Capital Projects	2019 Actuals ($000's)	2019 CarryForward ($000's)	2020 Budget ($000's)	2020 Forecast ($000's)	2021 Budget ($000's)	2022 Budget ($000's)	2023 Budget ($000's)	Note
50 St Revitalization/DT Multi-Purpose Building Study	-	75	-	-	**-**	-	-	
Accessibility Audit/Implementation	109	487	584	1,071	**581**	567	595	
Aquatic Centre	27	1,723	4,805	400	**-**	15,997	15,312	
Arbour Development Study	-	-	-	-	**50**	-	-	
Art & Culture Master Plan	-	-	-	-	**75**	-	-	
Asset Management	-	-	409	50	**-**	280	475	
Backup Power Liftstation Generator Installation	17	423	100	400	**-**	-	-	
Bailing Facility- Mechanical Upgrades	2	42	-	42	**-**	-	-	
Ban Commercial Cardboard	-	25	-	25	**-**	-	-	
Bike Park	15	-	-	-	**-**	-	-	
Bristol Freighter Repainting	-	55	-	102	**-**	-	-	
Budget Management	-	25	-	25	**-**	-	-	
Bunker Gear	12	-	-	-	**-**	-	-	
Capital Area Development Plan	-	-	-	-	**-**	60	-	
Centralized Composting Program	2	-	-	-	**-**	-	-	
CEP City Hall Boiler Design	20	361	-	361	**-**	-	-	
CEP Community Outreach	8	32	-	32	**-**	-	-	
CEP Interior LED Lighting	4	354	-	354	**-**	-	-	
CEP Transportation Initiatives	(3)	-	-	-	**-**	-	-	
CEP Waste Strategic Plan	-	50	-	50	**-**	-	-	
City Hall Upgrades	1	357	367	724	**-**	-	-	
Class Replacement	51	57	-	57	**-**	-	-	
Client Hardware Renewals	126	-	-	-	**-**	-	-	
CMP/W&S Federal Funded	490	10	-	105	**-**	-	-	
CMP/W&S Federal Funded - PAVING	791	-	-	7	**-**	-	-	
Columbarium Park	-	-	100	100	**150**	-	-	
Community Arena Ammonia Safety	-	-	-	-	**210**	-	-	
Community Energy Plan Projects	156	152	-	152	**120**	2,620	120	
CS Land Fund Capital Projects	43	2,027	-	144	**-**	-	-	
Curling Club Upgrades	-	-	36	22	**-**	-	-	
Data Storage Infrastructure	-	-	-	-	**-**	-	175	
Design and Construction Standards	5	70	-	70	**-**	-	-	
Dispatch Console	-	130	-	169	**-**	-	-	
Drainage Improvements	40	-	-	-	**-**	-	-	
Electronic Tendering	-	-	-	7	**-**	-	-	
Email Management	-		90	90	**-**	-	-	
Emergency Equipments & Vehicles (Class 8)	443	-	-	-	**-**	-	-	
Emergency Radio Infrastructure Renewal	-	-	-	-	**90**	-	-	
FDM Software	-	34	65	98	**-**	-	-	
Fire Hall Emergency Generator	7	180	120	-	**-**	-	-	
Fire Hall Improvement/Study	-	65	-	50	**-**	-	-	

CAPITAL FUND - 2021 Capital Projects

Capital Projects	2019 Actuals ($000's)	2019 CarryForward ($000's)	2020 Budget ($000's)	2020 Forecast ($000's)	2021 Budget ($000's)	2022 Budget ($000's)	2023 Budget ($000's)	Note
Firehall Emergency Response Equipment	-	-	-	-	**69**	-	-	
Firehall Minor Renovations	-	-	-	-	**251**	-	-	
Fleet Management	-	917	1,326	2,243	**1,353**	1,278	1,134	
Folk on the Rocks Rehabilitation	100	-	-	125	**-**	-	-	
General Plan Review	134	-	-	1	**-**	-	-	
GIS Enhancements	19	-	-	-	**-**	-	-	
Heavy Duty Vehicles (Class 4)	514	-	-	-	**-**	-	-	
Heavy Equipment (Class 5)	379	-	-	-	**-**	-	-	
Hydraulic Rescue Tools	-	-	-	-	**-**	60	-	
Implementation of 50/50 Recommendations	-	25	-	-	**-**	-	-	
Information Technology Infrastructure Renewal	-	94	337	337	**337**	367	367	
Intersections Widening & New Traffic Lights	65	30	-	30	**-**	-	-	
Lagoon Control Structure Replacement	18	32	250	50	**550**	-	-	
Lagoon Sludge Removal	31	469	-	30	**1,800**	2,800	2,800	
Land Fund Capital Projects	-	-	-	-	**210**	2,000	2,000	
Landfill Fire Control & Risk Reduction Plan	-	25	-	25	**-**	-	-	
Library Upgrades	-	-	94	116	**-**	80	-	
Light Duty Vehicles (Class 2)	34	-	-	-	**-**	-	-	
McMeekan Causeway Abutment Stabilization	25	425	-	375	**-**	-	-	
Medium Duty Fleet (Class 3)	45	-	-	-	**-**	-	-	
Monitoring Well Installation	29	75	-	75	**-**	-	-	
Multiplex Ice Plant Ammonia Safety	-	-	-	-	**170**	-	-	
Multiplex Ice Plant Maintenance/Upgrade	-	-	595	595	**-**	-	-	
Multiplex Upgrade	131	-	-	-	**-**	-	-	
Municipal Enforcement Vehicles (Class 7)	66	-	-	-	**-**	-	-	
Network Infrastructure	46	-	-	2	**-**	-	-	
New Landfill Cell Design	-	-	-	-	**350**	-	4,500	
New Landfill/ Landfill Expansion	-	45	-	45	**-**	-	-	
Park Development	-	-	139	139	**-**	90	-	
Park Equipment Replacement	-	-	-	-	**-**	135	115	
Parking Structure Feasibility Study	-	-	75	75	**-**	-	-	
Paving & Foundation Repairs	70	-	-	5	**-**	-	-	
Paving Program	3,584	-	3,680	2,800	**2,500**	3,000	3,500	
Permitting System Evaluation/Replacement	-	-	-	-	**125**	125	-	
PH#4 Water Truckfill Safety Project	-	-	-	-	**350**	-	-	
Phone System	-	360	-	360	**-**	-	-	
PHs- New Piping	193	-	-	-	**-**	-	-	
Playground Upgrades -Olexin and Forrest Drive	-	-	-	-	**115**	-	-	
Potable Water Reservoir Repairs	-	871	-	-	**-**	-	-	
Preventative Maint. for Multi-Facility Generator	85	-	-	-	**-**	-	-	
Printers & Multifunction Devices	44	-	-	-	**-**	-	-	
Propane-Fueled Fire Trainer	98	-	-	-	**-**	-	-	

Capital Projects	2019 Actuals ($000's)	2019 CarryForward ($000's)	2020 Budget ($000's)	2020 Forecast ($000's)	2021 Budget ($000's)	2022 Budget ($000's)	2023 Budget ($000's)	Note
Public Transit Review	33	17	-	62	-	-	-	
Public Work Garage Upgrade	41	-	-	-	-	-	-	
Pump Replacement Program	39	79	100	134	-	-	-	
Pumphouse & Liftstation Upgrades	34	50	-	50	-	-	-	
Pumphouse 1 Infrastructure Upgrades	22	-	-	-	-	-	-	
Range Lake Area Development Plan	-	-	-	-	-	60	-	
Recycling Vehicles & Scrap Steel	-	-	-	5	-	-	-	
Revitalization Strategy for Downtown	74	-	-	-	-	-	-	
RIMP Building Structural Assessment	-	-	-	-	-	75	-	
Rotary Range Lake Trail	-	-	-	-	-	210	-	
SCADA Upgrades (Federal)	168	150	-	150	-	-	-	
SCBA Compressor and Fill Station	-	-	-	-	-	80	-	
School Draw Parking Lot Improvement	14	-	-	-	-	-	-	
Secondary Site & Data Replication	-	10	-	10	-	-	-	
Self-Contained Breathing Apparatus- Heads Up Display	-	225	225	350	-	-	-	
Server & Storage Infrastructure	25	-	-	-	-	-	-	
Sewage Force Main Twinning/ Repairs and Retention	32	218	250	300	**150**	750	-	
Site Restoration	3	196	-	196	-	-	-	
Solid Waste Facility Upgrades	-	200	-	200	-	-	-	
Stanton Equipment Relocation	150	-	-	-	-	-	-	
Submarine Water Supply Line Replacement	57	-	1,000	100	**1,000**	1,000	1,000	
Sustainability Coordinator	87	-	120	120	-	-	-	
SWMP Implementation	4	96	-	96	-	-	-	
Tommy Forrest Ball Park Upgrades	45	-	200	200	-	-	-	
Traffic Light Upgrades	53	27	90	117	**70**	70	70	
Trail Enhancement & Connectivity	6	-	-	-	-	-	-	
Transfer Station & Cell Access Improvement	-	110	-	110	-	-	-	
Transit Upgrades (Federal)	68	-	-	-	-	-	-	
Twin Pine Hill Trail Development	20	-	-	-	-	-	-	
Voice Radio Support Equipment	12	-	-	-	-	-	-	
Water & Sewer Infrastructure Replacement	1,911	750	3,650	3,400	**4,750**	4,500	3,975	
Water & Sewer Piped Services Expansion Study	56	14	-	14	-	-	-	
Water & Sewer Replacement - PAVING	10	-	-	-	-	-	-	
Webcasting	-	-	185	185	-	-	-	
Weigh Out Station At SWF	104	196	-	196	-	-	-	
Wildland Fire Mitigation Emergency Measures	6	86	-	86	-	-	-	
Wiley Road Improvement (Smart Growth/Harbour Plan)	13	-	-	-	-	-	-	
Wireless Infrastructure	-	-	-	-	**75**	-	-	
YKCA Upgrades	-	-	20	8	-	-	-	
Total Capital Projects	11,163	12,526	19,012	18,224	**15,501**	36,204	36,138	

CAPITAL FUND - 2021 Capital Projects

Capital Projects	2021 Budget ($000's)	Formula Funding ($000's)	Gas Tax Rebate ($000's)	Other Grants ($000's)	Community Public Infrastructure ($000's)	IT Reserve ($000's)	Mobile Equipment Replacement Reserve ($000's)	User Fees ($000's)	Land Fund ($000's)
Accessibility Implementation	**581**	-	-	-	(581)	-	-	-	-
Arbour Development Study	**50**	(50)	-	-	-	-	-	-	-
Art & Culture Master Plan	**75**	(75)	-	-	-	-	-	-	-
Columbarium	**150**	(150)	-	-	-	-	-	-	-
Community Arena Ammonia Safety	**210**	(210)	-	-	-	-	-	-	-
Community Energy Plan Projects	**120**	(120)	-	-	-	-	-	-	-
Emergency Radio Infrastructure Renewal	**90**	-	-	-	-	(90)	-	-	-
Firehall Emergency Response Equipment	**69**	(69)	-	-	-	-	-	-	-
Firehall Minor Renovations	**251**	(251)	-	-	-	-	-	-	-
Fleet Management	**1,353**	-	-	-	-	-	(1,353)	-	-
Information Technology Infrastructure Renewal	**337**	-	-	-	-	(337)	-	-	-
Lagoon Control Structure Replacement	**550**	-	-	-	-	-	-	(550)	-
Lagoon Sludge Removal	**1,800**	-	-	(1,350)	-	-	-	(450)	-
Land Fund Capital Projects	**210**	-	-	-	-	-	-	-	(210)
Multiplex Ice Plant Ammonia Safety	**170**	(90)	-	(80)	-	-	-	-	-
New Landfill Cell Design	**350**	-	(350)	-	-	-	-	-	-
Paving Program	**2,500**	-	(2,500)	-	-	-	-	-	-
Permitting System Evaluation/Replacement	**125**	-	-	-	-	(125)	-	-	-
PH#4 Water Truckfill Safety Project	**350**	-	-	-	-	-	-	(350)	-
Playground Upgrades -Olexin and Forrest Drive	**115**	(115)	-	-	-	-	-	-	-
Sewage Force Main Repairs and Retentions	**150**	-	-	-	-	-	-	(150)	-
Submarine Water Supply Line Replacement	**1,000**	-	-	(750)	-	-	-	(250)	-
Traffic Light Upgrades	**70**	-	-	-	(70)	-	-	-	-
Water & Sewer Infrastructure Replacement	**4,750**	-	(3,501)	-	(1,249)	-	-	-	-
Wireless Infrastructure	**75**	-	-	-	-	(75)	-	-	-
Total Capital Projects	**15,501**	(1,130)	(6,351)	(2,180)	(1,900)	(627)	(1,353)	(1,750)	(210)

Department CS Community Services **Division** Parks & Trails

Project 50036570 Accessibility Implementation

Budget

	2021	2022	2023
	$	$	$
Expenditures	**581,000**	**567,000**	**595,000**
Funding			
Formula Funding		567,000	
Community Public Infrastructure Funding	581,000		595,000
Total Funding	**581,000**	**567,000**	**595,000**

Description

Purpose

The Accessibility Audit of the City's Facilities, Trails, Parks and Playgrounds identified key areas where barrier removal is required. A prioritized implementation strategy was developed, and approved by Council to ensure the City moves towards full accessibility in these key areas.These funds will be used to continue to implement accessibility improvements.

Background

Council provided funding in the 2017 Budget for the development of an Accessibility Audit. The scope of work included auditing the City's facilities and infrastructure, specifically for structural design of facilities as well as functional usability based on accessibility needs of individuals with a wide range of challenges including mobility, visual, hearing, cognitive and sensory disabilities.

The audit identified a number of projects for a variety of facilities that will assist Council in achieving their stated Community and Corporate Vision of an inclusive City and move Council towards achieving a community that ensures a high quality of life for all, including future generations.

The audit identified the need for approximately $5 Million of work to be completed over a ten-year period to strategically remove barriers on a priority based approach. Through the budgeting process, a three year implementation plan was developed in 2019 to address the short and mid-term projects.

Projects completed in 2020 include:
-The installation of accessible parking pads, multipurpose courts, picnic tables and benches at a variety of parks;
-Community Arena concession counter and the Fieldhouse customer counter were lowered;
-Components within facilities have been upgraded or adjusted including accessible doors openers; mirrors, hooks,dispensers, lighting, exit signs and

Department	CS Community Services	**Division**	Parks & Trails
Project	50036570 Accessibility Implementation		

AED machines;
-Repairs have been made to concrete/asphalt at key locations at facilities; and
-Accessible pads have been installed to accommodate the Wayfinding kiosks.

Operational Impact

There will be no additional O&M impact.

Department CS Community Services **Division** Pool
Project 55006570 Aquatic Centre

Budget

	2021	2022	2023
	$	$	$
Expenditures		**15,997,081**	**15,312,000**
Funding			
Formula Funding		3,279,270	2,786,811
Gas Tax Rebate		3,999,270	
Other Grants		7,998,541	2,526,459
Community Public Infrastructure Funding			3,998,730
Reserves		720,000	
Debt Funding			6,000,000
Total Funding		**15,997,081**	**15,312,000**

Description

Purpose

The development of an Aquatic Centre is a multi-year project that started in 2018 with the input of the Aquatic Centre Advisory Committee (ACAC) and is anticipated to be completed in 2024, pending Council approval and funding being secured.

Background

In the fall of 2018 Council adopted the Aquatic Centre Pre-Design Plan as prepared and recommended by the ACAC.

The Pre-Design Plan recommends that the facility includes a 52m lap pool, a warm water leisure pool complete with a lazy river and various play features, spectator viewing, diving boards, hot tub, steam room, canteen, multi-purpose rooms, storage and office space for youth groups as well as the required change room space and staff space. These components are detailed at the conceptual level within the Pre-Design Plan. Council subsequently requested that the consultation process with the community and stakeholders also include a 25m conceptual design option.

Council allocated funding in 2018, 2019 and 2020 to move the project forward including the development of the Pre-Design Study, securing the services of a Project Manager, securing the services of a Bridging Consultant and associated activities, and a site selection due diligence report including traffic, environmental and geotechnical studies.

Department	CS Community Services	**Division**	Pool
Project	55006570 Aquatic Centre		

Pending Council approval and securing funding, the work in 2021 will include issuing a Design-Build RFP and subsequent award of the project, foundation design, and construction. No budget is required for 2021 as there is sufficient carryover budget of $6.1 Million from previous and current years (see Gallery 1). The construction of the Aquatic Centre will continue in 2022 with completion expected in 2024.

Operational Impact

It is anticipated that the project will be completed in 2024 with the full impact of the operational costs to be in effect in 2025. The Pre-Design Plan indicates the annual net operating expenses for a 25m pool will be $551,000 more than the anticipated costs for the current pool, while the annual net operating expenses for a 52m pool will be $1.066 Million higher.

Department CS Community Services **Division** Pool
Project 55006570 Aquatic Centre

Gallery

Gallery 1

Aquatic Centre

Year	Consultant's Estimated Cash Flow ($)	Budget ($)	Budget Carry Forward ($)	Accumulated Budget Forward ($)	Source of funding	
					Build Canada Fund ($)	City ($)
2018	0	75,000	0	0	0	75,000
2019	0	1,750,000	1,723,419	1,723,419	0	1,750,000
2020	410,014	4,805,000	4,394,986	6,118,405	2,375,000	2,430,000
2021	1,539,986	0	0	4,578,419	0	0
2022	20,575,500	15,997,081	0	0	7,998,541	7,998,541
2023	15,312,000	15,312,000	0	0	2,526,460	12,785,541
2024	11,962,500	11,962,500	0	0	0	11,962,500
Total	**49,800,000**	**49,901,581**	0	0	**12,900,000**	**37,001,581**

Department	CS Community Services	**Division**	Parks & Trails
Project	FC0029 Arbour Development Study		

Budget

	2021	2022	2023
	$	$	$
Expenditures	**50,000**		
Funding			
Formula Funding	50,000		
Total Funding	**50,000**		

Description

Purpose

To undertake the planning and design for the construction of a community arbour in Yellowknife, in collaboration with the Yellowknives Dene First Nation, to enhance Indigenous presence in public spaces and as an act of reconciliation.

Background

Many communities throughout the NWT and elsewhere have community arbours that provide gathering places for people, First Nations and organizations to meet, learn, share and celebrate. Typically circular, with covered seating and a central fire area, these follow traditional Indigenous design and typically host all sorts of events.

Yellowknife is located on Chief Drygeese Territory, the traditional lands of the Yellowknives Dene First Nation since time immemorial, and the homelands of the North Slave Metis. Over 25% of the city's population is Indigenous, coming not only from Chief Drygeese Territory but also from areas beyond. As the capital city of the Northwest Territories, Yellowknife is a crossroads for peoples from all across the NWT who regularly travel to the community for a range of reasons. Ensuring Indigenous ways of being are honoured and entrenched in how the City delivers its programs, services and facilities is an important part of its work towards reconciliation.

In the spirit of reconciliation, the City is seeking to build an arbour in Yellowknife that can be enjoyed by all residents and visitors, and which can host gatherings, meetings and events as well as being a public space to be experienced and enjoyed. The City proposes to engage with the Yellowknives Dene First Nation in a planning exercise to determine the parameters for proceeding with construction of an arbour, and work collaboratively on the design, technical requirements and options for construction. It is essential that this asset be planned and built by Indigenous persons with knowledge of traditional arbour construction.

Department	CS Community Services	**Division**	Parks & Trails
Project	FC0029 Arbour Development Study		

Working with Indigenous partners to confirm, plan and construct an arbour would contribute to the ongoing work towards reconciliation within Yellowknife by honouring traditional building methods and structures.

Operational Impact

There are no O&M implications related to completion of a planning exercise with the Yellowknives Dene First Nation and planning and design for an arbour. It is anticipated that once constructed, there would be annual O&M costs to keep the structure in optimal condition as an asset of the City. It is envisioned that the arbour could be reserved for use by persons, organizations and groups, and it is proposed that rent would be waived for Indigenous events.

Department	CS Community Services	**Division**	Directorate
Project	CS0005 Art & Culture Master Plan		

Budget

	2021	2022	2023
	$	$	$
Expenditures	**75,000**		
Funding			
Formula Funding	75,000		
Total Funding	**75,000**		

Description

Purpose

An Arts and Cultural Master Plan will be developed to identify emerging issues, best practices and trends related the arts and cultural community.

Background

Yellowknife has a rich and colourful arts and cultural community with a wide variety of activities, events and programs that are reflected in a number of forms across the visual and performing arts. The delivery and support of the arts are provided in a number of venues and models including the business sector, private artists, organizations specific to one form or another and the City of Yellowknife library, programs and special events.

The Master Plan project will take a community engagement approach to identify arts and cultural resources within Yellowknife, and investigate and identify the trends and issues that will lead to the development of an overall community approach that will ensure the arts and cultural community is supported and continues to flourish. The Master Plan will provide guidance in areas such as policy development, administrative structure to support the arts and culture community, strategies for long term management, and growth of resources within Yellowknife.

Operational Impact

There will be no direct operational impact from this project; however, it will require a reallocation of current resources to address the implementation strategy.

Department CS Community Services **Division** Parks & Trails
Project 53536570 Columbarium

Budget

	2021	2022	2023
	$	$	$
Expenditures	**150,000**		
Funding			
Formula Funding	150,000		
Total Funding	**150,000**		

Description

Purpose

To build an additional Columbarium in the Lakeview Cemetery, thereby increasing the total number of niches from 100 to 200.

Background

In 2013, the City installed a 100-niche columbarium at the Lakeview Cemetery. By 2019, the Columbarium was already 75% full. In the last few years the demand for niches in the Columbarium has grown to the point that it is expected to be fully occupied or reserved very soon.

Budget 2020 included an allocation for the necessary ground work, landscaping, and site preparation. The recommended Budget 2021 allocation will be for the purchase and installation of the Columbarium.

Operational Impact

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

Department CS Community Services **Division** Yellowknife Community Arena
Project FC0021 Community Arena Ammonia Safety

Budget

	2021	2022	2023
	$	$	$
Expenditures	**210,000**		
Funding			
Formula Funding	210,000		
Total Funding	**210,000**		

Description

Purpose

The purpose of this project is to increase safety for the public and staff at theYellowknife Community Arena (YKCA) facility. The project will also be beneficial for the environment by reducing spill size and reducing the down time when maintenance occurs.

Background

Since the tragic events in Fernie, ammonia safety and plans to keep arenas as safe as possible have been brought to the attention of municipalities. The City of Yellowknife began a project to increase the safety of the Multiplex in 2020 by upgrading equipment and installing a containment system in case there was an ammonia spill in the facility. The addition of a similar system to the YKCA will allow the ammonia to be recovered and provide water containment for any spills thus increasing the safety for the public and staff.

The YKCA project will add an Ammonia Containment System and provide additional safety and recovery by installing a set of shut offs so that areas of the system could be isolated and there will be a reduced risk of losing the entire ammonia charge at one time. The shut offs will help in times of emergency but will also be very useful and go a long way to improve the safety for arena workers and contractors who do maintenance of the system. The system will also be able to store ammonia in a safe way rather than having to release the charge into the newly-added containment system thus saving money and reducing the amount of ammonia water that will need to be dealt with. Alarms and safety features that will add protection for the safety of the public and staff are also included in this portion of the two-year protection plan.

Department	CS Community Services	**Division**	Yellowknife Community Arena
Project	FC0021 Community Arena Ammonia Safety		

Operational Impact

There will be very little additional O&M for this system and down time and maintenance time should be significantly reduced by the shut off points and ability to save the ammonia charge in a spill situation.

Department PW Public Works & Engineering **Division** Community Energy Plan
Project CP0003 Community Energy Plan Projects

Budget

	2021	2022	2023
	$	$	$
Expenditures			
Sustainability Coordinator	120,000	120,000	120,000
Water Treatment Plant Pellet Boiler		2,500,000	
Total Expenditures	**120,000**	**2,620,000**	**120,000**
Funding			
Formula Funding	120,000	120,000	120,000
Community Public Infrastructure Funding		2,500,000	
Total Funding	**120,000**	**2,620,000**	**120,000**

Description

Purpose

To implement projects in line with the City of Yellowknife's Community Energy Plan (CEP) and Waste Management Plans.

Background

This project contains two items that relate to the City's sustainable projects development.

Sustainability Projects Coordinator
The Sustainability Projects Coordinator (previously titled the Energy Coordinator) was made a permanent position with the City in 2009. The primary duties of this position are:
-Researching, developing and implementing policies and projects that fall within the environmental sustainability portfolio including the CEP and Waste Diversion Projects.
-Developing policy recommendations for the implementation of solid waste management and waste diversion techniques.

This position has grown in its scope of work and has been instrumental in implementing the CEP and Waste Diversion strategies throughout the city.

Water Treatment Plant (WTP) Biomass Boiler
The City's CEP sets out ambitious targets for greenhouse gas emissions, renewable energy use, and increased energy efficiency. One way to meet these targets is to implement centralized boiler systems that use biomass to heat numerous buildings, such as the one that was recently installed to

Department	PW Public Works & Engineering	**Division**	Community Energy Plan
Project	CP0003 Community Energy Plan Projects		

heat the Multiplex, Fieldhouse, Fire Hall, City Garage, and Community Services Shop.

In 2019, the City commissioned a study to assess the feasibility of installing a centralized biomass boiler that would connect five buildings under three levels of government. The buildings include City Hall, the RCMP Detachment, Joint Task Force North (DND), the Legislative Assembly, and the Prince of Wales Northern Heritage Centre.

The outcome of the study determined that the project is feasible, however there will be significant challenges in advancing a centralized biomass boiler at City Hall. After review and consideration of fuel consumption data available for the WTP, Administration determined that the installation of a biomass boiler at this location will realize immediate benefits with minimal complications.

On April 27, 2020, a motion was unanimously passed by Council to re-allocate funding in the 2020 Budget from the City Hall centralized biomass boiler project to begin design on a biomass boiler for the WTP (Motion #0065-20).

Operational Impact

There is no anticipated impact to the O&M Budget at this time.

Department GG General Government **Division** Information Technology
Project CO0016 Emergency Radio Infrastructure Renewal

Budget

	2021	2022	2023
	$	$	$
Expenditures	**90,000**		
Funding			
Reserves	90,000		
Total Funding	**90,000**		

Description

Purpose

To replace end-of-support components of the City of Yellowknife's Emergency Radio Infrastructure that provides essential voice communications services for emergency personnel, and Public Works and Community Services staff.

Background

The City's Communications Infrastructure system was installed in 2014 and went live in early 2015. It includes a point-to-point wireless network that creates a robust, redundant backbone for radio communications that operate within a licensed frequency. Key components of this network are beyond end-of-sale and must be replaced before they reach end-of-support in the fall of 2021. Equipment locations mean specialized rigging and lift services will be required. These will be coordinated with other customers in Yellowknife to create some cost savings.

Operational Impact

A voice radio outage could severely jeopardize the safety of the City’s emergency responders and its citizens. Every reasonable effort must be made to ensure uninterrupted service, including proper maintenance and incremental enhancements while maintaining warranty and support. If this project does not proceed, it will not be possible to implement these incremental replacements that are necessary to ensure ongoing reliable system performance, and will present considerable risk to the City and its residents.

Department	PS Public Safety	**Division**	Fire
Project	FD0012 Firehall Emergency Response Equipment		

Budget

	2021	2022	2023
	$	$	$
Expenditures	**68,500**		
Funding			
Formula Funding	68,500		
Total Funding	**68,500**		

Description

Purpose

The acquisitions under this project will improve First Responder safety and improve efficiency in responding and working in an emergency incident. The project will reduce the injury potential for patients and First Responders on emergency medical calls, and will provide key detection information at fire, rescue, hazardous material and emergency medical scenes.

Background

The powered ambulance cot system enables firefighter/paramedics to transfer and transport patients more safely, securely and effectively by addressing issues related to uneven approach conditions in cot loading and unloading. These scenarios can make a First Responder's work very difficult and result in poor ergonomics with high lumbar and joint stresses on responders. This is a key focus is for responder safety as powered cots have been shown to reduce spinal compression forces in paramedics by as much as 50% thus preventing occupational injury.

Thermal imaging camera is a key piece of equipment that is utilized for service provided by the Fire Division. The primary use for cameras in fire emergencies to find the seat of the fire, search for victims, and overhaul to scene to make sure the fire is completely extinguished. Thermal imaging cameras are also used on hazardous material responses, motor vehicle crashes, and wildland interface firefighting.

Department	PS Public Safety	**Division**	Fire
Project	FD0012 Firehall Emergency Response Equipment		

Operational Impact

Acquisition of the powered cot system will be implemented by retrofitting Medic 7 in 2021 and will be the first step in adopting a mandatory power cot and load system for future ambulance procurement. This system is a substantial upgrade to current equipment with enhancements to support the controls, mattress and restraint system.

Thermal imaging camera replacement will support the ongoing operations of the Fire Division by replacing two cameras that have performed well but have reached their end of life for usage.

Department	PS Public Safety	**Division**	Fire
Project	FD0005 Firehall Minor Renovations		

Budget

	2021	2022	2023
	$	$	$
Expenditures	**251,000**		
Funding			
Formula Funding	251,000		
Total Funding	**251,000**		

Description

Purpose

With increased staffing levels of 250% (firefighter/paramedics and PSCC Dispatch) from the time of the original construction of the Fire Station, the two single use bathrooms available on the main floor are not meeting current capacity requirements. This project will upgrade these bathrooms to allow for multiple users and provide a shower.

The project will also provide rapid recoil system for power cords and air lines housed in the Fire Hall bays as an essential component for mobile fire apparatus and ambulances. Keeping fire apparatus, on-board radios, medical and other equipment fully charged, along with air tanks for air brake systems topped up and ready for deployment at all times, is made possible by outfitting the fire station with ceiling-mounted power cords and air lines.

Background

This project will augment the existing main floor washrooms, which are equipped with a sink, toilet and single shower, and will provide the ability to accommodate multiple users for current needs, including shower facilities for post-fire decontamination, in accordance with industry best practice. Under the current design, only one user per washroom is feasible. The architectural component of the project (including structural engineering, mechanical and electrical) will determine optimal space usage for showers, toilets and sinks as per the National Building Code.

The benefit of this work is that the increased capacity enhances efficiency and convenience for First Responders and provides the assurance that staff have facilities which provide for basic work related needs to address an increased requirement for additional facilities.

Firefighters can quickly deploy to the fire apparatus and have the apparatus ready to respond to emergency situations in a timely and safe manner. The rapid recoiling systems of hose reels allow fire fighters to be ready to respond at a moment’s notice without delay of managing cords and hoses. Fire stations equipped with reels provide the necessary maintenance status of apparatus and ambulances, while reducing trip hazards in getting hoses

Department	PS Public Safety	**Division**	Fire
Project	FD0005 Firehall Minor Renovations		

up off the ground, all while increasing fire station efficiency.

The scope of the capital request for power cords and air lines would be to upgrade ineffective retractors in place, but also to standardize power cords and support electrical systems.

The project scope includes:
-Remove existing retractable reals that are not functional
-Blow out existing airline system (corrosion build-up)
-Supply 6 new hose reels and connect air hoses
-Supply and install 15 retractable power cord reels
-Change existing power cords that are not compatible to conduit and wire for power requirements
-Testing of electrical equipment
-Verification of systems

Moreover, keeping the cords and hoses retracted prevents the causal factors of entanglement in apparatus or ambulances and equipment while driving out of the station. Additionally, the system upgrade prevents the causal factor of the vehicle from being driven away with the power cord or airline connected which could slow or stop a response to an emergency situation or have catastrophic damage to the power and air systems.

Operational Impact

Due to the current space available the project may not be able to meet requirements for barrier free access, or minimum number of toilets per floor occupancy.

This project has minor operational impact to the City, beyond the loss of current facilities during renovation. The current hot water capacity will need to be increased by installing a larger holding tank or alternate hot water heating system through future plans for Fire Station expansion or the addition of a satellite facility. Due to the minimum space allowable in the current mechanical room, the best approach is an on-demand hot water system.

Retractable power cord and hose reels are the preferred management solution choice for hoses and cords in the fire industry so this project will enhance Yellowknife Fire Department's (YKFD) operational response. The costs to maintain this system will be incorporated into YKFD's building maintenance budget.

Department PW Public Works & Engineering **Division** Fleet Management
Project 71507801 Fleet Management

Budget

		2021	2022	2023
		$	$	$
Expenditures				
		1,353,032	1,277,895	1,133,523
	Total Expenditures	**1,353,032**	**1,277,895**	**1,133,523**
Funding				
Reserves		1,353,032	1,277,895	1,133,523
	Total Funding	**1,353,032**	**1,277,895**	**1,133,523**

Description

Purpose

To continue replacing and redeploying fleet units according to the City of Yellowknife's Fleet Management practises.

Background

The reliability of the City's Mobile Equipment Fleet must be maintained to meet the service levels expected by residents. The City has a fleet of 159 pieces of heavy-duty and mobile equipment that support Fire and Ambulance, Road Maintenance, Water and Sewer Maintenance, Solid Waste, Parks, Arenas and Administrative functions, as well as 27 stationary engines for emergency power generation and fire pumping capacity.

Fleet management practises allow the City to maximize life cycle and properly budget and plan the replacement of all fleet vehicles on a regular basis. These policies and practises help to mitigate risk and repair costs associated with aged vehicles. As vehicles and equipment get older, the operation and maintenance costs of those vehicles increase, with limited resources available for maintenance and repairs. These vehicles should be replaced on a scheduled basis to reduce downtime due to repairs or failures, which could negatively impact the delivery of City services such as snow removal or water/sewer repairs.

Summary of Units:

Small Equipment – 30 units
Small equipment includes miscellaneous equipment required by City departments to do their work. Included are: riding mowers, snowmobiles (Municipal Enforcement Division), all-terrain vehicles (Firefighters), light trailers (Community Services and Public Works), line-painters, crack sealing equipment, trailer-mounted water pumps, and ground thawing equipment. Equipment in this group has a varied life expectancy and replacement cost.

Department	PW Public Works & Engineering	**Division**	Fleet Management
Project	71507801 Fleet Management		

Light-duty Trucks – 41 units
According to the City of Yellowknife Fleet Management practises, these vehicles should be reviewed for replacement after seven years and replaced after ten years. The City currently has 41 pickup trucks and vans in the fleet. The ages vary from one year to more than ten years.

Medium-duty Trucks – 8 units
According to the City of Yellowknife Fleet Management practises, these vehicles should be reviewed for replacement after six years and replaced after ten years. The City currently has 8 medium-duty trucks in the fleet.

Heavy-duty Trucks – 15 units
The 15 heavy-duty trucks and trailers include trailers, tandem tractors, and dump trucks. The heavy-duty trucks are to be replaced every twelve years. Trucks are used for City projects and snow removal in the winter. The cost of operating these vehicles rather than hiring contractors is approximately half. Each truck is operated for approximately 1,000 hours per year, saving the City $45,000 a year for 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.

Heavy Equipment – 10 units
Heavy equipment is to be replaced every 12 years, except specialty equipment, which is explained under that heading. Each piece of heavy equipment is operated for approximately 1,000 hours per year, saving the City $45,000 a 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.

Mobile Tractors – 9 units
This includes Zambonis, skidsteers, compactors, and forklifts. The anticipated lifespan of these units is ten years.

Municipal Enforcement Vehicles – 4 units
These are to be replaced every four years or 100,000 kilometres. Due to 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 cycles of these 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.

Department	PW Public Works & Engineering	**Division**	Fleet Management
Project	71507801 Fleet Management		

Emergency Vehicles – 10 units
This includes fire trucks, ambulances and water trucks. Due to increased demand, the replacement life cycle standard was re-evaluated by Public Works and the Fire Division, and the standard for replacement was reduced from 30 years to 20 years for most fire fighting equipment. 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. The City has three ambulances and one is replaced every four years. The newest is placed on “first out the door” service and the oldest is surplus.

Seasonal Vehicles – 18 Units
Once a vehicle such as a light-duty pickup truck is removed from its primary use, it is placed into a lower priority use, such as vehicles used for summer student work activities. If the repair costs of a summer vehicle exceed an estimated cost of $500, the vehicle may be removed from service at the discretion of the Director of Public Works and Engineering.

Stationary Engines – 27 Units
The City's fleet mechanics also maintain and service 27 stationary engines. These include standby generators for City water and sewer supply and City facilities (City Hall, Fire Division, Multiplex/Fieldhouse). The stationary engines provide standby electricity for water and sewer services in times of power outage or natural disaster. The estimated value of the stationary engines is approximately $5.1 Million. Many of the existing engines are older: five are over 30 years old, twelve are over 20 years old, fourteen are over 10 years old, and only seven are under 10 years old. Parts are often unavailable for engines over 20 years old. Although these engines get little use, even small breakdowns may lead to lengthy repairs.

The Mobile Equipment Reserve Fund (MERF) is not used to replace stationary engines even though the fleet resources are used to maintain them. It is recommended to departmental managers that the older stationary engines be replaced, and that one engine a year be replaced until all stationary engines are less than 20 years old.

Specialty Equipment – 9 Units
These pieces of equipment fall into their own category due to their level of importance to City operations. They are graders, street sweepers and vactor trucks. These are replaced more frequently because vital City operations would suffer due to prolonged breakdowns or repairs, which would have a direct impact on residents, vehicular traffic, emergency vehicle routes and the City’s transit system.

Department	PW Public Works & Engineering	**Division**	Fleet Management
Project	71507801 Fleet Management		

Operational Impact

Fleet management practises allow the City to properly budget and plan the replacement of all fleet vehicles on a regular basis. These policies and practices help to mitigate risk and repair costs associated with aged vehicles. As vehicles and equipment get older, the operation and maintenance costs of those vehicles increase, with limited resources available for maintenance and repairs. These vehicles should be replaced on a scheduled basis to reduce downtime due to repairs or failures, which could negatively impact the delivery of City services such as snow removal or water/sewer repairs.

Department GG General Government **Division** Information Technology
Project 44007600 Information Technology Infrastructure Renewal

Budget

	2021	2022	2023
	$	$	$
Expenditures	**337,000**	**367,000**	**367,000**
Funding			
Reserves	337,000	367,000	367,000
Total Funding	**337,000**	**367,000**	**367,000**

Description

Purpose

To continue the City of Yellowknife's planned and incremental investment in its Information Technology Infrastructure to provide reliable services while maximizing the service life of each component.

Background

The City's Information Technology infrastructure is essential for effective service delivery. This project will ensure consistent and reasonable investments in each of the four main categories of infrastructure in place at the City: servers and storage, network devices, printers and multifunction devices, and client hardware.

Servers and Storage
The City maintains physical and virtual servers to support a wide range of services to staff, citizens, and stakeholders. It also maintains a redundant file storage system to house and protect the City's burgeoning collection of data and documents that are essential to its day-to-day operations. This project will continue the City's planned and incremental investment in its server fleet and file storage infrastructure to help meet the growing requirements being placed on it.

The City's dependence on its server fleet intensifies with each activity that is automated. In addition to traditional financial applications, staff and stakeholders are adopting increasingly sophisticated solutions to meet diverse needs including emergency services dispatch, mapping, work management, elections, transit, permit processing, problem reporting, security cameras, building access, pellet boilers, solar panels, voice radio control, bulk water billing, and black/green cart management. To keep pace with these demands, the servers need to remain current and reliable.

In late 2007, the Information Technology Division adopted a virtualization strategy as a way to meet accelerating demands and provide the flexibility to

Department	GG General Government	**Division**	Information Technology
Project	44007600 Information Technology Infrastructure Renewal		

quickly deploy additional servers as needs arise. However, there are still limits to what can be accommodated within a single physical server and so growth in demand must be matched by growth in capacity. During the term of this budget, the Information Technology Division will use the allocated funds to grow the capacity of this environment, redeploy server equipment that is nearing the end of its life expectancy, and sustain a reasonable inventory of spare parts to ensure replacements are readily available when failures occur.

As with the demand for server capacity, the organization's need for storage continues to grow and the City must constantly invest in its infrastructure to ensure adequate capacity.

Network
The network that provides connectivity among the City's computers, laptops, servers, printers, cameras, mobile devices, telephones, traffic lights, SCADA monitors, and emergency voice radios is vital to the City's operations. Planned and incremental investment in this network is required so that it can continue to meet the increasing demands placed on it as functions throughout the organization turn to technology to streamline workloads and improve services.

The City's network employs Ethernet, leased and City-owned fiber, wireless, and microwave technologies to create connections among fourteen sites. Within each site the network connects numerous devices, ensuring that staff, citizens, and stakeholders have consistent and reliable access to applications, data, printers, and the internet.

The network also provides connectivity to every traffic light in order to streamline traffic control management within the Public Works department; this initiative alone added 63 network devices to the City's infrastructure. With additional traffic lights and cameras on the horizon, this complement will continue to grow.

In 2018 wireless connectivity was established to the City's Pumphouses and Liftstations. This added another 23 network devices to the City's infrastructure (Gallery 1).

Ongoing replacement of key network equipment assists in the reduction of unplanned outages and prepares for future technologies and growth. City-owned and operated connections have been established between several sites which has reduced reliance on third-party fiber services and resulted in annual operational savings of approximately $85,000.

In addition to connectivity, the network also plays a key role in protecting the City's Information Technology infrastructure and the corporate data assets stored within it (Gallery 2). The network's firewall and other protective mechanisms prevent unauthorized access attempts and its spam filter

rejects infected email and spam directed at the organization.

There is a continual focus on security as threats – both internal and external – are becoming increasingly sophisticated and pervasive. Initiatives such as ongoing cyber-threat awareness campaigns to help staff become more knowledgeable and mindful users, implementation of next generation virus protection, continual refinement of security configurations to mitigate risks from all sources, vulnerability assessments and health checks, and enhanced and more granular monitoring of network activity ensure a proactive approach to protecting City information and assets.

Printer and Multifunction Devices
The City maintains a fleet of printers and multifunction devices to meet the printing, scanning, and copying requirements of stakeholders. This project will continue the organization's incremental approach to implementing and maintaining multifunction devices throughout the organization so that these requirements can be met in the most cost-effective manner possible.

The City fleet consists of tiers of devices and all acquisitions are selected from one of these tiers to minimize the variety of devices installed throughout the organization, streamline consumables management, and reduce costs. Where appropriate, devices are reallocated throughout their lifespan in order to maximize their utility. As well, the organization is continually looking for ways to reduce the amount of printing.

Client (Staff) Hardware
This allocation will be used to renew and augment all client facing hardware components that require regular replacement in accordance with the City's Information Technology Evergreening strategy. This includes widely deployed elements like workstations, laptops, tablets, cell phones, desk sets, and radios, as well as more special purpose equipment like digital cameras, conference phones, and projectors.

Operational Impact

City service delivery relies on its Information Technology infrastructure. When any component is out of service, or not operating to specification, it will interrupt service delivery and reduce productivity.

Servers and Storage
When servers are appropriately matched to the work that needs to be done and sufficient disk space is available, services can be delivered more reliably and at a lower cost than when resources must be constantly manipulated and reallocated, often in response to failures. Without adequate investment, the organization will not be able to meet escalating server requirements or acquire much-needed additional storage capacity. In the short-term, this will negatively impact overall infrastructure performance and thus degrade service delivery to both internal and external clients, and over time it will lead to more frequent system outages and necessitate increased support efforts and costs.

Department	GG General Government	**Division**	Information Technology
Project	44007600 Information Technology Infrastructure Renewal		

Network
The City's network is vital to its operations and even short service interruptions have significant impacts on service delivery and employee productivity. It will be more cost effective – and present a lower risk to the City – to replace and enhance this equipment in a planned and orderly fashion rather than to experience problems that require excessive troubleshooting and repair or failures that create service outages. Lack of appropriately scaled and timed investment will negatively impact the City's ability to sustain its network and will put the organization at risk of a long term outage while replacement equipment is sourced. Over time, there may be increasingly frequent service disruptions when equipment fails. These failures will interrupt many aspects of City operations,and potentially jeopardize the health and safety of staff, citizens, and visitors.

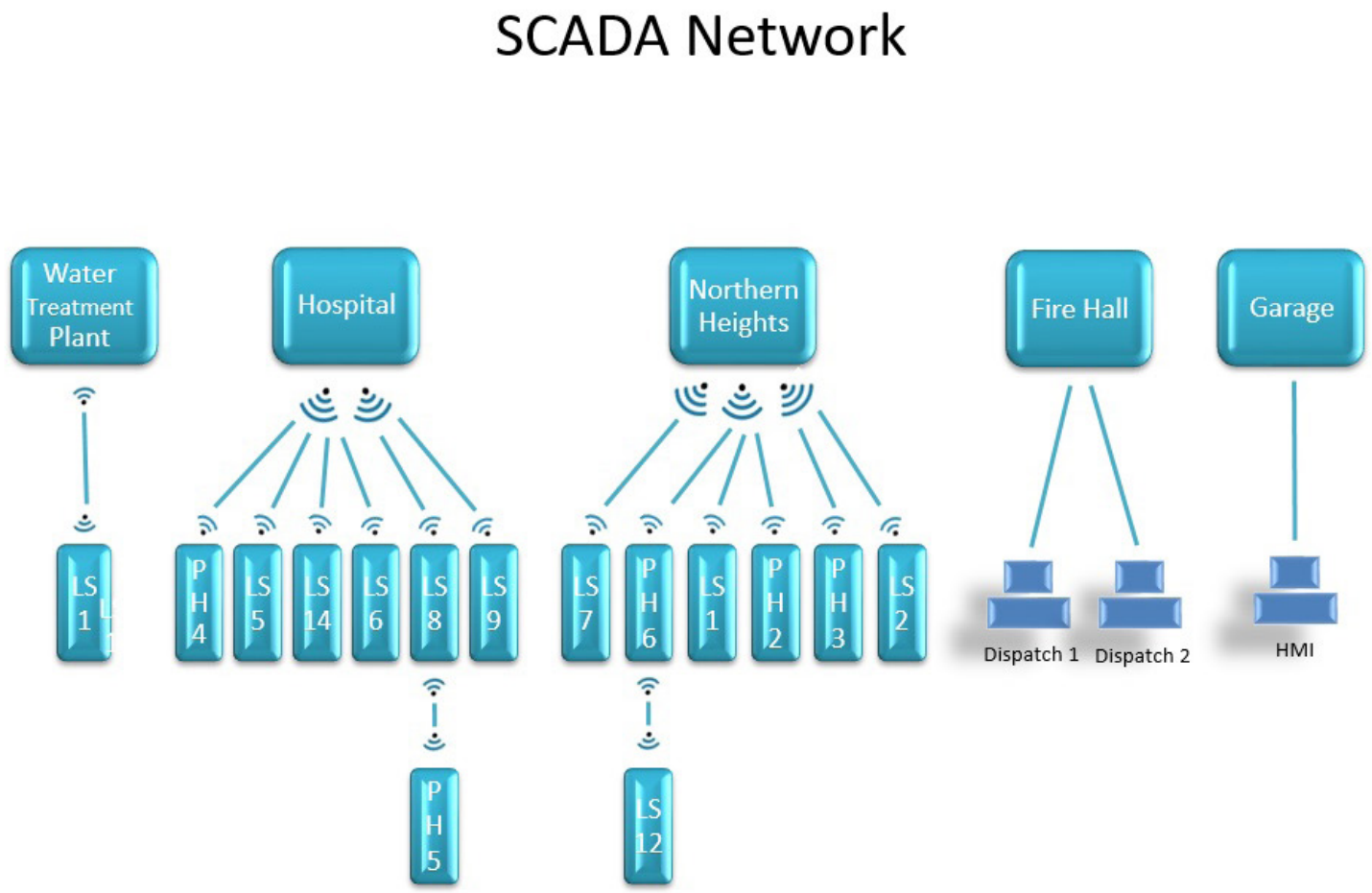
Printers and Multifunction Devices
Many printing and copying tasks are time sensitive, and must be done within legislated timeframes. If the printer and multifunction device fleet is not properly maintained, outages will affect the organization's ability to deliver services.

Client Hardware
Staff all across the organization rely on technology to complete their work and deliver programs and services. Appropriately maintaining client facing hardware components minimizes downtime and enables effective services for both staff and stakeholders. This will reduce troubleshooting and support efforts as replacements are completed in a planned and scheduled manner to minimize operational impact.

Department GG General Government **Division** Information Technology
Project 44007600 Information Technology Infrastructure Renewal

Gallery

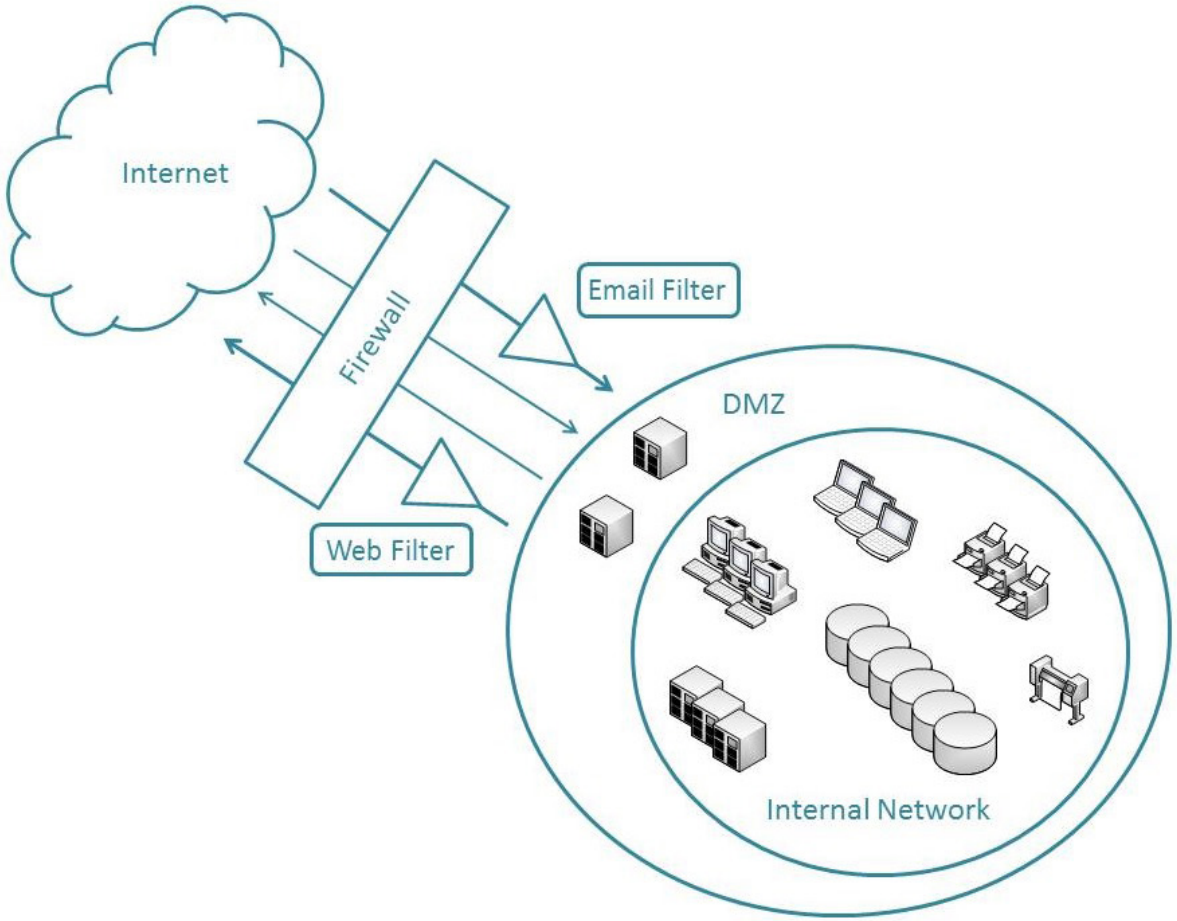
Gallery 1



Department	GG General Government	**Division**	Information Technology
Project	44007600 Information Technology Infrastructure Renewal		

Gallery

Gallery 2



Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	94006570 Lagoon Control Structure Replacement		

Budget

	2021	2022	2023
	$	$	$
Expenditures	**550,000**		
Funding			
User Fees	550,000		
Total Funding	**550,000**		

Description

Purpose

To replace failing control structures on Trapper's Lake to divert flow away from the Fiddler's Lake sewage lagoon.

Background

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 (Galleries 1 and 2). This ensured water from Trapper's Lake was not flowing into the lagoon, which will 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 of Yellowknife's water licence requirements, 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, thus increasing the overall capacity of the lagoon.

This is a multi-year project which saw the engineering work done in 2019, permitting and final design in 2020 and will conclude with the rebuilding of the dykes in 2021.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	94006570 Lagoon Control Structure Replacement		

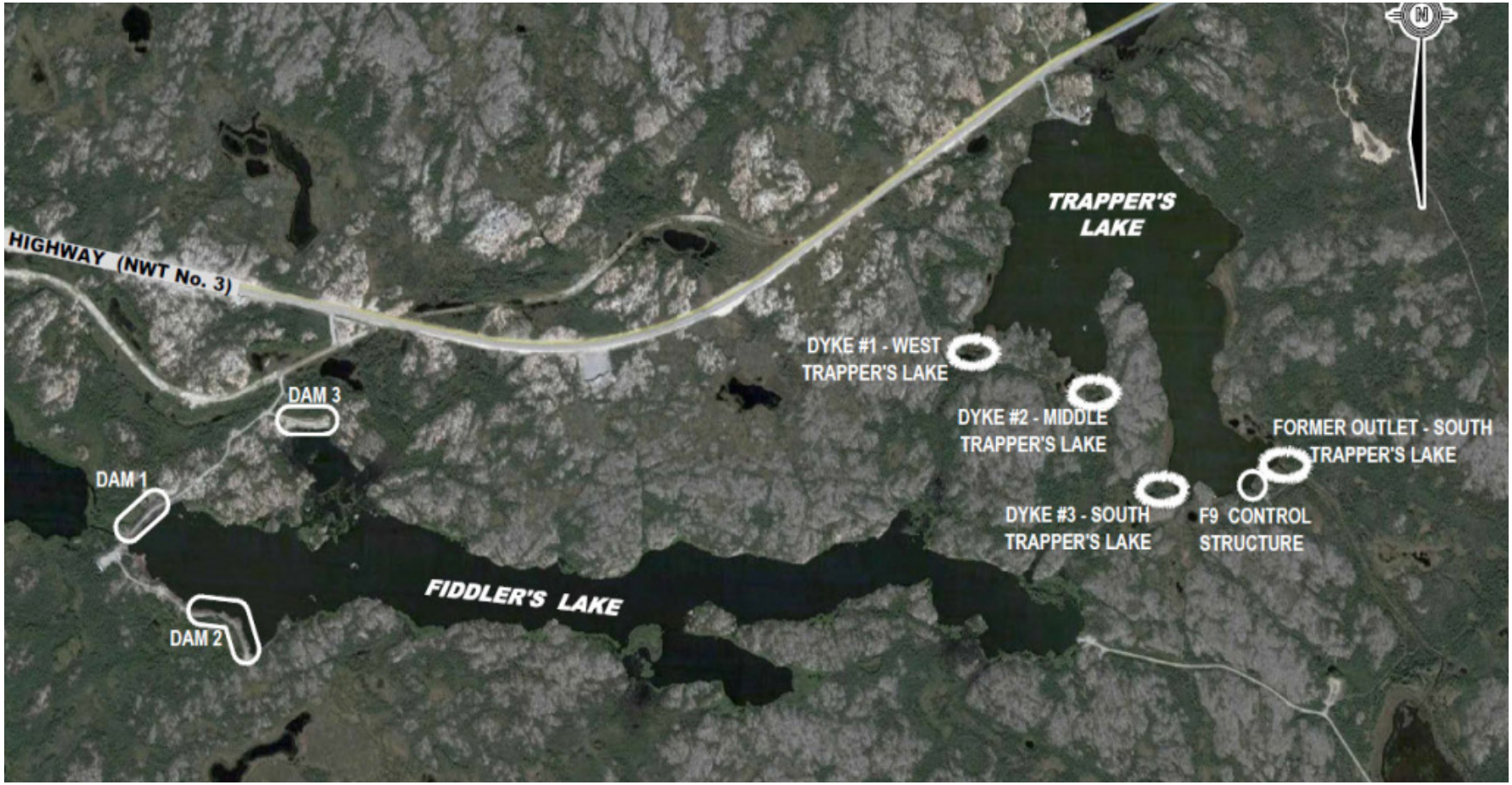
Operational Impact

This project has negligible direct effect on operations. Maintenance of control structures at Trapper's Lake is a requirement of the City's water licence and is consistent with good asset management principles.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	94006570 Lagoon Control Structure Replacement		

Gallery

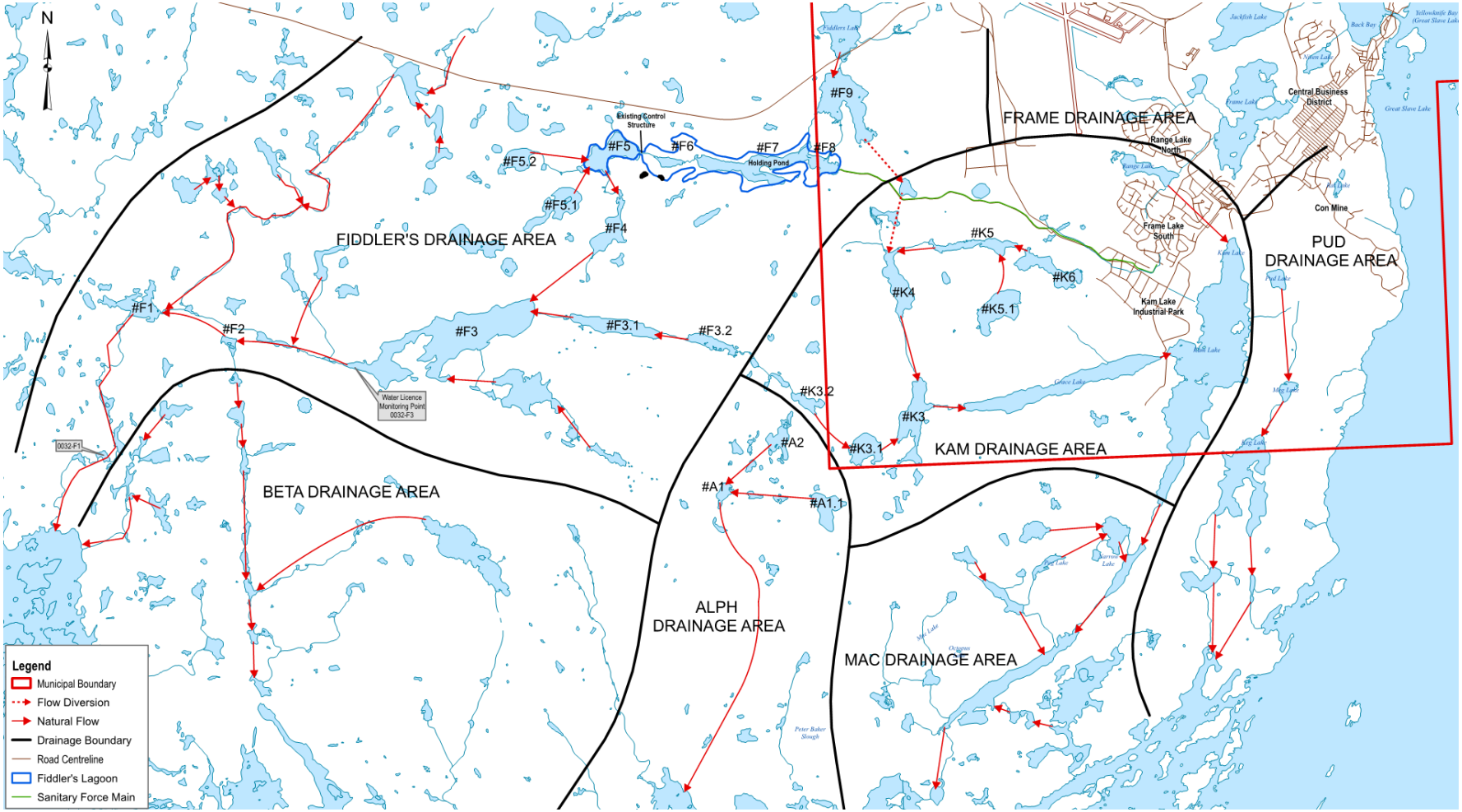
Gallery 1: Trapper's Lake Control Structures.jpg



Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	94006570 Lagoon Control Structure Replacement		

Gallery

Gallery 2: Fiddler's Lake Drainage Area and Surrounding Watersheds



Department PW Public Works & Engineering **Division** Water & Sewer
Project 94006575 Lagoon Sludge Removal

Budget	2021	2022	2023
	$	$	$
Expenditures	**1,800,000**	**2,800,000**	**2,800,000**
Funding			
Other Grants	1,350,000	2,100,000	2,100,000
User Fees	450,000	700,000	700,000
Total Funding	**1,800,000**	**2,800,000**	**2,800,000**

Description

Purpose

To remove sludge build up from the bottom of the Fiddler's Lake sewage lagoon.

Background

The Fiddler's Lake Sewage LagoonSystem has been in service since the mid-1980s. Since that time, solids in the raw sewage entering the lagoon have been accumulating at the bottom of the lagoon.

In June 2018, a survey was performed on the sludge layer to determine the approximate quantity of sludge currently in the lagoon. Gallery 1 shows the depths of the sludge throughout the lagoon. Based on the survey, it is estimated that roughly 226,000 cubic metres of sludge need to be removed from the lagoon.

The City of Yellowknife's water licence requires the creation of a sludge management plan. Part of that plan includes the removal of sludge built up in the lagoon. By removing the sludge, the overall holding volume of the lagoon will increase and the chemical and biological process that occurs in the lagoon will be able to take place in a more effective manner.

In 2019 a study was completed to evaluate sludge removal methods and sludge dewatering methods. It was determined that using a barge-mounted dredge was best for sludge removal, and the use of geotubes was best for dewatering. The methods chosen require a pad be built as a laydown area for the geotube dewatering process in order to remove as much liquid from the sludge as possible. The end use of the dewatered sludge is still to be determined, but is expected to be able to be used as cover material at the Solid Waste Facility.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	94006575 Lagoon Sludge Removal		

The anticipated timeline for this project is as follows:
2018 - Sludge Survey Completed
2019 - Sludge Removal Method Determined with Class D Cost Estimate
2020 - Engineering Design for Laydown Area of Geotubes
2021 - Construction of Laydown Area and Finalization of Desludging Operations
2022 - First Year of Sludge Removal
2023 - Second Year of Sludge Removal

NOTE:
Class A (more defined) estimates will be available once the finalization of the desludging operations are complete. The current figures noted for 2022 and 2023 are Class D estimates and could be subject to change for future budgets.

Operational Impact

There is no direct operational impact, however it will ensure continued performance of the FIddler's Lake Lagoon System.It is also a requirement of the City's water licence. This project is consistent with standard Asset Management principles.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	94006575 Lagoon Sludge Removal		

Gallery

Gallery 1: Fiddler's Lake Sewage Lagoon Sludge Depths

FIDDLERS LAGOON SLUDGE FINDINGS

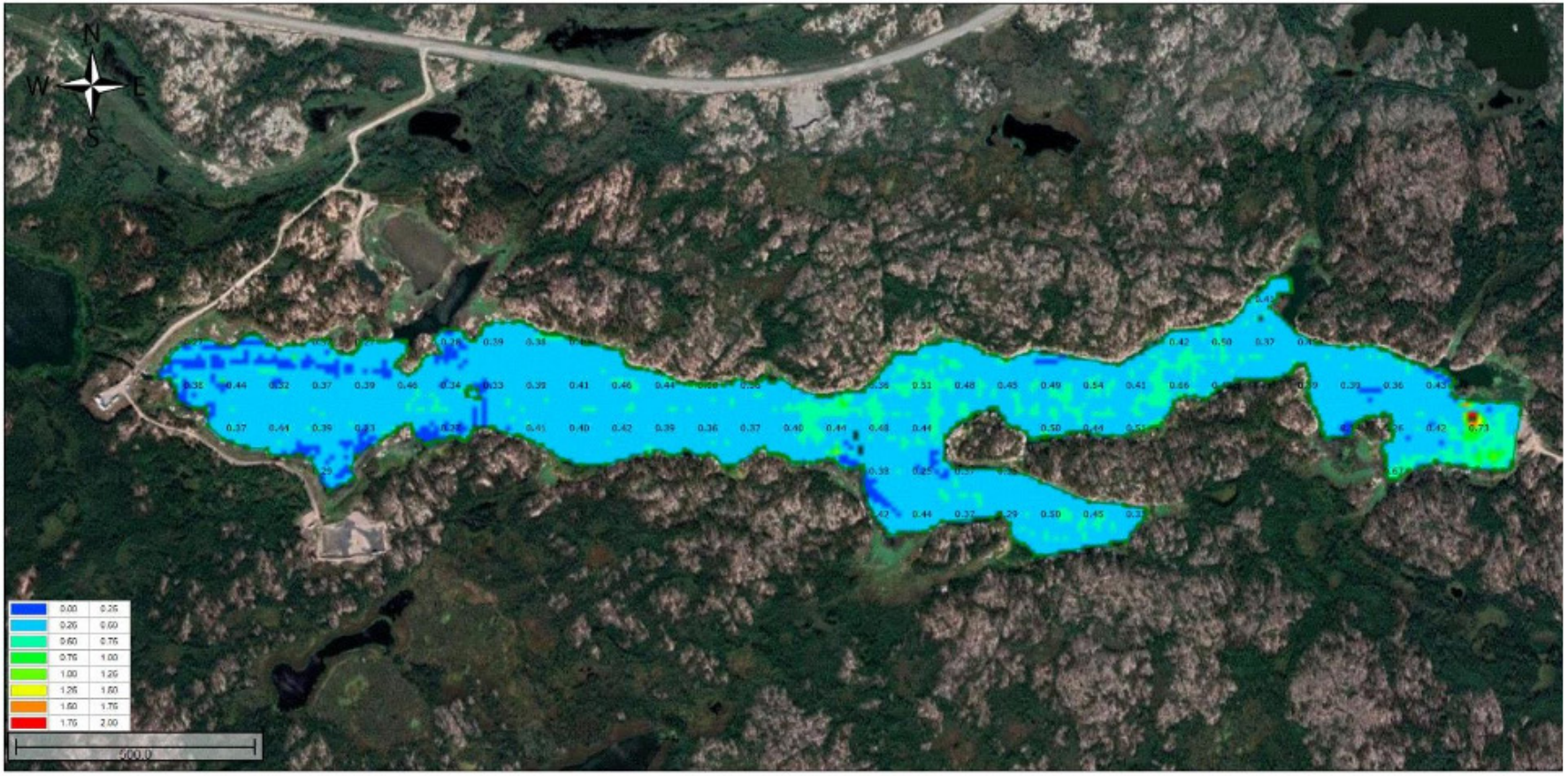


Figure 2 Fiddlers Lagoon sludge thicknesses (m)

Department PD Planning & Development **Division** Directorate
Project 60046570 Land Fund Capital Projects

Budget

	2021	2022	2023
	$	$	$
Expenditures	**209,500**	**2,000,000**	**2,000,000**
Funding			
Land Fund	209,500	2,000,000	2,000,000
Total Funding	**209,500**	**2,000,000**	**2,000,000**

Description

Purpose

During 2021, in addition to seeking to complete existing Land Fund projects, work will also include:

a) a new subdivision plan for residential development in the remaining Niven Phase V area, making the current lots available more marketable
b) planning and engineering of commercial/industrial lots in the Kam Lake area, to be approached in conjunction with other development interests and water/sewer infrastructure potential expansion

Background

Niven - Niven Phase V is an attractive location; however the lots remain unsold. The property is currently divided into three lots zoned R3 ResidentialMedium Density and consist of approximately 13,000 m3. Niven Phase V requires a new subdivision plan and refreshed presentation to best showcase the potential development possibilities in order to ensure appropriate disposal of this unique parcel.

Kam Lake - Anecdotally there has recently been increased interest in light industrial and commercial land that permits accessory residential development opportunities; this interest has come from an array of business perspectives including tourism, agriculture, construction and existing businesses seeking to expand. Administration is proposing to proceed with preparing an area development plan and subdivision design in 2021 to prepare for future development.

Department	PD Planning & Development	**Division**	Directorate
Project	60046570 Land Fund Capital Projects		

Operational Impact

Niven Phase V: Although it is difficult to determine costs, they will be minimal as this development will tie into existing infrastructure.
Kam Lake Expansion: Undefined

Department	PD Planning & Development	**Division**	Directorate
Project	60046570 Land Fund Capital Projects		

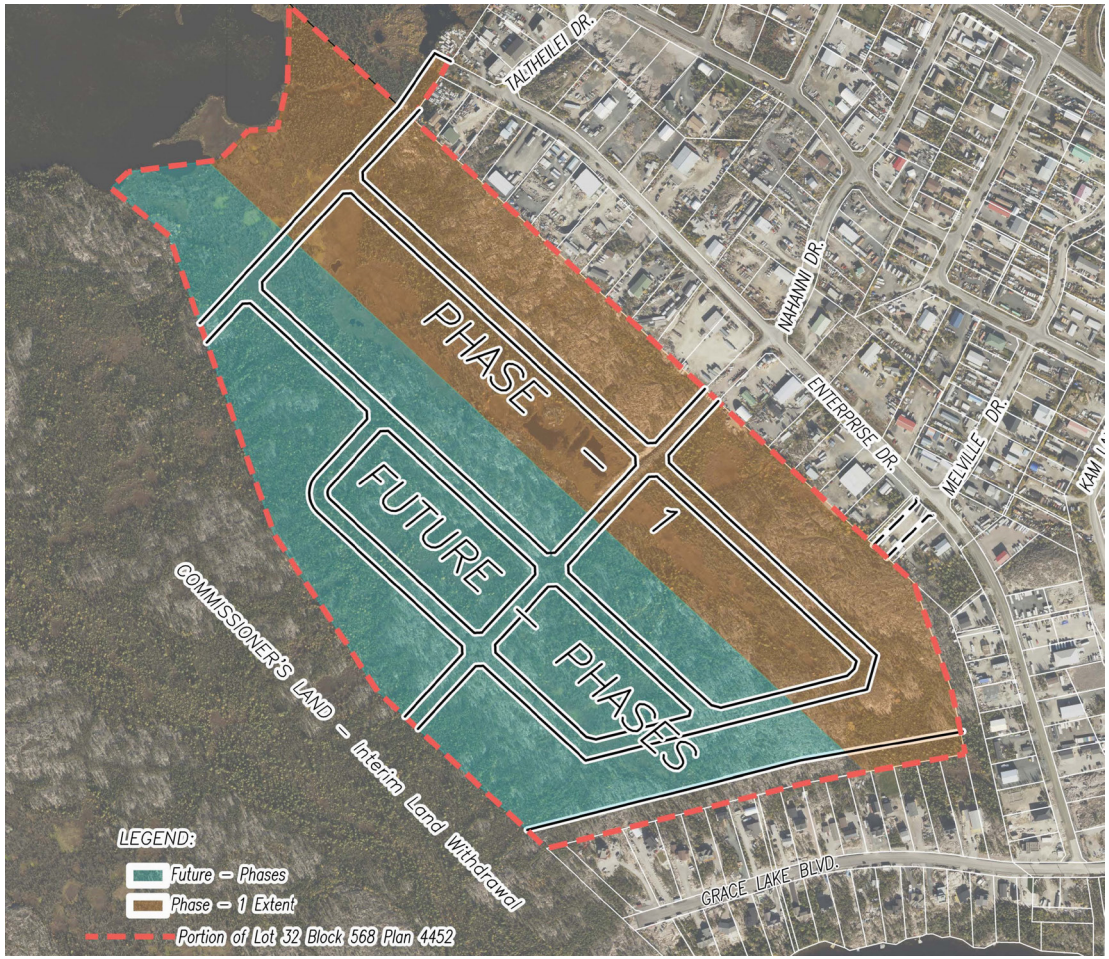
Gallery

Gallery 1: Niven Lake Phase V Current Layout

Department	PD Planning & Development	**Division**	Directorate
Project	60046570 Land Fund Capital Projects		

Gallery

Gallery 2: Proposed Kam Lake Subdivision Expansion



Department CS Community Services **Division** Multiplex
Project FC0028 Multiplex Ice Plant Ammonia Safety

Budget

	2021	2022	2023
	$	$	$
Expenditures	**170,000**		
Funding			
Formula Funding	90,000		
Other Grants	80,000		
Total Funding	**170,000**		

Description

Purpose

To replace the aging ice plant compressors with models that match the existing Community Arena ice plant; replace the faulty electrical control panel at the Multiplex to eliminate an ongoing issue of system power failures; and install an ammonia safety system (2020). The purpose of the second portion of this project is to make the ammonia system at the Multiplex Arena even safer and increase the amount of ammonia that could be recovered if there ever was an incident thus saving costs and down time while making repairs quicker and easier. There would be increased safety for the environment as well (2021).

Background

When the Multiplex was in the design stages the typical arena season commenced in the latter part of August and ran through to the following March or April, depending on the date of Easter. The plant was designed to operate during this season plus designed with a large enough capacity to eventually accommodate for summer ice. The typical season now operates from mid-July to the end of April which has caused the compressors to operate more hours each season which has led to an earlier than anticipated replacement date. Replacing the compressors will reduce the maintenance costs on the compressors, significantly reduce the amount of ammonia required, extend the life cycle of the ice plant and reduce the possibility of a compressor failure during the ice season (2020).

Recently there have been repeated electrical failures within the panel that controls the ice plant. When a failure occurs it affects power to the ice plant which in turns affects the facility's main breaker which then leads to complete facility black outs and significant down time which jeopardize both ice surfaces. Extended power outages have the potential to cause the bond between the ice and cooling floor to break, which could lead to the need to completely remove and replace the ice. The system has undergone ongoing repairs and diagnostics by contractors to try and isolate the issues. The problems have been discussed with electrical and refrigeration contractors and the solution proposed is to replace the electrical panel with an

Department	CS Community Services	**Division**	Multiplex
Project	FC0028 Multiplex Ice Plant Ammonia Safety		

upgraded model to ensure that power surges are properly addressed (2020).

It is recommended that the City install an ammonia safety system over two years. In 2020, the first stage would see the installation of upgraded detectors and the installation of an absorption tank containing water. The absorption tank will capture any discharged ammonia that results from a fault or issue with an ice plant component or vessel. Currently when ammonia is detected, the sensor will trigger an exhaust fan to discharge into the environment. The new system will ensure the ammonia is contained in the water tank and not released into environment (2020).

In 2021, an ammonia recovery system will be installed. This system will be activated at a pre-set level of ammonia discharge in the plant room. The detectors will trigger the ammonia recovery system to capture the ammonia charge into an expansion tank, basically vacuuming the ammonia from the plant and storing it safety until the required repairs are completed. This will remove the need to evacuate the building, which is difficult during regular ice activities and comes with additional safety concerns. An additional benefit is that the majority of the ammonia charge will be recovered and can be put back into the plant to allow of immediate start up after repairs.

The installation of the ammonia recovery system is key to continued operations should an ammonia event occur. The system will allow for a much faster response by qualified personnel. Without this system in place, there will be a need to wait for the current system to exhaust the ammonia from the plant room prior to carrying out repairs. The refrigeration contractors must travel to Yellowknife and any additional ammonia will require transportation time. The recovery system will allow for the ammonia charge to be pumped back into the ice plant immediately following repairs. This system makes a discharge to the environment very unlikely.

Since the tragic events in Fernie, ammonia safety and plans to keep arenas as safe as possible have been brought to the attention of municipalities. The City of Yellowknife began a project to increase the safety of the Multiplex in 2020 by upgrading equipment and installing a containment system in case there was an ammonia spill in the facility. The 2021 addition of a system that would allow the ammonia to be recovered is the final phase of the project that began in 2020.

The 2021 project will add safety to the Multiplex Ammonia Containment System by installing a set of shut offs so that areas of the system could be isolated and there would be a reduced risk of losing the entire ammonia charge at one time. The shut offs would help in times of emergency but would also be very useful and go a long way to improving the safety for arena workers and contractors who do maintenance of the system. The system would also be able to store ammonia in a safe way rather than having to release the charge into the newly added containment system thus saving money and reducing the amount of ammonia water that would need to be dealt with. Alarms and safety features that will add protection for the safety of the public and staff are also included in this portion of the two year protection plan.

Department	CS Community Services	**Division**	Multiplex
Project	FC0028 Multiplex Ice Plant Ammonia Safety		

Operational Impact

The upgrades to the plant will result in an annual savings of $20,000 in maintenance costs as the newer models do not require annual re-builds. The City will also see an annual reduction in power consumption of approximately $40,000 with the newer models (2020). This project will not add to the Multiplex O&M and will save time and money for maintenance and in the case of a spill (2021).

The work will be completed during the off-arena season to eliminate any disruption to regular ice activities.

Department PW Public Works & Engineering **Division** Solid Waste
Project SW0005 New Landfill Cell Design

Budget

	2021	2022	2023
	$	$	$
Expenditures	**350,000**		**4,500,000**
Funding			
Gas Tax Rebate	350,000		4,500,000
Total Funding	**350,000**		**4,500,000**

Description

Purpose

To design and construct a second generation landfill cell (cell C) at the Solid Waste Facility to accommodate for the city's future waste.

Background

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 system which consists of a liner system overlaid with collection pipes which direct liquids to a sump pit located in a utility hole. It was anticipated that the cell would 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 circumstances around building a landfill in an active quarry. A second cell was built in 2016 adjacent to the first with an anticipated lifespan of seven years.

Another cell (cell C) is needed to ensure that the City of Yellowknife has sufficient space to accommodate for future waste. Recent analysis of airspace and elevation anticipates that the existing Municipal Solid Waste (MSW) cells will be fully depleted in early 2027. Lateral expansion into cell C will need to occur before this deadline in order to optimize operations.

The recommended 2021 Budget allocation is for a detailed design of cell C and a sequencing plan that will guide planning and operations until the closure of the MSW cells. The recommended 2023 Budget allocation is for the construction of cell C and includes, but is not limited to, site clearing, rock blasting and removal, site work, drainage and road work, liner installation, and leachate collection system installation.

Department	PW Public Works & Engineering	**Division**	Solid Waste
Project	SW0005 New Landfill Cell Design		

Operational Impact

The design and construction of cell C works towards proactive planning of how airspace is to be managed on site. The design and ultimate construction allow for better strategy as to how material is handled and processed resulting in a more effective use of operational budgets.

Department PW Public Works & Engineering **Division** Roads & Sidewalks
Project 76156570 Paving Program

Budget

	2021	2022	2023
	$	$	$
Expenditures			
Balancing Difference	2,500,000	3,000,000	3,500,000
Total Expenditures	**2,500,000**	**3,000,000**	**3,500,000**
Funding			
Gas Tax Rebate	2,500,000	3,000,000	3,482,530
Community Public Infrastructure Funding			17,470
Total Funding	**2,500,000**	**3,000,000**	**3,500,000**

Description

Purpose

To repair or replace asphalt, concrete and other appurtenances on city streets as required, including storm water infrastructure. This project also installs concrete, asphalt and landscaping (if specified) on newly developed streets in the city.

Background

The typical design life of pavement is generally between 20 and 25 years, but it will vary significantly due to factors such as traffic volumes, vehicle types, geotechnical conditions, construction practices, and adequate maintenance.

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

As streets are reconstructed, the City of Yellowknife works with Northland Utilities Ltd.(Northland) to ensure that street lighting levels are evaluated and increased to comply with national standards. Also included in the paving program is coordination with Northland, NorthwesTel Inc. and NorthwesTel Cable Inc. to determine if replacement or addition of underground duct work for power and communication infrastructure is required.

Considerations when determining areas of reconstruction include:
-Condition and age of asset,

Department	PW Public Works & Engineering	**Division**	Roads & Sidewalks
Project	76156570 Paving Program		

-Recurring maintenance costs,
-Priority level of roadway,
-Number of impacted residents, and
-Underground infrastructure requirements.

Gallery 1 shows the 2021 to 2023 planned paving program. Gallery 2 shows the 2021 planned water, sewer and paving projects.

Operational Impact

Aging infrastructure has an operational cost of between two and four percent of replacement costs. Replacing this infrastructure will allow the department to focus operational and maintenance activities on other roads, sidewalks and storm water appurtenances in the city.

Department PW Public Works & Engineering **Division** Roads & Sidewalks
Project 76156570 Paving Program

Gallery

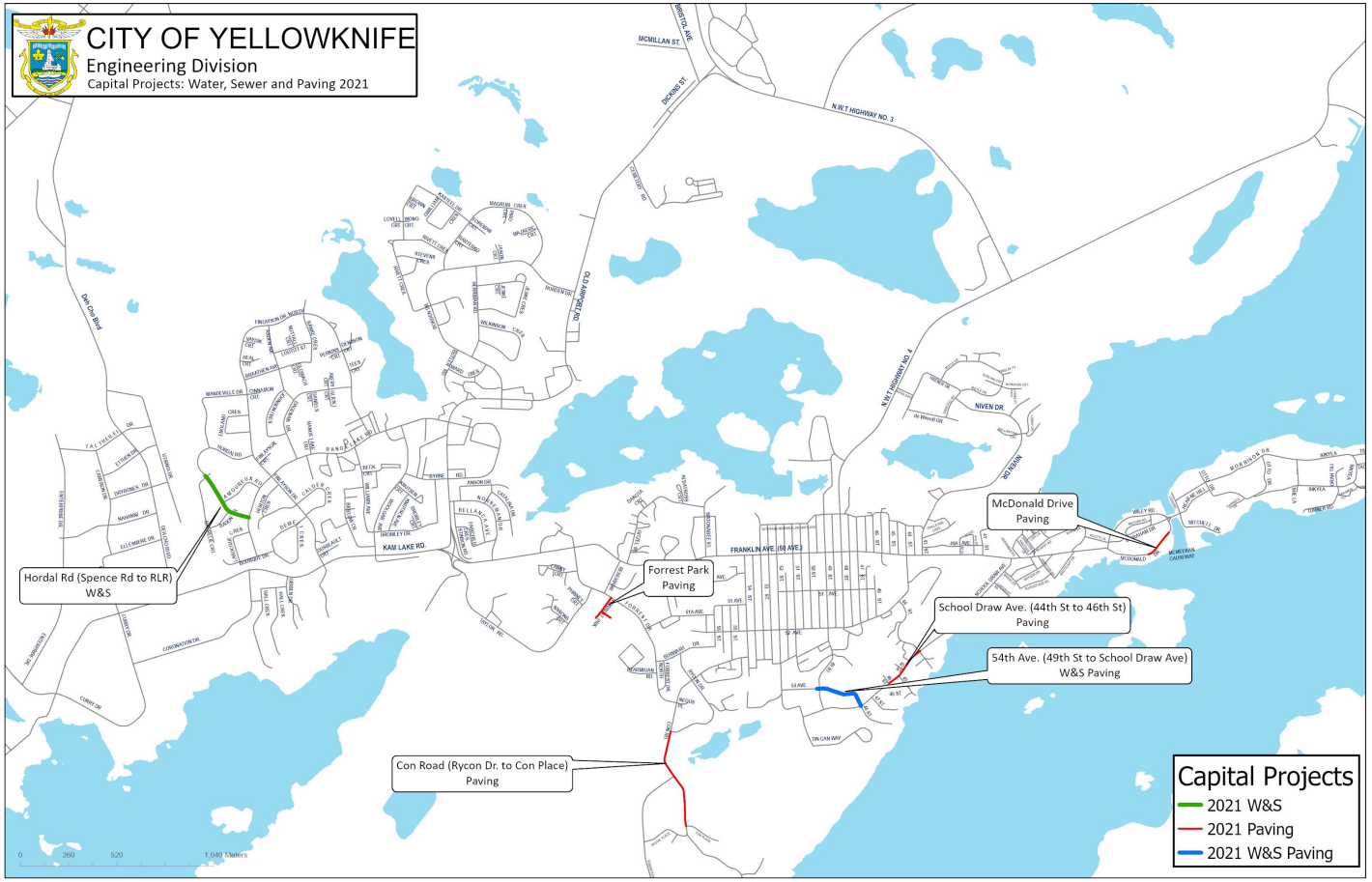
Gallery 1: 2021 to 2023 Planned Paving Program

Year	Street
2021	McDonald Drive
	School Draw (44th to 46th Street)
	Con Road (Rycon South to Con Place)
	Paving - Forrest Park
2022	45 Street (49 Ave. to Franklin Ave.)
	50 Street (Franklin Ave. to 52 Ave.)
	Hall Crescent (Phases 3 & 4)
2023	51 Street (49 Ave. to 51 Ave.)
	Wiley Road (Causeway to Hank Koenen Park)
	Franklin Avenue (Bretzlaff Dr. to Weaver Dr.)
	54 Street (50A Ave. to 51 Ave.)

Department	PW Public Works & Engineering	**Division**	Roads & Sidewalks
Project	76156570 Paving Program		

Gallery

Gallery 2: 2021 Planned Water, Sewer and Paving Projects



Department GG General Government **Division** Information Technology

Project CO0019 Permitting System Evaluation/Replacement

Budget

	2021	2022	2023
	$	$	$
Expenditures	**125,000**	**125,000**	
Funding			
Reserves	125,000	125,000	
Total Funding	**125,000**	**125,000**	

Description

Purpose

The purpose of this project is to evaluate the continued suitability of the CityView permitting software.

Background

The City of Yellowknife implemented the CityView permitting software solution in 2012. The associated portal provides online application and tracking services, while the internal components track permit assignments, progress, and approvals.

The purpose of the initial phase of this project is to evaluate the ongoing suitability of the CityView product relative to other products, including a next-generation offering from the same vendor, and permitting functionality available from the Environmental Systems Research Institute (ESRI). The City currently uses other products from ESRI for mapping, inventory, and work management.

The outcome of this evaluation will determine the next steps of the project.

Operational Impact

This project is not expected to impact operational costs.

Department PW Public Works & Engineering **Division** Water & Sewer
Project 90406571 PH#4 Water Truckfill Safety Project

Budget

	2021	2022	2023
	$	$	$
Expenditures	**350,000**		
Funding			
User Fees	350,000		
Total Funding	**350,000**		

Description

Purpose

To provide a safe means for filling Water Trucks while working at heights to meet Occupational Health and Safety Regulations, and to improve on-site parking and traffic flow.

Background

The City of Yellowknife has one potable Water Truck fill station located at Pumphouse #4 on the corner of Old Airport Road and Kam Lake Road. There are multiple activities occurring at this site, including potable Water Truck filling for Yellowknife, N'dilo and Dettah, as well as residents and contractors, RV (recreational vehicle) sewage dumping, and parking for the tennis courts located at the back of the Pumphouse situated on top of the potable water reservoir.

The demand for trucked potable water in the city has increased with the expansion of municipal services to areas without underground infrastructure. The City also provides potable water to the communities of N'dilo and Dettah. The demand for both the RV sewage dumping and tennis court activity has significantly increased which is creating instances of multiple use conflicts occurring at the same time.

The City is responsible to provide a safe means of access for contractors and private residents to fill potable water delivery trucks.This project will add a second truck fill station at this location to keep up with demand and provide redundancy. Safety apparatuses to facilitate working at heights will be installed at each fill station to ensure a safe means for operators to fill their tanks from the overhead pipe. As well, on-site parking stalls will be created to accommodate the tennis court use and improve traffic circulation given the conflicting uses in the area.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	90406571 PH#4 Water Truckfill Safety Project		

Operational Impact

The overall operational impact is expected to be minimal, with the exception of an additional truck fill location and safety apparatus that will have to be maintained and certified.

Department	CS Community Services	**Division**	Parks & Trails
Project	FC0025 Playground Upgrades Olexin and Forrest Drive		

Budget

	2021	2022	2023
	$	$	$
Expenditures	**115,000**		
Funding			
Formula Funding	115,000		
Total Funding	**115,000**		

Description

Purpose

The purpose of this project is to continue to refurbish and replace amenities on a rotational basis to keep playgrounds and pads safe and enjoyable for the community.

Background

The City has a plan to replace older playgrounds in a rotational manner so that the playgrounds are kept up in a safe and aesthetically pleasing manner. Playgrounds will be replaced with amenities that are modern and safe, and reflect the needs of the area that they are installed in. The Olexin playground was chosen as it is older and is in poorer repair than others of a similar age possibly due to high usage. It is an area with a high number of young families and receives a lot of use.

The Forrest Drive multisport court is uneven and holding water. There are older youth in the area who are not challenged by the play apparatus and have requested a repair to the area used to play basketball and hockey. A multi-purpose asphalt pad will encourage the use of the park in all seasons, by a greater number of youth of all ages, and increase the opportunities for youth to be active and maintain a healthy lifestyle.

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

Department	CS Community Services	**Division**	Parks & Trails
Project	FC0025 Playground Upgrades Olexin and Forrest Drive		

Operational Impact

There will be little O&M impact as this is a refurbishment and replacement project for existing equipment.

Department PW Public Works & Engineering **Division** Water & Sewer
Project 93306570 Sewage Force Main Repairs and Retention

Budget

		2021	2022	2023
		$	$	$
Expenditures				
		150,000	750,000	
	Total Expenditures	**150,000**	**750,000**	
Funding				
User Fees		150,000	750,000	
	Total Funding	**150,000**	**750,000**	

Description

Purpose

To improve the condition of the Force Main pipeline which transports sewage to the Fiddler's Lagoon treatment system.

Background

The City of Yellowknife has one Force Main that carries sewage from Liftstation #5 to the Fiddler's Lake Sewage Lagoon. This line was installed in 1979 with an expected 50-year lifespan. As the Force Main nears the end of its life, increased maintenance and the potential for additional leaks can occur. In 2018 the City experienced a significant break on the Force Main and the ensuing repair and cleanup resulted in substantial unexpected costs to the City. Another break occurred in 2019, during which the City shut down operations at Liftstation #5 and allowed the station to overflow in order to minimize contamination of private property. This necessitated a significant cleanup of contamination in the City Yard.

After seeing several substantial ruptures in the Force Main the past few years in the Kam Lake Industrial Park, this project was initiated in 2019 with an assessment of the current system. The following recommendations were presented:

Force Main Repair (Late 2020)
-Replacing a section of existing Force Main which has undergone multiple repairs.
-$440,000 Budget, completed with existing budget.

Engineering for Sewage Retention Structure (2021)
-Assess various options provided in the 2019 Engineering Study for a containment area in the City Yard to facilitate future repairs on the Force Main should it rupture, then prepare and post this work for competitive construction bids.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	93306570 Sewage Force Main Repairs and Retention		

-$150,000 Budget recommendation.

Construction of Sewage Retention Structure (2022)
-Construction of the sewage containment area will be completed. The construction of a retention structure will allow sewage to be stored in an environmentally safe structure while repairs are being carried out on Liftstation #5 or the Force Main itself.
-$750,000 Budget request.

Operational Impact

Improvements to the Force Main will reduce the likelihood of substantial sewage spills. Additionally, a containment area in the CIty Yard will minimize environmental impact and cleanup required, and give City staff time to complete necessary repairs.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	93306570 Sewage Force Main Repairs and Retention		

Gallery

Gallery 1: Sewage Force Main

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	97016570 Submarine Water Supply Line Replacement		

Budget

	2021	2022	2023
	$	$	$
Expenditures	**1,000,000**	**1,000,000**	**1,000,000**
Funding			
Formula Funding			250,000
Other Grants	750,000	750,000	750,000
User Fees	250,000	250,000	
Total Funding	**1,000,000**	**1,000,000**	**1,000,000**

Description

Purpose

To replace the original submarine water supply line from Pumphouse #2 at the Yellowknife River, to Pumphouse #1 and the Water Treatment Plant (WTP).

Background

Currently the City of Yellowknife obtains its drinking water from the Yellowknife River through an eight kilometre submarine pipeline that carries water from Pumphouse #2 at the river, through Yellowknife Bay, to the City's WTP. The submarine water supply line is reaching the end of its useful life, and needs to be replaced. Due to the presence of Giant Mine, and the contamination on site, the City was required to evaluate two source options for potable drinking water.

From 2009 to 2011, the City completed several tasks related to source water selection during design of the City's WTP:
-Evaluation of water source alternatives, including decision modeling and life cycle costs (as part of the Water Treatment Plant Preliminary Design Report, May 2009)
-Literature review to assess the extent of arsenic in Yellowknife Bay water and sediments (Technical Memorandum, May 5, 2010)
-Water and soil sampling at four locations around the Pumphouse #1 intake (August 2010)
-Monte Carlo (statistical) modeling of arsenic in Yellowknife Bay water (Technical Memorandum, December 2, 2010)
-Water source selection summary and recommendation (Letter, February 25, 2011)

Following public consultation in 2011, the City decided to continue using the Yellowknife River source with emergency supply from Yellowknife Bay,

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	97016570 Submarine Water Supply Line Replacement		

with the understanding that the issue would need to be revisited before the pipeline reached the end of its lifespan, which was estimated to occur around 2020.

In 2017, the City undertook a study to provide an updated recommendation based on new arsenic data and current cost information. The options were evaluated using a decision matrix model to provide City Council with the information necessary to make a decision on potable water source selection. The study was completed and the recommendation was to retain the Yellowknife River location as the City's water source. A separate review of the study by a third-party engineering firm was completed in 2018, and they concurred that the Yellowknife River should remain the water source.

Funding was received in 2019 through the Disaster Mitigation and Adaptation Fund (DMAF), a federal funding program that will cover up to $25.8 million of the project costs, which is 75% of total Budget costs. City Council provided approval via Motion #0123-19 on May 13, 2019 to move forward with the Yellowknife River as the City's primary water source, enter into a contribution agreement with Canada for DMAF funding, and to seek additional funding sources for the City's 25% obligation. City Staff are pursuing additional funding options for the remaining $8.6 million or 25% of the total project costs.

The detailed design and regulatory processes are anticipated to occur from 2021 through 2024, with tentative construction to occur during the winter of 2024/2025.

Operational Impact

The asset is past the end of its useful life. Failure of the pipeline will require the City to draw directly from Yellowknife Bay with no treatment for arsenic.

Department PW Public Works & Engineering **Division** Water & Sewer
Project 97016570 Submarine Water Supply Line Replacement

Gallery

Gallery 1: Tentative Schedule

	Budget	Tentative Project Schedule
2021	$1,000,000	Preliminary Engineering & Regulatory Work Water Line Design for Water Licence Renewal
2022	$1,000,000	Detailed Design Water Line, Pump House Upgrades
2023	$1,000,000	Permitting Project Staging and Preparation
2024	$10,000,000	Construction (Winter of 2024/2025)
2025	$20,982,958.00	Post Construction Activities
2026	$500,000	Post Construction Activities

Department PW Public Works & Engineering **Division** Roads & Sidewalks
Project 73807611 Traffic Light Upgrades

Budget

	2021	2022	2023
	$	$	$
Expenditures			
	70,000	70,000	70,000
Total Expenditures	**70,000**	**70,000**	**70,000**
Funding			
Community Public Infrastructure Funding	70,000	70,000	70,000
Total Funding	**70,000**	**70,000**	**70,000**

Description

Purpose

To improve traffic lights at signalized intersections by introducing technology that makes the intersections safer for vehicular and pedestrian traffic.

Background

There are nineteen intersections which rely on traffic lights for reliable vehicular flow. In recent years, the City of Yellowknife has installed equipment that uses different technologies to aid in traffic flow. These technologies include video detection and countdown pedestrian timers.

The 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. The cameras are not used to record video of any intersection, but are used for detection and data collection only.

Depending on the geometry of the intersection, either three or four cameras are required.

In 2017 when new traffic lights were installed at the intersection of Finlayson Drive and Kam Lake Road, countdown pedestrian timers were included ir the installation. This equipment uses the typical pedestrian crossing signals alongside a numerical countdown that ends when the light turns yellow. The use of this type of signal allows pedestrians to know how much time they have to cross the intersection.

This project has been ongoing since 2013 in order to improve vehicle detection at intersections with traffic lights. To date, video detection equipment

Department	PW Public Works & Engineering	**Division**	Roads & Sidewalks
Project	73807611 Traffic Light Upgrades		

has been installed at 12 intersections and countdown timers at six intersections. It is the City's intent to install video detection equipment at two intersections per year. Public Works recommends continuing with this project in order to improve the overall flow of traffic in Yellowknife.

Operational Impact

The video detection will collect data such as traffic counts, which would otherwise require a staff person counting vehicles, to be used for timing and coordination patterns.

Department PW Public Works & Engineering **Division** Water & Sewer
Project 96156570 Water & Sewer Infrastructure Replacement

Budget

	2021	2022	2023
	$	$	$
Expenditures			
	4,750,000	4,500,000	3,975,000
Total Expenditures	**4,750,000**	**4,500,000**	**3,975,000**
Funding			
Formula Funding			1,672,200
Gas Tax Rebate	3,501,200	4,500,000	
Community Public Infrastructure Funding	1,248,800		
User Fees			2,302,800
Total Funding	**4,750,000**	**4,500,000**	**3,975,000**

Description

Purpose

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

Background

In the late 1940s, the City of Yellowknife 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 it to the downtown residents of Yellowknife. By 1977, the sewer mains had degraded to the point where entire sections of the City's piped system failed. The water and sewer mains were comprised of cast iron and corrugated metal pipe (CMP) respectively, and were predominantly uninsulated. The pipe material, combined with no insulation in the freeze/thaw layer, resulted in high maintenance and repair costs that the City continues to deal with today.

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

The following are currently included in the annual Water & Sewer Infrastructure Replacement (Galleries 1 and 2) plans:
- Replacement of existing corrugated metal pipe sewer mains with ductile iron pipe
- Replacement of concrete sewer manholes

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	96156570 Water & Sewer Infrastructure Replacement		

- Replacement of existing cast iron water mains with appropriately-sized insulated ductile iron pipe
- Replacement of in-line hydrants, valves with hydrants, and valves located in insulated concrete vaults with manhole access
- Replacement of individual lot water and sewer services where deemed necessary
- Road stabilization and reconstruction with crushed rock backfill
- Completion of the project with concrete sidewalks and a paved roadway

Considerations when determining areas of reconstruction include:
- Condition and age of asset
- Recurring maintenance costs
- Priority level of roadway
- Number of impacted residents and services

Operational Impact

Aging infrastructure has an operational cost of between 2% and 4% of replacement costs. Replacing this infrastructure will allow the department to focus operational and maintenance activities in other areas of the water and sewer systems.

This project is consistent with good Asset Management principles.

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	96156570 Water & Sewer Infrastructure Replacement		

Gallery

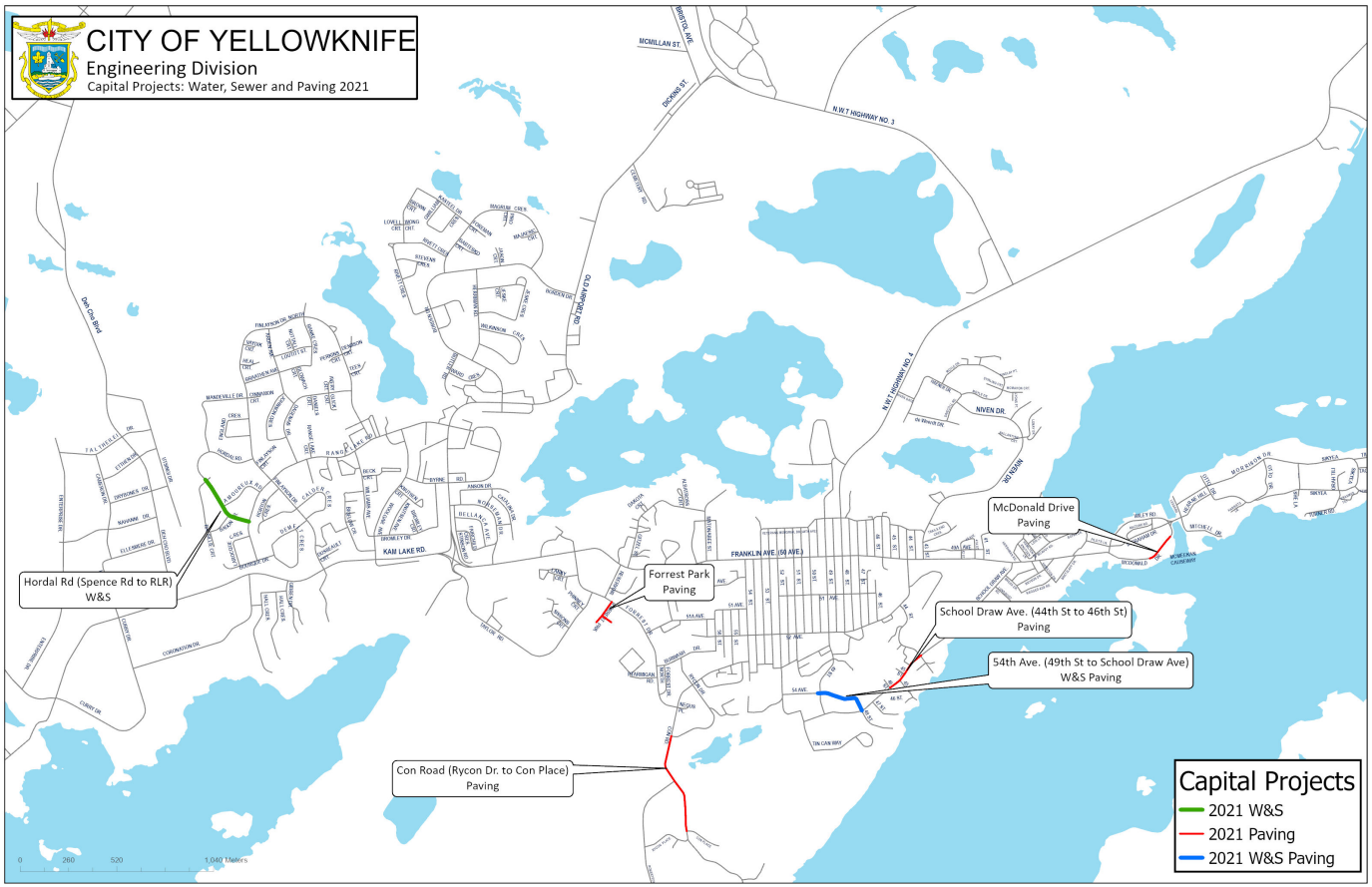
Gallery 1: 2021 to 2023 Water and Sewer Planned Upgrades

Year	Street
2021	Hordal Road (Phase 1)
	54 Avenue (49 St. to School Draw Ave.) - Paving
2022	Hordal Road (Phase 2)
	Hordal Road (Phase 1) - Paving
2023	Johnson Crescent
	Hordal Road (Phase 2) - Paving

Department	PW Public Works & Engineering	**Division**	Water & Sewer
Project	96156570 Water & Sewer Infrastructure Replacement		

Gallery

Gallery 2: 2021 Water, Sewer and Paving Projects Map



Department GG General Government **Division** Information Technology
Project 44517611 Wireless Infrastructure

Budget

	2021	2022	2023
	$	$	$
Expenditures	**75,000**		
Funding			
Reserves	75,000		
Total Funding	**75,000**		

Description

Purpose

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

Background

The Information Technology Division provides wireless network services for City employees at City Hall, the Multiplex, the Fieldhouse, the Public Works Garage, and the Library. As well, wireless Internet access is provided for citizens at City Hall, the Multiplex, the Fieldhouse, the Library, and the Somba K'e Civic Plaza (Gallery 1). Utilization of these services continues to increase and it is anticipated that there will be ongoing future growth in both utilization and the number of sites where service is required.

The current hardware and software will be at end-of-life and end-of-support in 2020. It does not interface with newer and more secure wireless protocols, and lacks redundancy as the total number of wireless access points exceeds the capability of a single controller, meaning that if one controller fails, some services will have to be discontinued. This project will acquire and deploy new controllers with automatic fail-over to establish redundancy for City-wide wireless functions, allow for additional access points to expand services, and ensure compatibility with current and future, more secure protocols.

Department	GG General Government	**Division**	Information Technology
Project	44517611 Wireless Infrastructure		

Operational Impact

All departments and many citizens rely on the existing wireless services. If this project does not proceed, the current services cannot be expanded or brought to compliance with current security protocols. Furthermore, in the event of equipment failure, services will have to be reduced.

Department	GG General Government	**Division**	Information Technology
Project	44517611 Wireless Infrastructure		

Gallery

Gallery 1