City of Yellowknife

Municipal Water Licence Renewal

Public information session

September 15, 2020

Welcome & Introductions

Meeting objectives

- Provide information and answer questions on:
  - How the City currently manages water and waste
  - Key component’s of the City’s water licence application
  - Ongoing and future projects
- Encourage residents and stakeholders to provide feedback on our application

Meeting plan

- Background and context for municipal water licence renewal
- Overview of application process and content
- Review and discuss main components licence application
  - Water treatment
  - Solid waste management
  - Stormwater management
  - Wastewater management
  - Spill contingency
- Wrap up and next steps

Component-by-component review

- Background and context
- What the water licence regulates
- What the city has done since 2010
- Key points from the application
- Topics of interest
- Time for questions and comments

Context for engagement

- Licence is required under the *NWT Waters Act* to draw water from local water bodies and deposit waste into the environment
- Current water licence in place since 2010, expires in 2022
- Pre-application engagement with residents and stakeholders is part of the licence renewal process
- New application will be submitted to Mackenzie Valley Land and Water Board in January 2021
- Applying for 12-15 year licence
- Full application will be available for public review once submitted on Board's Public Registry

Water licence overview

What our municipal water licence regulates

- The amount of water the City is allowed to withdraw from local water sources each year
- Terms and conditions for the design, construction, operation, maintenance, monitoring, management and reporting of all of the City's waste and water facilities
- The condition of wastewater before it can be released to the environment
- Conditions for the closures and reclamation of waste disposal facilities
- Management of stormwater
- Spill contingency

What is *not* regulated by the water licence

- Not all aspects of the City's water and waste services are regulated by the water licence
- Drinking water quality is regulated by the Department of Health and Social Services under the *NWT Public Health Act.* It will *not* be part of what is looked at under the water licencing process.

Application is made up of several documents

Water Treatment Plant

- ✓ Water Treatment Plant Operation and Maintenance Manual

Stormwater

- ✓ Stormwater Management Plan

Wastewater Facilities

- ✓ Sewage Disposal Facilities Operations and Maintenance Manual
- ✓ Fiddler's Lake Treatment System Management Plan

Solid Waste Facility

- ✓ Solid Waste Facility Operations and Maintenance Manual
- ✓ Hazardous Waste Management Plan
- ✓ Compost Facility Operation and Maintenance Manual
- ✓ Interim Closure and Reclamation Plan
- ✓ Solid Waste Facility Interim Groundwater Monitoring Plan

Spill Contingency

- ✓ Spill Contingency Plan

Water Treatment

Key document:

- *Water Treatment Plant (WTP) Operations and Maintenance Manual*

Background

- Municipal drinking water source is Yellowknife River
- New Water Treatment Plant (WTP) opened in 2015 uses best-available treatment technologies
- Raw water transported to WTP by underwater pipeline
- Licenced to draw water from Great Slave Lake for maintenance and emergencies only

What the water licence regulates

- Monthly and annual draw from approved water sources
- Quantity and content of waste (“residuals”) produced by treatment of water
- Reporting and actions required by the licence

Where we get our water

Yellowknife River (primary)

- Max. 4,000,000 m^3 per year (up from current annual limit of 3,600,000 m^3
- Max. of 575,000 m^3 per month (no change)

Yellowknife Bay (secondary/emergency)

- Maintenance of equipment and emergencies only
- Approx. 300 m^3 per month

Treatment processes and residuals

- ***Micro-strainer system:*** removes large particulate matter
- ***Membrane microfiltration system:*** removes small particles, contaminants and pathogens
- ***Sodium hypochlorite:*** final disinfection, less toxic and safer than previous chlorine gas system
- ***Fluoridation:*** dental health
- ***Residuals:*** mostly from cleaning membranes

Other topics of interest

- Screens on water intake pipes
- Overflows
- Reservoir leak
- Pipeline replacement

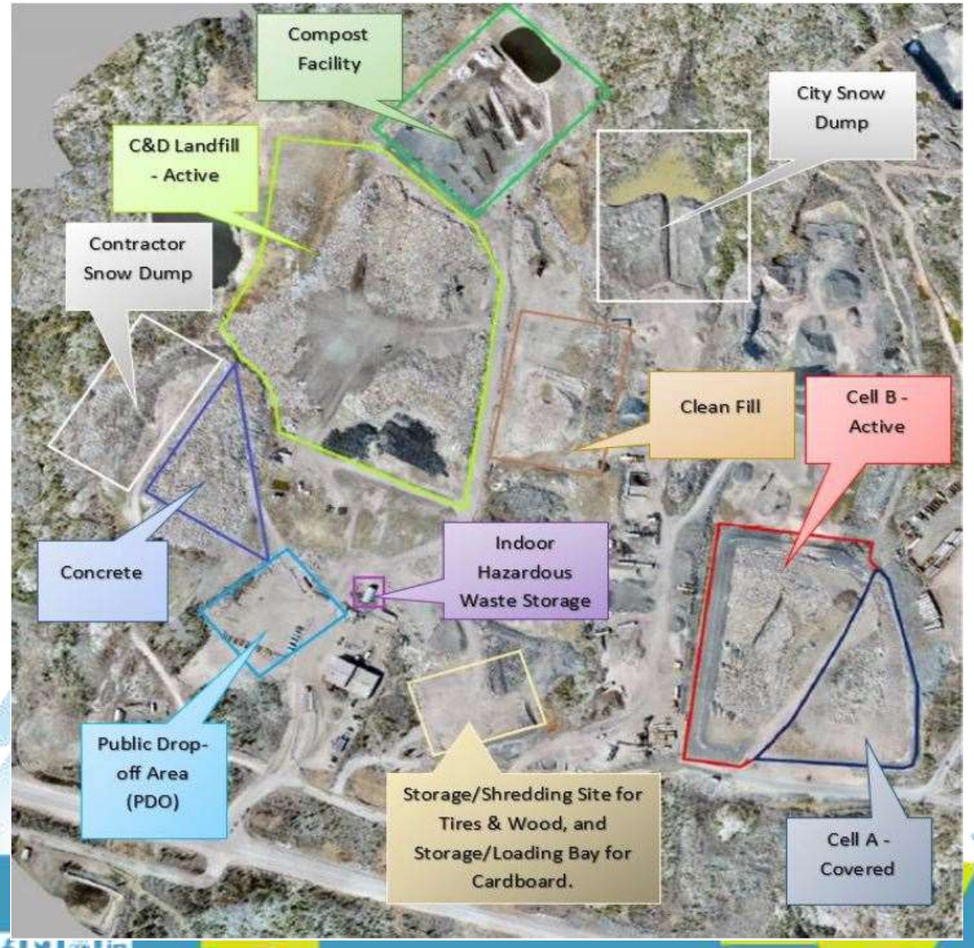
Questions?
Comments?

Solid Waste Management

Key documents:

- *Solid Waste Facility (SWF) Operations and Maintenance Manual*
- *Hazardous Waste Management Plan*
- *Compost Facility Operations and Maintenance Manual*
- *Interim Closure and Reclamation Plan*
- *Solid Waste Facility Interim Groundwater Monitoring Plan*

Background



- Solid Waste Facility (SWF)
  - Baling facility
  - Landfill
  - Designated materials areas
  - Hazardous waste management
  - Compost facility
  - Snow dump areas
- Five recycling depots throughout City

Background

ACCEPTED

- Household materials
- White goods
- Construction and demolition debris
- Animal carcasses
- Tires
- E-waste
- Scrap steel
- Honey bags and pet waste
- A wide range of recyclable materials
- Residential Hazardous waste
- Yard waste
- Uncontaminated snow

NOT ACCEPTED

- Hazardous wastes from medical sector
- Hazardous wastes from the industrial and commercial sector
- Materials without proper documentation (e.g. asbestos)
- No hydrocarbon contaminated soil/snow/water accepted regardless of source

What the water licence regulates

- Waste management and records
- Requirements for approval when planning to expand landfill cells or making modifications
- Monitoring requirements (leachate, surface water, groundwater, landfill gas)
- Record keeping and reporting requirements
- Contents of manuals and plans, including plans for closure and reclamation

What we have done since 2010

- Drop-off loop with dedicated salvaging area (2010)
- Compost pilot project (2009) expanded (2013-2017)
- Two Second Generation Landfill Cells (2011 & 2016)
- SWF boundary expanded (2015)
- Public Drop-Off (PDO) area (2020)
- Dedicated area for processing of materials (tires, brush, pallets) (2020)
- Baling facility for recyclables only (2020)
- Compactor used in landfill cells (2020)

SWF: Operations and maintenance

- Inspection and maintenance requirements and procedures to keep site clean, organized and functioning properly
- How staff limit potential nuisances and impacts on the environment
- Monitoring requirements for runoff, seepage and leachate – 7 Surveillance Network Program (SNP) stations (frequency, reporting, parameters)
- Record keeping requirements (operations, maintenance, waste volume estimates, inspections, repairs, etc.)

SWF: Operations and maintenance

RECENT UPDATES

- Plans for evaporation cannons
- Updated list of accepted materials
- Detail on interim and final covers
- SNP locations and test parameters

FUTURE PLANS

- New weigh-out scale and replacement of gatehouse;
- Reduce hazardous waste accepted (i.e. vehicles)
- Construction of additional landfill cells

Hazardous waste management

KEY POINTS

- What is accepted and not accepted
- Detailed information on each type of hazardous waste and how it must be handled
- Tracking and record keeping

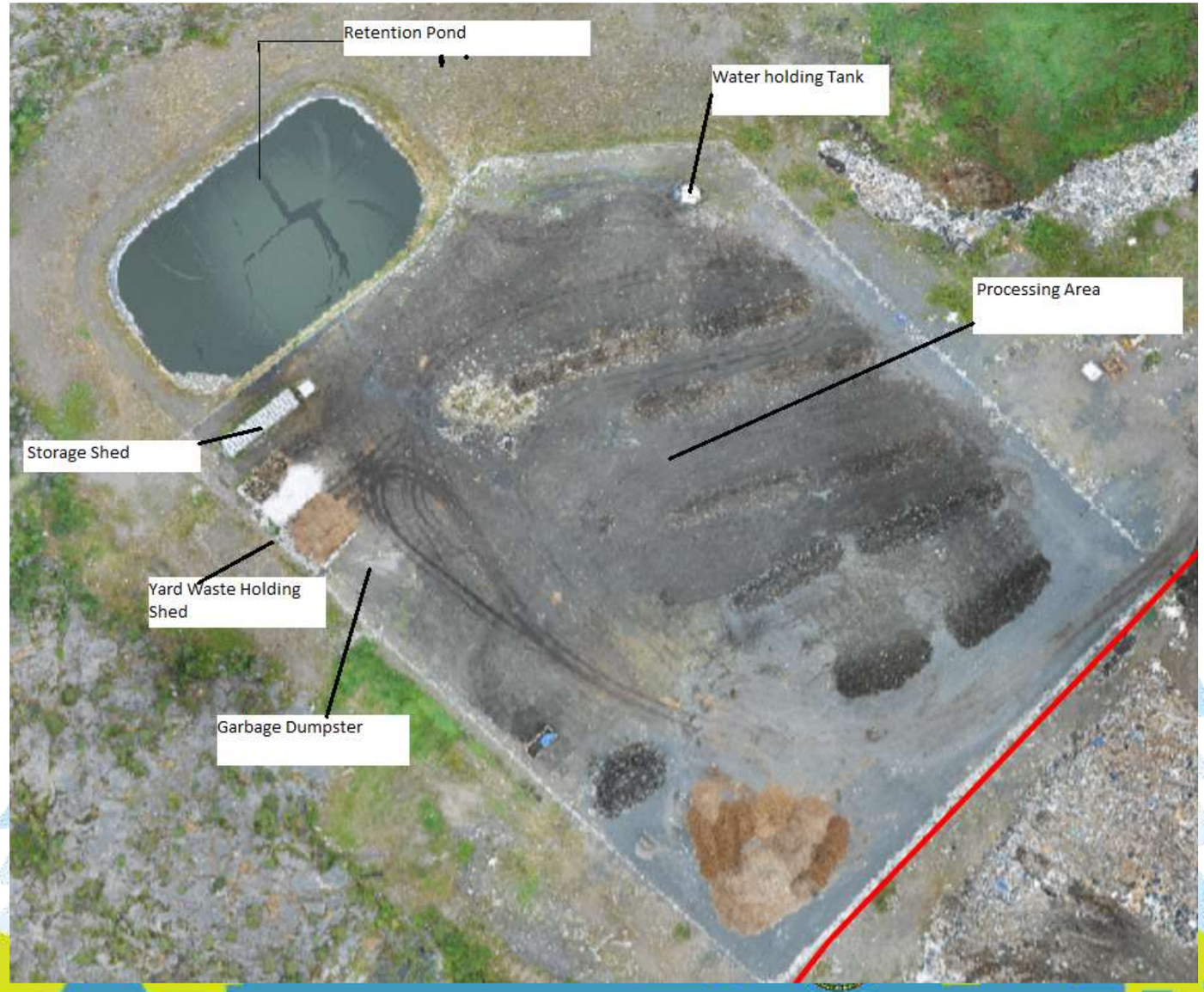
NOTABLE UPDATES

- requirements related to the use, inspection, maintenance and labelling of storage containers
- facility requirements, including safety measures, record keeping and emergency response
- Hydrocarbon contaminated soils no longer accepted
- Updated information for each type of hazardous waste

Compost Facility

COMPONENTS

- Base Pad
- Retention Pond
- Water Holding Tank
- Storage Shed
- Garbage Dumpster
- Yard Waste Holding Pen
- Processing Area



Compost facility: Operations and maintenance

KEY POINTS

- Detailed info on all components, including liner
- Procedures to operate and maintain facility to produce safe, useable final product
- Procedures to manage odours, nuisances and environmental impacts
- Monitoring and management of leachate and runoff
- Compost testing
- Placement and orientation of windrows
- Monitoring, inspection and reporting

NOTABLE UPDATES

- City completely took over operations and monitoring of compost facility from Ecology North in 2020
- Added Sampling Station
- Added safety information regarding handling of leachate and hazardous materials

Closure and reclamation

- Long-term closure goals
  - minimize impacts on the surrounding environment due to operation of the facility
  - return the site to a natural condition
  - limit human exposure to waste
  - reduce the generation of leachate
- Interim plan
  - a working document, gives general description of closure plan
  - discusses how to prepare areas of the facility that have reached their designed capacity so that they can eventually be closed out while other parts of the facility remain operational
  - Will be reviewed and updated as necessary

Closure and reclamation

Plan includes:

- Well-designed and managed site
- Progressive capping
- Regular environmental monitoring of the facility and surrounding area
- Regular inspections of the cap to confirm its integrity
- Remedial actions when necessary
- Environmental monitoring during operation, at closure, and for 25 to 30 years after closure (leachate, surface water, groundwater and landfill gas)
- Environmental Site Assessment at final closure

Groundwater monitoring

KEY POINTS

- 9 groundwater monitoring wells
- Potential contamination sources (main landfill, hazardous waste storage, off-site roads)
- Water sampling program and parameters
- Environmental water quality analysis requirements
- Quality Assurance and Quality Control protocols

NOTABLE UPDATES

- Interim Groundwater Monitoring Plan developed
- Plan review by third party consultant
- Three new monitoring wells to assess potential offsite contamination
- Planning for quality trend analysis to determine criteria
- Internal monitoring and sampling procedures

Questions?
Comments?

Stormwater Management

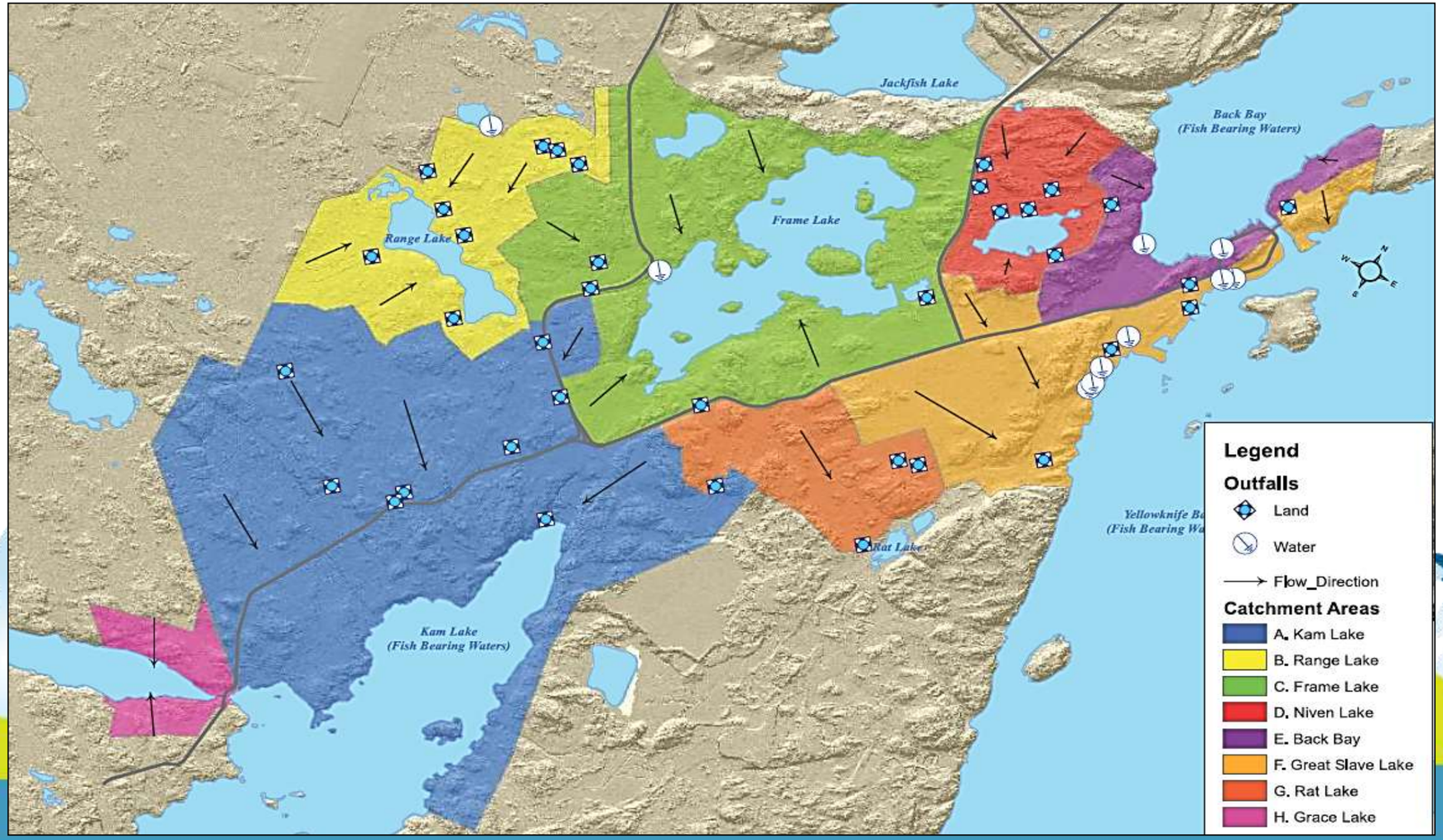
Key document:

- *Stormwater Management Plan*

Background

- City maintains infrastructure that collects and diverts stormwater (e.g. catch basins, stormwater drainage pipes, ditches)
- Monitoring, pollution control measures, public education to minimize impact of city stormwater on the environment
- By-law specifies permitted and prohibited types of water that can be put into stormwater drainage system and procedures in relation to unauthorized release
- City does not currently treat stormwater, but is doing research to see if it needs to consider treatment options

Where our stormwater goes



What the water licence regulates

Currently:

- Contents of the City's Stormwater Management Plan
- Reporting requirements for stormwater sampling program

Future:

- Sampling Locations

Updates to Stormwater Management Plan

A new “Natural Settings” section (Section 4)

- More information about the waterbodies that receive the stormwater so we can better understand any potential impacts

Updates to the monitoring program (Section 11)

- Clarify the objectives of monitoring
- Provide more detail on sampling locations, methods and how results are evaluated

Other edits

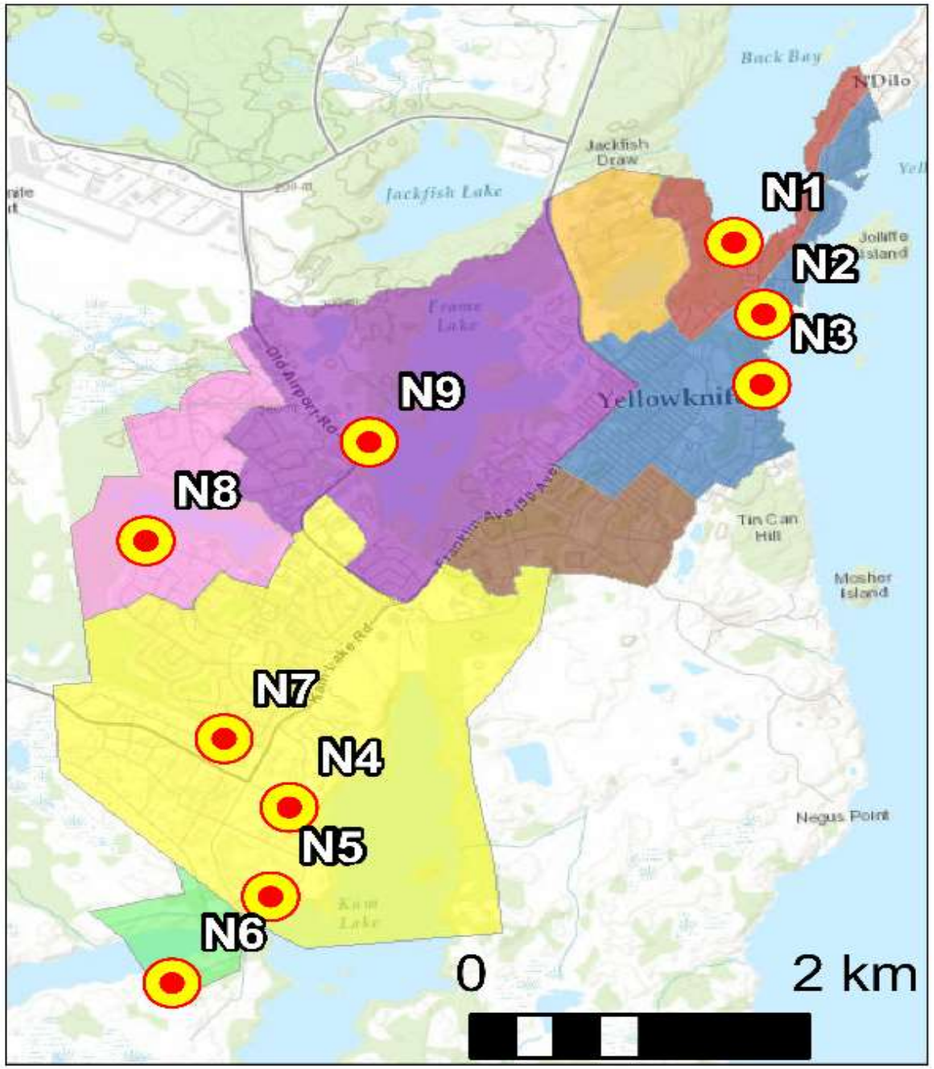
- To bring documents up to date, improve readability and address comments received

Stormwater sampling

Stormwater Sample Location

Catchment Area

- Back Bay
- Frame Lake
- Grace Lake
- Kam Lake
- Niven Lake
- Range Lake
- Rat Lake
- Yellowknife Bay



Stormwater sampling and trendline analysis

- 3-year monitoring program and trend analysis underway
- Anticipate report in spring 2023
- Will compare Yellowknife stormwater quality to Canadian Water Quality Guidelines for both Recreational Water Quality and the Protection of Aquatic Life
- Will help determine whether we should look at potential treatment options

Table 11.3.1: Stormwater Monitoring Parameters			
Field Parameters			
pH	Temperature		
Microbiology			
Biochemical Oxygen Demand	*Escherichia coli* (*E. coli*)	Fecal Coliforms	
Physical			
Total Suspended Solids	Specific Conductivity	Alkalinity, Total (as $CaCO_3$)	Total Dissolved Solids
Major Ions			
Calcium	Chloride	Fluoride	Hardness
Magnesium	Potassium	Sodium	Sulphate
Nutrients			
Ammonia as Nitrogen	Nitrate as Nitrogen	Nitrite as Nitrogen	Total Phosphorus
Organic			
Hydrocarbons			
Trace Metals, Total			
Aluminum	Antimony	Arsenic	Barium
Beryllium	Cadmium	Cesium	Chromium
Cobalt	Copper	Iron	Lead
Lithium	Manganese	Mercury	Molybdenum
Nickel	Rubidium	Selenium	Silver
Strontium	Thallium	Titanium	Uranium
Vanadium	Zinc		

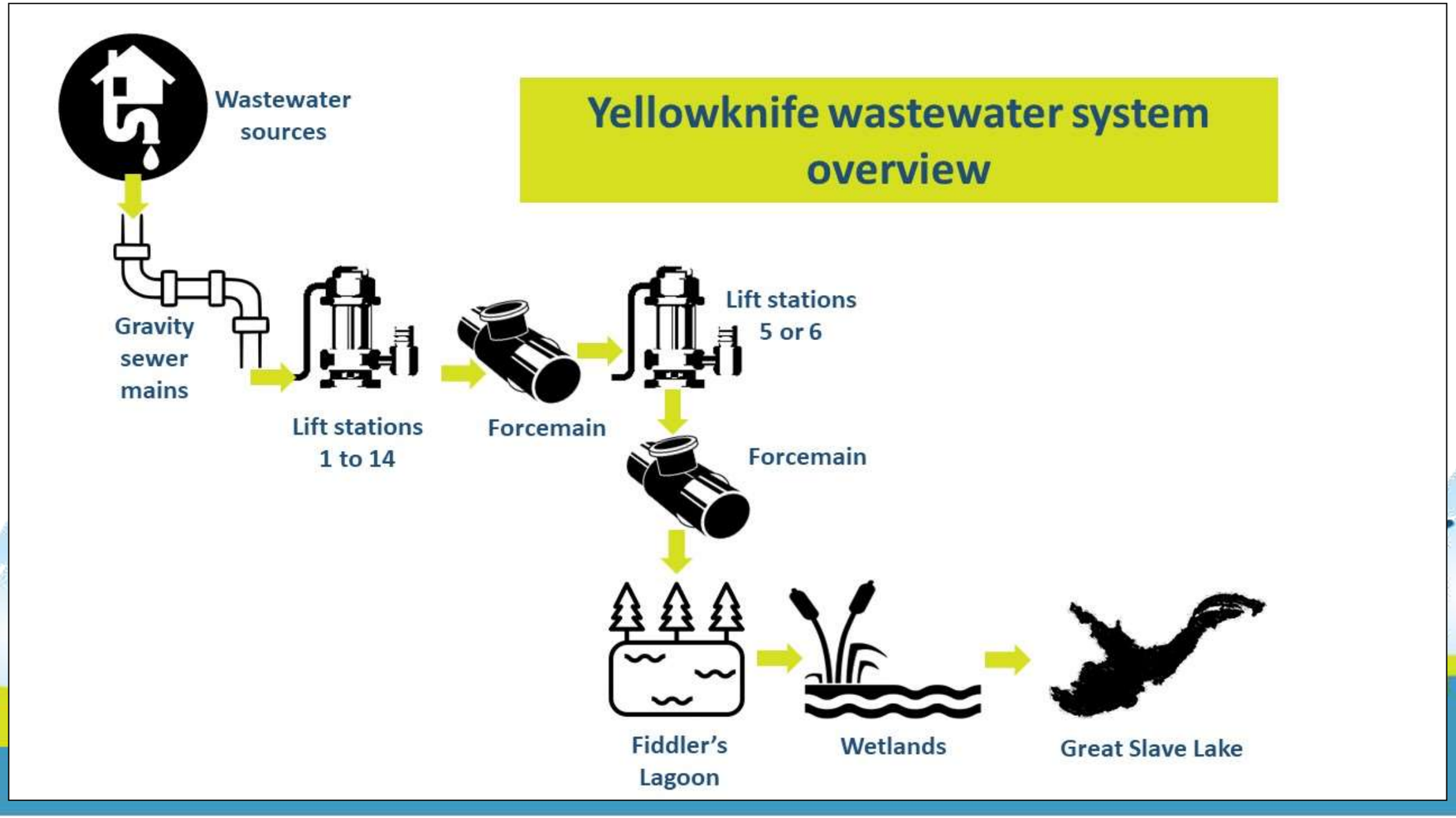
Questions?
Comments?

Wastewater Management

Key documents:

- *Sewage Disposal Facilities Operations and Maintenance Manual*
- *Fiddler's Lake Treatment System (FLTS) Management Plan*

Background


Yellowknife wastewater system overview
Wastewater sources
Gravity sewer mains
Lift stations 1 to 14
Forcemain
Lift stations 5 or 6
Forcemain
Fiddler's Lagoon
Wetlands
Great Slave Lake

The Fiddler's Lake Treatment System (FLTS)

Fiddler's Lagoon (1981, 1987)

- acts as a holding cell where wastewater enters the system and is stabilized
- exposure to air, wind and sun, organisms in the lagoon begins to break down wastewater
- "decanted" once a year over several weeks

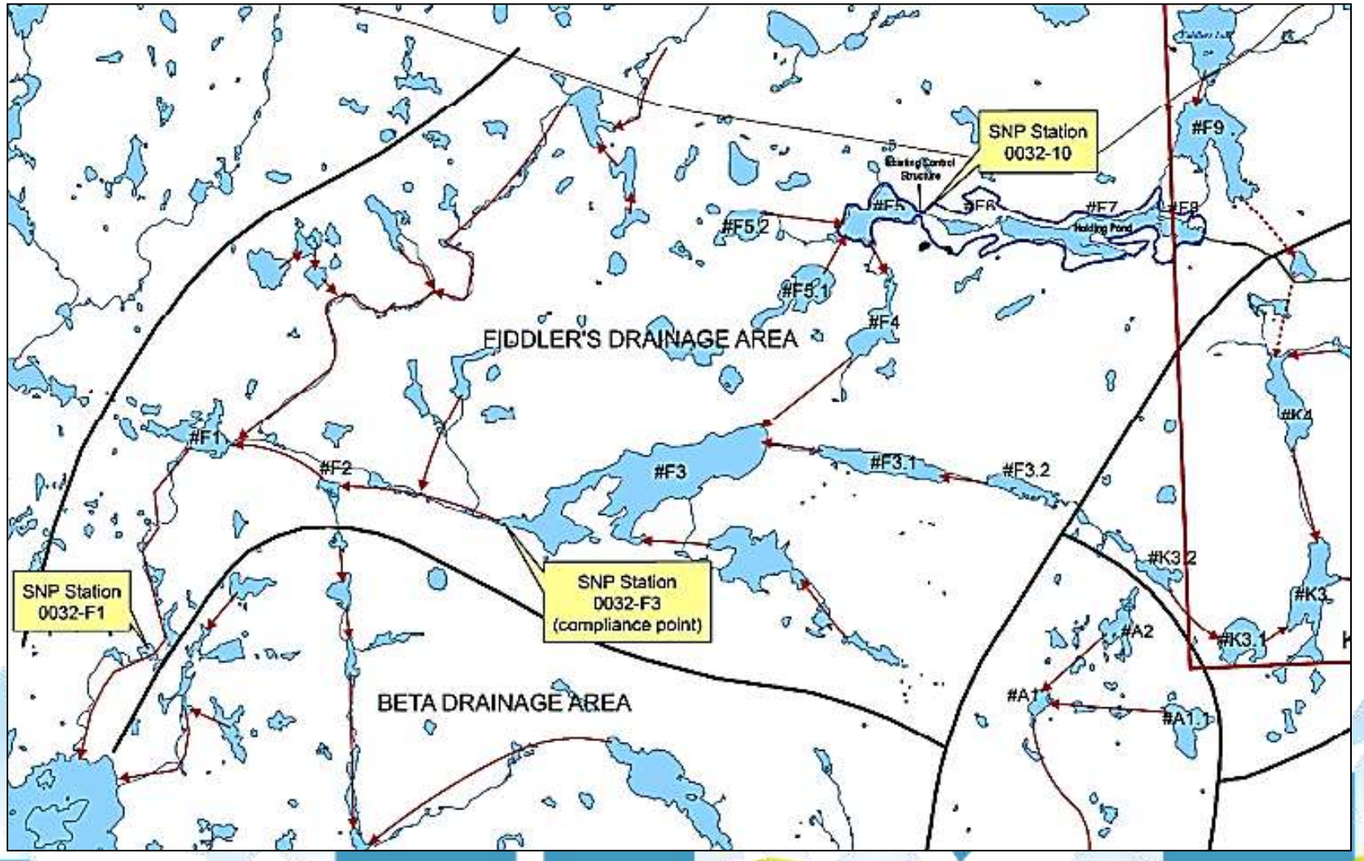
Wetlands system (13 km long)

- mixture of organic and sandy materials
- help to further treat the effluent before it is discharged to an open channel that leads to Great Slave Lake

What the water licence regulates

- Content of Sewage Disposal Facilities Operations and Maintenance Manual and the Fiddler's Lake Treatment System Management Plan
- Quality of water discharged into the environment ("effluent")
- Monitoring requirements (Surveillance Network Program)
- Control structure monitoring requirements (dams and dykes)
- Reporting requirements and action items
- Development approval and construction record requirements

Monitoring



- Water quality monitoring at 3 points in the system
- Compliance with water licence checked at Station 0032-F3, approximately 6 km upstream of Great Slave Lake

What we have done since 2010

- Studies to better understand the effectiveness and potential impacts of the wastewater system on the local environment:
  - pH levels in the treatment system and their potential linkages to algae growth
  - effluent characterization, including biochemical oxygen demand (BOD) and carbonaceous biochemical oxygen demand (cBOD)
  - Ammonia and phosphorus levels, accumulation in system and receiving water bodies
  - Sludge studies
- Repaired, replaced and improved Fiddler's Lake control structures (i.e. dykes and dams)
- Water and sewer infrastructure upgrades

Sewage Disposal Facilities O&M Manual

Operational document that describes:

- City personnel duties, responsibilities and training
- infrastructure component operations and maintenance requirements and procedures
- sampling and monitoring program requirements
- record keeping, safety, site access control and emergency response
- plans for sludge management

Fiddler's Lake Treatment System (FLTS) Management Plan

- Describes FLTS components
- Describes effluent requirements and objectives, and actual effluent quality
- Discusses water quality trends and other observations in the receiving environment
- Proposes effluent quality requirements and objectives, water quality triggers and thresholds, and Surveillance Network Program requirements
- Presents other future considerations such as climate change vulnerability/adaptation, non-traditional effluent constituents, etc.
- Describes plan for managing residual solids ("sludge") accumulated in Fiddler's Lagoon
- Outlines contingency actions the City could take if required

Parameters of concern: phosphorus and ammonia

- Monitoring has shown an upward trend of total phosphorous and ammonia in the system
- Doing further sampling and study to understand potential impacts on receiving water bodies and determine if the City needs to look at treatment options
- Treatment options will require significant investment

Sludge management

- System has accumulated residual solids (10% of operating volume)
- Not clear what effect this has on performance of the system
- De-sludging is a normal practice for this type of lagoon
- De-sludging will begin in 2022 and should be completed in 2025
- Once completed, we can assess impact on treatment system and need for further treatment options for phosphorus, ammonia, or other substances

Questions?
Comments?

Spill Contingency

Key document:

- *Spill Contingency Plan*

Spill Contingency Plan

Provides a clear response plan in the event of an unplanned release of any potentially harmful materials

Includes:

- Regulatory reporting requirements
- Site information, hazardous material storage, and infrastructure failure prevention
- Procedures if a failure or a spill occurs
- Equipment available for spill response
- Contact information and information on external resources
- Describes personnel responsibilities and training requirements

Types of spills

- **Sewage** spills from forcemains, lift stations, and Fidder's Lagoon structures
- **Fuel and gasoline** spills from aboveground and underground storage tanks at all City sites
- **Waste oil** storage spills from the tank at Baling facility or the City Garage
- **Sodium Hypochlorite** spills from the pump houses or Water Treatment Plant
- **Chlorine gas** release at the pool
- **Other types of chemicals** spills at City facilities

Prevention

- Regular testing and inspection of sewage forcemains
- Planned upgrade to Kam Lake Road forcemain
- Planned construction of sewage holding cell at largest lift station (#5, City Garage)
- Sewage lift stations monitored 24/7; most have backup power
- Underground fuel storage tanks replaced with double walled aboveground tanks
- Large waste oil storage tanks have secondary containment structures
- Chemicals stored and used as per Material Safety Data Sheets (MSDS) sheets at all facilities

Spill Contingency Plan

KEY POINT

- Action plans for spill type and location (includes spills on land, water, snow and ice)

NOTABLE UPDATES

- Overall updates to meet current regulatory requirements
- Updates to spill response personnel information
- Updates to figures

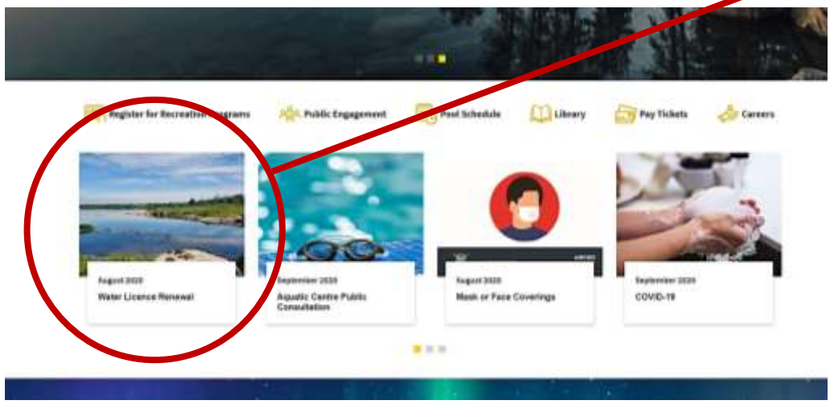
Questions?
Comments?

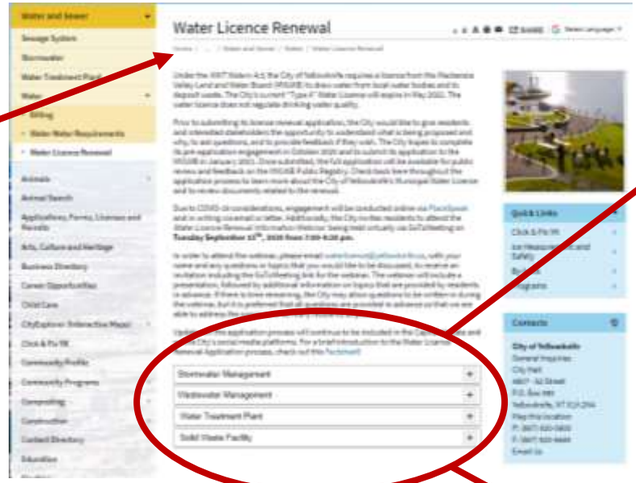
Recap

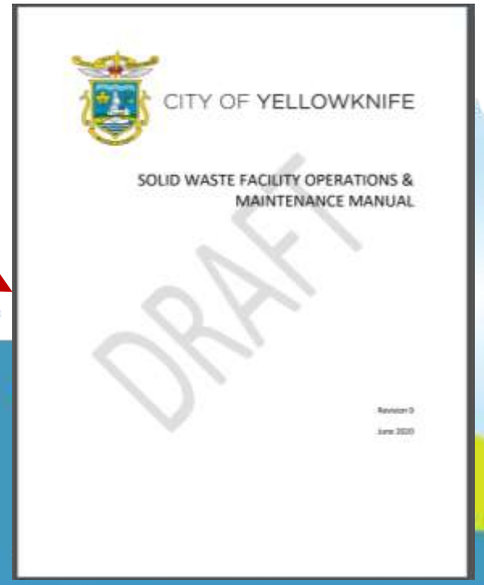
- Background and context for municipal water licence renewal
- Overview of application process and content
- Main components licence application
  - *Water treatment*
  - *Solid waste management*
  - *Stormwater management*
  - *Wastewater management*
  - *Spill contingency*

Additional resources available online

yellowknife.ca







We want your feedback!

- Two ways to provide input
  - *PlaceSpeak online engagement survey*
  - *Email: waterlicence@yellowknife.ca*
- Feedback period open until Friday, October 16

Thank you!