

CAPITAL FUND – 2023 Capital Projects

Capital Projects	2021	2021	2021	2022	2022	2023	2024	2025	Note
	Budget (\$000's)	Actuals (\$000's)	Carry Forward (\$000's)	Budget (\$000's)	Forecast (\$000's)	Budget (\$000's)	Budget (\$000's)	Budget (\$000's)	
Accessibility Audit/Implementation	581	1,708	737	567	1,100	595	550	400	
Aquatic Centre	-	830	5,280	20,757	26,037	43,057	3,588	-	
Arbour Development	-	-	-	-	-	-	250	-	
Arbour Development Study	50	-	50	-	50	-	-	-	
Art & Culture Master Plan	75	25	50	-	50	-	-	-	
Asset Management -Projects	-	70	313	300	400	340	430	370	
Backup Power Liftstation Generator Installation	-	135	201	-	71	-	-	-	
Baling Facility- Mechanical Upgrades	-	-	8	-	-	-	-	-	
Budget Management	-	-	25	-	25	-	-	-	
Cemetery Expansion/Irrigation- DNU	-	-	-	-	1	-	-	-	
CEP Community Outreach	-	-	32	-	1	-	-	-	
CEP Interior LED Lighting	-	5	334	-	250	-	-	-	
CEP Waste Strategic Plan	-	11	39	-	-	-	-	-	
City Hall Upgrades	-	79	175	-	175	-	-	-	
Columbarium Park	150	17	151	-	80	-	-	-	
Community Energy Plan Projects	-	144	-	-	30	-	100	-	
Community Services Land Fund Capital Projects	-	-	1,900	-	-	-	-	-	
Curling Club Upgrades	-	-	-	150	150	-	-	-	
Curling Rink Brine Line Replacement	-	-	-	-	-	615	-	-	
Design and Construction Standards	-	41	-	-	41	-	-	-	
Development & Building Permit Automation	125	41	84	-	84	-	-	-	
Email Management	-	21	-	-	4	-	-	-	
Emergency Radio Infrastructure Renewal	90	70	20	-	20	-	-	-	
FDM Software	-	27	19	-	25	-	-	-	
Fire Hall Emergency Response Equipment	69	50	-	-	-	-	-	-	
Fire Hall Equipment	-	-	-	175	175	95	58	58	
Fire Hall Expansion/ Renovation	251	30	221	295	566	4,449	2,551	-	
Fleet Management	1,353	1,454	878	1,278	300	1,882	3,214	1,447	
Folk on the Rocks Rehabilitation	-	31	-	-	-	-	-	-	

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Capital Projects	2021 Budget (\$000's)	2021 Actuals (\$000's)	2021 Carry Forward (\$000's)	2022 Budget (\$000's)	2022 Forecast (\$000's)	2023 Budget (\$000's)	2024 Budget (\$000's)	2025 Budget (\$000's)	Note
High Water Level Study	-	-	-	-	-	-	50	250	
Hydroseeder Solid Waste Facility	-	-	-	-	105	-	-	-	
Implementation of 50/50 Recommendations	-	-	25	-	-	-	-	-	
Information Technology Infrastructure Renewal	337	245	92	310	402	327	400	295	
Intersections Widening & New Traffic Lights	-	2	-	-	-	-	-	-	
Lagoon Control Structure Replacement	550	15	774	125	50	-	-	-	
Lagoon Sludge Removal	1,800	76	2,149	950	900	2,800	2,800	2,800	
Land Fund Capital Projects	210	-	206	3,350	597	900	2,000	1,000	
Land Surveying (Commissioners)	-	-	-	600	200	-	-	100	
Library/Arts Centre Development	-	-	-	-	-	-	-	2,500	
Lift Station #1 Replacement	-	-	350	-	350	3,260	5,500	200	
McMeekan Causeway Abutment Stabilization	-	6	-	-	-	-	-	-	
Monitoring Well Installation	-	58	-	-	-	-	-	-	
Multiplex Ice Plant Maintenance/Upgrade	170	-	170	-	250	-	-	-	
New Landfill/ Landfill Expansion	350	63	323	-	323	-	2,160	3,960	
Outdoor Recreation	-	-	-	-	-	165	555	-	
Park Development	-	17	-	-	-	-	-	-	
Park Equipment Replacement	115	33	82	135	217	250	490	150	
Patching Program	-	-	-	-	325	330	338	349	
Paving Block 501	-	-	-	-	144	-	-	-	
Paving Program	2,500	2,477	23	4,075	250	6,465	-	200	
Paving Program - ICIP	-	63	-	-	2,856	-	-	-	
PH#4 Water Truckfill Safety Project	350	105	345	150	234	-	-	-	
Phone System	-	18	-	-	-	-	-	-	
Public Transit Review	-	8	-	-	19	-	-	-	
Pump Replacement Program	-	61	-	-	-	-	-	-	
Pumphouse & Liftstation Upgrades	-	-	10	-	10	-	-	-	
Recycling Storage Building	-	-	-	-	-	-	50	650	
RIMP Building Structural Assessment	-	-	-	75	-	-	-	-	
Self-Contained Breathing Apparatus	-	97	-	-	-	-	-	-	
Sewage Force Main Twinning	150	17	240	750	50	-	-	-	
Site Restoration/Landfill Closure	-	152	-	-	-	-	75	-	



CAPITAL FUND – 2023 Capital Projects

Capital Projects	2021	2021	2021	2022	2022	2023	2024	2025	
	Budget	Actuals	Carry Forward	Budget	Forecast	Budget	Budget	Budget	Note
	(\$000's)								
Solid Waste Facility Upgrades	-	272	-	-	-	-	-	-	
Submarine Line Contracted Costs	1,000	98	2,724	1,000	1,000	1,000	9,000	21,130	
Surface Replacements	-	-	-	-	-	405	300	225	
Sustainability Coordinator	120	127	-	140	140	-	-	-	
SWMP Implementation	-	-	90	-	-	-	-	-	
Tommy Forrest Ball Park Upgrades	-	15	-	-	-	-	-	-	
Traffic Lights Upgrades	70	75	28	70	98	70	70	70	
Trail Development	-	-	-	210	105	-	-	-	
Transfer Station & Cell Access Improvement	-	-	99	-	-	-	-	-	
W&S Federal Funded - PAVING - ICIP	-	-	-	-	585	-	-	-	
Water & Sewer Infrastructure Replacement	4,750	3,972	213	4,225	3,853	-	100	2,000	
Water & Sewer Replacement - PAVING	-	506	109	-	109	-	-	-	
Water Licence Project- Fiddler's Lake Treatment System Projects	-	-	-	-	-	400	1,065	1,050	
Water Licence Project - Landfill Leachate Retention and Treatment	-	-	-	-	-	430	2,770	-	
Water Licence Projects - Solid Waste Management	-	-	-	-	-	50	150	100	
Water Treatment Plant Pellet Boiler	-	-	361	2,500	361	-	-	-	
Webcasting	-	79	106	-	106	-	-	-	
Weigh Out Station At SWF	-	170	-	-	100	-	-	-	
Wetland and GSL Monitoring	-	-	115	-	115	-	-	-	
Wildland Fire Mitigation Emergency Measures	-	80	-	-	-	-	-	-	
Wireless Infrastructure	75	1	74	-	74	-	-	-	
YKCA Upgrade - Contracted Costs	210	102	148	-	148	-	-	-	
Total Capital Projects	15,501	13,799	19,373	42,187	43,711	67,885	38,614	39,304	

CAPITAL FUND – 2023 Capital Projects

Capital Projects	2023 Budget (\$000's)	Formula Funding (\$000's)	Canada Community- Building Fund (\$000's)	Other Grants (\$000's)	Community Public Infrastructure (\$000's)	IT Reserve (\$000's)	Mobile Equipment Replacement Reserve (\$000's)	Major Community Facility Reserve (\$000's)	User Fees (\$000's)	Land Fund (\$000's)
Accessibility Implementation	595	(595)	-	-	-	-	-	-	-	-
Aquatic Centre	43,057	(21,916)	(19,041)	-	(1,349)	-	-	(751)	-	-
Asset Management	340	(340)	-	-	-	-	-	-	-	-
Curling Rink Brine Line Replacement Sand Floor	615	-	-	-	(615)	-	-	-	-	-
Fire Hall Equipment	95	(95)	-	-	-	-	-	-	-	-
Firehall Renovations/ Expansion	4,449	(4,449)	-	-	-	-	-	-	-	-
Fleet Management	1,882	-	-	-	-	-	(1,882)	-	-	-
Information Technology Infrastructure Renewal	327	-	-	-	-	(327)	-	-	-	-
Lagoon Sludge Removal	2,800	-	-	(2,100)	(700)	-	-	-	-	-
Land Fund Capital Projects	900	-	-	-	-	-	-	-	-	(900)
Lift Station #1 Replacement	3,260	-	-	(2,445)	(815)	-	-	-	-	-
Outdoor Recreation	165	-	-	-	(165)	-	-	-	-	-
Park Equipment Replacement	250	-	-	(80)	(170)	-	-	-	-	-
Patching Program	330	-	-	-	(330)	-	-	-	-	-
Paving Program	6,465	-	-	(3,559)	(2,906)	-	-	-	-	-
Submarine Water Supply Line Replacement	1,000	-	-	(750)	(250)	-	-	-	-	-
Surface Replacements	405	-	-	-	(405)	-	-	-	-	-
Traffic Light Upgrades	70	-	-	-	(70)	-	-	-	-	-
Water Licence Project - Fiddler's Lake Treatment System Projects	400	-	-	-	-	-	-	-	(400)	-
Water Licence Project - Landfill Leachate Retention and Treatment	430	-	(430)	-	-	-	-	-	-	-
Water Licence Projects - Solid Waste Management	50	-	-	-	-	-	-	-	(50)	-
Total Capital Projects	67,885	(27,395)	(19,471)	(8,934)	(7,775)	(327)	(1,882)	(751)	(450)	(900)



CAPITAL FUND – 2023 Capital Projects

Department CS Community Services
Project 50036570 Accessibility Implementation
Division Facilities

- Installing ramps in Council Chambers, the Somba K'e Park washrooms, and the Wildcat Café;
- Improving City Hall stairwells; and
- Making City Hall elevators more accessible.

Plans for 2023 - 2025 include:

- Installing accessible parking pads, multipurpose courts, picnic tables and benches at a variety of parks;
- Developing an accessible basketball court;
- Continuing to upgrade facility components such as accessible door openers, lighting and exit signs;
- Providing accessible amenities at additional playgrounds;
- Installing accessible washroom sinks;
- Developing accessible signage;
- Adding accessible parking spaces and curbing; and
- Continuing the development of accessible paths, benches, and tables at playgrounds and parks.

The drivers for this project are to increase our level of service in an efficient way, to possibly increase revenue due to additional user groups being able to use the areas, to ensure that we are using the best practices for the industry for operation and accessibility compliance to reduce risk and increase community trust and to reduce our health and safety and operational risks

Operational Impact

There will be no additional O&M impact for some of the work; however, additional playgrounds and trails/pads will create additional maintenance and upkeep requirements.



CAPITAL FUND – 2023 Capital Projects

Department Project CS Community Services
55006570 Aquatic Centre

Division Director

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	43,057,000	3,588,000	
Funding			
Formula Funding	21,915,986		
Canada Community-Building Fund	19,040,800	2,847,000	
Community Public Infrastructure Funding	1,349,214	741,000	
Reserves	751,000		
<i>Total Funding</i>	43,057,000	3,588,000	

Purpose Description

The development of the Aquatic Centre is a multi-year project that commenced in 2018 and will be completed in the third quarter of 2024.

Background

On November 23, 2021, a referendum was held to determine if the City could borrow funds to finance the development of the Aquatic Centre. The result of the referendum was support for the City to borrow up to \$10,001,000. With the support of the community to proceed with the Aquatic Centre secured, work commenced on finalizing the facility design.

The Design Build team, led by Clark Builders, mobilized to the site and commenced the necessary site work, including blasting, in May of 2022. Further key milestones were met in 2022 including the completion of the facility design that includes the following Council-approved components:

- 25-metre, three-lane leisure pool with beach entry
- 25-metre, eight-lane lap pool
- Amusement park type water slide and tot slide
- Lazy river
- Storage/office space for youth groups
- Splash Pad
- One-metre and three-metre diving boards
- Steam room and therapy pool
- Lease space
- Canteen/concession space

CAPITAL FUND – 2023 Capital Projects

Department Project CS Community Services
55006570 Aquatic Centre

Division Director

- Multi-purpose rooms
- Office space
- Universal change rooms
- Spectator seating

Further milestone accomplishments include the completion of two public consultations on accessibility design issues in March and June of 2021, and the completion of consultations with local Indigenous organizations in September of 2022.

The project budget is as follows:

Design Build Contract	\$67,735,329
Consultant Contract	\$640,226
5% Contingency	\$3,386,766
Project Total	\$71,762,321

The project is on track to meet the anticipated completion target in the third quarter of 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 Aquatic Centre Design Plan indicates the annual net operating expenses for the facility will be \$1,755,094.



CAPITAL FUND – 2023 Capital Projects

Department	GG General Government	Division	Asset Management & GIS
Project	45006570 Asset Management		

Previous Work

- In 2006, FSC Architects & Engineers were contracted to conduct an Infrastructure Needs Assessment. The study inventoried many of the City's capital assets, assessed their condition, determined their replacement costs, and quantified deferred maintenance.
- In 2008, changes to the Public Sector Accounting Board's standards introduced requirements for municipalities to report asset depreciation, and so the City developed mechanisms to track estimated asset values for this purpose.
- In 2010, the City established an Asset Management Task Force to oversee the completion of another inventory of assets and to assess their condition, maintenance, and replacement needs.
- In 2017, a study of fleet asset replacement schedules and funding was completed. In addition, the City received funding from the Federation of Canadian Municipalities to provide training for some staff around integrating the principles of levels of service, climate adaptation, and life-cycle cost analysis into its asset management practices.

These undertakings achieved some limited success in specific functions within the organization, particularly with respect to fleet and linear infrastructure. However, the 2006 and 2011 reports essentially sat on the shelf as the organization lacked internal resource capacity to advance more structured asset management practices.

Roadmap Process

In late 2018, Administration assembled an Asset Management Working Group to establish formalized corporate-wide asset management processes and practices at the City. The group utilized a competitive process to seek external expertise that could leverage the experiences, successes, and lessons-learned from other municipalities. In May of 2019, Dillon Consulting was awarded a contract to assess the usability of the previously-compiled data, compare City practices to best practices, and develop an Asset Management Roadmap to guide the City's next steps.

Dillon consulted with members of the Working Group to assess the current status of asset management relative to the key competencies in FCM's asset management readiness scale, plus a sixth area to reflect the importance of measuring levels of service and managing risk. These competency areas, and related asset management outcome areas, are shown in *Gallery 1 – Asset Management Key Competencies*.

Based on staff interviews, table-top exercises, and documentation reviews, the evaluation process rated the City's state in each of these competencies on a scale of one to five, where one describes an organization just starting out with asset management and five is considered an organization on the leading edge.

As shown in *Gallery 2 – Asset Management Readiness*, when the City's overall rating was determined it showed the City's current state at just beyond Awareness. A visioning exercise expressed the staff's intention to position the City at the Excelling end of the continuum, however, after considering the tasks and resources required to advance asset management, a conservative interim vision state between Establishing and Competence was identified, although if the City is able to complete all of the work identified in the Roadmap at the end of its five year path the organization could be at the high end of Competence.



CAPITAL FUND – 2023 Capital Projects

Department	GG General Government	Division	Asset Management & GIS
Project	45006570 Asset Management		

The consultants looked at the City’s current asset management state and identified the work that needs to be done to move the organization to its sought-after state. It organized this work into a five-year timeframe, centered around a theme for each year, and developed a Roadmap to guide the City; it was presented to the Governance and Priorities Committee in August 2019.

Roadmap

The original Roadmap assumed that an asset management leadership position would be filled in early 2020. However, this was unavoidably delayed and therefore the roadmap has been adjusted to reflect a later-than-planned start date. While valuable progress continues to be made, the impact of COVID on contractor movement and staff priorities as well as staff turnover in 2022 has continued to delay progress from the original timeline. The revised Roadmap, including progress to date, is summarized in *Gallery 3 – Roadmap Overview*.

Resources

The original Roadmap identified the need for almost 3,000 days of work and suggested that a considerable portion of it be done by external resources, in part because the City did not have internal resources to dedicate to it, and in part to allow the City to benefit from specialized expertise.

Aware of the need for strong internal guidance for an initiative as wide-ranging as Asset Management, the City created an AM leadership position in 2020 to provide direction, oversight, and coordination of its Asset Management activities. It was filled in late 2020, and over the course of 2021 it was found that several of the activities expected to use external resources were able to be completed internally by the new division of Asset Management & GIS, with support from the Asset Management Steering Committee. It is expected that this trend will continue. It was also found that using internal resources improved internal knowledge of, skill in using, and ownership of asset management practices. Moving forward the intent is to utilize internal resources as much as possible to further embed asset management practices and knowledge.

The roadmap estimates did not include the amount of time that would be required to find, record, enter, and track the additional data that will be managed and analyzed on an ongoing basis to support the asset management processes.

To support this collection and processing of data, as well as better facilitate the use of internal resources, an additional asset management position was approved for 2022, funded as part of this capital project. This role is anticipated to be filled in early 2023.

Rationale

Council has clearly articulated the importance of asset management by establishing “Develop and resource an asset management plan to guide long- term decision-making” as a key objective for their 2019 – 2022 term. This reflects how important asset management is to the City: it can help ensure effective stewardship of its increasingly valuable and complex assets, timely mitigation of the infrastructure gap, compliance with funding requirements, increased transparency and accountability, and can support better-informed decision making.

Previous attempts at formalizing corporate-wide asset management practices at the City have stalled due to lack of resources. Therefore, it is critical that this initiative be adequately resourced if it is to be successful.

CAPITAL FUND – 2023 Capital Projects

Department GG General Government
Project 45006570 Asset Management

Division

Asset Management & GIS

Operational Impact

While additional operating resources will be required to implement and sustain more structured asset management practices, properly maintained and managed assets will contribute to overall lower life-cycle costs and longer-serving assets, resulting in efficiencies and cost savings.



CAPITAL FUND – 2023 Capital Projects

Department Project GG General Government
45006570 Asset Management

Division

Asset Management & GIS

Gallery

Competency Areas	Asset Management Outcome Areas
Policy & Governance	Policy & Objectives Strategy & Framework Measurement & Monitoring
People & Leadership	Cross-Functional Groups Accountability Resourcing & Commitment
Data & Information	Asset Data Performance Data Financial Data
Planning & Decision-Making	Documentation & Standardization Asset Investment Plans Budgets
Contribution to Asset Management Practice	Training & Development Knowledge Sharing – Internal Knowledge Sharing – External
Asset Management Practices, Processes, and Procedures	Risk Management Levels of Service (LOS) Asset Management Plan

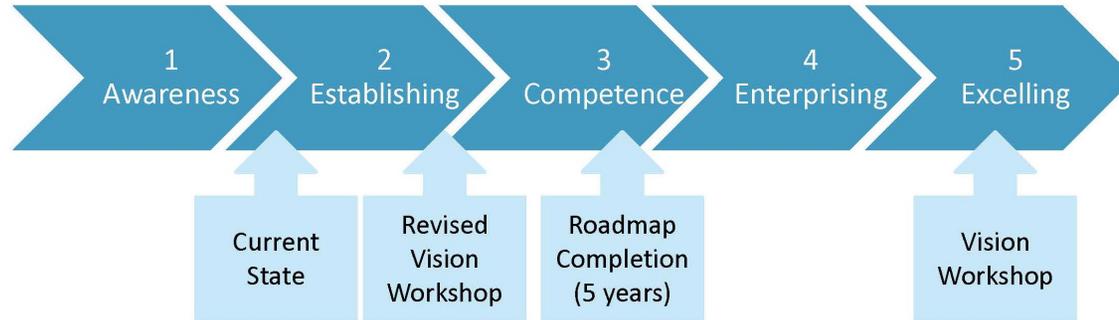
Gallery I – Asset Management Key Competencies

CAPITAL FUND – 2023 Capital Projects

Department Project GG General Government
45006570 Asset Management

Division Asset Management & GIS

Gallery



Gallery 2 - Asset Management Readiness



CAPITAL FUND – 2023 Capital Projects

Department Project GG General Government
45006570 Asset Management

Division

Asset Management & GIS

Gallery

Year	Theme	Description of Opportunities
Year 0 (2020/2021)	Raising awareness	Asset management is a team sport requiring broad support across the organization. In 2021, Council approved the City's Asset Management Policy, and an Asset Management Strategy governance structure was drafted for senior leadership teams approval prior to presentation to Council in 2022.
Year 1 (2021)	Building the base	In 2021, foundational work included the formation of an Asset Management Steering Committee with representation from seven divisions, and the development of several key elements including an Asset Registry tool and supporting Directive, condition and criticality standards, a Levels of Service framework and template, and a Corporate Risk Matrix.
Year 2 (2022)	Building Alignment & Asset Performance	In 2022, Asset Management entered a critical phase where the policy, directives, procedures, and tools that have been developed began to roll-out within select Divisions. The core concepts of Asset Management were used to update administration's approach for Capital Prioritization. The 10-year capital plan for Fleet assets is now coming directly from the Asset Registry. The condition of roads and some facilities were assessed in order to establish a baseline for evidence-based service and capital planning. Analysis of operational data has identified improvements in data collection and asset performance. Self-assessment using FDM Asset Management Readiness Assessment places our current maturity at 2 out of 5, equivalent to "Establishing".
Year 3 (2023)	Asset Performance & Asset Management Plans	In Year Three there will be a continued focus on opportunities that develop and align existing processes with asset management practices, collect asset condition information, and develop asset management plans to incorporate the practices and information from preceding years, and capture a high level state of infrastructure.
Year 4 (2024)	Integration with Demand Management	In Year Four, master planning will be undertaken to complete the pictures of service and asset requirements. Work will continue to develop asset management plans across all City assets and to enhance those completed with validated asset strategies.
Year 5 (2025)	Operations and recalibration	In Year Five, focus will shift towards maintenance improvements and the Roadmap implementation will be reviewed and recalibrated based on new information.

Gallery 3 – Roadmap Overview

CAPITAL FUND – 2023 Capital Projects

Department CS Community Services **Division** Facilities
Project FC0030 Curling Rink Brine Line Replacement Sand Floor

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	615,000		
Funding			
Community Public Infrastructure Funding	615,000		
Total Funding	615,000		

Purpose

To replace the brine lines in the Curling Rink to reduce the chance of leaks.

Background

The Curling Rink is an aging facility that is used by youth and adult competitors in leagues ranging from Learn to Curl to National Competitions.

Brine lines become brittle over time and leaks can ruin a sheet of ice for a season. The brine lines at the Yellowknife Curling Club have failed in a couple places during the last two seasons, which indicates that the lines are now brittle and in need of replacement.

Brine lines are part of the refrigeration system used to keep an ice surface solid. The lines are located beneath both the ice surface and the sand pad below. Brine leaks are very disruptive causing ice to melt in sections. The location of the lines means that they cannot be repaired mid-season without taking the ice out, digging up the sand, making repairs and starting the ice making process over. The complete replacement of the lines in the off season should ensure many years of uninterrupted play on high quality ice.

This project will be carried out by professional ice/refrigeration contractors to ensure the safety of the project and to meet current specifications and best practices for ice making and ice plant maintenance. This work will be scheduled outside of the curling season so it will have little or no impact on user groups. The City has upgraded the two refrigeration plants, added safety systems to deal with ammonia and are now moving on to brine safety measures that will keep ice making efficient, the ice maintainable and the facility safe for staff and users. This project reduces the risk of an environmental spill and increases community trust that we are operating efficiently and safely. The project will also allow the sand pads to be leveled and graded appropriately to improve the quality of the ice and ease of maintaining the ice. This project eliminates many small fixes that are costly, reduce customer satisfaction due to ice sheets closing and hours spent on repairs in an inefficient, ad hoc fashion.

The drivers for this project are to maintain a City asset and level of service in an efficient way, ensure that the City is using the best practices for the industry for operation and regulatory compliance and reduce our health and safety and operational risks.



CAPITAL FUND – 2023 Capital Projects

Department CS Community Services
Project FC0030 Curling Rink Brine Line Replacement Sand Floor

Division Facilities

Operational Impact

No O&M impact.

CAPITAL FUND – 2023 Capital Projects

Department PS Public Safety **Division** Fire & Ambulance
Project 63007615 Fire Hall Equipment

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	95,000	58,000	58,000
Funding			
Formula Funding	95,000	58,000	58,000
<i>Total Funding</i>	95,000	58,000	58,000

Description

Purpose

To maintain the preparedness of the Fire Division to meet established Level of Service and maintain response capabilities with key equipment resources being functional and reliable to protect the safety of our workers and our citizens. Stewardship of physical resources entrusted to us by our citizens is a core principle of Public Safety.

Background

In 2023 two vital pieces of equipment will be acquired: the SCBA Air Compressor and Fill Station and a power ambulance cot.

1. The SCBA (Self-Contained Breathing Apparatus) air compressor and fill station equipment, purchased in 2004, fills SCBA air cylinders with compressed breathing air. The current equipment has reached the end of manufacturer life cycle.

The self-contained breathing apparatus, or SCBA, is the foundational personal protective equipment providing the greatest amount of airway protection from toxic atmospheres at emergencies. This equipment is essential to comply with Occupational Health and Safety Regulations of the NWT Safety Act and to meet the Fire Division Level of Service.

2. The power ambulance cot with loading system will replace a manual cot to provide three key benefits: simplifying lifts for greater safety of patient and staff, greater stability and comfort for the patient during movement, and protecting staff from lifting and time-loss injuries. This further supports the Emergency Medical Services (EMS) program with ambulance standardization and inter-operability with the current power cot installed in the newer ambulance. This purchase is the continuation of the Fire Division program to migrate from manual cots to power cots.

The power ambulance cot complies with the Occupational Health and Safety Regulations of the NWT Safety Act, which requires the employer to provide and maintain systems of work and working environments that protect the safety of the worker, including musculoskeletal injuries. The replacement of a manual cot addresses the risk of exacerbating injuries incurred by patients during transfer and transport to the hospital.



CAPITAL FUND – 2023 Capital Projects

Department PS Public Safety
Project 63007615 Fire Hall Equipment

Division Fire & Ambulance

In 2024 a Quick Shelter for preparedness equipment will be acquired. It will be versatile enough for emergency management program, mass causality management, hazardous materials incidents, and rehabilitation support for staff.

An identified gap in the City's community risk reduction is the capacity to deploy quickly a shelter to protect potential victims for small/large scale emergencies on site, to protect and support staff or victims with decontamination procedures, and to rehabilitate City staff during prolonged emergencies or events.

A shelter supports staff capacity to address any of the risks that can quickly overwhelm our local emergency resources and to minimize the impact of the emergency on the victims for maximize success of the outcome.

The plan for 2025 is to replace tele-communicator workstations, which will be at their end-of-life. Ergonomic workstations maintain the Occupational Health and Safety Regulations of the NWT Safety Act for the employer to provide conventional ergonomic standards that promote health and safety while recognizing the value of movement during the workday to prevent musculoskeletal injury risk and associated costs, and worker satisfaction.

Operational Impact

2023

The cost of SCBA compressor and fill station replacement will not increase O&M costs, as there will be no change in the maintenance and air testing schedule from the previous equipment. There are foreseen improvements with maintenance and power costs with newer efficient equipment.

The cost of power ambulance cot replacement will not increase O&M costs, as there will be no change in the maintenance schedule from previous equipment.

2024

There will be no O&M cost impact for the addition of the equipment.

2025

There will be no O&M cost impact for the addition of the equipment.

CAPITAL FUND – 2023 Capital Projects

Department PS Public Safety **Division** Fire & Ambulance
Project 63046570 Fire Hall Renovations/Expansion

Budget			
	2024	2024	2024
	\$	\$	\$
Expenditures	4,449,060	2,550,940	
Funding			
Formula Funding	4,449,060		
Community Public Infrastructure Funding		2,550,940	
<i>Total Funding</i>	4,449,060	2,550,940	

Description

Purpose

To expand and renovate the existing Fire Hall to accommodate current staffing levels and equipment required to meet the needs of the programs that support the Fire Division Level of Service adopted by Council.

Background

On February 8, 2021, Council approved Option 1A (renovation/addition to the existing Fire Hall) from the 2020 Fire Hall Study, as the most feasible and fiscally responsible approach for addressing requirements to improve the facility's condition and its functionality. Council also directed that Administration bring forward a capital request to implement a Fire Hall Renovation/Expansion project as part of Budget 2022.

The 2020 Fire Hall Study listed the Class D cost estimate to renovate and expand the existing facility. Estimated costing was expected to fall within the standard competitive bid range for contractors with local conditions (labour, materials, construction schedule, and market conditions at the time) causing the actual cost of the work to be outside of industry norms.

In 2022, the City conducted a competitive Request for Proposals opportunity for consulting services for the project management and detailed design of the expansion and renovation, including a review and refinement of the construction requirements, timeline, and construction costs. To maintain functionality and operational readiness of the current Level of Service, the scope of the project was phased into two parts; an addition and then the renovation of the existing structure.

Consulting and design services started in September 2022, with a construction tender to be awarded in early 2023, construction beginning mid-2023, with a completion date at the end of 2024.

Given the current market conditions, construction costs are now expected to be substantially higher than those identified in the 2020 Fire Hall Building Study, as reflected in the revised budget allocations.



CAPITAL FUND – 2023 Capital Projects

Department PS Public Safety
Project 63046570 Fire Hall Renovations/Expansion

Division Fire & Ambulance

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 design will include options to increase energy efficiency, thus reducing increases to operation and maintenance costs.

CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
71507801 Fleet Management

Division Fleet Management

		Budget		
		2023	2024	2025
		\$	\$	\$
Expenditures		1,881,885	3,213,624	1,446,772
Funding				
Reserves		1,881,885	3,213,624	1,446,772
	Total Funding	1,881,885	3,213,624	1,446,772

Description

Purpose

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

Background

The reliability of the City's Mobile Equipment Fleet must be maintained to meet the service levels required. The City has a fleet of 128 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 26 stationary engines for emergency power generation and fire pumping capacity. The current replacement value of the City's fleet is \$18.7M.

Fleet management practices allow the City to maximize life cycles and 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 affect the delivery of City services such as snow removal or water/sewer repairs.



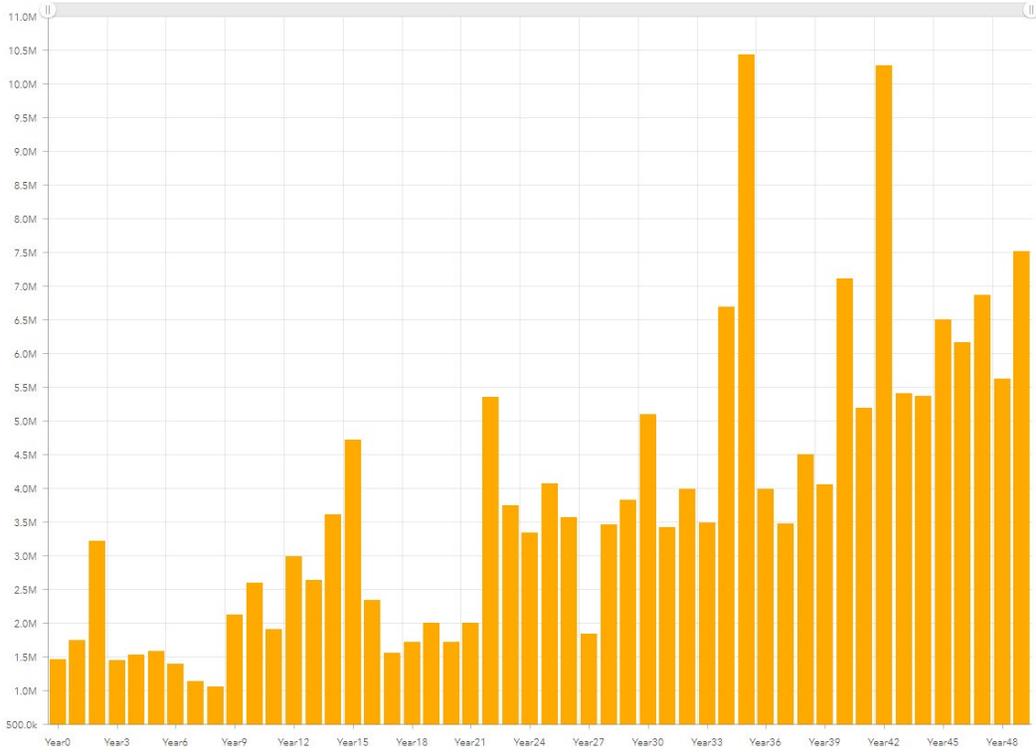
CAPITAL FUND – 2023 Capital Projects

Department PW Public Works & Engineering
Project 71507801 Fleet Management

Division Fleet Management

Gallery

50 Year Forecast



Number of Assets	128
Current Replacement Value	18.7M
Annual Average (10yr Forecast)	1.7M
Annual Average (50yr Forecast)	3.8M

Gallery 1 - 50 Year Forecast

CAPITAL FUND – 2023 Capital Projects

Department Project GG General Government
44007600 Information Technology Infrastructure
Renewal

Division Information Technology

		Budget		
		2023	2024	2025
		\$	\$	\$
Expenditures		327,000	400,000	295,000
Funding				
Reserves		327,000	400,000	295,000
	Total Funding	327,000	400,000	295,000

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

Annual investments in the City's Information Technology infrastructure are critical to the continued reliable delivery of essential services to both staff and citizens. These investments fall into the following four main technology categories at the City: servers and storage, network infrastructure, printers and multifunction devices, and client hardware.

Servers and Storage

The City's physical and virtual server infrastructure supports delivery of core applications and services to staff and residents. As applications and services evolve and expand, the requirement for more intensive storage, memory and CPU usage puts constant pressure on the need to continually improve and modernize the organization's infrastructure. This project will continue to maintain robust systems through coordinated renewal of this vital infrastructure.

Continual improvements to service delivery requires more and more technology resources to meet these needs. Modernizing and updating services and systems that deliver more advanced mapping, financial applications, transit, permitting, security, emergency radios etc., add increased dependency on the City's server and storage infrastructure. To keep pace with these demands, servers need to remain current and reliable.

Several years ago, server virtualization technology was adopted to meet the demands brought on by this increased modernization of services. This technology allows for quick deployment of servers as needs arise without the need to purchase additional hardware. While the requirement to rely on physical servers has diminished it cannot be eliminated entirely. So as some services and applications are virtualized there are some that will only operate on a single physical server. Therefore, there is still a need to replace physical servers as they reach their end of life. During the term of this budget the Information Technology Division will use the allocated funds to continue to grow the capacity of this virtualization technology, replace server equipment that is nearing its end of life and maintain an inventory of spare parts to ensure replacements are available should failures occur.



CAPITAL FUND – 2023 Capital Projects

Department Project	GG General Government 44007600 Information Technology Infrastructure Renewal	Division	Information Technology
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As more and more services are automated, the requirement for data storage and redundancy also continues to grow. Additional data collection and retention requirements and increased attention to protecting privacy mean the City must constantly invest in its infrastructure to ensure adequate capacity.

Network

The City's computers, servers, printers, security cameras, streetlights, SCADA equipment, server and storage infrastructure, emergency radio system and telephones are connected by the network, and reliable and efficient connectivity is vital to the City's operations. Planned and consistent investments in this network allow the Information Technology Division to ensure this network remains robust and reliable, and provides redundancy as the City delivers more and more automated services.

The City's Ethernet network is interconnected by leased and City-owned fiber circuits, wireless point-to-point and microwave technologies distributed across 14 sites (Gallery 1). At each site, the network connects numerous devices, ensuring that staff, citizens, and stakeholders have consistent and reliable access to applications, documents, data, printers, and the internet.

The Public Works Department's traffic control systems are also interconnected at 19 intersections throughout the city. These systems manage 76 traffic lights and traffic detection cameras that ensure the efficient flow of traffic. With additional traffic lights and cameras on the horizon, this complement will continue to grow (Gallery 2).

In 2018, wireless connectivity was established to the City's Pump Houses and Lift Stations. This added another 23 network devices to the City's infrastructure (Gallery 3).

Scheduled replacement of key network components helps mitigate unplanned network outages and ensures the stability of this equipment while maintaining vendor support. Recent investments in city-owned point-to-point network infrastructure and dark fiber connections across the network have reduced reliance on leased commercial connection infrastructure and resulted in approximately \$85,000 in annual operational savings.

Investments in next-generation virus protection, intrusion protection devices, firewalls, and email scanning and filtering systems help protect the City's information technology infrastructure. In 2019, the Information Technology Division embarked on a plan to assess its perimeter defenses and lay the groundwork for a progressive information technology security strategy. As a result, there is an enhanced focus on how information technology infrastructure and assets are protected. As the risk of increasingly sophisticated threats become more prevalent, initiatives like ongoing security awareness training for all staff, periodic phishing campaigns, monthly vulnerability assessments, penetration testing, annual security profile reviews and disaster recovery plans have been implemented. Enhanced monitoring of critical systems and services has also resulted in more proactive and efficient incident management leading to fewer unexpected events that could cause interruptions in the delivery of services to residents and stakeholders.

CAPITAL FUND – 2023 Capital Projects

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

Printer and Multifunction Devices

While the City has reduced the number of printers across the organization, there is still the need to maintain a fleet of printers and multifunction devices to meet printing, scanning, and copying requirements in a cost-effective manner. This fleet of devices is replaced based on manufacturer's recommendations and warranty requirements that maximize lifespan, reduce costs, and ensure reliability. Devices are redeployed across the organization when appropriate to extend lifespan and maximize their utility.

Client (Staff) Hardware

The City's Information Technology Evergreen Strategy prescribes renewals for desktops, laptops, docking stations, tablets, cellphones, and monitors. These devices are replaced on a regular basis to ensure maximum useful life and reduce support and maintenance calls and service interruptions as these devices age. In addition, more specialized equipment like emergency radios, digital cameras, conference and desk telephones, as well as projectors and receipt printers are replaced as required.

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.

Reliable and efficient Information Technology infrastructure is at the core of delivering essential services to residents and stakeholders. Disruptions to this infrastructure can have serious consequences on the delivery of these services and the health and safety of residents.

Servers and Storage

Allocating server resources and storage requirements to match each vendors' recommendations ensures applications will perform as expected.

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 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.

Network

The City's network is vital to its operations and even short service interruptions have significant impacts on service delivery and employee productivity. Scheduled critical network infrastructure replacements significantly reduce unexpected downtime, accommodate growth, provide stability and ensure vendor support and maintenance for the life of the equipment. 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 more frequent interruptions or long-term outages while replacement equipment is sourced at potentially higher costs. These failures will interrupt many aspects of City operations, and potentially jeopardize the health and safety of staff, citizens, and visitors.



CAPITAL FUND – 2023 Capital Projects

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

Printers and Multifunction Devices

While efforts to reduce printing and copying are encouraged, there is still a requirement to print documents within legislated timeframes and this requires that the fleet of printers and multifunction devices is maintained to avoid delays. These devices also allow for the scanning of paper documents so they can be retained in the City's document management system.

Client Hardware

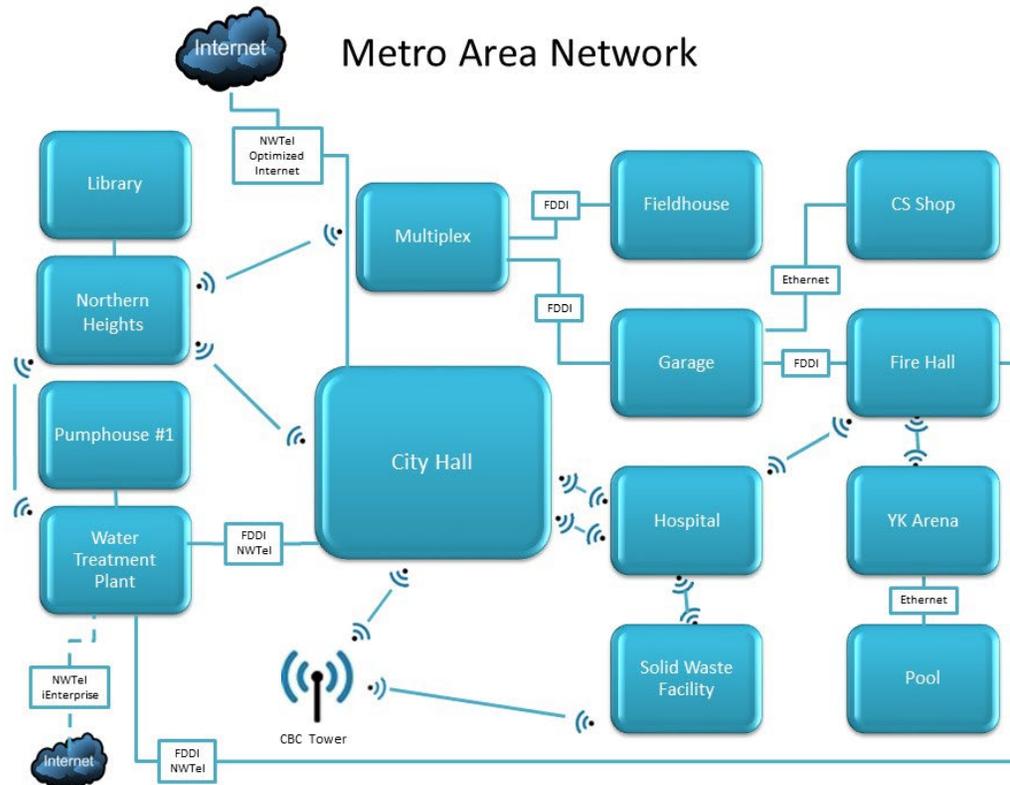
Staff across the organization rely on technology to complete their work and deliver programs and services. The City's fleet of business-class computers and laptops are expected to run multiple resource intensive applications and systems. Planned and scheduled replacements of these devices maintain warranty and support from vendors and reduce unexpected downtime for staff. Some devices are also exposed to harsh elements and working conditions and as a result may require replacement more frequently.

CAPITAL FUND – 2023 Capital Projects

Department Project GG General Government
44007600 Information Technology Infrastructure
Renewal

Division Information Technology

Gallery



Gallery 1: Metro Area Network



CAPITAL FUND – 2023 Capital Projects

Department Project

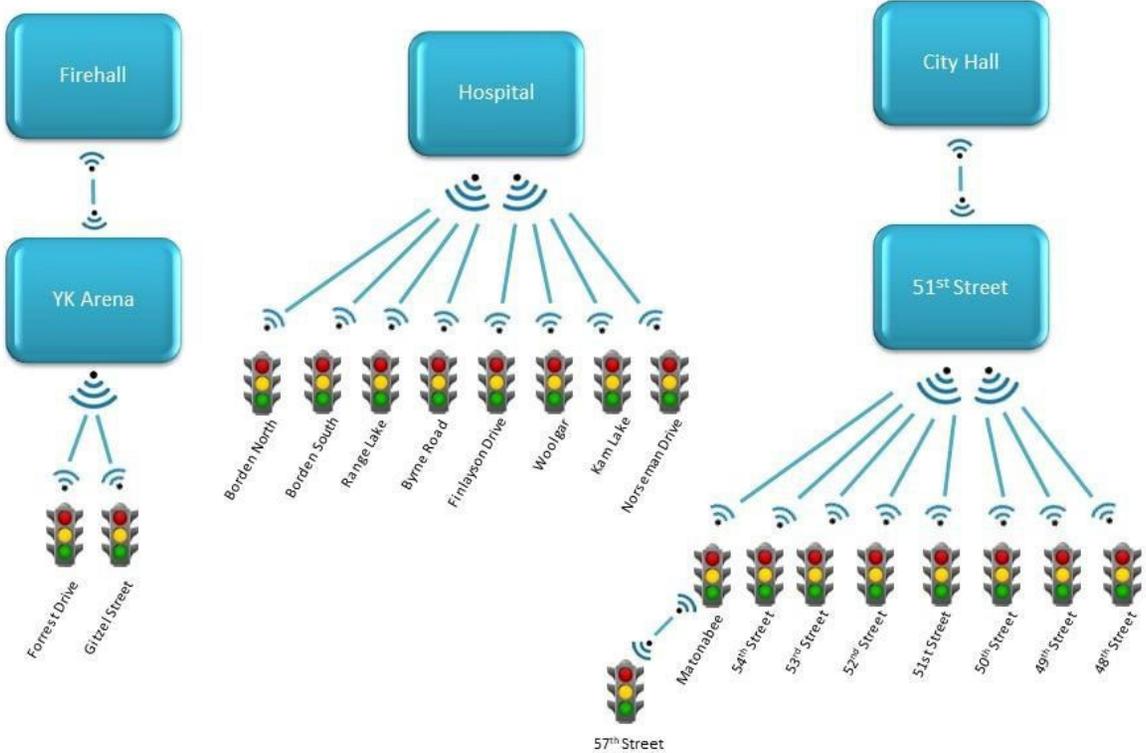
GG General Government
44007600 Information Technology Infrastructure
Renewal

Division

Information Technology

Gallery

Traffic Light Network



Gallery 2: Traffic Light Network

CAPITAL FUND – 2023 Capital Projects

Department Project

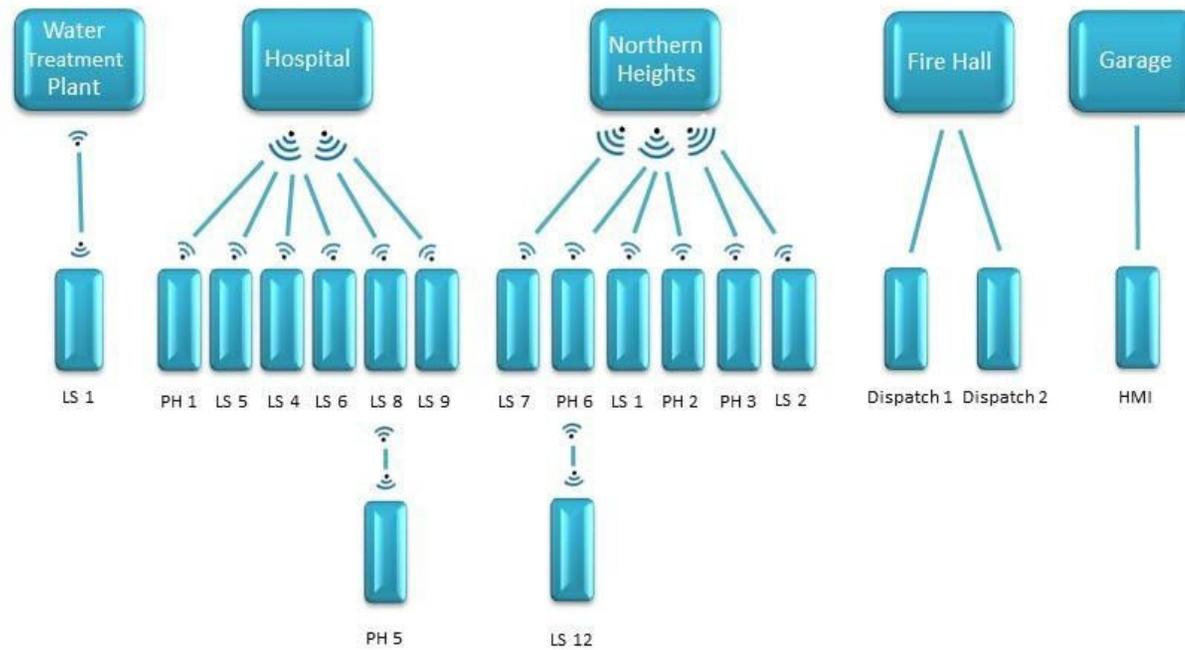
GG General Government
44007600 Information Technology Infrastructure
Renewal

Division

Information Technology

Gallery

SCADA Network



Gallery 3: SCADA Network



CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
94006575 Lagoon Sludge Removal

Division Water & Sewer

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	2,800,000	2,800,000	2,800,000
Funding			
Formula Funding		679,300	
Canada Community-Building Fund			2,800,000
Other Grants	2,100,000	1,462,500	
Community Public Infrastructure Funding	700,000		
User Fees		658,300	
<i>Total Funding</i>	2,800,000	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 Lagoon System 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 needs to be removed from the lagoon.

The buildup of sludge affects chemical and biological processes that occur in the lagoon. Due to its effect on the lagoon itself, removal of sludge should be done on a regular basis. As sludge has not been removed in many years, the project has been split into phases, with the first phase of sludge removal anticipated to take roughly 113,090 cubic metres of sludge over a two-year period.

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 moisture from the sludge. 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.

CAPITAL FUND – 2023 Capital Projects

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

The City of Yellowknife's new water licence requires the creation of a sludge management plan as part of the Sewage Disposal Facilities Operation and Maintenance Plan. Specifically, Schedule 3, Item 1 states the following regarding sludge management for the lagoon:

1. The **Sewage Disposal Facilities (SDF) Operation and Maintenance Plan** referred to in Part F, Condition SEWAGE DISPOSAL FACILITIES OPERATION AND MAINTENANCE PLAN shall include but not be limited to:

h) Sludge Management:

- i. Parameters to be included as part of the laboratory analysis of sediment samples collected as part of each desludging event, including, but not limited to, total metals, and emerging contaminants;
- ii. Production rate of sludge;
- iii. Method of sludge containment and de-watering;
 - a. Site location and maintenance;
 - b. Sludge removal methods;
 - c. Measures implemented to mitigate the generation and distribution of suspended solids;
 - d. Details on contingencies for sludge production should phosphorus treatment result in increased TSS concentrations; and
 - e. Sludge drying;
- iv. Sludge Disposal;
 - a. Sampling procedures and approvals;
 - b. Planned uses;
 - c. Disposal location(s), details and contingencies should dewatered sludge not meet criteria for reuse;
- v. Delineation of triggers for future desludging events;
- vi. Reporting; and
- vii. Figures showing site features and layout.

The anticipated project schedule is shown in the following table. It is anticipated that the first phase of sludge removal will be completed in 2026.

Project Schedule

2018	Sludge Survey Completed
2019	Preliminary Engineering, Methods, Class D Estimating
2020/21	Design – Access Road, Laydown Area, Desludging Methods
2022	Construction – Upgrading Access Road
2023	Construction – Laydown Area
2024	Sludge Removal – Phase 1, Year 1



CAPITAL FUND – 2023 Capital Projects

Department Project	PW Public Works & Engineering 94006575 Lagoon Sludge Removal	Division	Water & Sewer
2025	Sludge Removal – Phase 1, Year 2		
2026	Dewatered Sludge Testing and Relocation		

The estimated cash flow for this project is shown in the table below:

Project Cash Flow

	Carryover	2023	2024	2025	2026	Totals
Sludge Removal		2,879,638	2,462,320	2,450,518	2,808,945	11,436,050
Budget	\$2,264,455	\$2,800,000	\$2,800,000	\$2,800,000		11,499,084

Once the first phase of sludge removal is complete, evaluation of the project and planning for the removal of the remaining sludge will occur. As well, the City’s Water Licence will require the following information regarding sludge to be reported annually as part of the Annual Water Licence Report:

- i) A summary of activities conducted in accordance with the approved Sludge Management requirement of the Sewage Disposal Facilities Operation and Maintenance Plan, referred to in Part F, Condition SEWAGE DISPOSAL FACILITIES OPERATION AND MAINTENANCE PLAN – REVISED and Schedule 3, Condition 1(h) of this Licence, including:
 1. A summary of sludge management activities;
 2. Tabulated results of sludge sampling in the years when desludging is conducted; and
 3. Results of depth surveys and volume measurements.

CAPITAL FUND – 2023 Capital Projects

Department PW Public Works & Engineering
Project 94006575 Lagoon Sludge Removal

Division Water & Sewer

Operational Impact

This project will have an effect on operational requirements as an annual survey of sludge accumulation in the lagoon will be required in order to ensure that removal is completed when the sludge reaches a depth determined by this project.



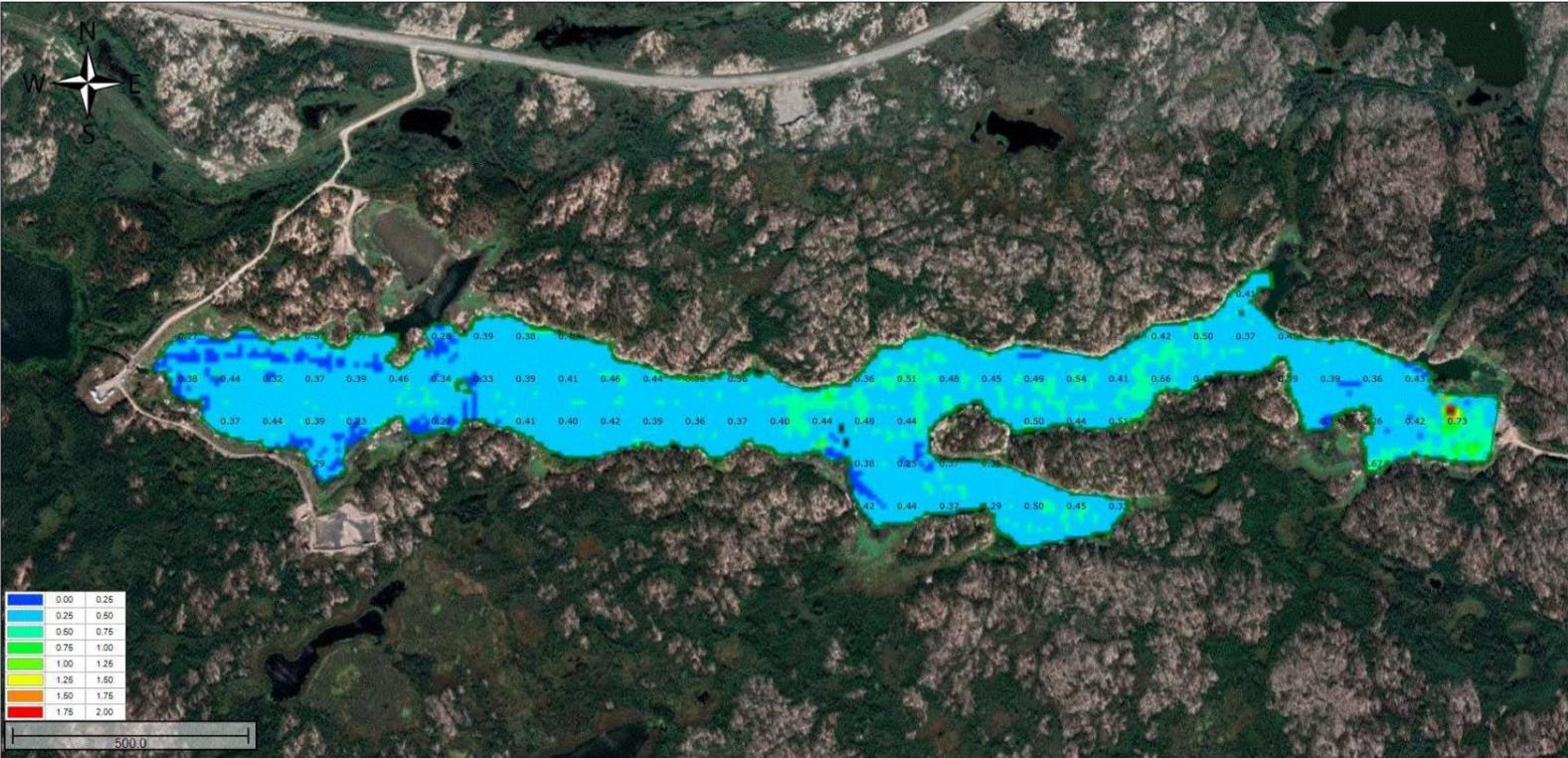
CAPITAL FUND – 2023 Capital Projects

Department PW Public Works & Engineering
Project 94006575 Lagoon Sludge Removal

Division Water & Sewer

Gallery

FIDDLERS LAGOON SLUDGE FINDINGS



Gallery 1: Fiddler's Lake Sewage Lagoon Sludge Depths

CAPITAL FUND – 2023 Capital Projects

Department Project PD Planning & Development
60046570 Land Fund Capital Projects

Division Planning & Lands

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	900,000	2,000,000	1,000,000
Funding			
Land Fund	900,000	2,000,000	1,000,000
<i>Total Funding</i>	900,000	2,000,000	1,000,000

Purpose

To continue the City's strategic land acquisition, which supports development to meet current and future needs, as well as to utilize land acquired for subdivision, infrastructure and sale to the public.

Background

Development and subdivision plans for the next three years include (not in order of priority):

- a) Creation of infill lots in Old Town, Downtown and Central Residential areas and 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;
- c) Encouraging new commercial development along Old Airport Road including consideration for municipal servicing; and
- d) New residential subdivision locations, context options (potential).

Budget allocations include engineering, surveying and some development costs for proposed lands to be resold.

2023-2024 will focus on completing Land Fund projects started in 2021-22. There are limited commercial, industrial or residential lots in the city available for purchase and development. Commercial use is to be encouraged in the Downtown and Old Airport Road areas while industrial uses are to be promoted within the Kam Lake and Engle Business District areas.

The establishment of Area Development Plans for the listed areas will provide lands for development over the planning period. Planning staff will review development needs, population growth and employment statistics in guiding the prioritization of the Area Development Plans.



CAPITAL FUND – 2023 Capital Projects

Department Project PD Planning & Development
60046570 Land Fund Capital Projects

Division Planning & Lands

Operational Impact

None.

CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
WS0017 Lift Station #1 Replacement

Division Water & Sewer

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	3,260,000	5,500,000	200,000
Funding			
Other Grants	2,445,000	4,125,000	150,000
Community Public Infrastructure Funding	815,000		
User Fees		1,375,000	50,000
Total Funding	3,260,000	5,500,000	200,000

Description

Purpose

To design and construct a new lift station on the corner of Franklin Avenue and School Draw Avenue to replace existing Lift Station #1.

Background

Lift Station #1 (LS1), constructed in 1967, is the oldest of 14 lift stations in the City of Yellowknife (City). The lift station is located near the intersection of School Draw Avenue and Franklin Avenue. The station's catchment area in 1967 consisted of the downtown area and areas east of downtown. Lift Station #7 (LS7) was constructed in 1984 to serve the downtown area, thereby reducing the catchment area for LS1 to the areas east of downtown. LS1 also receives septage hauling from Old Town, Latham Island, and N'dilo. The station originally pumped to a lagoon at Niven Lake, but was redirected in 1981 to discharge into the gravity collection system for Lift Station 5 (LS5) through a common force main with LS7. LS5 pumps to the Yellowknife Lagoon.

A condition assessment completed in 2019 recommended a complete replacement of the asset that is over 50 years old. In addition to this recommendation, there are several multi-family developments anticipated in the near future that will increase demand on this lift station making the project an essential asset replacement.

Given the City's historical investment in underground infrastructure, the City will defer underground pipe replacement projects until this project is complete. Funding earmarked for underground pipe replacement will be reallocated towards this project along with federal funding to minimize the overall impact on the capital budget.

This approach will allow the existing lift station to continue to operate while the new construction occurs, and will be decommissioned once the new lift station is operational. In addition, this approach also allows the City to redesign the entire area for functionality given the multiple uses that occur on site.



CAPITAL FUND – 2023 Capital Projects

Department PW Public Works & Engineering
Project WS0017 Lift Station #1 Replacement

Division Water & Sewer

Project Schedule

2022	Preliminary and Detailed Design
2023	Construction – Year 1
2024	Construction – Year 2
2025	Post Construction Activities

Operational Impact

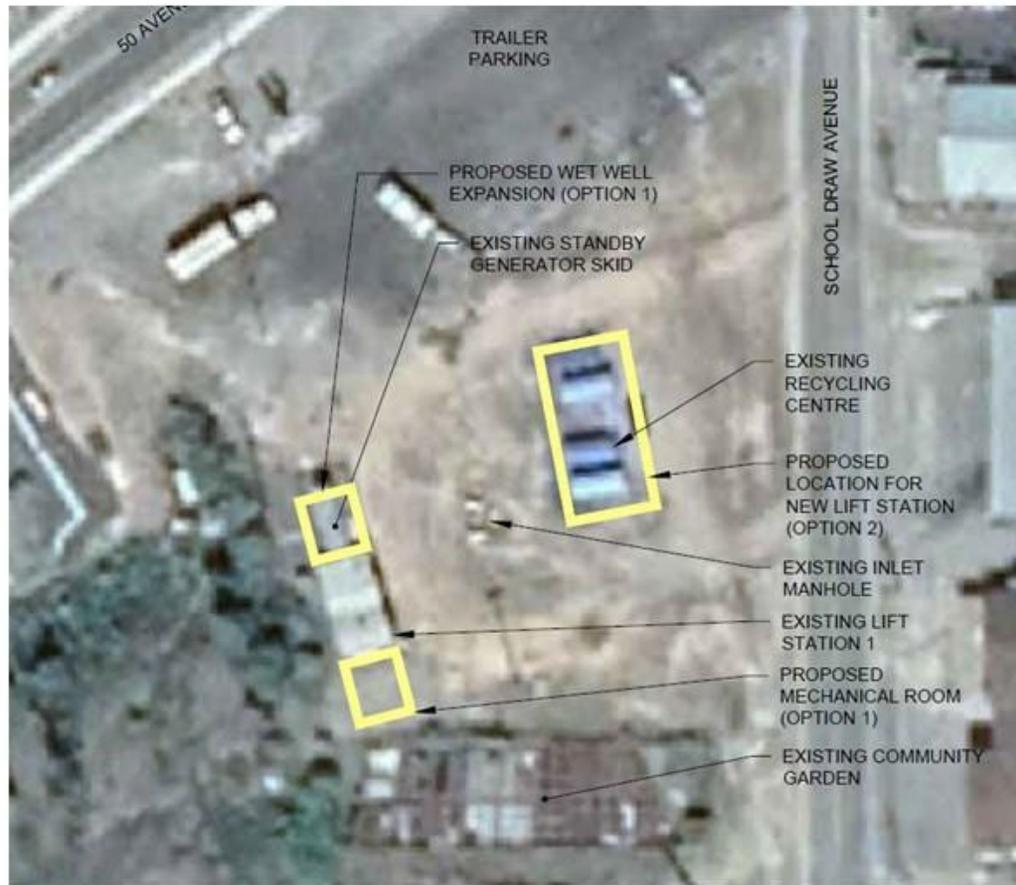
The anticipated impact to O&M budgets is expected to be minimal as it is a replacement project. However, energy savings and efficiencies are anticipated with modernized infrastructure.

CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
WS0017 Lift Station #1 Replacement

Division Water & Sewer

Gallery



Gallery 1 – Lift Station Diagram



CAPITAL FUND – 2023 Capital Projects

Department	CS Community Services	Division	Facilities
Project	FC0032 Outdoor Recreation		

that balls do not make it to the playground. Financially, there will be no additional costs for this project but the project will reduce risk, promote health and safety of playground users and increase community trust regarding the safety measures we are taking to keep children active and safe.

Projects for 2024 include the replacement of the dock in the Rotary Waterfront Park. This dock is well used by locals and visitors to access Yellowknife Bay. Through heavy use and time and weather conditions it is deteriorating and will need replacement to remain in a safe and functional use. Also in 2024, it is proposed that the well-used Niven Lake Trail be surfaced to increase the usability by all abilities. The trail is currently crushed gravel and enhancing the surface to an asphalt surface will bring it up to the same standard as the McMahon Frame Lake Trail. Both are heavily used commuter and recreational use trails. In 2024 it is also proposed that Forrest Drive Park and Parker Park turf be renovated so that they remain to the standard that the public expects of City park turf. Over time due to heavy use and the short growing season experienced in Yellowknife, turf required a major overhaul to rejuvenate the soil and new grass.

The drivers for this project are to maintain our level of service in an efficient way, ensure that we are using the best practices for the industry for operation and regulatory compliance and reduce our health and safety and operational risks.

Operational Impact

There will be a small infrastructure increase with the fencing and turf but adding the irrigation to the turf makes it virtually maintenance free for watering. The area needs to be finished so mud is not tracked onto other areas so the mowing is not much additional time when added to turf maintenance that already occurs at Hall Crescent.



CAPITAL FUND – 2023 Capital Projects

Department Project CS Community Services
53116570 Park Equipment Replacement

Division Parks & Trails

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	250,000	490,000	150,000
Funding			
Formula Funding		113,940	56,000
Canada Community-Building Fund			14,000
Other Grants	80,000		80,000
Community Public Infrastructure Funding	170,000	376,060	
<i>Total Funding</i>	250,000	490,000	150,000

Description

Purpose

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 of Yellowknife replaces older playgrounds in a rotational manner so that the playgrounds are kept up in a safe and useable state. The lifecycle of a playground is approximately 20 years. There are 20 playgrounds maintained by the City, which necessitates the replacement of one playground per year. The new playgrounds are replaced with amenities that are modern and safe, and reflect the needs of the area that they are installed in following consultations. The additions will improve safety and accessibility and maintain infrastructure in a way that ensures that City assets are replaced in a scheduled manner that prioritizes safety. Multi-sport surfaces are resurfaced to make sure they are safe, level and do not have cracks, pot holes or hold water. The courts are resurfaced in a way that reflects the City's commitment to accessibility and will include amenities that are accessible for users.

In 2023 work will include updates to the Latham Island Park Multi-Sport Court and replacement of the Forrest Drive Park playground. In 2024, the Multi-Sport courts at the School Draw Park and St. Joe's Park will be upgraded and exercise equipment will be added to the Hall Crescent Park. In 2025, the Josephine Walcer playground will be replaced.

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

CAPITAL FUND – 2023 Capital Projects

Department CS Community Services
Project 53116570 Park Equipment Replacement

Division Parks & Trails

Operational Impact

There will be little O&M impact during the term of this budget, as this is essentially a refurbishment and replacement project for existing equipment.



CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
 RS0003 Patching Program

Division Roads & Sidewalks

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	329,536	338,494	348,649
Funding			
Formula Funding		338,494	348,649
Community Public Infrastructure Funding	329,536		
<i>Total Funding</i>	329,536	338,494	348,649

Purpose	Description
----------------	--------------------

To maintain serviceability standards of city streets and sidewalks.

Background

The annual patching program identifies and repairs sections of road and sidewalks to extend the life expectancy of the street and ensure it maintains adequate serviceability standards.

Often the serviceability and life expectancy of a street can be greatly improved by fixing small localized issues as they arise and before they become too problematic.

Work completed under the annual patching program includes:

- Pavement Patches,
- Curb and Sidewalk replacement,
- Asphalt Overlays, and
- Catch Basin and Manhole Adjustments.

Operational Impact

Repairing sections of road and sidewalks reduces ongoing operational maintenance costs.

CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
76156570 Paving Program

Division Roads & Sidewalks

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures			
Paving Program	5,675,000		200,000
Water & Sewer Paving	790,000		
<i>Total Expenditures</i>	6,465,000		200,000
Funding			
Canada Community-Building Fund			200,000
Other Grants	3,558,750		
Community Public Infrastructure Funding	2,906,250		
<i>Total Funding</i>	6,465,000		200,000

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,
- Recurring maintenance costs,



CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
 76156570 Paving Program

Division Roads & Sidewalks

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

Tentative Paving Plan

	Wiley Road & Weaver Drive (Causeway to Franklin Ave.) Franklin Avenue (Bretzlaff Dr. to Weaver Dr.)
2023	Hordal Road (Spence Rd. to Finlayson Dr.) - W&S Paving Deh Cho Boulevard. (Kam Lake Rd. to Ellesmere Dr.) Kam Lake Road (Coronation Dr. to Curry Dr.)
2024	No Paving Program
2025	Engineering Services for 2026 Paving Program

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.

CAPITAL FUND – 2023 Capital Projects

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

Division Water & Sewer

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	1,000,000	9,000,000	21,130,400
Funding			
Formula Funding		2,250,000	1,104,700
Other Grants	750,000	6,750,000	15,847,800
Community Public Infrastructure Funding	250,000		1,125,500
User Fees			3,052,400
<i>Total Funding</i>	1,000,000	9,000,000	21,130,400

Description

Purpose

To replace the original submarine water supply line from Pumphouse #2 at the Yellowknife River, to Pumphouse #1 and complete the required upgrades at each facility as a result of the water line replacement.

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)



CAPITAL FUND – 2023 Capital Projects

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

Division Water & Sewer

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

Tentative Project Schedule

2022	Detail Design & Regulatory Approval
2023	Detail Design & Regulatory Approval
2024	Phased Construction – Water Line and Pump House Upgrades
2025	Phased Construction – Water Line and Pump House Upgrades
2026	Post Construction Activities

Tentative Project Cash Flow

Carryover	\$2,852,558
2023	\$1,000,000
2024	\$9,000,000
2025	\$21,130,400
2026	\$500,000
Total	\$34,482,958

CAPITAL FUND – 2023 Capital Projects

Department Project CS Community Services
FC0031 Surface Replacements

Division Facilities

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	405,000	300,000	225,000
Funding			
Formula Funding		300,000	225,000
Community Public Infrastructure Funding	405,000		
Total Funding	405,000	300,000	225,000

Purpose Description

To replace two surfaces at the Fieldhouse that are worn due to use and age. The surfaces are the playground flooring and the turf on one field. A second project to replace the other turf field will follow in 2024, so groups always have a field available during replacement.

Background

The Fieldhouse was opened in 2010 and both fields were covered with turf as soccer was expected to be the main use of the facility. Soccer still uses much of the time at the facility but other user groups also use the field surfaces. This project will include replace the turf on one field in 2023 and on the second field in 2024. The 2023 scope will also include pour-in-place rubberized flooring for the indoor playground area at the fieldhouse to replace the tiled product that is curling up as it ages and creating an uneven surface.

The current turf is nearing the end of its life and needs to be replaced as it develops wrinkles as the turf stretches with use. More modern turf options come in a panel system that eliminates many of the problems we are experiencing with the original turf with its carpet-like installation. The newer product will allow for damaged areas to be repaired as problems arise and eliminate the large wrinkles we are currently experiencing. The product includes the underlay and turf in one unit so there is no slippage between layers.

Another option for this project is to install a multi-sport type of surface that will allow for other sports like tennis, pickle ball, futsal and other uses like conference rentals etc. to occur on that field. This option could offer new revenue streams for the facility and provide a variety of ways for people to access the facility.

The City will engage with users to determine what type of surfacing is appropriate for users as both types of turf have their pros and cons but are similar in costs.



CAPITAL FUND – 2023 Capital Projects

Department CS Community Services
Project FC0031 Surface Replacements

Division Facilities

The final portion of the 2023 plan is to install pour-in-place rubber surfacing on the indoor playground to provide a long lasting, even surface that will provide a playable surface for years to come. A continuous flooring option will reduce the risk of tiles deteriorating and curling which causes tripping hazards and maintenance/janitorial concerns due to the cracks between tiles. A pour-in-place surface eliminates all the edges and thus the dirt in cracks and edges that stick up and is a thicker surface if someone falls.

The drivers for this project are to maintain the level of service in an efficient way, possibly increase revenue due to additional user groups being able to use the fields, ensure that we are using the best practices for the industry for operation and sport specific compliance and reduce our health and safety and operational risks.

2025 will see the replacement of the Somba K'e Tennis Court playing surface. The current surface is showing signs of a well-used facility with cracking, lifting and peeling. There is a need to plan for the replacement before the surface becomes a safety concern for users.

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

Operational Impact

There should be no additional operational costs and could lead to savings in maintenance and/or additional rentals or users depending on the field surface chosen.

CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
73807611 Traffic Light Upgrades

Division Roads & Sidewalks

		Budget		
		2023	2024	2025
		\$	\$	\$
Expenditures		70,000	70,000	70,000
Funding				
	Formula Funding		70,000	70,000
	Community Public Infrastructure Funding	70,000		
	<i>Total Funding</i>	70,000	70,000	70,000

Purpose

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

Background

There are 19 intersections that 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; which also includes motorcycles and bicycles. The cameras can also capture traffic data, such as vehicle type as well as vehicle speeds. However, vehicle speed data can only be used for data collection 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.

This project has been a phased approach and has been ongoing since 2013 in order to improve vehicle detection and traffic flow at signalized intersection. To date, video detection equipment has been installed at 14 intersections and countdown timers at eight intersections. Public Works recommends continuing with this project in order to improve the overall flow of traffic in Yellowknife.

In recent years, this project has also included upgrades to pedestrian crossings through the installation of countdown pedestrian timers and additional stand-alone push button crosswalks at intersections of high pedestrian traffic.



CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects

Division Water & Sewer

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures			
Fiddler’s Lake Adaptive Management Plan	300,000	850,000	1,000,000
Wetland Delineation and Great Slave Monitoring	50,000	65,000	50,000
Flow Calculation/Metering at Lagoon Control Structure	50,000	150,000	
<i>Total Expenditures</i>	400,000	1,065,000	1,050,000
Funding			
Canada Community-Building Fund			1,050,000
User Fees	400,000	1,065,000	
<i>Total Funding</i>	400,000	1,065,000	1,050,000

Description

Purpose

To meet the requirements of the City’s new water licence for evaluating the effectiveness of sewage treatment provided by the Fiddler’s Lake Treatment System.

Background

The City’s new water licence has numerous projects associated with the sewage treatment provided by the Fiddler’s Lake Treatment System. Table 1 lists the items and the associated water licence sections. These projects have been grouped for efficiency.



CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
 WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects

Division Water & Sewer

Item		Water Licence References	
Budget Project	Water Licence Item	Submission Date	Submission Requirements
Wetland Delineation and Great Slave Lake Monitoring	Wetland Delineation Study Report	Section F, Item 18	Schedule 3, Item 2 & 6
	Great Slave Lake Monitoring Program	Section F, Item 19 & 22	Schedule 3, Items 3 & 6
Fiddler’s Lake Adaptive Management Plan (includes F3 Inflow Study and Treatment Method Evaluation)	Treatment Evaluation Report	Section F, Item 20	Schedule 3, Items 4 & 5
	Effluent Quality Criteria Report	Section F, Item 21	Schedule 3, Items 1 & 5
	Fiddler’s Lake Treatment System Adaptive Management Plan	Section F, Item 22	Schedule 3, Item 6
Flow Calculation/ Metering at Lagoon Control Structure and Start of Receiving Environment	Flow Measurements	Annex A, Part C, Table 2 - Requirement of Surveillance Network Program for Stations 0032-10 (Lagoon Control Structure) and 0032-F1 (Start of Receiving Environment)	

Table 1: Fiddler’s Lake Treatment System Projects Summary

The work required for these projects as outlined in the water licence is significant. Schedule C Items 2 through 6 from the Licence are included here in order to show the magnitude of the work required.

Water Licence Schedule C, Items 2-6:

2. The **Wetland Delineation Study Report** referred to in Part F, Condition WETLAND DELINEATION STUDY REPORT shall include but not be limited to:
 - a) Clearly defined objectives of the **Wetland Delineation Study**;
 - b) An updated Fiddlers Lake Treatment System Overview Map that includes description of the system drainage:
 - i. Any additional outflows (b) delineation of drainage in the area around the honey bag pit;
 - ii. flow pathway(s) through the Fiddler’s Lake Drainage Area
 - iii. current or historical flow diversions in the Fiddlers Lake Drainage Area;
 - iv. clearly delineated watershed boundaries (e.g., Fiddler’s Lake, Beta, Alpha, Mac, Kam Drainage Areas);
 - v. main outflow location from the Fiddler’s Lake Treatment System to Great Slave Lake (i.e., downstream of SNP 0032-F1 and 0032-F11);
 - vi. potential flow connections, if identified, between lakes in the Fiddler’s Lake Drainage Area, and lakes to the south in the Beta Drainage Area; and

CAPITAL FUND – 2023 Capital Projects

Department Project		Division	Water & Sewer
	PW Public Works & Engineering WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects		
	<ul style="list-style-type: none">vii. any additional outflow location(s) to Great Slave Lake from the Fiddler’s Lake Treatment System or immediate downstream waterbodies, if identified.		
	<ul style="list-style-type: none">c) Information supporting the Fiddler’s Lake Treatment System Overview Map, including:<ul style="list-style-type: none">i. a description of the best practice field procedures used;ii. evidence from field investigations, including but not limited to photographs; andiii. a summary of relevant field measurements or data.d) Summary of findings<ul style="list-style-type: none">i. Identified outflow(s) to Great Slave Lake, with rationale;ii. Changes from previous understanding on flow direction in the Fiddler’s Lake Drainage Area, Beta Drainage Area, and other applicable drainage areas; andiii. Estimated effects from variable hydrological conditions, such as wet or dry years.e) Proposed changes, with rationale, to the SNP annexed to this Licence; andf) A summary of any actions taken to address the recommendations, including rationale for any decisions that deviate from the recommendations.		
3.	The Great Slave Lake Monitoring Program Design Plan referred to in Part F, Condition GREAT SLAVE LAKE MONITORING PROGRAM DESIGN PLAN shall include but not be limited to:		
	<ul style="list-style-type: none">a) Objectives and purpose of the Great Slave Lake Monitoring Program;b) A summary of previous monitoring and how it informed the revised design plan;c) Details of the sampling design, including a description of the areas to be monitored:<ul style="list-style-type: none">i. Maps showing all proposed sampling locations; andii. Rationale for locations, including:<ul style="list-style-type: none">a. how reference locations were selected;b. information from the Wetland Delineation Study such as outflow location(s) to Great Slave Lake; andc. spatial extent compared to zone of influence from FLTS effluent.d) A summary of how the proposed study addresses the recommendations from past monitoring program(s);e) A description of the sampling and analysis to be conducted:<ul style="list-style-type: none">i. Field measurements;		



CAPITAL FUND – 2023 Capital Projects

Department Project	PW Public Works & Engineering WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects	Division	Water & Sewer
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- ii. Analytical parameters;
- iii. Sample media;
- iv. Sampling methods; and
- v. Quality assurance and quality control procedures.

f) A description of procedures to analyze and interpret data collected; and

g) A description of how the Great Slave Lake Monitoring Program will be incorporated into the Surveillance Network Program annexed to this Licence.

4. The **Treatment Evaluation Report** referred to in Part F, Condition TREATMENT EVALUATION REPORT shall include but not be limited to:

- a) Options analysis for total phosphorus and ammonia treatment, including but not limited to Phoslock and chemical treatment:
 - i. A list of potential treatment approaches to improve phosphorus and ammonia concentrations in the Fiddler’s Lake Treatment System;
 - ii. Exploration of concepts for the various treatment approaches;
 - a. Descriptions;
 - b. Assumptions;
 - c. Photographs, diagrams;
 - d. Applicability to Northern climate; and
 - e. Location in the FLTS where the treatment would occur;
 - iii. To the extent practicable, outline:
 - a. Expected treatment efficacies (i.e., reduction in Total Phosphorus and Total Ammonia Nitrogen loadings or concentrations to the FLTS and receiving environment);
 - b. Timeline for improvements in Total Phosphorus and Total Ammonia Nitrogen to occur under typical conditions; and
 - c. Climate change considerations;
 - iv. Information on treatment implementation and operational feasibility, including cost/benefit analysis; and
 - v. Environmental trade-off assessment:
 - a. An evaluation of potential increases to water and sediment concentrations of various parameters (e.g., aluminum, iron, chloride and/or sulphate), downstream from the lagoon in the FLTS resulting from an alternate treatment method;

CAPITAL FUND – 2023 Capital Projects

Department Project	PW Public Works & Engineering WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects	Division	Water & Sewer
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- b. Impacts of potential concentration increases; and
 - c. Mitigations.
 - b) Decision framework and criteria for selecting a treatment option;
 - c) Linkage to proposed EQC from Effluent Quality Criteria Re-evaluation Report;
 - d) Final selected treatment option; and
 - e) Timeline for treatment implementation and necessity and recurring treatment events, if applicable.
5. The **Effluent Quality Criteria Re-evaluation Report**, referred to in Part F, Condition EFFLUENT QUALITY CRITERIA RE-EVALUATION REPORT that includes, but is not limited to:
- a) Tabulated and graphical summaries of Total Phosphorus and Total Ammonia Nitrogen data from SNP stations 0032-10, 0032-F3, 0032-F1, and 0032-F11, as well as data from the inlet to Lake F3;
 - b) Tabulated flow measurements (SNP stations 0032-10 and 0032-F1);
 - c) Calculation of Total Phosphorus and Total Ammonia Nitrogen loadings to Great Slave Lake;
 - d) Updated determination of the hydraulic retention time of the Fiddler’s Lake Lagoon, as well as the remaining FLTS (wetlands and lakes);
 - e) Analysis of impacts of decant timing on ammonia concentrations by month;
 - f) A description of effects on water quality and loadings from the desludging activities;
 - g) An assessment based on Part F, Condition TREATMENT EVALUATION REPORT, on predicted lagoon discharge water quality after treatment implementation;
 - h) Proposed technology-based Effluent Quality Criteria for Total Phosphorus and Total Ammonia Nitrogen, with rationale and assumptions, that are lower or equal to the EQC listed in Part F, Condition EFFLUENT QUALITY CRITERIA – SEWAGE DISPOSAL FACILITIES;
 - i) Proposed changes to the EQC listed in Part F, Condition EFFLUENT QUALITY CRITERIA – SEWAGE DISPOSAL FACILITIES and Licence SNP, if required; and
 - j) Proposed date for revised EQC implementation.
6. The **Fiddler’s Lake Treatment System Adaptive Management Plan** referred to in Part F, Condition FIDDLER’S LAKE TREATMENT SYSTEM ADAPTIVE MANAGEMENT PLAN shall include but not be limited to:
- a) Updated versions of figures originally presented in the Fiddler’s Lake Treatment System Adaptive Management Plan, including:



CAPITAL FUND – 2023 Capital Projects

Department Project		Division	Water & Sewer
	PW Public Works & Engineering WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects		
			<ul style="list-style-type: none">i. Watershed boundaries, flow paths and outflow(s) from Part F WETLAND DELINEATION STUDY and Schedule 3, Condition 2; andii. Existing and proposed SNP stations;
			<ul style="list-style-type: none">b) An updated assessment of water quality data collected from the Fiddler’s Lake Treatment System, including but not limited to:<ul style="list-style-type: none">i. Effluent quality summary statistics and temporal plots for EQC parameters at SNP 0032-F3;ii. Loading calculations for key parameters of potential concern (POPC) at SNP 0032-10 and SNP 0032-F1;iii. Identification of POPC, with rationale, in accordance with Appendix 2 of the Board’s Guidelines for Effluent Mixing Zones (2017);iv. Water quality data collected at receiving environment station SNP 0032-F1 since 2018, compared to CCME Canadian Water Quality Guidelines for the Protection of Freshwater Aquatic Life;v. Revised calculations for un-ionized ammonia at SNP 0032-F1, using field temperature and pH measurements;vi. Proposed water quality objectives for on-going comparison at SNP 0032-F1;vii. Updated temporal plots for EQC parameters listed for SNP 0032-F3 and POPC at SNP 0032-F1, plotted with water quality objectives if applicable; andviii. summary of findings and trends.c) Details on current and planned desludging activities, including but not limited to, basis for planning, and criteria and triggers for future de-sludging events;d) Delineation of tiered action levels for stations SNP 0032-F1 and at least one station in Great Slave Lake;e) For each Action Level, a description of how exceedances of the Action Level will be assessed and, generally, which types of actions may be taken by the Licensee if the Action Level is exceededf) Proposed changes, with rationale, to the Licence SNP;g) Proposed changes, with rationale, to the timing and duration of Fiddler’s Lake Lagoon decant;h) Proposed changes, with rationale, to Water Treatment Facilities residuals or sludge management with corresponding revisions to be submitted in a revised Water Treatment Facilities Operations and Maintenance Plan (Schedule 3, Condition 13);i) A Great Slave Lake Monitoring Program Report, including but not limited to:<ul style="list-style-type: none">i. A summary of activities conducted under the Great Slave Lake Monitoring Program from the preceding three years of monitoring;ii. A plain language summary and interpretation of major results;iii. An accurate description of the monitoring locations and any SNP stations used for evaluation of data;

CAPITAL FUND – 2023 Capital Projects

Department Project	PW Public Works & Engineering WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects	Division	Water & Sewer
	<ul style="list-style-type: none"> iv. Tabular summaries of all data (including Excel format) and information generated under the Great Slave Lake Monitoring Program; v. An interpretation of the results, including an evaluation of spatial effects in Great Slave Lake from the Fiddler’s Lake Treatment System; vi. Data for reference area(s) in Great Slave Lake that are not influenced by effluent from the Fiddler’s Lake Treatment System, with rationale for their locations; vii. A comparison of results to action levels as defined in the Fiddler’s Lake Treatment System Adaptive Management Plan; viii. Recommendations, with rationale, for changes to the Great Slave Lake Monitoring Program; and ix. Any other information specified in the approved Great Slave Lake Monitoring Program Design Plan. 		
	<ul style="list-style-type: none"> j) An Inlet of Lake F3 Special Study, including but not limited to: <ul style="list-style-type: none"> i. Tabular summaries of Water quality analytical results (including Excel format) at the inlet of Lake F3 twice per year (once in freshet, and once in fall) for a duration of two years; ii. Analysis of the four water samples for: field parameters, total suspended solids, major ions, nutrients, CBOD5, fecal coliforms, oil and grease, total metals, total petroleum hydrocarbons, and acute toxicity (Rainbow Trout and Daphnia magna); iii. A comparison of water quality and toxicity between the inlet and outlet of Lake F3 and an explanation how water quality changes through Lake F3; and iv. A summary of findings from the Inlet of Lake F3 Special Study. 		
	<ul style="list-style-type: none"> k) Proposed resubmission schedule for future revisions to the Fiddler’s Lake Treatment System Management Plan. 		

The anticipated schedule to meet the water licence requirements is shown in Table 2.

2022	Wetland Delineation and Great Slave Lake Monitoring	<ul style="list-style-type: none"> • RFP issued and awarded • Completion of Wetland Delineation (includes submission to MVLWB) • Design of Great Slave Lake (GSL) Monitoring Program
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CAPITAL FUND – 2023 Capital Projects

Department Project	PW Public Works & Engineering WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects	Division	Water & Sewer
2023	Wetland Delineation and Great Slave Lake Monitoring	<ul style="list-style-type: none"> • Submission of GSL Monitoring Program Design to MVLWB • GSL Monitoring Program – year 1 • RFP issued and awarded • Lake F3 Inflow Sampling – year 1 • Data gathering for treatment method evaluation • RFP issued and awarded • Design for installation of meters completed. 	
	Fiddler’s Lake Adaptive Management Plan		
	Flow Calculation/Metering at Lagoon Control Structure and Start of Receiving Environment		
2024	Wetland Delineation and Great Slave Lake Monitoring Fiddler’s Lake Adaptive Management Plan	<ul style="list-style-type: none"> • GSL Monitoring Program – year 2 • Lake F3 Inflow Sampling – year 2 • Selection of pilot treatment methods & contracts for pilot methods in place • Installation of Meters prior to decant • First year of meter use 	
	Flow Calculation/Metering at Lagoon Control Structure and Start of Receiving Environment		
2025	Wetland Delineation and Great Slave Lake Monitoring Fiddler’s Lake Adaptive Management Plan	<ul style="list-style-type: none"> • GSL Monitoring Program – year 3 • Evaluation of sampling data • Pilot treatment methods implementation – year 1 • Comparison of results to water licence Effluent Quality Criteria 	
2026	Wetland Delineation and Great Slave Lake Monitoring Fiddler’s Lake Adaptive Management Plan	<ul style="list-style-type: none"> • GSL Monitoring Program – year 4 • Evaluation of sampling data • Pilot treatment methods implementation – year 2 • Evaluation of results 	
2027	Wetland Delineation and Great Slave Lake Monitoring Fiddler’s Lake Adaptive Management Plan	<ul style="list-style-type: none"> • GSL Monitoring Program – year 5 • Evaluation of sampling data and integration into Fiddler’s Lake Adaptive Management Plan • Completion of evaluation of all data • Completion of revised Fiddler’s Lake Adaptive Management Plan • Submission of Plan to MVLWB 	

Table 2: Project Schedule

CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
WS0018 Water Licence Project – Fiddler’s Lake Treatment System Projects

Division

Water & Sewer

Tentative Project Cash Flow

2022	\$170,500
2023	\$400,000
2024	\$1,065,000
2025	\$1,050,000
2026	\$850,000
2027	\$265,000
Total	\$3,800,500

Operational Impact

The operational requirements as a result of this work are currently unknown, but could be substantial, depending on the outcome of the treatment method evaluation. Annual costs for sampling will increase to include the ongoing required sampling of Great Slave Lake.



CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
SW0006 Water Licence Project – Landfill Leachate Retention and Treatment

Division Solid Waste

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures	430,000	2,770,000	
Funding			
Canada Community-Building Fund	430,000	2,770,000	
Total Funding	430,000	2,770,000	

Description

Purpose

To provide treatment of leachate produced in landfill cells and during the baling of waste.

Background

Over the last few years, the topic of disposal of leachate from the Solid Waste Facility has been discussed with regulatory bodies at length. Leachate is generated at the Solid Waste Facility in the landfill cells and during the baling of waste. Past practice was to dispose of the leachate at the Fiddler's Lake Sewage Lagoon. However, due to the composition of leachate, the regulators are concerned about the effect it is having on the lagoon and the wetland treatment system. Due to this concern, the City's new Water Licence does not allow for the discharge of leachate to the sewage lagoon system, thus a solution for the treatment of leachate must be found.

The current Water Licence requires the submission of a Leachate Management Plan (LMP). The LMP must meet the requirements of Schedule 3, Item 11 which states the following:

The **Leachate Management Plan** for the Solid Waste Disposal Facilities referred to in Part F, Condition LEACHATE MANAGEMENT PLAN shall include but not be limited to:

- a) Details on the types and sources of leachate requiring management, including operational Cells, the Baling Facility, and any runoff ponds, including but not limited to:
 - i. Inspection;
 - ii. Management;
 - iii. Testing;
 - iv. Disposal; and
 - v. Contingencies.
- b) Detail on mitigations taken to reduce leachate volumes;

CAPITAL FUND – 2023 Capital Projects

Department Project	PW Public Works & Engineering SW0006 Water Licence Project – Landfill Leachate Retention and Treatment	Division	Solid Waste
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- c) Schedule for changes to leachate management practices for each source;
- d) Summary of leachate management and treatment infrastructure, including but not limited to:
 - i. Establishing maximum acceptable leachate head levels and triggers and strategies to further minimize water infiltration to SWDF cells; and
 - ii. A proposal for Groundwater monitoring required for the Leachate Management Facility (including implications to the Licence SNP);
- e) An outline of the proposed mitigations for managing leachate from the Old Landfill Cell;
- f) How the Leachate Management Plan influences the SWDF Design, Operations and Closure Plan and other plans.

The City retained a Consultant to provide options for leachate management, based on best practices for landfills. The decision was made to move forward with a leachate management facility consisting of a shallow lined pond and evaporators. The LMP was submitted to the Mackenzie Valley Land and Water Board in September 2022 for review and approval, prior to construction. The final design will take into account any items identified during the regulatory review of the LMP, and will take into account leachate generated by additional landfill cells.

Project Schedule

2023	Final Design and Tendering
2024	Facility Construction

Operational Impact

This project will affect operations at the Solid Waste Facility as the Leachate Management Facility will add a number of items to the required workload, including, but not limited to:

- Transporting leachate from the various generation points on site to the Facility;
- Operation of the evaporators at the Facility;
- Inspections of the various components of the Facility (liners, pumps, etc.); and
- Annual maintenance to startup the facility in the spring and winterize it in the fall.



CAPITAL FUND – 2023 Capital Projects

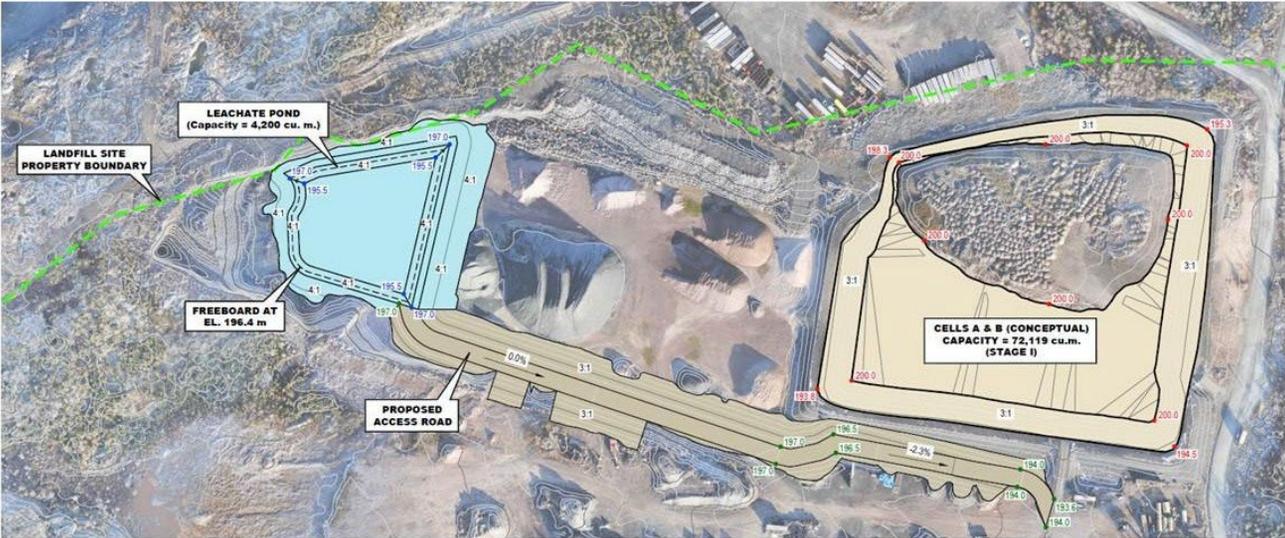
**Department
Project**

PW Public Works & Engineering
SW0006 Water Licence Project – Landfill Leachate Retention
and Treatment

Division

Solid Waste

Gallery



Gallery 1 – Leachate Facility

CAPITAL FUND – 2023 Capital Projects

Department Project PW Public Works & Engineering
SW0007 Water Licence Projects – Solid Waste Management

Division Solid Waste

Budget			
	2023	2024	2025
	\$	\$	\$
Expenditures			
Hydrogeological Study & Groundwater Trend Analysis	25,000	75,000	75,000
Landfill Gas Assessment	25,000	75,000	25,000
<i>Total Expenditures</i>	50,000	150,000	100,000
Funding			
Formula Funding		150,000	100,000
User Fees	50,000		
<i>Total Funding</i>	50,000	150,000	100,000

Purpose

To meet the requirements for studies and management plans for the Solid Waste Facility as prescribed in the City's new water licence issued May 31, 2022.

Background

The City's new water licence requires numerous studies and management plans to be completed. Two items that relate to the Solid Waste Facility (SWF) are the Hydrogeological Study and Groundwater Trend Analysis and the Landfill Gas Assessment.

Each of these items are multi-year projects due to the data that must be gathered and analyzed.

Hydrogeological Study and Groundwater Trend Analysis.

Schedule 3 Item 10 of the new water licence itemizes the requirements of the Groundwater Monitoring Plan for the SWF, which is to be submitted to the Water Board by March 31, 2026. Item 10e) refers to the completion of a hydrogeological study, and item 10f) refers to the Groundwater Trendline Analysis Report.

- e) Completion of a Hydrogeological Study of the existing and planned extent of the SWDF (Solid Waste Disposal Facility):
 - i. Supporting information for items a) and c) I, ii, iii, iv above; [Item a refers to groundwater conditions, and item c refers to the groundwater monitoring program]
 - ii. Response to recommendations included in the Study, including timelines for actions and rationale;
 - iii. Based on the outcomes of the SWDF Drainage Study, an evaluation of any resulting impacts to the Hydrogeological Study design; and



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- iv. A description of how the recommendations from the Study have been implemented and how they influence the Design, Operations and Closure Plan for the SWDF and the Groundwater Monitoring Plan.
- f) Completion of a **Groundwater Trendline Analysis Report**:
 - i. Supporting information for item b) (I, ii, iii) and d)(i) above;
 - ii. Site specific groundwater criteria and Action Levels with rationale;
 - iii. Establish where the site-specific groundwater criteria will be met;
 - iv. Explain how background conditions will be considered;
 - v. Plans for obtaining and using nearby regional data from other sources;
 - vi. Tabular summaries (including Excel format) of all data and information generated under the Groundwater Monitoring Plan;
 - vii. Identification of POPC, with rationale;
 - viii. Temporal plots for POPC and a summary of findings and trends;
 - ix. Determine, provide rationale for, and use a conversion factor for total and dissolved metals; and
 - x. A description of how the recommendations from the Study have been implemented, and how they influence the Design, Operations and Closure Plan for the SWDF and the Groundwater Monitoring Plan.

As each of the items listed above will require extensive annual sampling and analysis of sampling results, the project is expected to span three years. At the end of the project, the annual sampling program for groundwater will be updated, which may require an increase in the annual operational budget for sampling.

Landfill Gas Assessment

Schedule 3 Item 12 of the new water licence requires the completion of a Landfill Gas Assessment, which is to be submitted by March 31, 2025. Specifically, the Licence requires:

- 12. The **Landfill Gas Assessment** referred to in Part F, Condition LANDFILL GAS ASSESSMENT shall include but not be limited to:
 - i. A Report on the methodology and findings of the Landfill Gas Assessment;
 - ii. A summary of how the recommendations from the Landfill Gas Assessment will be incorporated into the SWDF Design, Operations and Closure Plan, including relevant timelines, and if not, rationale for not incorporating recommendations.

It is anticipated that the Landfill Gas Assessment will be completed over multiple years in order to follow industry standards for Landfill Gas Assessments and meet the requirements of the water licence.

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Project Schedule

2022	Hydrogeological Study and Groundwater Trendline Analysis (HS>A) – RFP for project issued and awarded.
2023	HS>A – year 1 of field work Landfill Gas Assessment (LFA) – RFP for project issued and awarded; work begins
2024	HS>A – year 2 of field work; start of analysis Landfill Gas Assessment (LFA) – field work and analysis; integration of information into SWF Closure Plan
2025	HS>A – year 3 of field work; completion of analysis Landfill Gas Assessment (LFA) – Submission to MVLWB
2026	HS>A – Report submitted to MVLWB; information integrated into Groundwater Management Plan

Tentative Project Cash Flow

2022	\$25,000
2023	\$50,000
2024	\$150,000
2025	\$100,000
2026	\$100,000
Total	<hr/> \$425,000 <hr/>



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Operational Impact

The results of the Landfill Gas Assessment are likely to cause an increase in operational budget and monitoring requirements during and post closure of areas of the landfill.

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