be established in the future. For example, reduced acceptable levels of turbidity and trihalomethanes (THMs) are currently under review and its resulting requirement for further treatment is expected to be forthcoming within the next couple of years. Public demand for improved water quality is expected, which would in turn establish the need for water conditioning in the future.

Since the City obtains its water from the Yellowknife River, a surface water source, there is always a potential for either of the water-borne pathogens (*Cryptosporidium* and *Giardia lamblia* which causes giardiasis, referred to as beaver fever) to enter our water supply. To date, Yellowknife has not experienced an outbreak of either of these pathogens. Although the likelihood of an occurrence is low, the City should still establish emergency response procedures. A key emergency measure, besides issuing a boil water order, would be to implement appropriate water treatment processes.

During the summer of 2004, a boil water advisory was issued because of the high level of silt in the Yellowknife River. The level of silt exceeded the guidelines.

During the 2002 - 2004 budget planning process, it became apparent that another related factor needed to be considered simultaneously for the project. Pumphouse #1 was constructed in 1948 and added to piece-by-piece from 1968 through the mid□1980s. It has been long overdue for replacement and was originally planned to be done in the early 1990s following the construction of the new reservoir (1991). The new pumphouse building has been designed to be located on top of the reservoir. The extensive growth of

the City over the recent past has created an additional burden on the capacity of the reservoir. The current demand is starting to exceed the capacity of the reservoir. In order to meet the growth of the City the reservoir must also be expanded. The intent is to expand the capacity of the reservoir to meet the City's current and future ten-year needs.

The first phase of this project was the reservoir expansion at the existing facility; this work was completed in 2008. The engineering services contract was awarded to AECOM in the spring of 2010 and has been progressing to date. Currently, the consultant has been working towards water source selection, civil site design and access, as well as the detailed design of the plant itself. In August 2013, the contract to build the new Water Treatment Plant (WTP) was awarded. Work on site began in October 2013 and will continue until 2015. Contracts awarded to date are as follows:

Access Road	$2,097,804
WTP Construction*	$28,839,000
Engineering	$2,231,983
Total Project Costs	**$33,168,787**

*WTP Construction includes $2,354,613 for the membrane supply contract.

As the project has progressed throughout 2013, the updated construction cash flow is as follows:

Project Expenditures to Date (Includes access road design and construction, plant construction to date and engineering fees to date)	$3,973,859
2013 Projected Expenditures Remaining (includes engineering and construction fees)	$896,928
2014 Construction	$19,827,000
2015 Construction	$8,321,000
2016 Post-Construction Fees	$150,000
Total Project Cost	**$33,168,787**

This total figure includes the access road construction that was completed in 2011, along with all piping upgrades that were a requirement of that road construction. It also includes engineering design fees to date.

This project works to achieve City Council's Objective #2 (c)[1].

O&M IMPACT There would be no significant change in O&M costs or staff time for the pumphouse. However, operating costs will increase with addition of treatment estimated at $70,000 (3% capital) per year.

[1] Develop smart and sustainable approaches to energy, water and sewer, waste management, and building systems.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION PUMPHOUSES/LIFTSTATIONS

PROJECT Pumphouse and Liftstation Capital Upgrades

COST

2014	$65,000
2015	$65,000
2016	$65,000

PHASE Ongoing

DESCRIPTION Many of the City's six pumphouses and 12 liftstations are aging and require increased architectural care and maintenance. These building exteriors have aged cladding and inefficient windows, and it is suggested that insulation and windows be upgraded to reduce heating costs. This, in conjunction with new siding and roofing, will reduce operating costs for each building and will help the buildings to blend better with the surrounding neighbourhood.

In addition to the architectural upgrades, mechanical and electrical upgrades are required for the heating and ventilation systems. The upgrades include installation of energy efficient furnaces and boilers, double-walled or self-contained fuel storage tanks and upgrades to air handling units.

This project works toward City Council's Goal #2[1].

O&M IMPACT Replacing the siding, roofing and windows as well as increasing insulation will reduce heating costs and remove the need for painting every three to four years. Replacement of fuel tanks will reduce the risk of environmental spills.

[1] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Pumphouse Reservoir - Flushing, Cleaning and Repairs

COST 2014 $25,000 – Pumphouse #3
2016 $25,000 – Pumphouse #4

PHASE Ongoing

DESCRIPTION The City has three water storage reservoirs that provide potable drinking water to our residents, as well as firefighting capabilities. The City's Water License MV2009L3-0007 was renewed with a condition that the main reservoir be cleaned. Under operational compliance, the City should clean the main reservoir at Pumphouses #3 and #4.

Flushing the reservoir requires advanced planning and management. The process includes draining the reservoir, removing and disposing of the sediment, and disinfecting the interior of the reservoir, all while maintaining a continuous water supply to the city. An additional requirement during the flushing is to evaluate the walls and grout small cracks.

Public Works & Engineering recommends the flushing, cleaning and repair of the City's water reservoirs once a year on a three-year cycle as there are three reservoirs.

During the construction of the Water Treatment Plant, work will be done on the pumps, pump wells and other processes for Pumphouse #1, which will eliminate the need for the scheduled cleaning of the Pumphouse #1 reservoir in 2015.

This project works toward meeting City Council's Goal #2[1].

O&M IMPACT Less debris in the reservoir will add to the effectiveness of the chlorine added to the water. This will increase the free chlorine residual and, in turn, reduce the quantity of chlorine required for disinfection. Additional savings will occur when any cracks found in the reservoir walls are filled and leaks abated.

1 Stewards of our natural and built environment.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION PUMPHOUSES/LIFTSTATIONS

PROJECT Pump Replacement for Pumphouses and Liftstations

COST

2014	$100,000
2015	$100,000
2016	$100,000

STATUS Ongoing

DESCRIPTION The City has six pumphouses and 12 liftstations which, together with water and sewer pipe networks, make up its water distribution and sewage collection system. Each station contains between two and nine pumps. Liftstations also use communitors (grinders) to break down sewage before it returns to the collection system. The pumps and grinders must be maintained in order to ensure a continuous supply of water and discharge of sewage for residents. Failure of pumps or grinders at any liftstation can result in a sewage overflow, which has occurred in the past. This resulted in sewage entering people's homes. In 2003, a sewage overflow at Liftstation #6 cost the City $25,000 for remediation.

Pump rebuilding costs about $7,000 to $25,000 per pump, while replacement costs $10,000 to $35,000 per pump. The costs to rebuild or replace a comminutor (sewage grinder) are $30,000 and $80,000, respectively. Larger pumps, as in Liftstations #5 and #6, cost between $30,000 and $40,000 to replace.

A new standard for electric motors has been determined by the Water and Sewer Division. The new motor specification is more efficient and capable of upgrades to variable frequency drive in the future. Levels of maintenance have also increased to ensure efficiencies are of the highest possible level. In many instances, specialized personnel and equipment must be utilized to do so. Public Works & Engineering staff continue to improve the efficiency of the water and sewer service and increase maintenance standards to provide a high level of service to residents.

Based on standard industry procedure and the experience of Public Works & Engineering staff, pumps are to be replaced after approximately 25 years of operation. Pumps and communitors have been installed at different times, so the replacement dates of these items will be spread out. The high number of components and the high cost of repairs justify a capital expenditure that can be allocated to repairing and replacing of these pumps and communitors.

Public Works & Engineering estimates that the total replacement value of the pumps is approximately $1.6 million, and proposes to spend about $100,000 per year for pump replacements and monitoring to continue the orderly replacement of pumps that are in poor condition.

This project works towards City Council's Goal #2[1].

O&M IMPACT Generally, newer pumps are more efficient, requiring less energy to run. O&M funding should decrease as a result. Utility costs will be reduced and call-outs to check on failed pumps will also be reduced.

1 Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Monitors and Controls Upgrading of Pumphouses and Liftstations

COST
2014 $75,000
2015 $75,000
2016 $75,000

STATUS Ongoing

PHASE Ongoing

DESCRIPTION In a three-phase program in 1997 through 2000 the City began automating all of its pumphouses and liftstations. In addition, the City installed a dedicated communication line to interconnect its most crucial facilities in order to avoid the characteristic interruptions of a telephone line. Many parts are now obsolete and, with the advancement of computer technology, some replacement parts are no longer available and upgrades are required.

The automation of these stations used for the delivery of essential services reduced operator time and increased the system reliability. The City implemented the Supervisory Control and Data Acquisition (SCADA) computer system as the network controller of the system. The main computer for the SCADA system is located in Pumphouse #1. As a result of the automation, this is the only station that is staffed 24 hours a day. All alarms and system feedback are received on the SCADA computer in Pumphouse #1. This is the centre for emergency dispatch, and automation is need to relieve operators of the hands-on requirement. Emergency dispatch is now their primary function.

In order to ensure effective upgrades and maintenance to the City's SCADA monitors and controls, an assessment of the current system was performed. The assessment evaluated the monitors and controls employed in the system and the system deficiencies, as well as recommending improvements to the system.

The implementation of the findings of the assessment is the second part of this project, and was initiated 2007 and will continue through 2016. To date, numerous shortcomings in the monitoring and controls system have been resolved and new infrastructure is being put in place that increases efficiency of the City's infrastructure system.

The City's new water treatment plant project will be the hub for the City's SCADA system. The upgrading that has been continuous since 2007 will ensure up-to-date equipment and an easy transition when the treatment plant comes online.

This project works toward City Council's Goals #1[1] and #2[2].

O&M IMPACT The upgrades to the monitoring and controls system will effectively increase the efficiency of the system and reduce operational maintenance by reducing the number of call-outs.

With the proper repair of the SCADA system, Water & Sewer trades workers will be able to reduce building inspections and spend more time repairing worn components.

Implementation of new water quality monitors will relieve the need for weekend rounds and increase water quality compliance ability and public expectations.

[1] Building a sustainable future
[2] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Pipe Replacement for Pumphouses and Liftstations

COST
2014 $300,000
2015 $300,000
2016 $300,000

STATUS Ongoing

DESCRIPTION The age of our infrastructure is such that the City will have to rebuild the piping of a pumphouse or liftstation yearly to avoid catastrophic failure. In a study performed by AD Williams Engineering in 2004, it was determined that inspected pipes of two buildings were only 40% to 70% the thickness of new pipes. Small leaks are occurring regularly in these buildings.

Liftstation #5 is the main liftstation for the City. All but one of the other liftstations in the city pump sewage to Liftstation #5 and from there it is pumped to Fiddler's Lake Lagoon. With nine liftstations pumping to Liftstation #5 it is very important that it function at peak operating performance. Shutdowns for unplanned repairs are not viable. Overflow sewage goes into Kam Lake. There are not enough trucks in the City to haul the sewage to the lagoon, should a break occur.

The pipe at Liftstation #5 has deteriorated over time to the point that it is now 40% of its original thickness. Average thickness at elbow bends is 50% of original thickness and most straight run pipes are 60% to 65% of original thickness (AD Williams Engineering, November 2004). Leaks require repair approximately every two months. Should pipe replacement not be completed, it is inevitable that a main pipe break will occur resulting in the City being unable to remove sewage.

This works toward City Council's Goals #1[1] and 2[2].

O&M IMPACT The welded pipe will be replaced with Victaulic style connectors. Replacement pipe will be coated with epoxy paint to prolong the life cycle replacement. Future repairs may be done by City crews at significant cost savings.

[1] Building a sustainable future
[2] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Submarine Line Inspection

COST 2014 $30,000
2016 $30,000

STATUS New

DESCRIPTION The City obtains all of its potable water from the Yellowknife River. Pumphouse #2, located at the Yellowknife River just upstream of the bridge, delivers water via a 400-mm welded steel submarine pipeline below Yellowknife Bay to Pumphouse #1 which is the water distribution centre for the City.

The existing submarine pipeline was installed in 1968 and it is now 45 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.

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. The study recommended that, in order to maintain the design service life of the pipeline, the current rate of weld corrosion had to be arrested as soon as possible.

One of the options of arresting the corrosion recommended by the study was to recoat the internal surface of the pipeline. This option involves a three-step pigging process. First, the pipe is cleaned with solvent and acid runs. Next, the internal surface is chemically dried and conditioned. The last step is to coat the internal surface of the pipeline. To prepare for the internal coating project (i.e., to investigate the pipe conditions and to assess the urgency of the project), a submarine pipeline inspection will be carried out before the project. The coating process may be physically impossible to perform. The Giant Mine branch of the submarine pipeline was decommissioned in March of 2006.

It is worth noting that within five to ten years it will be time to replace the submarine line. At that time the pipeline will be approximately 50 years old and should be replaced. Extending the life of a 50-year old pipeline by five to eight years at a cost of $800,000 is not considered cost-effective. It would be prudent to plan for the replacement of the pipeline. Other avenues would be better explored at this time, and $30,000 has been budgeted to conduct the biannual inspection and a more in-depth analysis of the existing pipeline.

This project may be affected by the City's water treatment plant study. The study will determine the long-term plan for the City's water supply and treatment, as well as whether Yellowknife Bay water is to be used as the new water source and whether the submarine pipeline will still be required in the future.

This project works toward Council's Goals #1[1] and #2[2].

O&M IMPACT There is no direct impact on O&M but these inspections will help determine the structural integrity of the aging pipeline. Funding is currently being set aside for the replacement of this pipeline in 2020.

[1] Building a sustainable future
[2] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER (PUMPHOUSES & LIFTSTATIONS)

PROJECT Pumphouse and Liftstation GenSet Installation (Backup Power)

COST

2014	$175,000	LS #9 Generator Replacement
2015	$175,000	LS #8 Generator Replacement
2016	$250,000	PH #4 Generator Replacement

PHASE Final

DESCRIPTION The age of our infrastructure is such that the City of Yellowknife will have to rebuild a pumphouse or liftstation genset regularly to avoid catastrophic failure. Genset provides backup power in case of power failure.

Backup power at pumphouses is required in order to ensure a continuous supply of water to the city.

In the original design for liftstations, backup power was not required because wells could receive sewage for hours and not overflow. With the growth of the City in recent years, however, any power outage lasting longer than 15 minutes at a high-flow time of day creates the risk of a liftstation overflow. An overflow would result in sewage flowing into the nearest lake, causing an environmental hazard.

This project works toward Council's Goal #2[1].

O&M IMPACT Fewer sewage spills due to power outages, and greater public confidence in the water and sewer system.

[1] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Fire Hydrant Repair/Upgrading

COST

2014	$30,000
2015	$30,000
2016	$30,000

STATUS Ongoing

DESCRIPTION The City maintains 330 fire hydrants. The hydrants are used in emergency situations to fight fires, but are also a source of water in the event sections of water piping become damaged. The underground pipe can be shut off and the system connected above ground, one hydrant to the next to maintain circulation on the system and prevent freezing.

The Department of Municipal and Community Affairs standard for community works states that each hydrant should be inspected and rebuilt every six years. Each year, Public Works & Engineering inspects all fire hydrants in the city during the annual water main flushing program. At this time, a list of defective or damaged hydrants is established and maintenance is facilitated accordingly. There are approximately 55 hydrants that will be repaired or upgraded annually. By maintaining the standard, the City protects residents and itself from fires, mishaps and lawsuits arising from non-functioning hydrants.

Maintenance work includes removing the hydrant, dismantling, and inspecting it, then replacing worn or non-functional parts. Upgrades are also performed on the hydrants to make them more reliable in winter operation. In vaults that are susceptible to flooding, plugs are installed to stop water from entering through a drain hole. This water would freeze and render the hydrant inoperative. Metal bearings are replaced with Teflon busing to give the hydrant a “thermal break”, which helps to prevent the transfer of cold from air to water and cause freezing of otherwise moving parts.

A new hydrant vault will increase ease of future maintenance and eliminate service disruption due to high maintenance requirements.

This project works toward meeting City Council’s Goals #1[1] and #2[2].

O&M IMPACT Emergency repairs proceed more smoothly because valves and hydrants work properly. There are fewer emergency calls because of faulty hydrants. Should there be a fire, all persons on the Water and Sewer crew have the ability to repair a hydrant in an emergency.

[1] Building a sustainable future
[2] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER AND SEWER

PROJECT Lagoon Control Structure Replacement

COST $150,000

STATUS New

DESCRIPTION Since 2009, leaks have been occurring through the control structure at Fiddler's Lake Sewage Lagoon. The structure consists of stop logs and valves which are used during decant to allow effluent to flow from the lagoon into the wetland environment in a controlled manner. Each fall, once decant is completed, the valves are closed and stop logs are put back into place. However, even with yearly changes to the method for installing the stop logs, leaks have been occurring during the summer.

Any sewage spills must be reported to the NWT Spill Line as well as the Mackenzie Valley Land and Water Board, as per the City's water licence. Due to the recurrence of the leaks at the control structure, the City has been informed by the water licence inspector that a permanent solution must be determined to eliminate the leaks by the end of 2014.

The new control structure is planned to consist of a metal sheet with valves located at various levels for decanting. This structure will allow for a more controlled release of effluent and will be easier to keep water tight to protect against leaks.

This project works toward Council's Goal #2[1].

O&M IMPACT The City's Spill Contingency Plan, as approved under the City's water licence, requires samples to be taken from two water licence sampling stations downstream of the lagoon any time there is a leak at the control structure. Sampling continues weekly for four weeks, then biweekly until decant. If a leak occurs in May, an additional 14 sampling events must occur. This greatly increases sampling costs, as the sites are only accessible by helicopter. Changing the lagoon control structure will eliminate these leaks, thus reducing the sampling costs.

The new control structure will also reduce the amount of time workers spend removing and installing stop logs during decant, as the new control structure will not need to be rebuilt each fall.

[1] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER AND SEWER

PROJECT Rebuilding of Trappers Lake Flow Control Structures

COST $150,000

STATUS New

DESCRIPTION The Fiddler's Lake Sewage Lagoon System was built in 1980. As part of the system, the drainage pathways for Trapper's Lake were altered to divert them from the sewage lagoon area. This ensured water from Trapper's Lake was not flowing into the lagoon which would increase the volume of effluent entering the lagoon and affect its capacity.

In order to divert the flow from Trapper's Lake, a series of earthen dykes and dams were built in low-lying areas along the shoreline. A concrete and earth control structure was built in the location chosen for flow from the lake into the designated drainage area. As part of the City's water licence, these dams, dykes and control structure must be inspected every four years. During the last inspection, it was noted that these structures are no longer performing as intended and require rebuilding.

Rebuilding of the dams, dykes and control structure will stop the flow from Trapper's Lake to Fiddler's Lake Sewage Lagoon, which will help to reduce the total amount of runoff entering the lagoon system.

This project works toward Council's Goal #2[1].

O&M IMPACT This project has a negligible effect on O&M.

[1] Stewards of our natural and built environment

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Water Licence Study and Report Requirements

COST $60,000

STATUS Ongoing

DESCRIPTION In May 2010, the City received a renewal for its water licence. The duration of the new water licence is 12 years, beginning May 31, 2010 and ending May 30, 2022.

The new licence requires the City to perform studies, create management plans and compile reports for the Fiddler's Lake Sewage Lagoon and the Solid Waste Facility. These items have been submitted intermittently since 2011, with the remaining requirements to be submitted in 2014.

The project still to be completed at the Solid Waste Facility is an investigation into background metal concentrations in the area surrounding the landfill.

The projects still to be completed for the Fiddler's Lagoon include a Lagoon Treatment System Management Plan, comparison of effluent quality and lagoon performance with the CCME Canada-wide Strategy for the Management of Municipal Wastewater Effluent, and evaluations of three site-specific parameters.

In order to maintain compliance with the terms of the current water licence these studies, reports and management plans must be undertaken and submitted within the given timeframes.

This works toward Council's Goal #2[1].

O&M IMPACT No impact to O&M, the majority of this work will be done on a consultant basis.

[1] Stewards of our natural and built environment.

DEPARTMENT PUBLIC WORKS & ENGINEERING

DIVISION WATER & SEWER

PROJECT Water & Sewer Infrastructure Replacement
Accelerated Corrugated Metal Pipe (CMP) Replacement

Program

COST 2014: $5,710,000
2015: $2,820,000
2016: $4,610,000

STATUS Replacement

PHASE Program initiated in 1984 and is ongoing

DESCRIPTION The water and sewer capital projects are part of ongoing replacement of the deteriorated water and sewer mains, and upgrading of residential water and sewer services.

Background - The Development of the City's Water & Sewer Infrastructure

The majority of Yellowknife is on piped water and sewer service with the exception of Old Town, Latham Island, Kam Lake Industrial Park, commercial buildings at the Airport, and some commercial buildings along Old Airport Road.

In the late 1940s, the City began providing piped water and sewer services in the present downtown area. Pumphouse #1 was constructed during this time to draw water from Great Slave Lake and distribute water to the downtown residents of Yellowknife.

Expansion of the City through the 1950s and 1960s was predominantly in the downtown area later referred to as the Central Business District (CBD). By the late 1960s, the expansion had reached the area of 50A Avenue and 57 Street.

The City continued to obtain its water directly from Great Slave Lake until runoff and windblown arsenic resulted in high arsenic levels in the water and lake bottom sediments. In 1969, a new water intake line was constructed from the mouth of the Yellowknife River to Pumphouse #1. The submarine line is still in use and is a good example of Yellowknife's aging infrastructure requiring major work in the future. The estimated cost of replacing the water intake line is about $11 million.

There was considerable expansion during the 1970s. The early 1970s saw the development of Matonabee/ Gitzel streets and construction along Forrest Drive. Pumphouse #3 was constructed in 1970 to serve the new areas of the City. In 1976, development began in Frame Lake South in the area of Bromley Drive and Williams Avenue. To supply water to this area, Pumphouse #4 was constructed in 1978 to serve Frame Lake South and Range Lake North areas. Pumphouse #4 has a capacity of servicing 10,000 people, and currently serves about two-thirds of that capacity.

In the 1980s, expansion of the City was generally in Frame Lake South. In the 1990s, expansion of the City was generally in Range Lake North. Pumphouse #5, the recirculation pumphouse, was built in 1989 and serves as a recirculation station which simply keeps the water moving in the Range Lake area to avoid freezing.

Expansion in 2005 to 2022 for residential development is envisioned to be in Niven Lake and Tin Can Hill.

Water and Sewer Replacement Program

Water and sewer mains and services in the downtown core of the City had been installed in the 1940s and 1950s. By 1977, the sewer mains had degraded to a point of failing entire sections of the City's piped system. This jeopardized the provision of reliable and

safe water and sewer services for a significant part of the city.

Corrugated metal pipe (CMP) sanitary sewers were first installed in Yellowknife in the 1940s and continued to be used until 1977. After 1977, ductile iron pipe became widely available as a viable and cost-effective alternative. CMP was considered feasible at the time due to its ability to withstand deformations resulting from permafrost deformation or freeze thaw ground movements, its low economic cost, and its ability to withstand the necessary freighting from Edmonton to Yellowknife. However, infrastructure replacement programs have revealed that CMP used in the 1940s is badly corroded and in some cases, is no longer intact for the bottom half of the pipe. Sewers without bottoms will sometimes collapse, resulting in the blocking of the pipe, and causing sewage to back up into the homes of residents. In some cases sewage is traveling into the surrounding environment which results in high groundwater infiltration and gravel/soil accumulation in sewers which in turn taxes the City's remaining infrastructure.

Cast iron water mains were installed at the same time as the CMP sanitary sewers from the 1940s to the early 1970s. These cast iron water mains are un-insulated and as a result, substantial thaw settlement of areas with permafrost has occurred. This results in pulling apart at the joints and sudden failure of the mains in some locations. The un-insulated mains necessitated substantial heating of the water to prevent freezing of the water mains. Finally, the water mains originally installed were not large enough, in many cases, to provide current levels of fire protection.

The useful life of the CMP sewers, installed during the 1940s through the 1970s, has been found to be about 25 - 30 years. In 1984, a program was initiated by the City to replace all of its deteriorated water and/or sewer piping in the downtown core - referred to as the Central Business District (CBD). As this was far beyond the City's financial capabilities, the GNWT funded a significant portion of the replacement costs annually. Since 1984, the City, along with GNWT cost sharing, has spent nearly $23 million and an estimated $7 million is required to complete the CBD area for piping infrastructure. A substantial amount of CMP sewer and cast iron water mains lies outside of the CBD and also needs to be replaced.

With the ongoing replacement programs continuing today, the City changed the standard to more modern materials such that the water mains are now insulated ductile iron pipe and the sewer mains are ductile iron. With the newer materials and standard installation construction practices, the life expectancy of water and sewer pipes can be as much as 50 years. While 50 years is expected, the actual life of a particular pipe will vary depending on the area of town that the water and sewer infrastructure is located. In Yellowknife, we have three different areas of rock, granular native material, and frost susceptible soils. A note of caution in assuming life expectancy - some areas of the City have inferior ground conditions (frost susceptible soils) which will result in lower life expectancies.

Typically, the driving force for the replacement of the water and sewer mains has been the perforated corrugated metal pipe sewer lines which have collapsed. The replacement program consisted of not only replacing the sewer pipes but, while the trenches are open, upgrading the water mains and services to current standards and levels of installation.

Included in the annual Water & Sewer Upgrading Programs are the following:

- Replacement of existing corrugated metal pipe sewer mains with ductile iron pipe.
- Concrete sewer manholes.
- Replacement of existing cast iron water mains with appropriately sized insulated ductile iron pipe.
- Replacement of single heat traced copper service lines with a dual, insulated copper re-circulating system.
- Replacement of in-line hydrants and valves with hydrants and valves located in insulated, poured-in-place concrete vaults with manhole access.
- Road stabilization and reconstruction with crushed rock backfill.
- Completion of the project with concrete sidewalks and a paved roadway.

As part of its water/sewer infrastructure replacement program, the City also replaces single line water services (both the heat trace type and Aquaflow). We suspect that a significant number of these are inoperative leading to freeze-ups during the winter. Generally, when single line services fail, a bleeder is installed to avoid freezing. Bleeders work by continually running water so it doesn't freeze. The water coming out from the bleeders is wasted, and is a burden to the City's infrastructure. The bleeders and single line water services will be replaced with dual line insulated copper re-circulating system. Sewer services will be repaired / replaced based on their condition assessed by a camera inspection and/or field determination.

In 2012, City Council approved a plan that would accelerate the replacement of all CMP remaining in the City. The acceleration of this program means increased funding to replace the CMP as quickly as possible to avoid emergency repairs in cold winter months which can be very costly and a public safety concern.

2014 Water and Sewer Replacement Projects

Lanky Court
In September 2010, Public Works crews had to respond to an emergency collapse of a section of sanitary sewer main on Lanky Court. After further investigation it was discovered that this section of pipe was repaired but the remaining pipe in the cul-de-sac is in poor condition. A video inspection of the sewer main in 2013 indicated failure of the pipe is imminent.

In addition to replacement of the sewer main, there are also several private potable water services that will need replacement. This project will also be able to upgrade these lines and install proper freeze protection.

Replacement of asphalt and concrete for this area will be done immediately following the water and sewer replacement.

Franklin Avenue (from Old Airport Road to just past Norseman Drive)
This section of CMP is vital in that it carries a large volume to the City's main Liftstation #5, which is located in the City yard on Taylor Road. This project will dramatically reduce traffic flow in this corridor. It will also require the replacement of asphalt and concrete immediately following the water and sewer replacement, as this road is a main artery.

Liftstation #5/Public Works Garage/Fire Hall
In conjunction with work going on in Northlands Trailer Park, two new water vaults will be installed by the Fire Hall and Public Works Garage in order to tie in new infrastructure and decommission existing infrastructure that has been replaced.

Bromley Drive and Bromley Court Paving (from 2013 CMP replacement)
This street was excavated as part of the scope of work for the 2013 CMP replacement program. It is scheduled to be resurfaced with asphalt and concrete in 2014.

Knutsen Court Paving (from 2013 CMP replacement)
This street was excavated as part of the scope of work for the 2013 CMP replacement program. It is scheduled to be resurfaced with asphalt and concrete in 2014.

Reservoir Road Paving (from 2008 CMP replacement)
This street was excavated during the 2008 CMP replacement program. It is scheduled to be resurfaced with asphalt in 2014.

2015 Water and Sewer Projects

Con Road (Rycon Drive to 54 Street)
This is an older section of CMP that is scheduled to be replaced. The Rycon Drive loop was replaced in 2004. This section of Con Road should replace the remaining CMP in the area. With the planned redevelopment of the Shaganappy/Ptarmigan area, this CMP replacement should coincide with this work and will provide local residents a great finished product.

Forrest Drive (between 51A Avenue and Burwash Drive)
This section of CMP was not scheduled to be replaced until near the end of the CMP program. It was thought to be in relatively good shape compared to the remaining sections. However, in the summer of 2012, there was a major failure of this pipe and the City had to perform an emergency repair to keep the infrastructure intact. It became evident that this pipe has deteriorated rapidly and needs replacement.

Replacement of asphalt and concrete will be done immediately following the water and sewer replacement.

54th Avenue
Due to unstable ground conditions in this area, there has been major movement of the road surface. With this movement, the underground infrastructure in this area has shifted and will require regrading/replacement.

2016 Water and Sewer Replacement Projects

Horton Crescent
Frost susceptible ground conditions have caused the sanitary sewer mains to heave which has resulted in sever sewer back-ups resulting from the residential services becoming disconnected from the sewer mains. The sewer main has sagged and holds large amounts of standing sewage which in turn creates problems during the winter months when the sewage freezes.

Williams Avenue
This street is one of the last streets to have the sewer mains upgraded from CMP to ductile iron. The remaining section runs from Range Lake Road to approximately 70m past Bigelow Crescent and services a number of multi-family units.

Con Road Paving (from 2015 CMP replacement)
This street was excavated as part of the scope of work for the 2015 CMP replacement program. It is scheduled to be resurfaced with asphalt and concrete in 2016.

54th Avenue Paving (from 2015 CMP replacement)
This street was excavated as part of the scope of work for the 2015 CMP replacement program. It is scheduled to be resurfaced with asphalt and concrete in 2016.

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

Remaining CMP Inventory

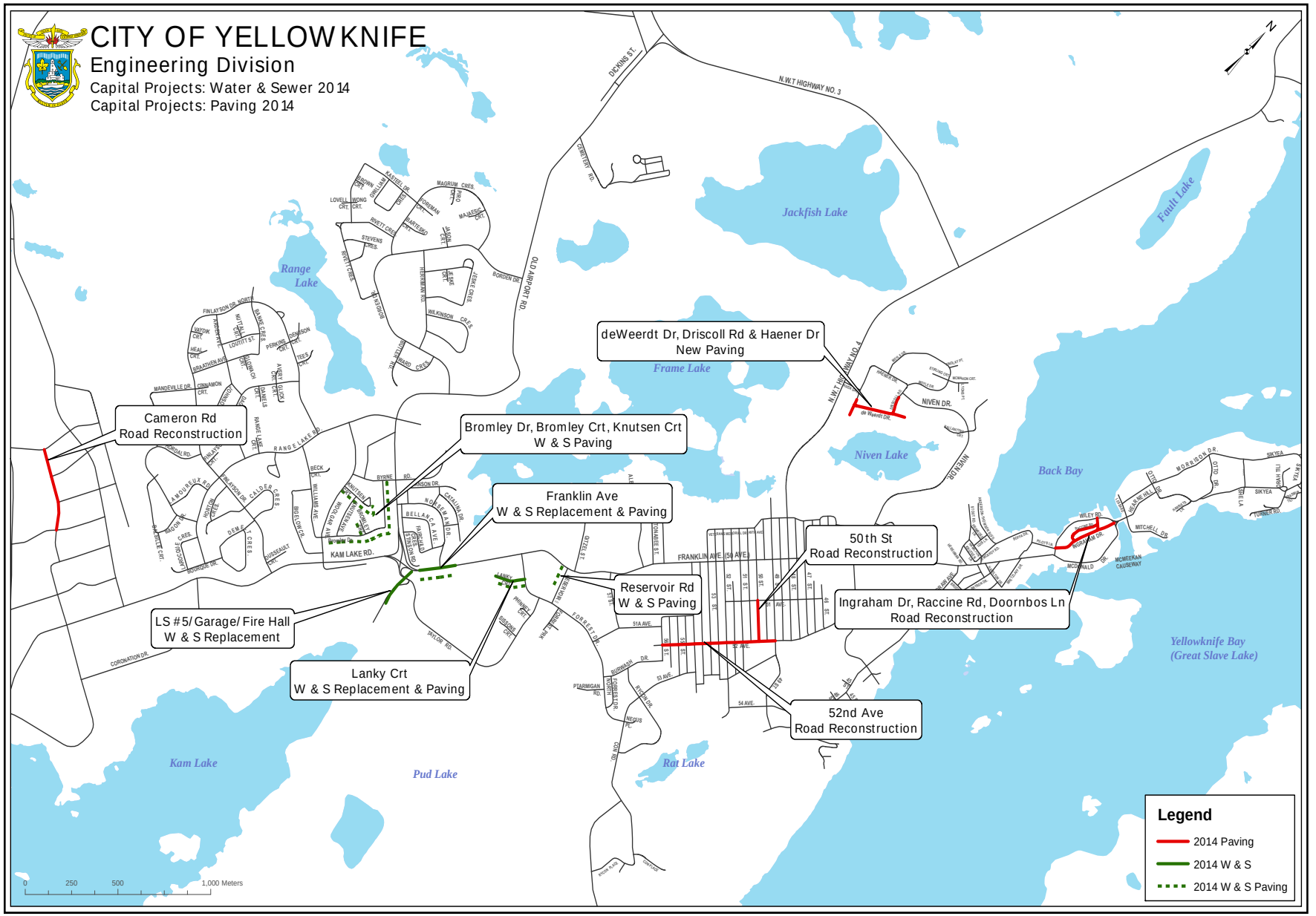
Street	Replacement	CMP Estimate	Paving Estimate
Lanky Court	2014	$950,000	$400,000
Franklin Avenue	2014	$1,300,000	$1,300,000
LS#5/Garage/ Fire Hall	2014	$400,000	-
Bromley Drive	2013/2014	-	$900,000
Knutsen Court	2013/2014	-	$400,000
Reservoir Road	2014	-	$60,000
Forrest Drive	2015	$650,000	$500,000
Con Road	2015/2016	$1,070,000	$710,000
54th Avenue	2015/2016	$600,000	$400,000
Horton Crescent	2016/2017	$1,750,000	$750,000
Williams Avenue	2016/2017	$1,750,000	$600,000
TOTAL		**$8,025,000**	**$5,715,000**

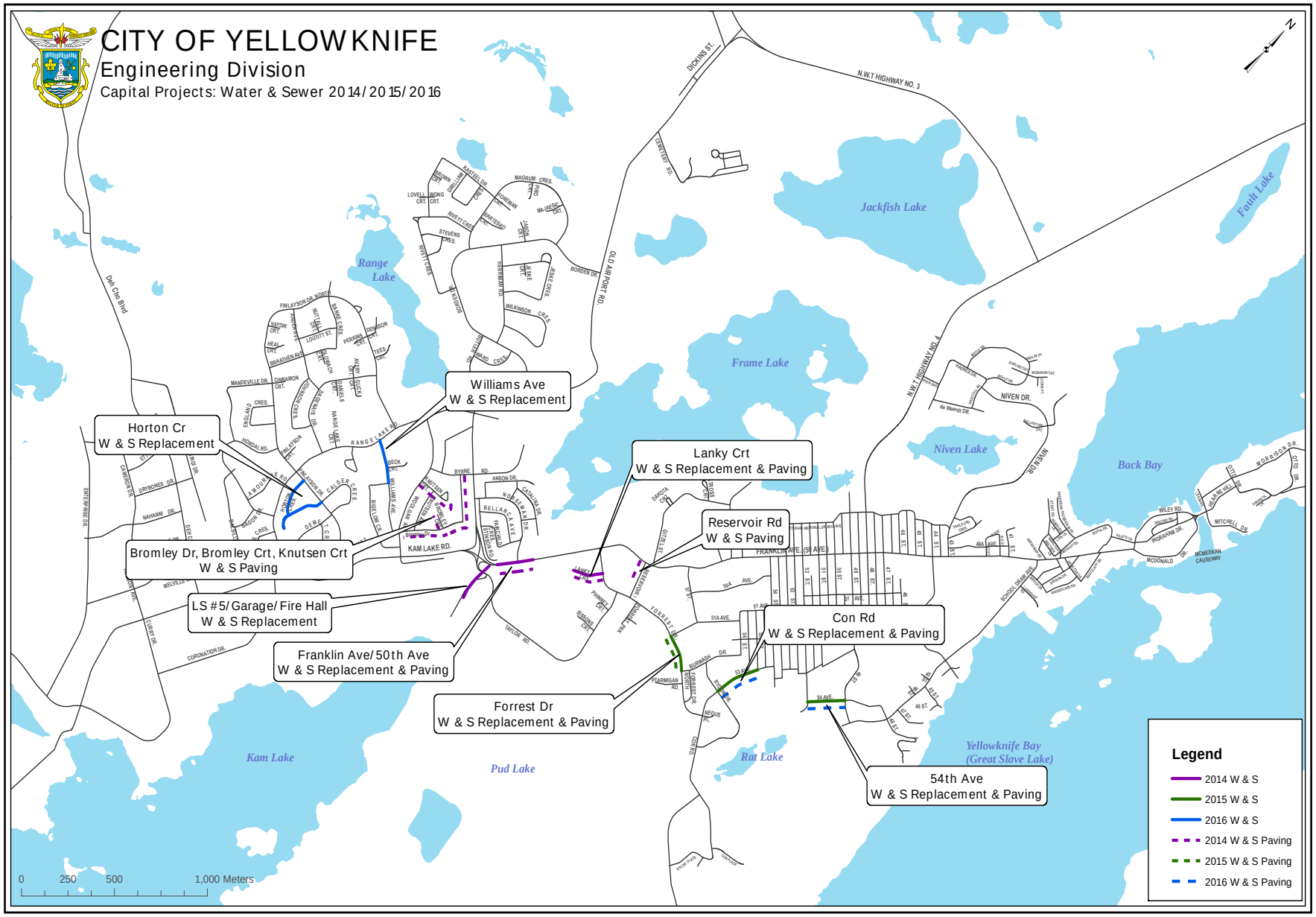
This project works toward Council's Objectives #1(b)[1] and #2(c)[2].

O&M IMPACT Upgrading of aging, shifting and problematic infrastructure reduces the amount of time spent repairing mains and services and allows for maintenance activities to occur with fewer difficulties. These upgrades also eliminate bleeders, reducing the amount of water wastage in the City.

[1] Continue to have a sustainable and practical approach to infrastructure deficit reduction

[2] Develop smart and sustainable approaches to energy, water and sewer, waste management and building systems


CITY OF YELLOWKNIFE
Engineering Division
Capital Projects: Water & Sewer 2014
Capital Projects: Paving 2014
Cameron Rd
Road Reconstruction
deWeerdt Dr, Driscoll Rd & Haener Dr
New Paving
Bromley Dr, Bromley Crt, Knutsen Crt
W & S Paving
Franklin Ave
W & S Replacement & Paving
50th St
Road Reconstruction
Reservoir Rd
W & S Paving
Ingraham Dr, Raccine Rd, Doornbos Ln
Road Reconstruction
LS #5/ Garage/ Fire Hall
W & S Replacement
Lanky Crt
W & S Replacement & Paving
52nd Ave
Road Reconstruction
Jackfish Lake
Range Lake
Frame Lake
Niven Lake
Back Bay
Fault Lake
Kam Lake
Pud Lake
Rat Lake
Yellowknife Bay
(Great Slave Lake)
Legend
2014 Paving
2014 W & S
2014 W & S Paving
0
250
500
1,000 Meters


CITY OF YELLOWKNIFE
Engineering Division
Capital Projects: Water & Sewer 2014/2015/2016
Williams Ave
W & S Replacement
Horton Cr
W & S Replacement
Lanky Crt
W & S Replacement & Paving
Reservoir Rd
W & S Paving
Bromley Dr, Bromley Crt, Knutsen Crt
W & S Paving
LS #5/ Garage/ Fire Hall
W & S Replacement
Con Rd
W & S Replacement & Paving
Franklin Ave/ 50th Ave
W & S Replacement & Paving
Forrest Dr
W & S Replacement & Paving
54th Ave
W & S Replacement & Paving
Jackfish Lake
Frame Lake
Range Lake
Niven Lake
Back Bay
Fault Lake
Kam Lake
Pud Lake
Rat Lake
Yellowknife Bay
(Great Slave Lake)
N.W.T. HIGHWAY NO. 3
OLD AIRPORT RD.
KAM LAKE RD.
FRANKLIN AVE. (50 AVE.)
0 250 500 1,000 Meters
Legend
2014 W & S
2015 W & S
2016 W & S
2014 W & S Paving
2015 W & S Paving
2016 W & S Paving