

City of Yellowknife

# Submarine Pipeline Replacement

Open House

November 2, 2022

Delivering a better world

# Agenda



## Introducing the Project

- Project History
- Project Drivers
- Project Schedule



## Project Elements

- Submarine Pipeline Replacement
- Pumphouse 1 + 2 Upgrades
- Intake Screen Design
- Land Use
- Regulatory + Engagement



## Key Considerations

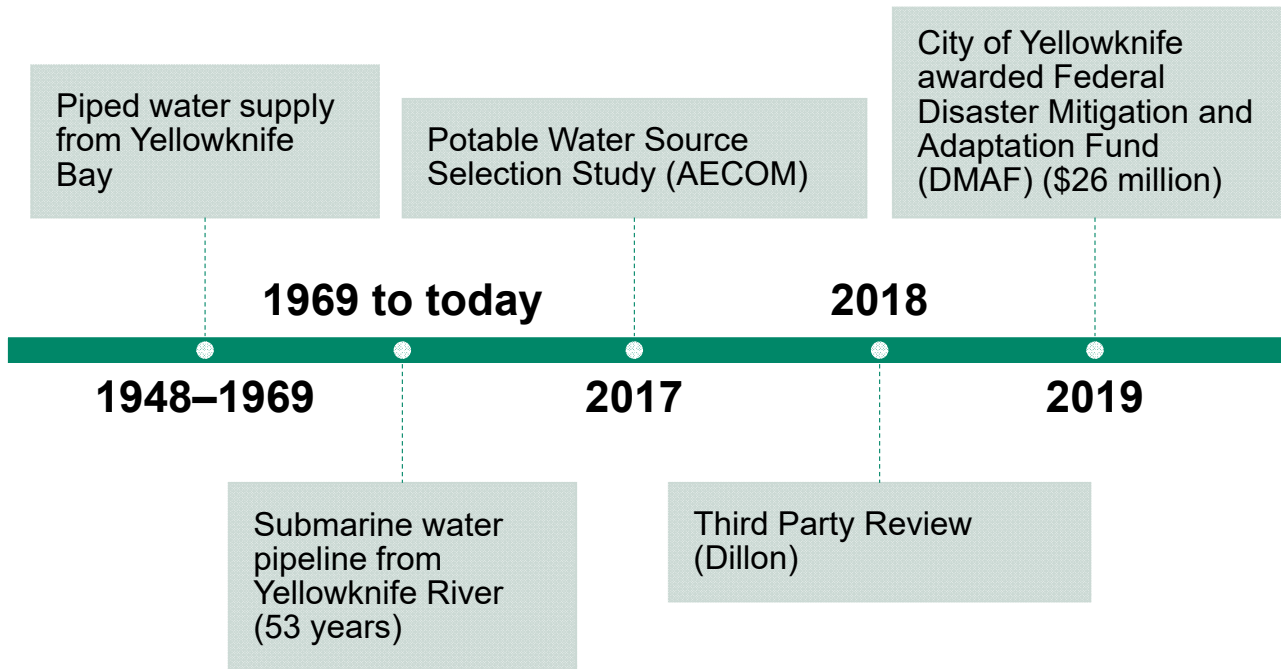
- Water Quality + Monitoring
- Construction Sequencing
- Construction Timing

# Introducing the Project

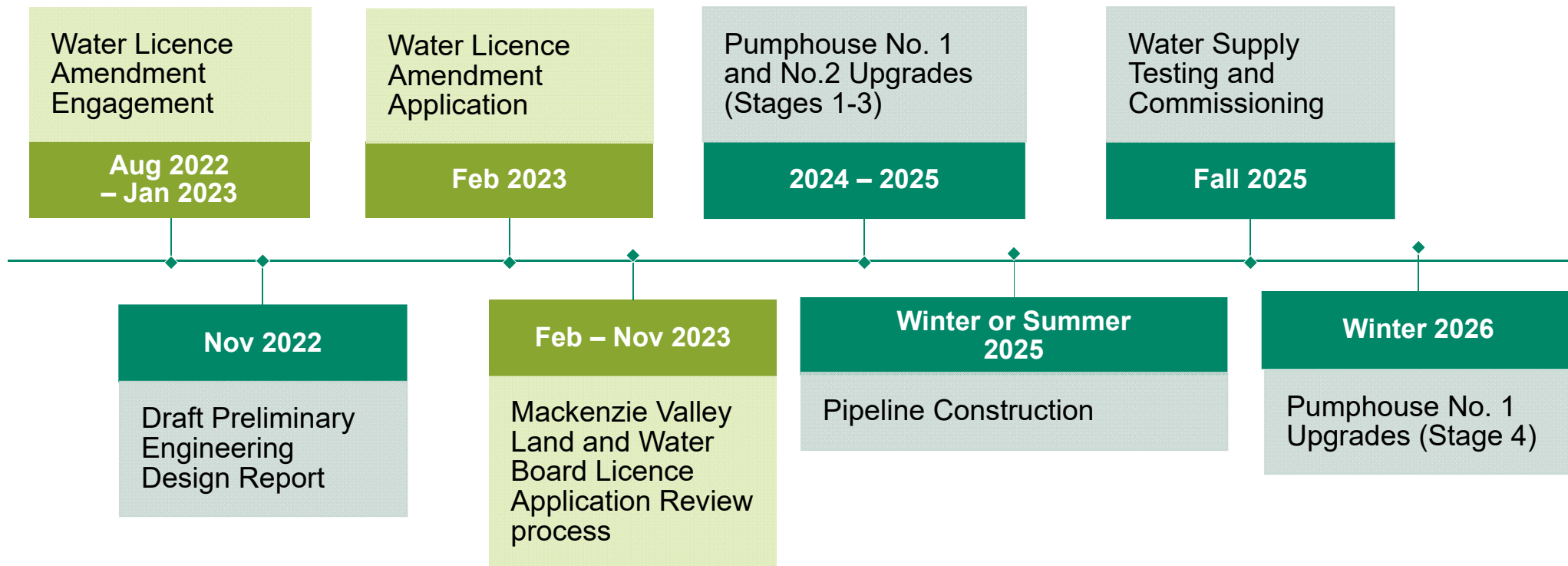
- Project History + Drivers
- Project Schedule



# History + Drivers



# Project Timeline



\* Estimated schedule - to be revised as planning progresses

# Project Elements

- Submarine Pipeline Design + Replacement
- Pumphouses
- Intake Screen Design
- Land Use
- Regulatory + Engagement

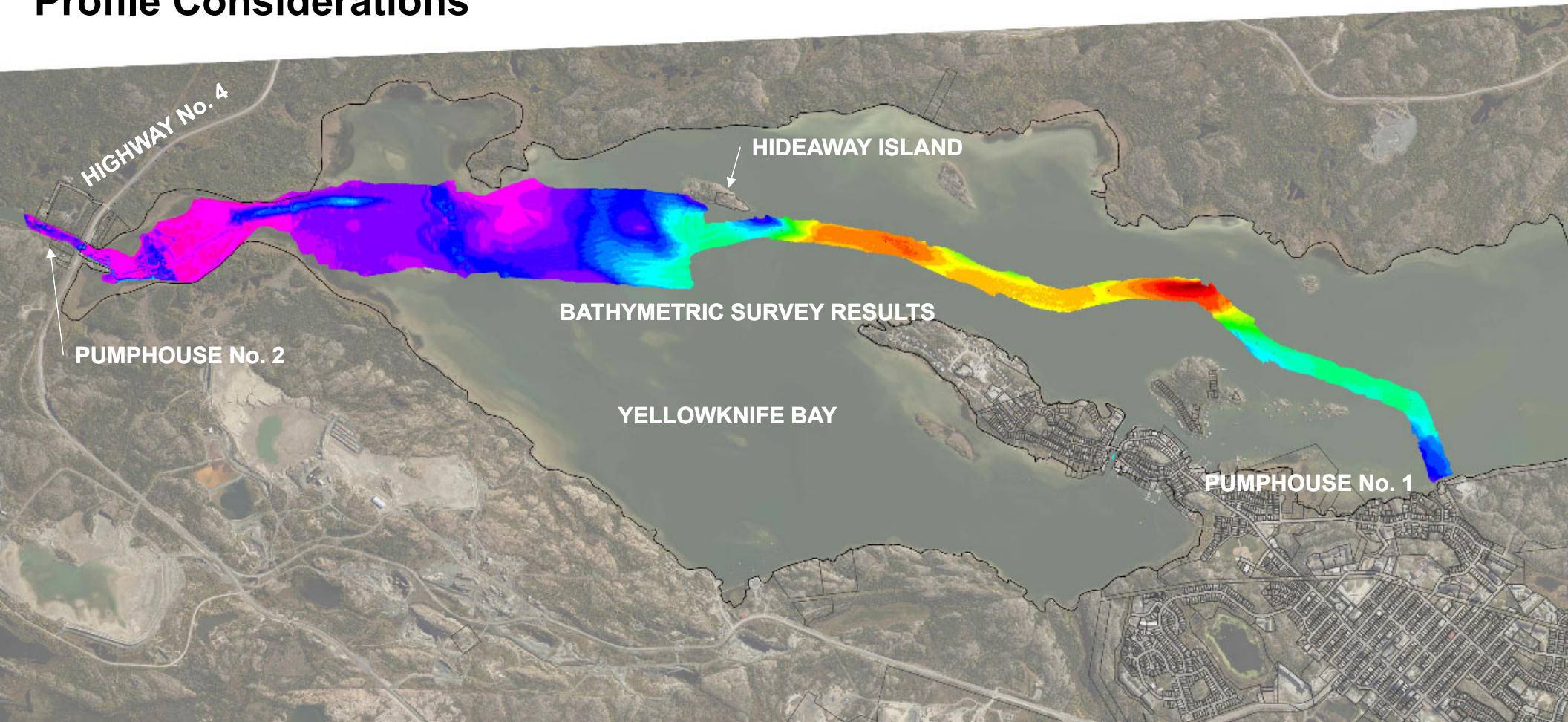


# Submarine Pipeline Design + Replacement

- Profile Considerations
- Proposed Pipeline Routes
- Pipeline Material & Features



## Profile Considerations





## Slide 8

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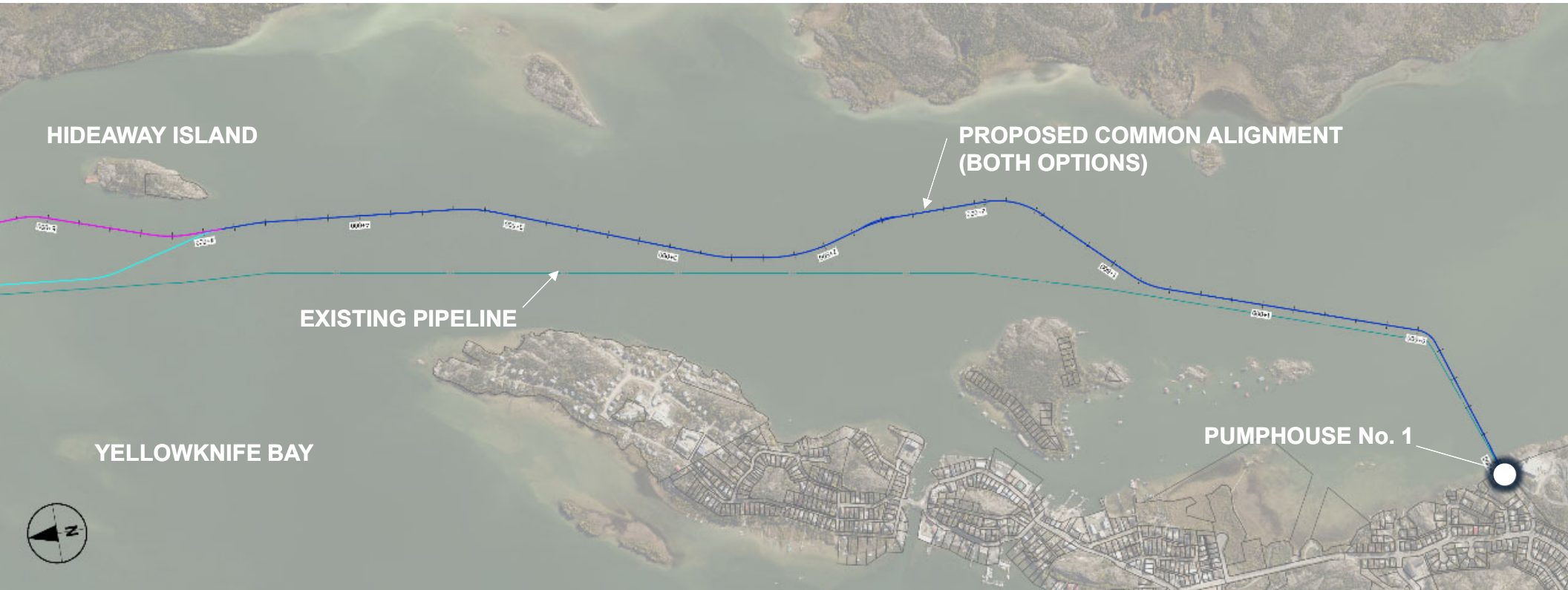
**MM98** Any images we can use from the drone survey, bathymetry or sub-bottom profiling work? Field photos of work being conducted?

McPherson, Morag, 10/19/22

# Proposed Alignment – Overall

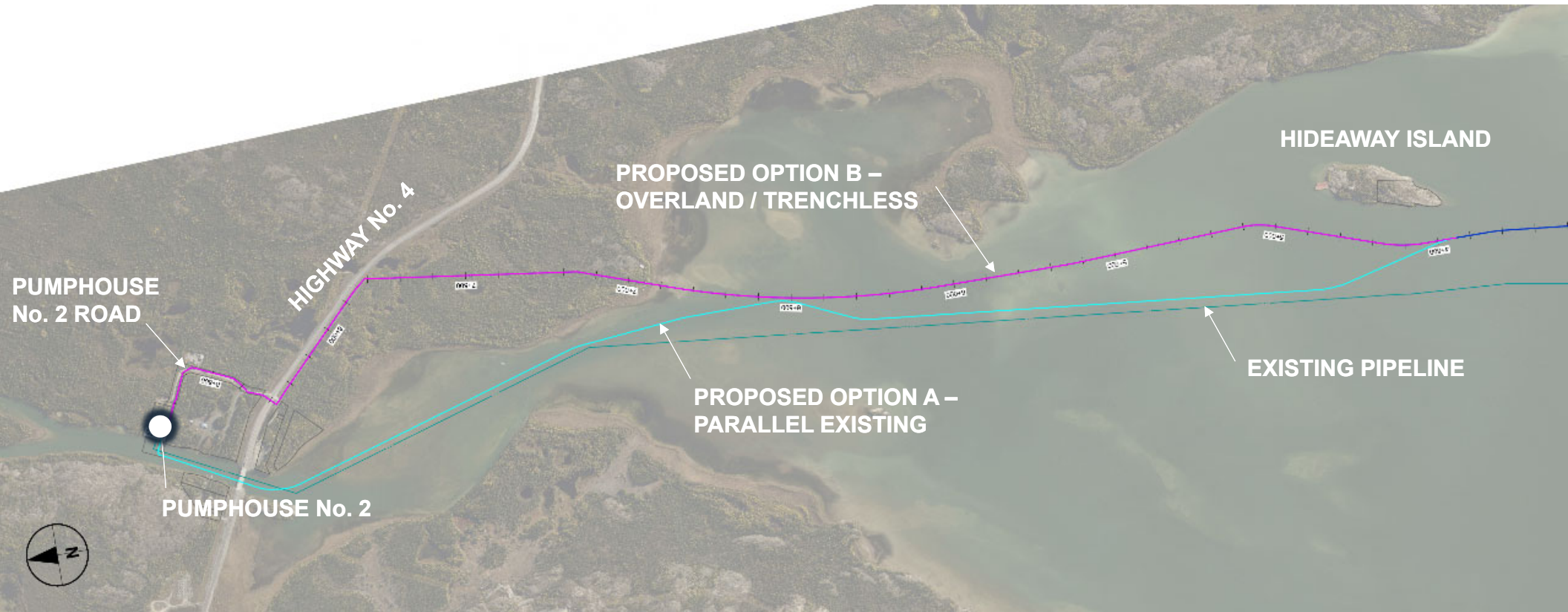


# Proposed Pipeline – Common Alignment





## Proposed Pipeline – Option A & B Alignments



## Recommended - Pipeline Option B Horizontal Directional Drilling







**OPTION B  
PROPOSED TRENCHLESS  
SHORELINE CROSSING**

**HIDEAWAY ISLAND**

**PUMPHOUSE No.2 ROAD**

**HIGHWAY No. 4**

**YELLOWKNIFE RIVER  
TERRITORIAL DAY  
USE PARK**

**WELEDEH GATHERING AREA**



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## Pipeline Material + Features

### High Density Polyethylene (HDPE)

- Proven submarine pipeline construction
- Does not corrode
- Relatively light material
- Concrete weights required for submersion



### Steel

- Existing pipeline material
- Susceptible to corrosion





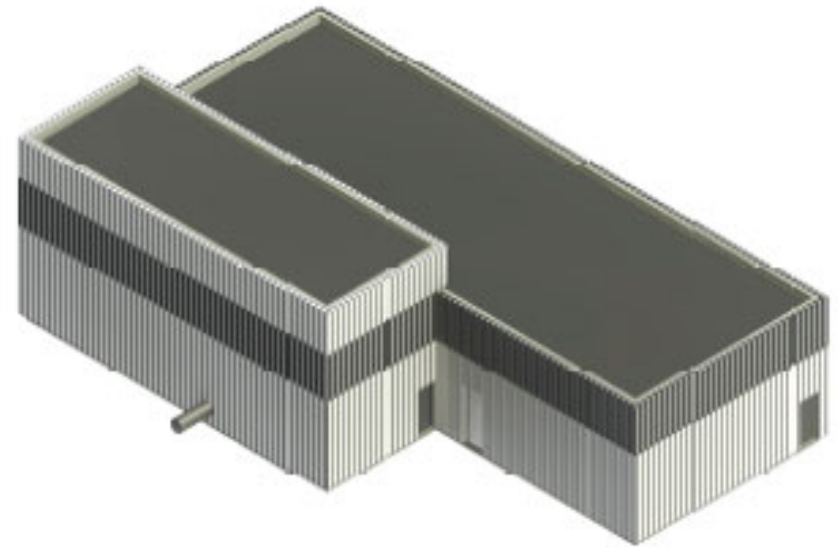
# Pumphouses



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## Pumphouse No. 2

- 75 year design life for structure
- Replace pumps and piping
- New ventilation, cooling
- New generator
- Air compressor for intake screens
- Electrical and heating upgrades
- Building and road expansion



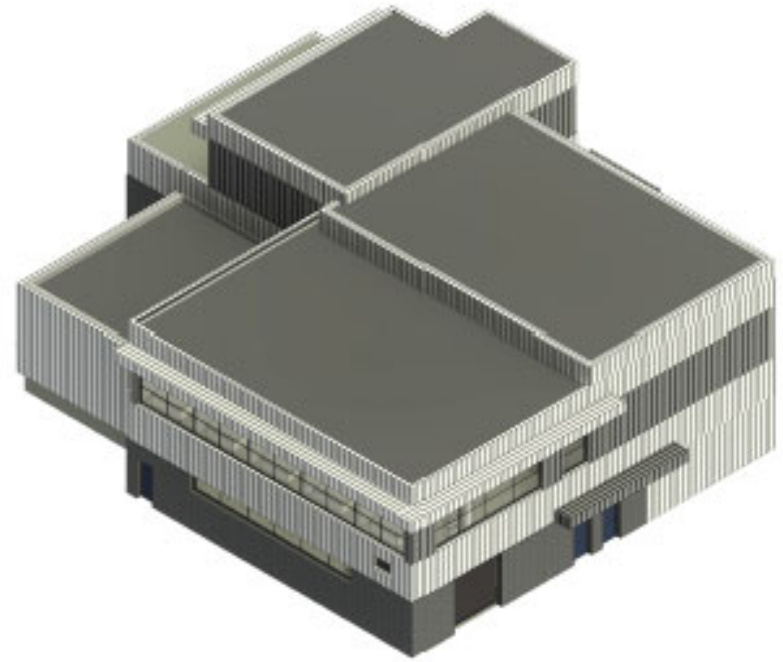
Conceptual Rendering – Pumphouse No. 2



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## Pumphouse No. 1

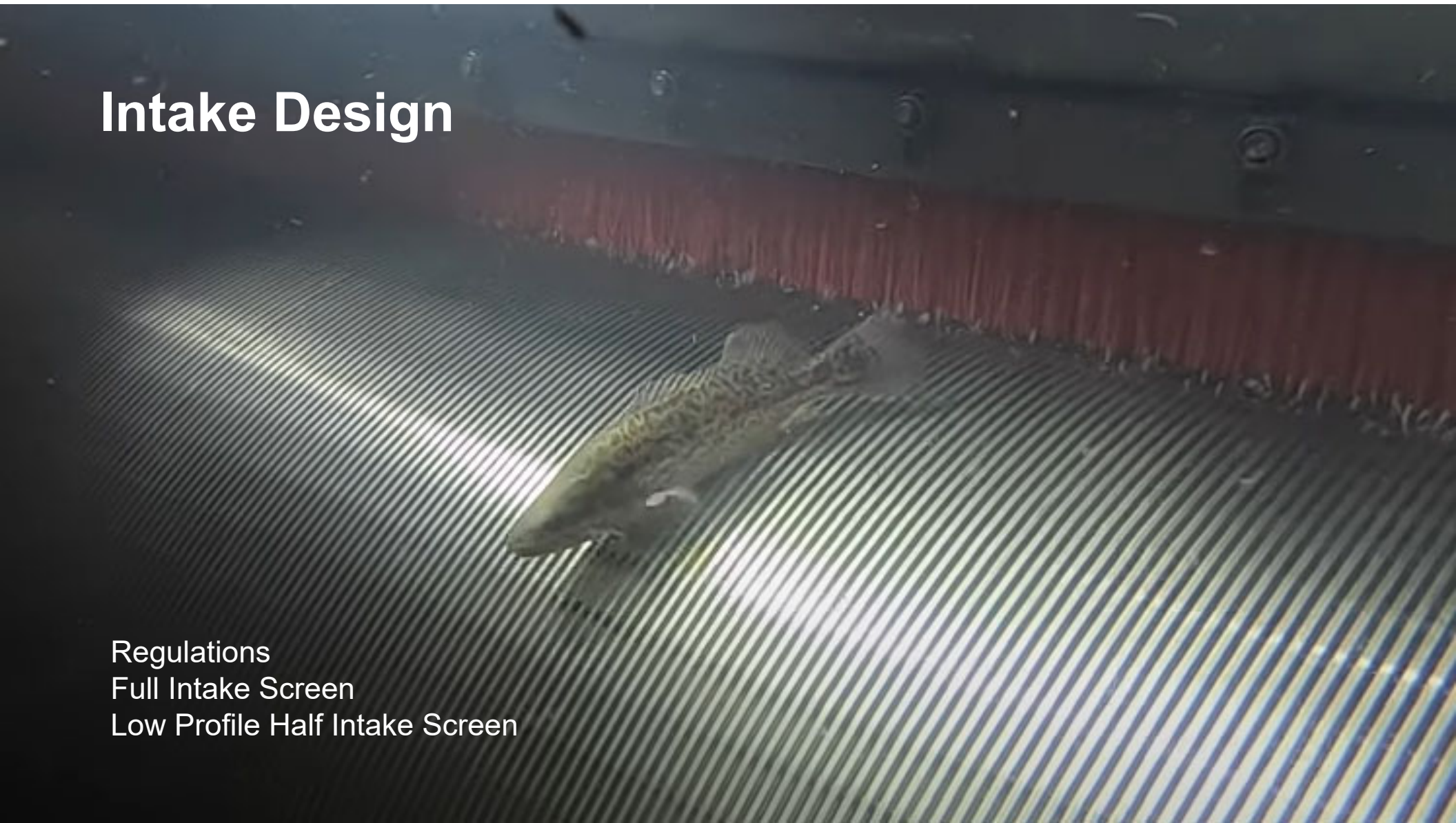
- 75 year design life for new structure
- Replace oldest part of structure
- Piping
- Heat, ventilation, cooling
- Generator
- New office space on second floor
- Site grading, parking, water/wastewater






Conceptual Rendering – Pumphouse No. 1

# Intake Design

Regulations  
Full Intake Screen  
Low Profile Half Intake Screen



## Department of Fisheries and Oceans Code of Practice: End-of-Pipe Fish Protection Screens

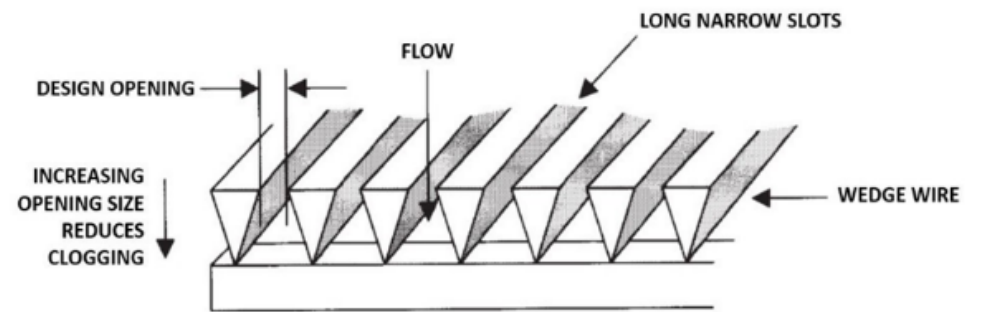
Key Fish Species in Yellowknife Bay				
Species Group	Species	Willideh Name	DFO required approach Velocity	Photos
Salmon and Walleye	Inconnu	wiilii	0.098 m/s	
	Lake Trout	łwezo		
	Lake Whitefish	łi		
	Cisco	wiilitsòà		
	Arctic Grayling	ts'èt'ìq		
	Longnose Sucker	dohdori		
	Ninespine Stickleback	-		
	Slimy Sculpin	-		
Pike	Northern Pike	łhdaà	0.055 m/s	
Eel	Burbot	Nòhkwe	0.035 m/s	



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## Department of Fisheries and Oceans Code of Practice: Key Design Requirements

- Effective screen area
- Screen material
- Screen shape



Credit: Paul Vecsei

## Intake Replacement Locations

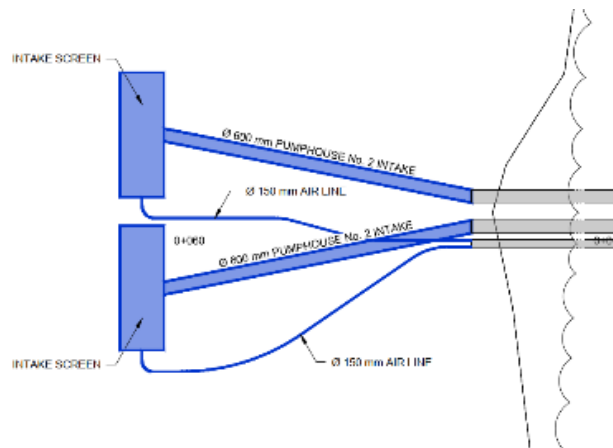
- 1) River Intake at Pumphouse No. 2  
(Primary)



- 2) Bay Intake at Pumphouse No. 1  
(Emergency / Secondary)



## Yellowknife River - Low Profile Half Intake Screens



- Two screens each installed on existing 600mm intake pipe
- Mounted to a concrete base
- Ideal for rivers and locations with shallow depth
- Able to operate at half the water depth of standard / traditional intake screens.
- Designed to counteract the forces of the River
- 0.035 m/s maximum approach velocity at design flow of submarine pipeline
- Compressed air cleaning system



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## Yellowknife Bay – Cylindrical Tee Style Screen



- New Tee screen will replace existing 600mm intake pipe
- Ideal for lakes and other locations with abundant depth
- Space efficient and easy to install relative to the half intake style screen
- 0.035 m/s maximum approach velocity at 20-year maximum instantaneous Water Treatment Plant flowrate

# Land Use

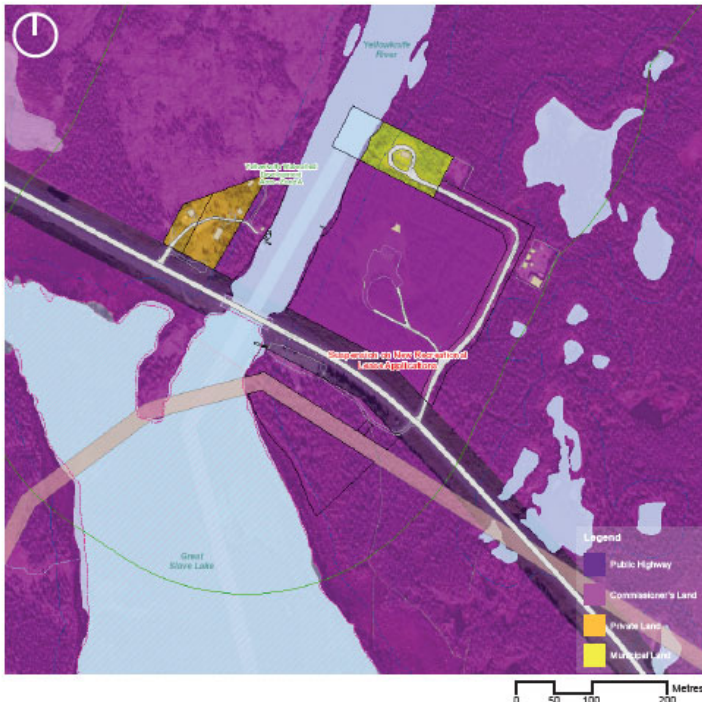
- Pumphouse No. 2
- Pumphouse No. 1
- Submarine Pipeline Lease Easement





## Pumphouse No. 2: Option B

- Overlapping land interests south of Highway No. 4 (Ingraham Trail)
- Proposed pipeline route will require construction and permanent easement



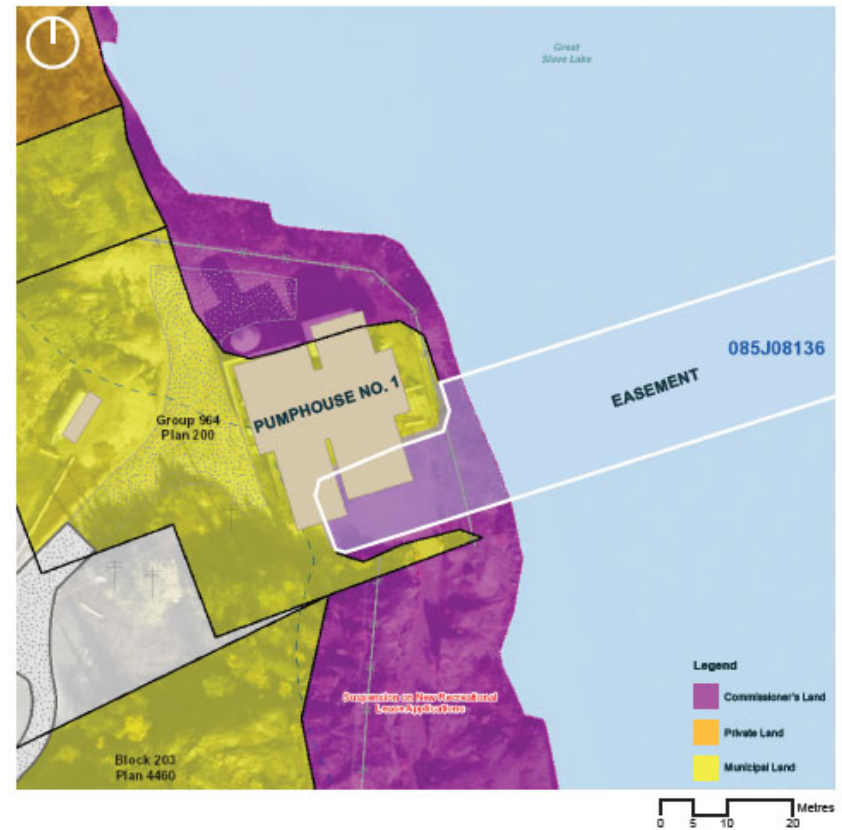
Credit: <https://www.maps.geomatics.gov.nt.ca/ATLAS>





## Pumphouse No. 1

- Commissioner's land between Pumphouse No 1 property and Yellowknife Bay
- Proposed Pumphouse No 1 expansion will further encroach on this property
- Connects to existing pipeline easement

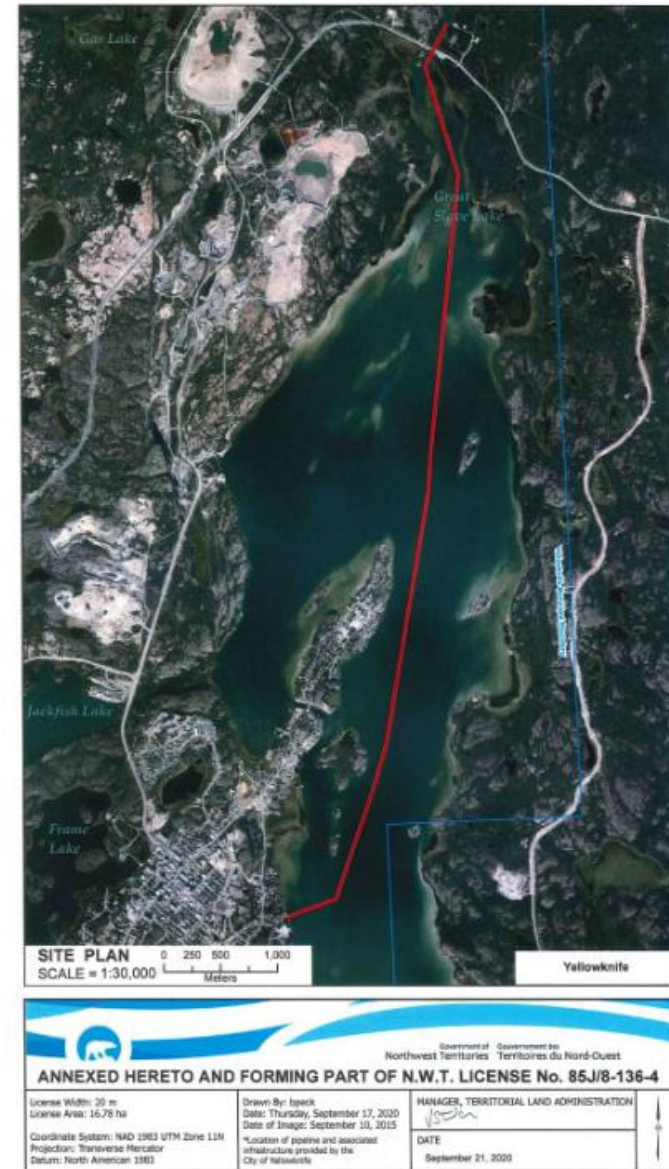


Credit: <https://www.maps.geomatics.gov.nt.ca/ATLAS>



## Submarine Pipeline Lease

- Lease agreement between City and Government of the Northwest Territories
- Existing pipeline lease easement 20 m width along existing alignment (16.78 ha)
- Revised alignment will require revised lease agreement





# Regulatory Context





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# Regulatory Requirements and Reviews

## MVLWB

- Preliminary Screening *Mackenzie Valley Resource Management Act*
- Amendment Application to Type A Water Licence MV2021L3-0003 + plan updates
  - Engagement
  - Spill Contingency
  - Waste Management
- Type A Land Use Permit
  - Geotechnical investigations
  - Pumphouse expansions and upgrades
  - Pipeline alignment overland route and Horizontal Directional Drilling



Source: [www.cklbradio.com](http://www.cklbradio.com)

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## Regulatory Requirements and Reviews

### Department of Fisheries and Oceans *Fisheries Act*

- Codes of Practice
- Measures to protect fish and fish habitat
- Request for Review

### Transport Canada *Canadian Navigable Waters Act*

### Government of the Northwest Territories

- Lands

### Others

- Explosives permit
- City permits



Cisco run at Tartan Rapids, Yellowknife River. Photo: Paul Vecsei

# Considerations

- Drinking Water Quality + Monitoring
- Decommissioning the Existing pipeline
- Construction Timing



## Drinking Water + Quality

- Water is drawn from Yellowknife Bay for maintenance and emergencies
- The City will seek permission to draw water from the Bay for a period of construction.
- Water is tested monthly, annually, and each time water is drawn from the Bay.



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## Decommissioning the Existing Submarine Pipeline

- Existing pipeline will be left in place.
- Limit sediment disturbance to Yellowknife Bay lake bed
- Localized, short term disturbance as pipeline settles.
- Seeking stakeholders' input to understand concerns
- Ongoing sediment sampling and water quality monitoring during construction

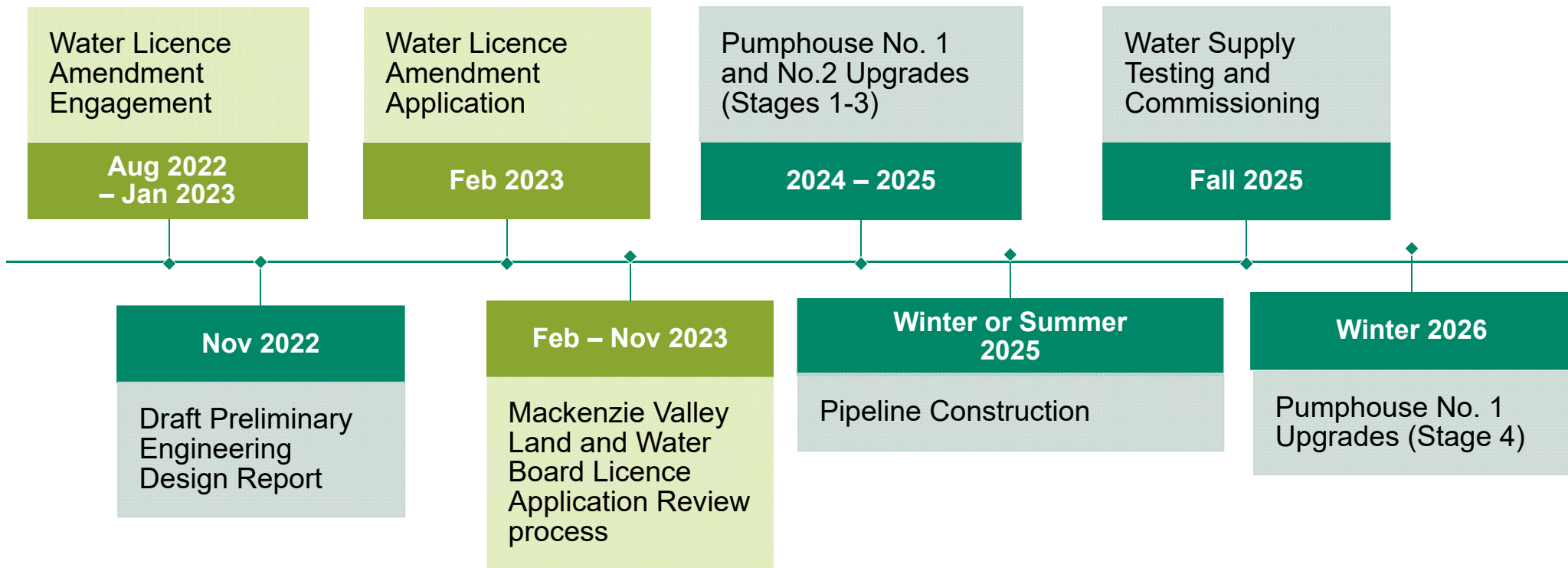


## Construction Timing





# Construction Sequencing



\* Estimated schedule - to be revised as planning progresses

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## Submarine Pipeline Construction (1969)



Photo credit:  
Ray Coutts



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## Submarine Pipeline Construction

### Summer Installation



vs

### Winter Installation





# Discussion & Questions