

Anglais: Department of Community and Government Services (CGS), Government of Nunavut (GN) retained exp Services Inc. (exp) to prepare the detailed design for the new water treatment facility and an expansion of the community raw water storage. The scope of the exp assignment includes preparation of the schematic design, design development, preparation of detailed construction drawings and preparation of construction documents such as specifications. Early in this design assignment, representatives of CGS and exp met with the Hamlet Council. Several issues were raised by members of Council.

- Safe manoeuvring of trucks at the truck-fill facility was viewed to be an important safety concern, both for water truck drivers and community members.
- Appropriate arrangements at the truck loading arm to minimize spilled water and the resulting ice accumulation was considered important.
- Measures to minimize the impacts of snow-drifting were viewed to be important. The water treatment plant facility will include two pump houses, the reconditioned pump house which will supply water from the existing reservoirs #1 and #2, and a new pump house supplying water from the new reservoir. The facility will also include a treated water storage tank to provide chlorine contact time for disinfection and process wastewater storage tank to collect waste water from the treatment process (backwashing of the filters). The wastewater storage tank will require to be emptied by the Hamlet's sewer trucks. The water treatment plant will have a dual truck fill arm for simultaneous filling of water trucks. The fill rate for the water trucks will result in the trucks being filled in approximately 13 minutes. The water treatment processes that have been incorporated into the design include the following.
- Self Cleaning Strainers This step will remove large colloidal contaminants such as dust and larger debris (grass, sand and weed growth). This step makes the next stage (pressure media filters) last longer and be protected from large items that may be picked up by the pumps.
- Pressure media filtration This is the main filtering stage that filters down to 5 microns in size. This is not absolute but gets most of the particles down to 5 microns in size.
- Cartridge filtration downstream of the media filters. The first set of filters is to remove particles down to 5 microns in size. If the pressure media filters are working appropriately this filter will see very small amounts of particles and will not need to be changed more than a couple of times a year. This is also the location where the use of carbon filters for taste can be installed if an event occurs. The second set of cartridge filters is for particles down to 1 micron in size. With the previous filters working properly these filters will see very little amount of dirt and should last for extended periods of time. The use of 1 micron filtration is for the removal of crypto and giardia oocysts that can be between 1-5 microns in size. The pumps have been sized to handle a variety of duty points and can change the pump speed automatically. With pumps speeds set to achieve a flow rate, as the filters will begin to plug, the pumps will work harder to force the same amount of water to go through them. This should eliminate the effects of partially plugged filters on the treatment process and maximize the filter usage.
- Ultraviolet disinfection This type of disinfection "deactivates" pathogens. It is only present when the water is passing thru the filter. It does not kill them, but it makes them unable to reproduce, and therefore

[illegible]

Proposed term of operation: from 2017-05-15 to 2038-05-17

## Activités

### Activités

Emplacement	Type d'activité	Statut des terres	Historique du site	Site à valeur archéologique ou paléontologique	Proximité des collectivités les plus proches et de toute zone protégée
Water Reservoir Cell #3	Municipal and Industrial Development	Municipal	Adjacent to water reservoir cells #1 (constructed 1998) and #2 (constructed 1988), community water treatment plant/truckfill station.	No known archaeological/paleontological sites.	Within Hamlet of Arviat municipal boundaries.
New Water Treatment Plant	Municipal and Industrial Development	Municipal	Adjacent to water reservoir cell #1 (constructed 1998) and existing pumphouse and standby generator buildings.	No known archaeological/paleontological sites.	Within Hamlet of Arviat municipal boundaries.

### Engagement de la collectivité et avantages pour la région

Collectivité	Nom	Organisme	Date de la prise de contact
Arviat	Hamlet Council	Preliminary meeting with Hamlet Council and design consultant (exp) regarding new water treatment plant and raw water storage expansion (Cell #3)	2016-11-01
Arviat	Hamlet Council	Motion Number for approval of the project is 77/17	2017-05-04

## Autorisations

### Indiquez les zones dans lesquelles le projet est situé

Kivalliq

### Autorisations

Organisme de régulation	Description des autorisations	État actuel	Date de l'émission/de la demande	Date d'échéance
Gouvernement du Nunavut, ministère du Développement économique et des Transports	Letter from Todd McKay, Director, Nunavut Airports to Paul Clow, CGS, as approval from EDT, Nunavut Airports Division for the proposed water reservoir. Determined that the proposed water reservoir will not impair the safety of aircraft operating in the airspace surrounding the Arviat airport.	Applied, Decision Pending	2017-04-12	
Transports Canada	TC #2017-195 Aeronautical Assessment Form for Obstacle Evaluation	Active	2017-03-31	2018-09-30
Office des eaux du Nunavut	3AM-ARV1016 Ammendment/Renewal Application filed	Applied, Decision Pending		

## Utilisation de matériel

Équipement à utiliser (y compris les perceuses, les pompes, les aéronefs, les véhicules, etc.)

Type d'équipement	Quantité	Taille – Dimensions	Utilisation proposée
Loader, excavator, dump trucks, etc.	-	-	Construction of Cell #3 and Water Treatment Plant

## Décrivez l'utilisation du carburant et des marchandises dangereuses

Décrivez l'utilisation de carburant :	Type de carburant	Nombre de conteneurs	Capacité du conteneur	Quantité totale	Unités	Utilisation proposée
Diesel	fuel	0	0	0	Liters	For heavy equipment

## Consommation d'eau

Quantité quotidienne (m3)	Méthodes de récupération de l'eau proposées	Emplacement de récupération de l'eau proposé
2000	Overland pipeline to water reservoirs - approx. daily amount over 3 months (175,000m3 annually)	Wolf Creek - no additional water requirements/consumption during project construction

## Déchets

### Gestion des déchets

Activités du projet	Type des déchets	Quantité prévue	Méthode d'élimination	Procédures de traitement supplémentaires
Municipal and Industrial Development	Mort-terrain (sol organique, déchets, résidus)	60,000m3	Excavated material at Cell #3 site - to be reused in berm construction	Surplus material to be disposed of offsite as per direction from site Engineer and Hamlet

## Répercussions environnementales :

The contractor must adhere to environmental protection procedures during construction of the new reservoir cell, with measures outlined for the disposal of waste, and protecting drainage systems and waterways. Refer to Environmental Procedures Specifications uploaded to Project Documents. Excavated material is to be reused for the construction of the cell berms.

## Détails Partie 2

### Informations générales du projet

- The Hamlet of Arviat has outgrown the current reservoir infrastructure and additional capacity is required to meet the water demands of the growing community. Limiting water availability will increase the risk of water wash diseases. - There is no alternative to constructing additional reservoir capacity. Not locating the third reservoir cell beside the existing infrastructure does not make financial or operational sense, as additional treatment and truckfill stations would be needed. - Approval will be required from the NWB upon completion of the NIRB screening process.

### Conformité de l'énoncé opérationnel de Pêches et Océans Canada

N/A

### Transport

- Site will be accessed by Hamlet road adjacent to the current reservoirs and pumphouse. Road is frequently used, by community residents and large water trucks for the delivery of water. - Dust management will be achieved by following speed limits. - Supplies will be brought into Arviat via sealift. - Modular construction of the new water treatment plant is anticipated, taking place in the south prior to shipping. - No additional flights.

### Site du camp

N/A

### Équipement

- Heavy equipment will be used for construction purposes only. No equipment will remain on site for operation.

### Eau

- Construction of a new water reservoir cell (Cell #3) and new water treatment facility is required. It has been requested from the NWB that the amount of water authorized be increased to 175,000 cubic metres annually to meet the water demands of the community. - The community water source is Wolf Creek. No additional water requirements/consumption are required during project construction. - An overland pipeline supplies water to the two water reservoir cells currently in place, seasonally from July-September.

### Eaux d'égout (eaux grises, eaux usées, autre)

- No wastewater is produced by the new reservoir cell. - Wastewater is produced from the new water treatment plant that will be trucked stored in the wastewater tank and trucked to the community sewage lagoon. Wastewater will be produced from the filter backwashing process, operational drains and online analyzers, and the water treatment plant washroom.

### Carburant

- Fuel will be stored onsite of the new water treatment plant for heating and for the back-up generator. The current water treatment plant has fuel stored for the same purposes. - Diesel is used to operate heavy equipment during construction.

### Produits chimiques et marchandises dangereuses

- Calcium hypochlorite (granular chlorine) and fluoride will be used in the water treatment process. The chlorination room is separate from the rest of the water treatment plant with its own exterior door. - Chlorine and fluoride are currently used at the water treatment plant and reservoir.

### Répercussions sur la main-d'œuvre et les ressources humaines et socioéconomiques

- Construction tender will include standard GN NNI Policy.

### Participation du public/savoir traditionnel

- Arviat Hamlet Council was consulted in the early planning phase of the water treatment plant and storage expansion (Cell #3) project. Hamlet Council passed a motion (77/17) approving this project.

## SECTION I : Développement municipal et industriel : Informations du projet

- The Hamlet of Arviat requires additional water storage and water treatment to meet the needs of the growing municipality. The municipality is responsible for supplying treated water to residents, with the assistance of CGS. Construction is being managed through CGS. - The existing water reservoir includes two cells adjacent to the road out of town to the north of the community. A third cell with an estimated active volume of 103,427 metres cubed is required to meet the water needs of the community to 2038. Locating the new cell (Cell #3) to the west of Cell #1 will share the western berm of Cell #1, reducing the volume of granular needed to be imported, and avoid exposure to high tides, small ponds, or the existing subdrainage system for the cells. Cell #3 will be constructed similar to Cell #1, with a high density polyethylene (HDPE) liner. Equipment is planned to be mobilized to the site during sealift 2017, and construction will take place summer 2018. First fill of the new cell is anticipated for late summer/early fall 2018. The third cell will operate under the Hamlet Water Licence, currently under renewal, 3AM-ARV1016. The contractor must adhere to environmental protection procedures during construction of the new reservoir cell, with measures outlined for the disposal of waste, and protecting drainage systems and waterways. Excavated material is to be reused for the construction of the cell berms.

### Description de l'environnement existant : Environnement physique

- Additional information on the condition of the permafrost and soil in the water reservoir and water treatment plant area can be found in the Geotechnical Report.

### Description de l'environnement existant : Environnement biologique

- The area where the third reservoir cell will be constructed is adjacent to the other two cells. This area has previously been disturbed and there is little vegetation. - Little wildlife in the area of the new reservoir cell and water treatment plant is assumed due to the proximity to the community, adjacent to a busy road out of town, and next to the activity of 6-7 water trucks delivering water daily from approximately 7am-10pm.

### Description de l'environnement existant : Environnement socio-économique

- There is significant human health risk in not completing this project. By restricting the water available to the community, people will not be able to achieve minimum daily water volumes needed to prevent water wash diseases.

#### **Identification des répercussions et mesures d'atténuation proposées**

- Permafrost impacts will be mitigated during construction by excavating and installing the liner quickly as to not allow the ground to thaw. - Construction noise cannot be avoided, however it is for a limited time period. Heavy vehicle activity around the water treatment plant is already a daily occurrence. - The construction phase has the potential to create employment and economic opportunities for the community; either directly at the construction site or indirectly through the use of hotels, local stores, restaurants, etc.

#### **Répercussions cumulatives**

- Further developing the area of the current water reservoir cells and water treatment plant will create a larger impacted area. However, the health needs of the community have to be met and the alternative would be to develop a new area.

Impacts

		Identification des répercussions environnementales																								
		PHYSICAL	Designated environmental areas	Ground stability	Permafrost	Hydrology / Limnology	Water quality	Climate conditions	Eskers and other unique or fragile landscapes	Surface and bedrock geology	Sediment and soil quality	Tidal processes and bathymetry	Air quality	Noise levels	BIOLOGICAL	Vegetation	Wildlife, including habitat and migration patterns	Birds, including habitat and migration patterns	Aquatic species, incl. habitat and migration/spawning	Wildlife protected areas	SOCIO - ECONOMIC	Archaeological and cultural historic sites	Employment	Community wellness	Community infrastructure	Human health
Construction																										
Municipal and Industrial Development		-	-	M	-	-	-	-	-	-	-	-	M		-	-	-	-	-		P	-	-	-	-	
Exploitation																										
Municipal and Industrial Development		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		P	-	-	-	-	
Désaffectation																										
Municipal and Industrial Development		-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-	-		-	-	-	-	-	
(P = Positive, N = Négative et non gérable, M = Négative et gérable, U = Inconnue)																										



Project Map



