Nunavik Residual Materials Management Plan

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Renewable Resources, Environment, Lands and Parks Department
Service des ressources renouvelables, de l'environnement, du territoire et des parcs

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List of Abbreviations

AAPR	Association of Auto Parts Recyclers
ARPE:	Association pour le recyclage des produits électroniques (electronic device recycling)
BGE	Boissons Gazeuses Environnement
CIBC	Canadian Imperial Bank of Commerce
CRD	Construction-renovation-demolition
FCNQ	Federation of Cooperatives of Northern Québec
HHW	Household hazardous waste
ICI	Industrial-commercial-institutional
ICT	Information and communications technologies
JBNQA	*James Bay and Northern Québec Agreement*
Kativik Act	*Act respecting Northern Villages and the Kativik Regional Government*
KEAC	Kativik Environmental Advisory Committee
KEQC	Kativik Environmental Quality Commission
KRETC	Kativik Regional Employment and Training Committee
KRG	Kativik Regional Government
KRPF	Kativik Regional Police Force
KSB	Kativik School Board
MDDELCC	Ministère du Développement durable, de l'Environnement et de la Lutte contre les changements climatiques (sustainable development, the environment and the fight against climate change)
MRNF	Ministère des Ressources naturelles et de la Faune (natural resources and wildlife)
NEAS	Nunavut Eastern Arctic Shipping
NRBHSS	Nunavik Regional Board of Health and Social Services
NRMMP	*Nunavik Residual Materials Management Plan*
QRMMP	*Québec Residual Materials Management Policy*
3R-RD	Reduction, reuse, recycling, reclamation and disposal
RRRPE	*Regulation respecting the Recovery and Reclamation of Products by Enterprises*
NV	Northern village
NWT	Northwest Territories

Work Team

Coordination

Michael Barrett
Associate Director
Renewable Resources, Environment, Lands and Parks Department
Kativik Regional Government

Frédéric Gagné
Director
Municipal Public Works Department
Kativik Regional Government

Mélissa Gagnon
Environmental Specialist
Renewable Resources, Environment, Lands and Parks Department
Kativik Regional Government

Drafting:

Véronique Gilbert
Project Manager
Renewable Resources, Environment, Lands and Parks Department
Kativik Regional Government

Raphaël Joanisse-Clément
Project Manager
Municipal Public Works Department
Kativik Regional Government

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Executive Summary

The *Nunavik Residual Materials Management Plan* is in line with the Québec government's goal to build a green economy. The approximately 13 million tonnes of residual materials produced every year in Québec contain an irrefutable potential for manufacturing and energy production.

The *Québec Residual Materials Management Policy* aims to eliminate waste and maximize added value through the sound management of the province's residual materials. The Policy's underlying objective is to ensure that the only residual material sent for disposal is final waste.

To reach this objective, the Policy prescribes the implementation of measures targeting three major residual materials management issues:

- Ending resource waste.
- Promoting the achievement of the goals of the *Climate Change Action Plan* and of the *Québec Energy Strategy*.
- Making all stakeholders involved responsible for residual materials management.

This executive summary describes concisely the measures recommended to allow Nunavik to meet the residual materials management objectives set for Québec.

Analysis of current residual materials management demonstrates that the 14 northern villages generate close to 12,000 tonnes, or 122,000 m^3, of residual materials annually. Almost all of these residual materials end up in local landfills where they are burned, buried or stored. No concerted recycling system exists. Several reuse and recycling projects have been launched in recent years in different northern villages, but these projects remain local initiatives.

The orientations adopted for *Nunavik Residual Materials Management Plan* have served as the terms of reference for the development and understanding of attendant implementation measures. The orientations are:

- Improve knowledge of residual materials management;
- Foster management methods applicable in Nunavik in line with sustainable development concepts;
- Deliver regional support to the northern villages for measures to achieve set objectives;
- Maintain residual materials processing and management costs at levels that are economically and socially acceptable.

These orientations constitute the foundations of the *Nunavik Residual Materials Management Plan* and are the basis of the recommended management measures.

Improved landfill management is a key component of every measure and will be pursued in every northern village. Among other actions, this measure will involve the assignment of an employee to oversee operations. Specifically, the employee will be responsible for coordinating and supervising activities at the local landfill. Estimated costs for improved management of northern landfills throughout the region are $4,300,000 over five years. In connection with improved management of northern landfills, a study will be carried out to determine the feasibility of setting up incinerators in the region.

Institutions, businesses and industries will have to establish internal environmental committees and be required to comply with the new measures proposed in the *Nunavik Residual Materials Management Plan*.

The selective collection of different categories of residual materials will contribute to the acquisition of knowledge about residual material quantities and the best methods for implementing management and recovery projects. It will serve to help the northern villages to extend the service life of local landfills and to improve the quality of the environment. The various selective collection measures will, for the most part, be implemented as pilot projects in communities that are prepared to invest the needed time and funding.

Regarding the management of recyclable materials, such as glass, plastic, metal, paper and cardboard, the *Nunavik Residual Materials Management Plan* proposes two collection options. Each northern village that decides to implement a pilot project will be able to choose the suitable option for it. The first option involves voluntary participation. Deposit containers are set up at strategic locations in the community and residents are encouraged to deposit their pre-sorted recyclable materials. The second option involves door-to-door collection. If this option is chosen by a northern village, changes will have to be made to existing residential garbage boxes. This option makes recycling more accessible to residents, requiring less effort on their part. Regardless of the option chosen by the participating northern villages, the collected materials will need to be stored and prepared prior to transportation to recycling centres. Estimated costs for the set-up and operation of the two recyclable materials management methods are close to $1,410,000 over five years per pilot project.

Decomposing organic waste generates greenhouse gases and toxic water leachate that can enter the soil, streams and lakes, and the water table. Under the *Nunavik Residual Materials Management Plan*, the three measures recommended for the management of organic materials should be set up in at least one northern village within five years. The first measure permits the composting of plant material and is tied to the greenhouse projects underway or planned in different northern villages in the coming years. The costs related to

this measure are close to $210,000 over five years and will be almost entirely financed by community partners. The second measure is a modular rotating composter pilot project. The pilot project will ultimately make it possible to manage 33% of organic materials sent to the local landfill for disposal including animal carcasses as well as paper and cardboard. Estimated costs for the set up and operation of a modular rotating composter are close to $650,000 over five years.

Waste produced by construction activities will also be targeted by various management measures, such as the creation of clearly identified disposal and reuse zones at northern landfills for this type of material. The landfill operator will have to ensure that the sorting of construction-renovation-demolition waste is performed properly by contractors. At the same time, changes to call-for-tender documentation for construction-renovation-demolition contracts in Nunavik will be looked at by a feasibility study. The changes could entail contractors taking full responsibility for construction-renovation-demolition waste and household hazardous waste not covered under the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*, and returning it to the south. Municipal by-laws regarding the management of construction-renovation-demolition waste at landfills could help generate revenue for northern villages, as has been successfully done in Kuujjuaq and Kuujjuarapik where by-laws improved the management of the large quantities of construction materials being sent to landfills for disposal. Revenue generated in this manner could be re-injected into the management of local landfills, for example to pay for the wages of the landfill operator.

Bulky appliances containing halocarbons should be better controlled at northern landfills because these gases are highly toxic for the atmosphere. In order to recycle these gases and the metal carcasses, a measure is proposed and will be implemented in all the northern villages within five years. The measure involves hiring a refrigeration specialist to travel to the communities with his equipment in order to empty halocarbons from all waste appliances. The metal from the appliances can be included in the scrap metal recycling project. Estimated costs for the measure are about $310,000 for all the northern villages over five years.

Scrap vehicles sent for disposal at northern landfills always contain hazardous materials (such as batteries, used oil, gasoline and antifreeze). To prevent these hazardous materials from entering landfills, a protocol regarding the removal of vehicles from service will be developed with the northern villages. The sole measure proposed will involve the purchase of equipment to remove the hazardous materials from the vehicles, and to train mechanics. Estimated costs for this measure are roughly $400,000 over five years for six villages.

As the issue of scrap metal management (vehicles, bulky appliances, construction waste, etc.) was specifically raised during preliminary consultations, the adoption of related measures under the *Nunavik Residual Materials Management Plan* has been made a priority

for the region. The proposed measure includes responsibility for all costs (equipment, transportation and wages) so that the equipment can subsequently be used to clean up the landfills in other northern villages. Estimated costs for this measure are close to $2,300,000 for the pilot project and, then, roughly $1,300,000 for each additional project. The revenue generated by the sale of scrap metal will serve to cover part of the costs of the project.

The management of household hazardous waste is already handled by the northern villages. Disposal zones that comply with safety criteria will be set up and publicized in every community. The KRG will continue to provide technical assistance to the northern villages regarding the management of these highly toxic materials. The upcoming implementation (summer of 2015) of the *Regulation respecting the Recovery and Reclamation of Products by Enterprises* will contribute positively to the management of household hazardous waste and provide funding for part of the costs related to the transportation and processing of these materials.

RECYC-QUÉBEC has a mandate to promote the recovery and recycling of beer and soft-drink containers. Initiatives may or may not include funding (coaching, support, etc.). For tires, RECYC-QUÉBEC delivers support and coaching, in addition to administering the Program for the Integrated Management of Scrap Tires. The KRG will follow up with the northern villages to ensure they are able to take advantage from this assistance.

Regional support for the implementation of the *Nunavik Residual Materials Management Plan* is part of the plan's overall orientations. The KRG will use existing human resources, among other things, to analyze legal issues, deliver technical assistance, produce annual reports and a five-year overview, as well as ensure environmental monitoring. The KRG will also be responsible for producing information and awareness tools for each of the measures to be set up. Estimated costs for the follow-up and coordination of the *Nunavik Residual Materials Management Plan* in Nunavik is $150,000 over five years.

The feasibility of the measures proposed to improve residual materials management in the Kativik Region will depend on securing the necessary funding and the development of partnerships between the KRG and various regional and provincial organizations. Most of the measures are in line with the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*. The northern villages will need the support of the KRG to implement the new measures proposed in the *Nunavik Residual Materials Management Plan*.

Context

The KRG was created following the signature of the JBNQA to deliver public services to the inhabitants of Nunavik, Nunavimmiut. The municipalities of the region and the Québec government also delegate other mandates to the KRG.

As well, the KRG delivers technical assistance to the 14 northern villages in the following fields: legal affairs, management and municipal accounting, land use planning and development, environmental management, engineering and public transportation. The KRG is the primary interlocutor of the Québec government, and is recognized as an essential contributor to regional development projects.

For several years, the KRG has focused efforts on improving residual materials management practices in the region.

Several programs stemming from the Québec residual materials management policy were not or are not applicable in Nunavik. This situation has produced multiple delays in the drafting and implementation of a residual materials management plan for the region.

It must be recognized that Nunavik is a unique region of Québec. The wildlife and vegetation are unlike those found elsewhere, permafrost exists, the territory is immense and there are no roads connecting the northern villages. These are a few of the realities that differentiate Nunavik from southern Québec and that require adapted approaches to the problems posed by residual materials.

Consequently, the *Nunavik Residual Materials Management Plan* is intended to give the northern villages tools that take into account their unique realities and can contribute to improving the management of residual materials. The Management Plan will also make it possible to increase awareness of the importance to reduce, reuse, recycle and reclaim residual materials in order to protect the environment.

1. Description of the Territory

1.1 Territory covered by the management plan

1.1.1 Geology of the territory and climate

Nunavik is the region situated north of the 55th parallel in Québec. Covering 500,164 km^2, it represents a third of the province. Nunavik is bordered by Newfoundland and Labrador on the east and by Hudson Bay, Hudson Strait and Ungava Bay.

The region sits on the Canadian Shield, which holds ore-bearing minerals, the main ones being iron, nickel, asbestos, uranium and copper.

The glaciers of the Quaternary era helped shape the topography that is made up of rounded and asymmetric hills, valleys, elongated lakes, striated rock surfaces and unconsolidated deposits. Nunavik possesses a wide range of landscapes: rugged mountains, cuestas, marine plains and interior plateaus.

The region's uniqueness is also reflected in its climate. Two climate types characterize the region: arctic in the north and subarctic in the south. From north to south, temperatures may reach as low as -50°C in winter and up to 30°C in summer. The presence of large water bodies (Hudson Bay and Ungava Bay) influence local weather conditions. Continuous permafrost (in the north) and discontinuous permafrost (in the south) is further evidence of the region's cold climate.

In the northern part of the region, the average total annual precipitation is 300 mm while, in the southern part, it is 700 mm. Compared with other regions of Québec, which can receive more than 1,000 mm of rain and snow annually, Nunavik is relatively dry and experiences less snow accumulation. On the other hand, several studies on climate change disturbances forecast increased precipitation for the region.

Ice covers seaways between November and July, greatly influencing the marine transportation of goods.

1.1.2 Land categories

Land development in Nunavik is covered under the Kativik Act which stems from the JBNQA.

The JBNQA classifies Nunavik into three categories of land (Figure 1):

- **Category I**: lands for the exclusive use and benefit of Inuit that are administered by landholding corporations in each community.
- **Category II**: provincial lands on which Inuit have exclusive hunting, fishing and trapping rights; Inuit and the KRG are jointly involved in their administration (hunting, fishing, trapping, tourism development).
- **Category III**: provincial public lands where Inuit have the exclusive right to exploit certain aquatic species and certain fur-bearing animals, and to participate in the administration and development of the territory with the KRG.

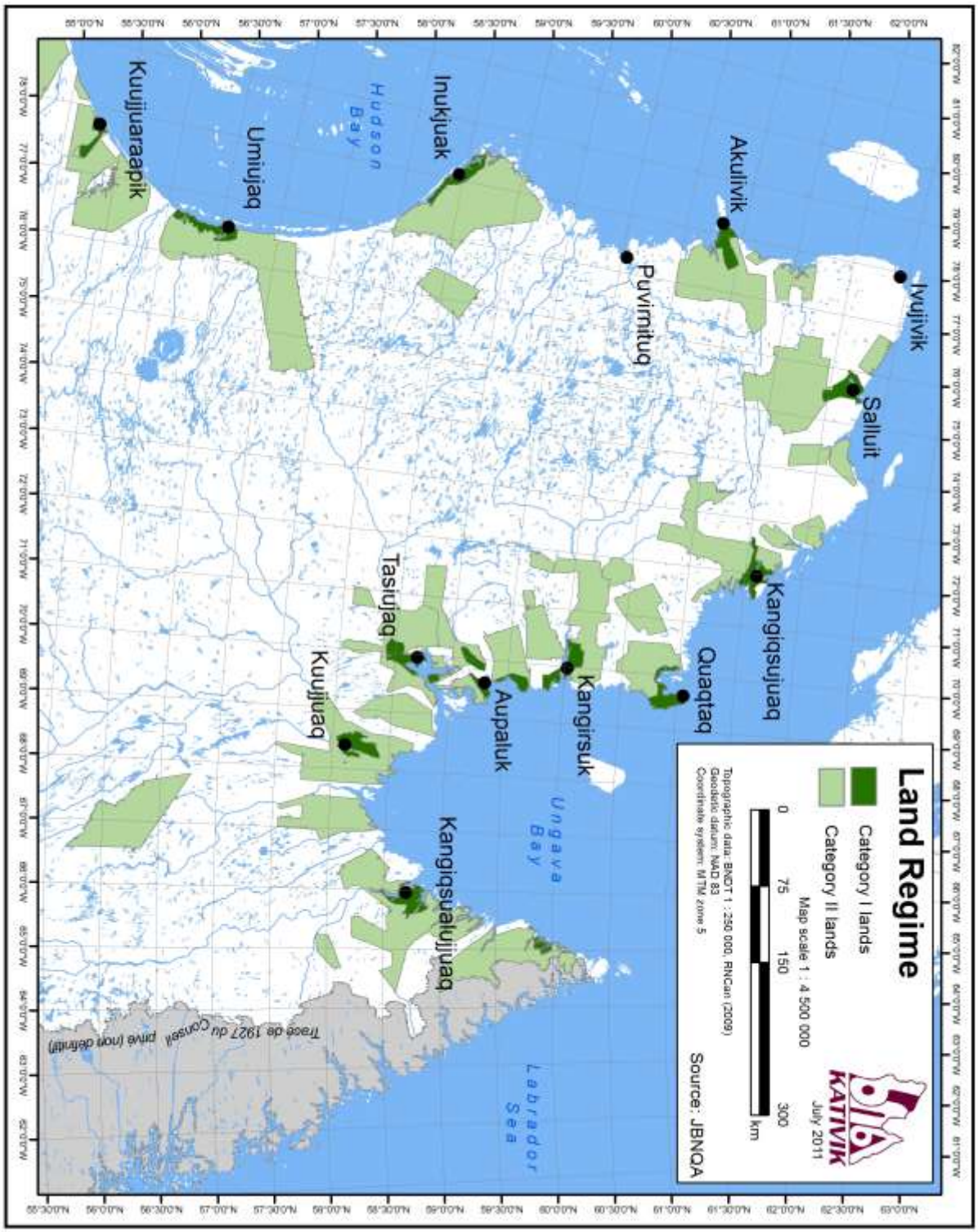
1.1.3 Land development[1]

The land uses and land development policies followed in Nunavik correspond with choices made by the region's inhabitants, local and regional organizations, as well as various regional stakeholders and users. They are based on past and current use of the region by the communities and desired uses for the coming years. They also take into account the existing natural and social environments, as well as potentials and constraints.

Sections 244 and 176 of the Kativik Act define town planning and land development rules. Section 244 grants the KRG municipal powers over all the region north of the 55th parallel, except for the municipal territories of the northern villages and the category IA and IB lands of the Cree community of Whapmagoostui. The current KRG master plan covers especially category II and III lands. The Kativik Act provides two tools to govern the physical organization of the region: a master plan (section 176(1)) and a zoning by-law (section 176(2)). The KRG is responsible for enforcing the master plan in its territory. In this manner, the KRG must be notified of any development project within its boundaries, whether or not the project is subject to the environmental and social assessment and review procedure established under the *Environment Quality Act*.

[1] KRG, 1998.

FIGURE 1: LAND CATEGORIES (I, II AND III) IN NUNAVIK



Source: KRG, 2011

Lands for Subsistence Harvesting Activities

In order to reflect the desire of residents and various stakeholders to preserve the region's culture and way of life, recognition has been granted for lands that are vital for the survival of the region's inhabitants and their subsistence activities, such as hunting, fishing and trapping.

Most of the zones identified for subsistence activities are accessible to a majority of inhabitants, either by water or land routes. The occupation of these lands is denoted by the presence of camps and tents. These lands include several wildlife resources harvested by the communities for survival purposes.

The master plan defines essential and important areas for subsistence activities (Figure 2). Essential areas situated on category I and II lands are habitats of high biological productivity (spawning, calving and nesting grounds, migration corridors, etc.) and represent, so to speak, the kitchen pantries of the communities. Important areas for subsistence activities situated on category II and III lands are habitats of lesser biological productivity that are used on a more extensive and seasonal basis.

Subsistence harvesting areas include a majority of the archaeological sites identified to date, as well as several areas of aesthetic and ecological interest described below.

Areas of Interest

Territories of interest are divided into two categories: historical and aesthetic or ecological.

This network is made up of areas that are important for the harvesting or protection of biological resources, unique or representative regional landscapes, or areas with remarkable, rare or threatened elements. The goal of the network is to preserve all areas of interest from the adverse effects of human activity in general and industrial activity more specifically (Figure 2).

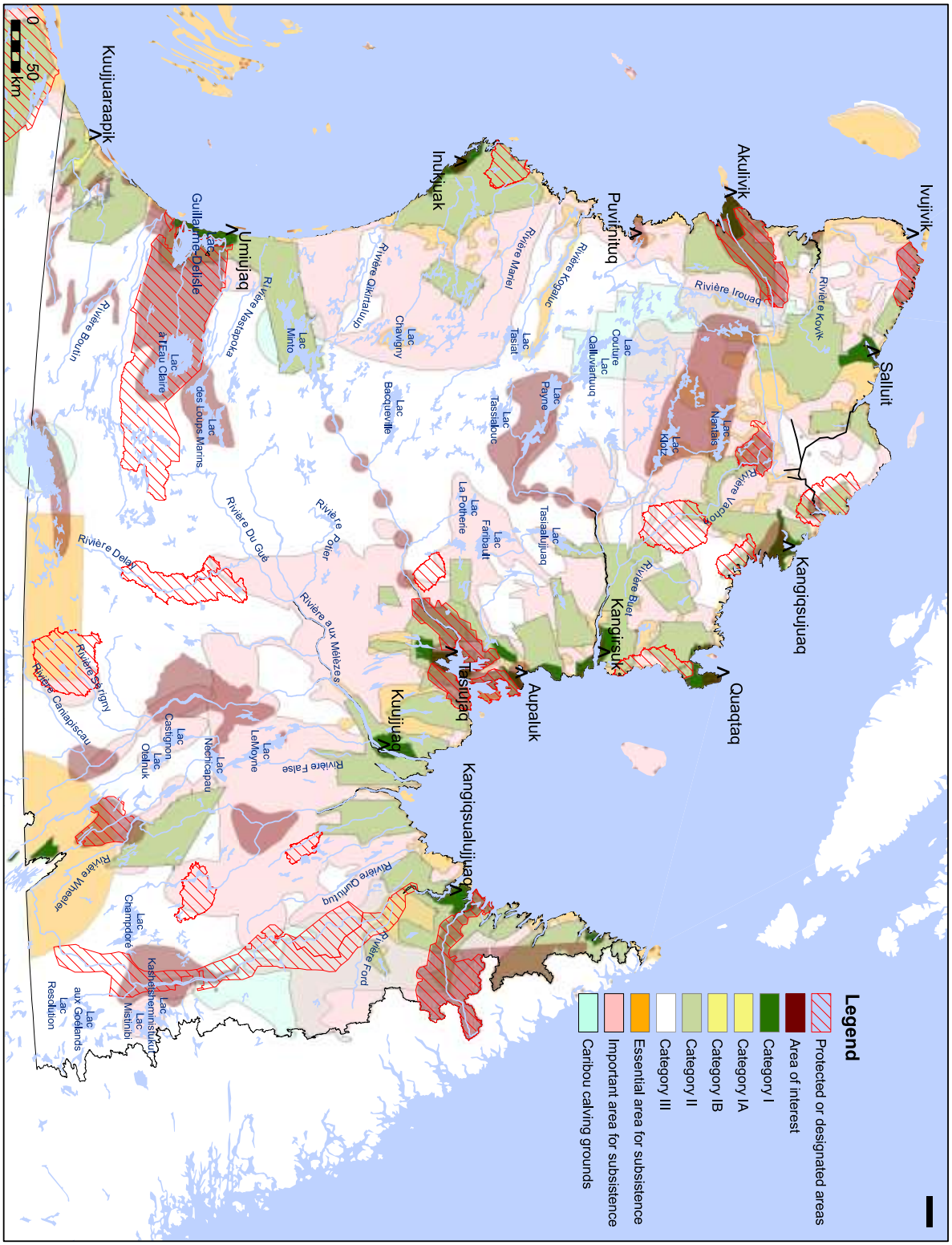
Areas of historical interest

Areas of historical interest are areas that contain sites of historical, archaeological or cultural value. A majority of the areas of historical interest identified to date are found along the coasts and around the communities. These are characterized by different periods of occupation by Pre-Dorset, Dorset, Thule and historic Inuit groups.

According to the Avataq Cultural Institute, the number of sites of historical or archaeological interest exceeds 2000. Notwithstanding, many sites remain to be discovered to properly represent all the territory covered by the region's early inhabitants.

The Avataq Cultural Institute suggests that no construction be authorized within a 100-m buffer zone around archaeological sites. As well, prior to the issuance of permits and the execution of any kind of work, research and onsite inspections should be carried out to check historical potential. Additional protection measures could be established for sites that possess exceptional heritage characteristics or value.

FIGURE 2: ESSENTIAL AREAS, IMPORTANT AREAS AND AREAS OF INTEREST



Source: KRG, 2011

Areas of aesthetic and ecological interest

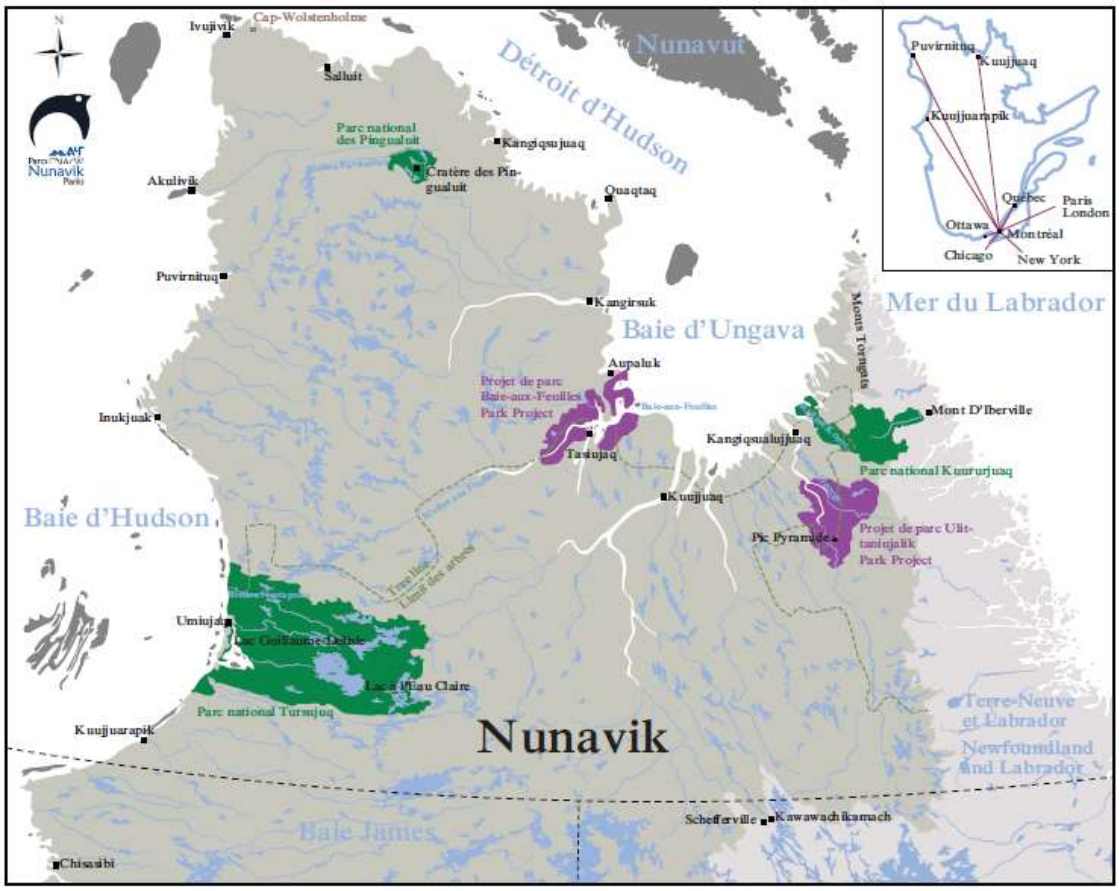
The MDDELCC assigned a mandate to the KRG (Nunavik Parks) for the management of Québec national parks in Nunavik.

Nunavik Parks is involved in areas of interest through its parks network, providing protection for exceptional natural features and representative landscapes against the invasion of human activity, including non-renewable resource exploitation. Notwithstanding, wildlife harvesting rights are officially recognized for Inuit for their traditional and subsistence activities.

Three parks have formally been created to date: Parc national des Pingualuit, Parc national Kuururjuaq and Parc national Tursujuq. All three are situated on category II and III lands (Figure 3).

Other zones are protected for the creation of further national parks or protected areas. The area covered by these national parks, national park reserves and protected areas currently represents 12% of Québec.

FIGURE 3: PRESERVATION AREAS IN NUNAVIK



Source: Nunavik Parks, 2013

Lands for Multiple Uses

Areas designated for multiple uses occupy a vast inland territory, mainly category III lands, where different land-use activities are possible. Although the main land uses remain subsistence and sport activities, other land uses do exist. These areas cover half of the Kativik Region and include some areas of interest. These areas are characterized by the integrity of their natural environment.

Outfitters, tourism activities, holiday activities and industrial activities are scattered across the region; some are seasonal (tourism) or in operation for a limited time (mines). Among the activities that pose a threat to the environment, attention should be drawn to the many year-round outfitting camps in the southern Ungava region. The occupation of these lands is largely denoted by the presence of permanent camps and facilities. It should also be mentioned that there are two operating mines in the region, several decommissioned mining sites and many exploration camps that are also having an impact and leaving marks on the environment.

Urban Land Use

The urban land use designation is assigned to the areas mainly characterized by a permanent population and the buildings, services and infrastructure required to maintain and develop a community.

The signing of the JBNQA in 1975 and the adoption of the Kativik Act in 1978 established a municipal regime in the northern villages, effectively creating boundaries for urban land use. The northern villages are all situated on category I lands, except for Puvirnituq and Ivujivik. Because these two communities did not sign the JBNQA, they did not define any category I lands. The territories of each of the 14 northern villages (Figure 4) are characterized by a built-up core (the village) and a surrounding area that includes public infrastructure, such as an airport, a solid waste disposal site, a drinking water intake, a wastewater lagoon, access roads, etc. It should also be noted that there is a tendency to extend roads beyond the built-up core and to construct secondary residences or camps beyond municipal boundaries.

FIGURE 4: NORTHERN VILLAGES IN NUNAVIK

Source: Makivik 2005.

Various services and urban activities are located within the built-up cores of the villages, including residential, commercial and industrial sectors (garages, fuel reservoirs, etc.), public services (schools, a health centre or CLSC, police station, churches, etc.), administrative services (offices for the municipality, the landholding corporation, regional administration, etc.), and recreation infrastructure (arena, gymnasium, community centre, etc.). Recreation infrastructure is generally scattered around the built-up core.

Any activity or project in an urban zone must comply with the master plan and zoning by-law of the northern village. northern villages should consult with the KRG Renewable Resources, Environment, Lands and Parks Department prior to adopting urban development planning.

1.2 Demographic profile

1.2.1 Permanent population

Nunavik has a total population of more than 11,500; more than 10,000 of these inhabitants are Inuit. The region's population lives in 14 communities situated north of the 55th parallel along the coasts of Ungava Bay, Hudson Strait and Hudson Bay. All the northern villages, except for four, have populations of less than 1,000. The largest communities are Kuujjuaq, Puvirnituq, Salluit and Inukjuak. Nunavik's population is young. More than 60% of residents are younger than 30, which is to say twice the proportion of the population compared to southern Québec.

1.2.2 Seasonal population

On a seasonal basis, activities in the construction, mineral exploration and tourism sectors cause local populations to swell. Notwithstanding, the number of jobs in these sectors does fluctuate, and it is difficult to forecast the number of tourists who will visit different attractions.

- Regarding the construction sector, close to 415 workers from outside of the region were employed in 2011[2]. These non-resident workers receive room and board in (temporary or permanent) camps set up for this purpose that are owned by either the concerned municipality or a construction company.

- Regarding the mineral exploration sector, exact data on the number of workers from outside of the region is not available, but it is estimated that this sector employed roughly 300 workers in 2011[3]. These non-resident workers sometimes receive room and board in communities (when the proximity of the exploration site permits) or in temporary camps set up near mineral exploration sites.

- Regarding the tourism sector, outfitters employed close to 70 non-resident workers in 2011[4]. In the same year, the number of outfitting clients totalled 1,850[5], and Nunavik parks received close to 120 visitors[6]. It should be noted that tourists are travellers and make use of accommodation facilities in the communities close to where tourism activities are carried out (outfitting camps, parks, cruise ships, etc.).

[2] MDDEFP, 2012.
[3] Nunavik Mineral Exploration Fund, 2012.
[4] KRG, 2011.
[5] MRNF, 2012.
[6] KRG, 2012.

1.2.3 Demographic projections

The annual rate of growth of the Inuit population is estimated at about 3%, i.e. four to fives times greater than the Québec average (Table 1). Among other consequences, this strong growth will exert more pressure on infrastructure and services, including increased quantities of residual materials.

Table 1: Demographic projections until 2030 in Nunavik

Villages	Population 1996	Population 2006	Households 2006	Population 2010	Annual growth 1996–2010	Population Projection 2020
Akulivik	413	513	120	548	2.33%	676
Aupaluk	160	176	35	192	1.43 %	220
Inukjuak	1,201	1,621	335	1,735	3.18%	2287
Ivujivik	276	353	85	370	2.43%	460
Kangiqsualujjuaq	657	744	160	767	1.20%	859
Kangiqsujuaq	482	613	140	634	2.25%	777
Kangirsuk	398	472	115	489	1.63%	569
Kuujjuaq	1,755	2,163	515	2,336	2.36%	2887
Kuujjuarapik (Cree + Inuit)	1,245	1,388	145 (Inuit) n/a (Cree)	1,441	1.12%	1602
Puvirnituq	1,185	1,471	330	1,532	2.09%	1852
Quaqtaq	259	319	65	333	2.04%	401
Salluit	941	1,259	275	1,364	3.21%	1802
Tasiujaq	192	251	55	256	2.38%	317
Umiujaq	317	394	85	441	2.86%	567
Total	**8,820**	**10,925**	**2,460**	**12,438**	--	**15 276**

Sources: Statistics Canada, [2]Makivik Corporation.

1.3 Socio-economic profile[7]

As is the case in other outlying regions, Nunavik's economic record is very poor. The region is highly dependent on government assistance. Climate constraints, scattered resources, the distance from urban centres and the absence of qualified workers hinder development.

As regards jobs, the private business–cooperative sector and the public–parapublic sector each provide about half the jobs available in the region. The activities that generate jobs and income are mostly found in the communities. Outside of communities, economic activities are characterized by wildlife resource exploitation for subsistence and tourism purposes.

Each community possesses one or more schools that may offer elementary, secondary or adult education. School curriculums are adapted to local needs and emphasize the preservation of Inuit culture and language. Although schooling has progressed considerably over the last decade, the region's inhabitants continue to be at a disadvantage due to their lower levels of education. This shortcoming deprives Inuit society of the professional skills

[7] KRG, 2011.

needed to foster development momentum and, at the same time, contribute to improving the quality of living.

It should be recalled that the cost of living is very high in the north. This hard economic reality means that the difference in the cost of consumer items between urban centres in Québec and Nunavik is approximately 40%. In this context, subsistence harvesting activities are very important.

1.3.1 Private businesses

Excluding mining-sector activities, there is little industry in Nunavik. The para-industrial sectors of energy, transportation, construction, and retail businesses and cooperatives are also included in this section.

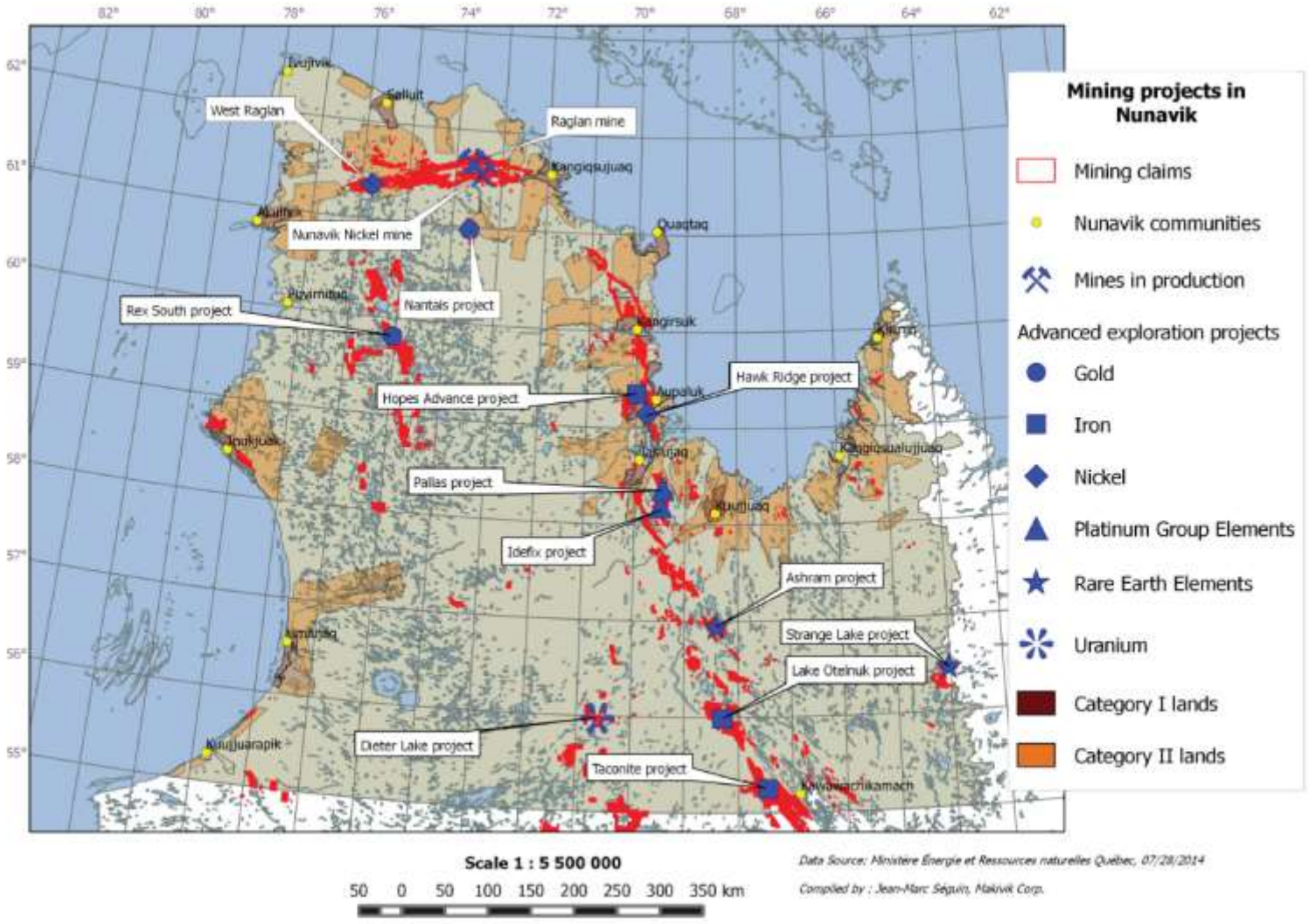
Mining sector

Two mines are currently in operation in Nunavik, specifically the Raglan mine operated by Glencore and the Nunavik Nickel mine operated by Jien Canada Mining Ltd. The mines are located within a few kilometres of one another on the Ungava Peninsula and sit on one of the largest nickel sulphide deposits in the world (Figure 5). They employ close to 1400 workers, of which 16% are Inuit.

The Raglan and Nunavik Nickel mines were designed to minimize liquid effluents, water consumption and atmospheric emissions, to confine waste rock, and to progressively rehabilitate mine tailings. They operate landfills and manage their residual materials independently.

Several mineral exploration activities are being carried out in the region (Figure 5). None however possess permanent infrastructure as such, although access roads and landing strips could be considered permanent. Mineral exploration activities employ close to 375 prospectors, including close to 75 Inuit from nearby communities. Mineral exploration sites manage residual materials according to a variety of methods based on the terrain and proximity of communities: trench landfills, portable incinerators, transportation of residual materials to the closest landfill, etc. The MDDELCC is responsible for enforcing regulations and for ensuring that these sites comply with standards.

FIGURE 5: MINING PROJECTS IN NUNAVIK



Energy sector

Hydro-Québec is responsible for power generation in the northern villages and, to this end, operates thermal power plants in each community. Hydro-Québec employs 27 workers throughout the region, including 23 Inuit.

Almost all buildings and homes are heated with oil-burning furnaces. Each community has furnace oil reservoirs and delivery trucks. FCNQ Petro and Halutik are responsible for the distribution of fuel products in the region.

Transportation sector

The transportation sector is the most important consumer service in the region. It generates about 415 jobs (115 part-time).

Two airlines deliver air transportation services in Nunavik: Air Inuit and First Air. They offer scheduled and charter flights. Other airlines also offer charter flights throughout the region.

Marine transportation is vital for the region due to the absence of road and railway links. Essential items, such as food, fuel and construction materials, that are transported by ship each summer and fall, make it possible to resupply communities and remote or mining camps. NEAS and Desgagnés Transartik are the only two shipping companies that serve the region. All the communities possess marine infrastructure that permit the unloading of supplies.

Construction sector

Several contractors are involved in Nunavik's construction sector. In 2011, these contractors generated close to 550 jobs, of which 130 were held by local residents. Construction is largely paid for with government funding and has been growing in recent years. Home costs in the region are excessively high due, among other reasons, to the high cost of shipping materials, accommodating workers (largely recruited from southern Québec) and carrying out construction (in particular insulation and adapted designs). This sector will continue to boom in the coming years: the construction of hundreds of new homes is planned in response to the current shortage of dwellings that has arisen because of population growth.

Retail business and cooperative sector

Retail businesses in most of the communities are operated by the FCNQ and the Northern Stores (subsidiary of the Northwest Company). Private businesses are also emerging solidly in some communities. All retail businesses combined provide employment for close to 420 workers (150 part-time) in the region.

The FCNQ also owns and operates 13 hotels each in a different community. Some landholding corporations also own and operate hotels and restaurants in their respective community. These facilities provide services for the region's large number of business travellers (regional services, meetings, training, etc.) or for tourism. Together, these services generate close to 135 jobs (50 part-time).

In Nunavik, there are also two banks that offer services directly to clients; both are in Kuujjuaq: Caisses Desjardins and the CIBC. In the other communities, the FCNQ handles basic banking.

1.3.2 Public and parapublic sector

This sector employs close to 2,800 workers (650 part-time) for the delivery of municipal, provincial and federal services.

- Drinking water and wastewater transportation are included in municipal services and swell the number of municipal workers in each northern village.
- Provincial services are listed in Table 2. Basic services are delivered in every northern village, while regional services are, to a large extent, based in Kuujjuaq.
- Few federal services are delivered in Nunavik (Table 2). Postal services are subcontracted to local businesses (FCNQ cooperatives or Northern Stores) except in Kuujjuaq. Other services (transportation, employment, public works, marine infrastructure, airports, etc.) are administered by the KRG.

Table 2: Public and parapublic services delivered in Nunavik

Community	Health											Education					Regional administrat.								Others				Federal				
	Health centre and social services	Service point (CLSC, youth protection)	Group home (6–12 year olds)	Group home (12–18 year olds)	Supervised residence (mental health)	NRBHSS	Youth rehabilitation centre (12–18 year olds)	Elders residence / loss of autonomy	Mental health residence (crisis centre)	Treatment centre (disintoxication)	Women's shelter	Kativik School Board	Primary and secondary school	Vocational training centre	Adult education centre	College preparatory centre	KRG	Sustainable employment centre	Childcare centre	Recreation centre	Nunavik Parks	Airport	KRPF detachment	Municipal office	Sureté du Québec	Wildlife protection office	Court of justice	Kativik Municipal Housing Bureau	Meteorological service of Canada	Post office	NAV CANADA	Service Canada	Canada Post
Akulivik		√											√					√	√	√		√	√	√						√			
Aupaluk		√											√					√	√	√		√	√	√						√			
Inukjuak		√									√		√	√	√		√	√	√	√		√	√	√					√	√			
Ivujivik		√											√					√	√	√		√	√	√						√			
Kangiqsualujjuaq		√											√					√	√	√	√	√	√	√						√			
Kangiqsujuaq		√						√					√			√		√	√	√	√	√	√	√						√			
Kangirsuk		√											√					√	√	√		√	√	√						√			
Kuujjuaq	√		√	√	√	√		√		√	√	√	√		√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Kuujjuarapik		√	√										√					√	√	√		√	√	√			√			√			
Puvirnituq	√			√				√	√				√					√	√	√		√	√	√			√			√			
Quaqtaq		√											√					√	√	√		√	√	√						√			
Salluit		√					√				√		√					√	√	√		√	√	√						√			
Tasiujaq		√											√					√	√	√		√	√	√						√			
Umiujaq		√											√					√	√	√	√	√	√	√						√			

1.3.3 Tourism sector

The tourism sector plays an important role in Nunavik's economy. Tourism activity can be divided into three main areas: outfitters, Nunavik Parks and adventure tourism companies.

Outfitting camps are mainly concentrated between Ungava Bay and the 55th parallel, offering caribou hunting and salmon and arctic char fishing. The 50 or so outfitters in the region operate more than 200 permanent and mobile camps. Inuit have the exclusive right to operate outfitting camps on category I and II lands. The different outfitters generate on average 140 seasonal jobs, of which more than half are filled by the local population.

Parks Nunavik employs about 30 staff (including 17 Inuit) at the KRG and at the three parks in operation. The park network is expanding and will create many more new jobs in the coming years.

Adventure tourism companies deliver guiding and technical support services for tourists and groups visiting the region in search of adventure (kayaking, trekking, snowmobiling, canoeing, dogsledding, etc.).

2. Background

This section explains current practices for the collection, recovery and disposal of residual materials. It also provides a breakdown of the residual materials generated in the territory each year.

2.1 Current methods for residual materials management

Nunavik's current methods for residual materials management are detailed below.

2.1.1 Administrative organization of the territory and current regulations

The KRG is responsible for implementing the *Nunavik Residual Materials Management Plan* and improving northern landfill and wastewater lagoon infrastructure across the territory. The 14 northern villages are responsible for managing local landfills and collecting residual materials.

Québec laws and regulations regarding residual materials management and the environment are applicable in Nunavik.

The main regulation on residual materials management is the *Regulation respecting the Landfilling and Incineration of Residual Materials* (R.R.Q., c. Q-2, r. 19), which replaced the *Regulation respecting Solid Waste* in January 2006. The regulation defines operational requirements for northern landfills and prohibits such landfills except north of the 55th parallel (Nunavik) and in some Basse-Côte-Nord communities. It contains stipulations about the location of northern landfills, the type of waste acceptable and its burning, and the procedures to follow to close a northern landfill.

The *Act respecting Northern Villages and the Kativik Regional Government* (R.S.Q., c. V-6.1) grants each northern village jurisdiction over the management of its residual materials and landfills. Although each community can craft its own regulations, the development of a regional residual materials plan would lead to uniform and better management of landfills.

In addition to the KRG, two organizations are mandated to observe, analyze, critique and/or make decisions about projects that have an environmental or social impact on Nunavik: the Kativik Environmental Quality Commission (KEQC) and the Kativik Environmental Advisory Committee (KEAC).

The KEQC oversees the assessment and review of projects proposed for the territory north of the 55th parallel covered under the *James Bay and Northern Québec Agreement*. The KEQC first analyzes preliminary data supplied by the project proponent and submitted by the Provincial Administrator (the Deputy Minister of Sustainable Development,

Environment, Wildlife and Parks), and then decides whether to prescribe an evaluation and a review of impacts on the natural and social environments, in accordance with Chapter II of the *Environment Quality Act*. If the project is deemed to require a impact assessment, the KEQC issues directives on the scope of the proposed study. When the project is deemed not to require an impact assessment, the KEQC issues an attestation of exemption. It also analyzes the impact assessments it receives and may hold public hearings with the communities affected by a project. Lastly, it determines whether a project should be authorized or not.

The KEAC is mandated to monitor the application and administration of the environmental and social protection regimes prescribed under section 23 of the *James Bay and Northern Québec Agreement*. It is also responsible for advising governments on important related matters as well as land use regime issues. The KEAC plays an advisory role with governments and the KRG as they develop or amend laws, regulations and policies pertaining to the environment, the social milieu and land use. It also studies existing laws, regulations, policies and administrative procedures related to these three issues and makes amendment recommendations. It studies and makes recommendations on methods and procedures for assessing and analyzing impacts on the natural and social environments. It can also provide technical assistance to the northern villages and the KRG. All of the KEAC's decisions and recommendations are submitted to the governments of Québec and Canada and to relevant regional and local administrations for consideration and recommendation.

2.1.2 Municipal agreement[8]

Since the villages are responsible for the management of their own residual materials, they may draft by-laws to that end. The villages have a common by-law on municipal taxes and services (No. 2010-01) that governs municipal residual materials collection and the management of landfills and wastewater lagoons. Kuujjuaq is the only village that has adopted additional residual materials management by-laws, listed in Table 3.

Table 3: Municipal by-laws in effect

Village	By-law No.	Scope
Kuujjuaq	2008-02	Use of landfills and disposal of refuse.
	2008-03	Banning of single-use plastic shopping bags.

2.1.3 Characteristics of current residual materials collection, recovery and disposal methods

Currently, the northern villages perform weekly residential and commercial collections. Each home, business and institution has a waste bin made of wood or plastic, and some businesses have metal containers. All waste is collected and sent to the local landfill for disposal. Access to the site is not always restricted or regulated, and individuals can deposit their trash there despite the site being fenced off. Construction companies are responsible for transporting their waste to the landfill and sometimes are charged additional fees, in particular in Kuujjuaq and Kuujjuarapik, because of the quantity of this kind of waste or existing municipal by-laws (Kuujjuaq).

The equipment available for residual materials management operations depends on the size of the village. Each northern village has at least one of each of the following types of heavy equipment. This equipment is not, however, used solely for the landfill, but may be used for other municipal purposes such as housing construction.

- Dump truck;
- Garbage truck;
- Excavator;
- Bulldozer.

[8] See Appendix 1 for information on municipal by-laws.

After being piled at the site, household residual materials are eliminated by open-air burning, as provided in the *Regulation respecting the Landfilling and Incineration of Residual Materials.* It is then compacted with heavy equipment. Cover material is added every six months or year, depending on the availability of material near the site and the time of year. Table 4 provides a succinct summary of current management methods.

Table 4: Current management methods at landfills in the 14 northern villages

Village	Facility	Management	Materials processed	Activities	Frequency of collection
All	Landfill	Each northern villages	All	Elimination Storage Recycling	Weekly (no sorting / all materials mixed together)

2.1.4 Residual materials landfills

All of Nunavik's villages have a northern landfill on their territory that meets the requirements of the *Regulation respecting the Landfilling and Incineration of Residual Materials*. It should be specified that the landfills in Ivujivik and Kuujjuarapik each operate at two sites: one for flammable residual materials and another for non-flammable residual materials. Several sites opened in the 1980s are almost full despite the sorting activities of the past years. To remedy the situation, the KRG Municipal Public Works Department is planning to open up new sites in the villages of Kuujjuarapik, Kangirsuk and Inukjuak in five to ten years. In Kuujjuaq, the site is scheduled for expansion within the next five years.

Generally, northern landfills are located a few kilometres from the community. Refer to the maps contained in Appendix 5. The access road sometimes doubles as a road to other infrastructure such as airports, marine infrastructure, power plants, etc. The site dimensions vary greatly, depending on the size of the village. Refer to the data provided in Table 5.

Table 5: Assessment of residual material area (m^2) by landfill.

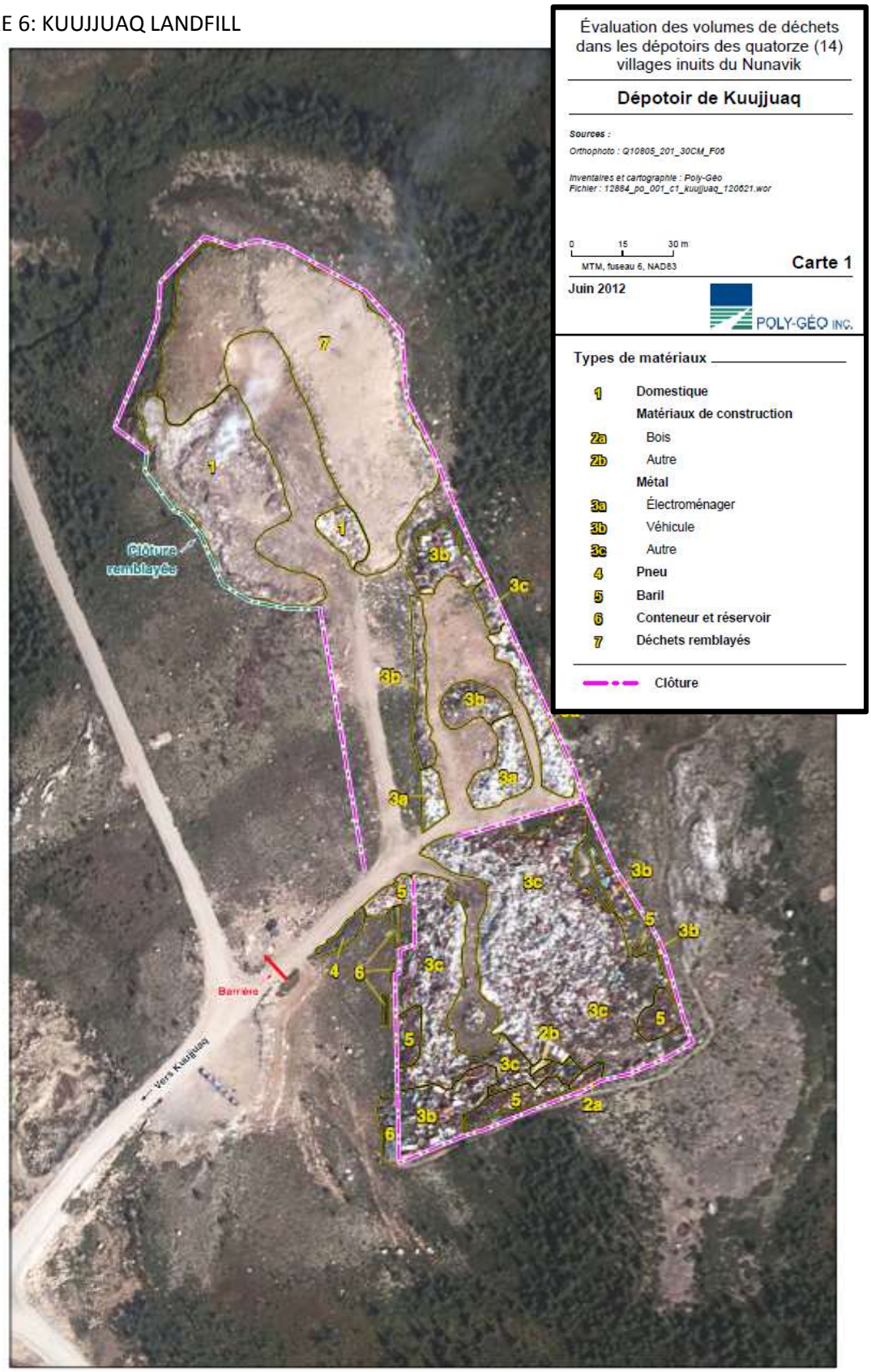
Village	Landfill area (fenced area)	Residual materials inside the fenced area	Residual materials outside the fenced area
Akulivik	20,200	10,150	3,050
Aupaluk	12,100	9,240	2,300
Inukjuak	45,180	25,580	60
Ivujivik (site 1= flammable)	6,720	3,890	0
Ivujivik (site 2= non-flammable)	3,780	2,660	1,820
Kangiqsualujjuaq	7,600	4,490	480
Kangiqsujuaq	3,2000	7,560	380
Kangirsuk	19,000	13,360	6,060
Kuujjuaq	28,280	28,700	750
Kuujjuarapik (site 1= non-flammable)	24,000	14,900	0
Kuujjuarapik (site 2= flammable)	23,150	11,490	0
Puvirnituq	33,670	15,390	5,030
Quaqtaq	11,900	7,070	370
Salluit	20,270	12,240	970
Tasiujaq	15,310	12,350	670
Umiujaq	16,220	6,290	160

Source: Table 1 from the characterization study performed by Poly-Géo in 2012. Refer to Appendix 4.

Most of the sites are divided into two zones, one for flammable materials and another for non-flammable materials. In Ivujivik and Kuujjuarapik, these zones are situated at different sites. The landfills receive waste from all sectors (municipal, industrial-commercial-institutional, and construction-renovation-demolition).

Some sites, including Kuujjuaq, are divided into three zones—household waste, vehicles and bulky items, and metal (Figure 6).

FIGURE 6: KUUJJUAQ LANDFILL



Source: KRG, Northern landfill characterization study by Poly-Géo in 2012.

The activities of sorting and piling by material type are performed according to the weather, manpower and each village's landfill budget.

As for hazardous waste, storage details are provided below for the northern villages.

Villages	**Types of hazardous waste**
Kangiqsujuaq	→ Shelter at the landfill.
Kangirsuk	→ Shelter with regulation-prescribed concrete slab floor near the municipal garage.
Salluit	→ Regulation-prescribed concrete slab floor in an unheated municipal garage.
Kangiqsualujjuaq	→ Double-bottomed container.
Quaqtaq	→ Double-bottomed container.
Inukjuak	→ Double-bottomed container.
Kuujjuarapik	→ Double-bottomed container.
* Seven remaining villages	→ No regulatory site to date.

Refer to the landfill maps and photos contained in Appendix 5.

2.1.5 Recycling

Local recycling efforts have been limited so far in the region (between 0 and 5% of materials are recovered or reused[9]). This lapse is due to numerous logistical constraints, including distance from large cities, lack of roads connecting Nunavik's villages, and the high cost of transporting materials by ship. Lack of human resources to work on recycling projects and lack of public interest are also factors.

However, some local initiatives recover some types of material, but there are no collection, sorting or processing facilities operating at a municipal or regional level. It is therefore difficult to determine the amount of residual materials that are recovered or reused. It is important to point out that, although certain data appearing in this section is a few years old, the situation has not evolved since.

- In 2007, the KRG began a paper recycling project at its head office in Kuujjuaq. Employees compact the materials and they are transported by ship to the Cascade company, which collects paper. The KRG has collected the equivalent of one marine container per year since 2007 and hopes to expand the program to other organizations in Kuujjuaq.

- The KRG has also taken the initiative to collect outdated information and communications technologies equipment from different organizations in Kuujjuaq and ship it by marine container. So far two containers have been shipped, the first in 2009 and the second in 2010. The 1Optimum company is responsible for handling the containers once they arrive in southern Québec. The KRG plans to continue providing this service pending the set up of drop-off centres in accordance with the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*.

- FCNQ stores in each village and Newviq'vi in Kuujjuaq offer compacting services for returnable metal beverage containers in accordance with the *Act respecting the Sale and Distribution of Beer and Soft Drinks in Non-Returnable Containers*. The quantity of cans shipped for recycling every year by the two companies. Tomra Canada assumes responsibility for the containers on their arrival at the port in Valleyfield. Newviq'vi also collects plastic bottles in special bags supplied by BGE. The retailer ships six or seven marine containers to recycling companies each year and estimates that it collects about 20% of the cans from its village.

[9] Pesca, 2004.

According to BGE, the quantities of non-returnable containers shipped annually from 2009 to 2013 are as follows.

Newviq'vi		FCNQ	
Year	**Units**	**Year**	**Units**
2009	345 698	2009	--
2010	388 914	2010	2 549 401
2011	386 764	2011	2 519 447
2012	386 874	2012	2 787 960
2013	307 188	2013	2 414 520

The maintenance of compacting equipment, as well as the storage and shipping of the containers is a complex and costly operation. Moreover, the revenue generated does not fully cover expenditures.

- Newviq'vi has also taken the initiative to return milk, ice cream and bread containers used for shipping by way of an agreement with shipping and transportation companies (First Air). This way it helps avoid the accumulation of thousands of plastic boxes, cartons and styrofoam in landfills each year.

- By municipal by-law (Kuujjuaq 2008-03), single-use plastic shopping bags were banned from Kuujjuaq businesses in 2008. Clients have been urged to use re-usable bags or boxes available in store or to pay for biodegradable bags ($0.10).

- FCNQ stores across Nunavik have eliminated plastic bags and offer the option of re-usable.

- Used oil is used to fuel a specially designed furnace installed at the municipal garage in Inukjuak.

- Used oil from the power plants in 13 northern villages is collected and sent to the south of the province by Hydro-Québec. In Kuujjuaraapik, used oil is used to fuel a specially designed furnace installed in the power plant.

- Construction materials, vehicles and other re-usable items are summarily sorted at the landfill. Parts and materials may be recovered by village residents for personal use. This unofficial recycling helps to slightly reduce the accumulation of residual materials at landfills.

- Old asphalt is incorporated into the asphalt blend during new paving work in the northern villages.

- Between 2005 and 2010, scrap tires from each village were sent to recycling companies by marine container. The initiative was organized initially by the KEAC and financed by RECYC-

QUÉBEC as part of the 2001–2008 Program for Emptying of Scrap Tire Storage Sites in Québec.

- Since 2011, the KRG arranges funding with RECYC-QUÉBEC for shipping and recycling of tires through the Program for the Integrated Management of Scrap Tires 2009–2012. A procedure for scrap tire recycling was implemented by the KRG in 2012 (refer to Figure 7) to facilitate coordination with the northern villages and ensure that the shipments meet the recycler's requirements.

FIGURE 7: PROCEDURE FOR THE SHIPPING OF TIRES BY MARINE CONTAINER

Source: KRG

- The annual Kuujjuaq school bazaar provides another opportunity for re-using clothing, toys, furniture, household appliances, dishes and other articles.

- The women's shelter in Inukjuak collects clothing and other items for re-use and distribution to families in the community.

- Textiles are collected daily by the Wellness Centre in Kuujjuaq. Residents are invited to take their old clothes directly to the centre or deposit them in a specially marked collection box. The clothes are sorted, and usable items are made available to local residents or transported free of charge by Air Inuit for re-use in the 13 other villages. Clothes in poor condition are cut up and re-used as cloths at the auto mechanics school in Kuujjuaq Also re-used are other items such as small household appliances, books, dishes and children's toys.

- In a study conducted by Université Laval, a composting pilot program was implemented in Kuujjuaq beginning in the summer of 2011 as a component of a larger initiative, the Kuujjuaq Greenhouse Project. Organic waste from grocery stores (Northern and Newviq'vi) was collected three times a week and piled up in windrows near the village greenhouse. Additional carbon is added to the pile in the form of shredded paper, as there was no other source of carbon available in sufficient quantities. Other major participants joined the project in the summer of 2012 and in 2013, including the cafeteria at the Ungava Tulattavik Health Centre and the restaurant at the Kuujjuaq Inn. Additional compost bins were built to respond to the needs of residents and fledgling home gardeners. This initiative helps meet two urgent needs in the region: lack of fertile soil for vegetable gardens and lack of landscaping materials (for homes and roads), and the need to reduce the amount of residual materials accumulating in northern landfills. This project is being enabled to continue with funding and participation on the part of the KRG, the NRBHSS and the Northern Village of Kuujjuaq.

2.1.6 Collection of hazardous waste

The KRG and the KEAC have produced tools to improve hazardous waste management in Nunavik. These include guidelines for the public, municipal employees and regional organizations. The northern villages are responsible for implementing the guidelines. Municipal employees have received training in monitoring and managing accidental contaminant spills (by the MDDELCC in 2010) and storing and transporting hazardous materials (by the KRG in 2006 and 2009). The public and institutions are responsible for delivering their hazardous waste to the municipality, after which the municipality is responsible for handling the waste. The KEAC has produced three simple guides (Figure 8), as well as posters and refrigerator magnets (Figure 9) to spread the information to each group concerned.

FIGURE 8: GUIDES 1, 2 AND 3 ON MANAGING HAZARDOUS WASTE IN NUNAVIK

Source: KEAC.

FIGURE 9: REFRIGERATOR MAGNET FOR RESIDENTS

Source: KEAC.

As was mentioned in Section 2.1.4, there are storage challenges. In particular, there are almost no suitable storage facilities for household hazardous waste in half of the villages.

As regards vehicle battery and industrial battery recycling, a procedure was set up by the KRG in 2014 to facilitate the shipping of this type of household hazardous waste to the recycler Newalta in Montreal (Figure 10).

In terms of monitoring the management of hazardous waste, the MDDELCC inspects a few villages each year, and the KRG supports the villages in implementing the measures set out in the guides and procedures.

FIGURE 10: BATTERY RECYCLING PROCEDURE

Source: KRG

2.1.7 *Regulation respecting the Recovery and Reclamation of Products by Enterprises*

The Regulation is being brought into effect in the region defined in section 2 (v) of the *Act respecting Northern Villages and the Kativik Regional Government* (R.S.Q., c. V-6.1).

Currently, large quantities of residual materials covered under the Regulation are accumulating in landfills operated by the northern villages. The businesses targeted under the Regulation, however, will soon be required to assume the costs related to their recovery.

2.1.8 Scrap vehicles

Currently, scrap vehicles (cars, trucks, snowmobiles, ATVs, motorcycles, boats and heavy equipment) are sorted into a designated section of the landfill. There is no fluid recovery protocol in effect, and most of the vehicles still have their tires and batteries. In addition, there are several damaged vehicles around homes in the villages. To date, there have been no metal collection efforts in Nunavik. This problem is a result of the remoteness of the villages, the absence of any AAPR members, the absence of road access and the lack of government funding.

2.1.9 Bulky item collection

The northern villages do not offer bulky item collection, but organizations with staff housing, such as the KRG, the Kativik School Board, health centres and so forth, handle the transportation of broken appliances to the landfill zone designated for this purpose. As there is a shortage of household appliance repair expertise, organizations tend to discard defective items instead of having them repaired. In addition, there is no halocarbon collection protocol in effect.

2.1.10 Wastewater collection and disposal

Municipal services are highly influenced by the climate in Nunavik. Since the ground is permanently frozen, there is no sewer or aqueduct system in any village except Kuujjuarapik. As an alternative, all residential buildings have water and wastewater tanks (insulated from the cold and bad weather) which must be supplied regularly with drinking water and emptied by specially-designed trucks. These amenities require a number of infrastructures and equipment (garages, trucks, wastewater lagoons, drinking water pumping plants) in order to ensure adequate service.

This is why most of the villages have wastewater lagoons to hold municipal wastewater. These are all settling ponds, except in Kuujjuarapik, which has an aerated lagoon. An aerated lagoon and a settling pond are being built in Salluit and Puvirnituq respectively and are scheduled to be completed by 2015. The process of constructing lagoons has lasted from 1984 to today. They are designed to be emptied in only 20 or 25 years. According to the KRG Municipal Public Works Department, this means that there will be no sludge to be treated for the next 20 years. For the moment, it is not possible to estimate the quantities of sludge being produced by wastewater discharges because no village currently maintains related statistics.

The cost of wastewater collection is presented in Table 6. The cost of operating the lagoons is almost nil.

2.1.11 Residual materials collection and disposal costs

The northern villages assume the entire cost of collecting and managing wastewater and municipal, commercial and institutional residual materials.

Table 6 shows operational expenses for the Northern Village of Kuujjuaq[10] in 2011. These figures were extrapolated to northern villages as a whole.

Table 6: Residual materials management costs for the region

Residual Materials Management	Kuujjuaq Cost/year	Nunavik Cost/year
Residual materials collection (municipal and ICI)	$476 733	$2 538 358
Wastewater collection	$1 082 840	$5 765 566

These costs include the following expenses:

- Taxable salaries and benefits;
- Telephone, internet, insurance;
- Vehicle parts and maintenance;
- Fuel for vehicles.

2.2 Composition of residual materials generated annually in the territory

There are no scales at Nunavik landfills. As well, no characterization studies have been conducted on the composition and quantity of residual materials sent for disposal annually in the territory for any of the sectors targeted in the *Nunavik Residual Materials Management Plan* (municipal, industrial-commercial-institutional or construction-renovation-demolition). This is why it was necessary to refer to several studies conducted in Québec and elsewhere to estimate the characterization of the region's residual materials.

To characterize the waste that has accumulated in northern landfills since they were established in the 1980s, the KRG commissioned a study to evaluate quantities through an analysis of georeferenced images, superimposed with LIDAR data, the details of which are presented in the tables 5 and 9, as well as in Appendix 4.

[10] See appendices 2 and 3.

2.2.1 Estimated quantities and composition of municipal residual materials

Given the similarities between villages in the NWT and Nunavik (population, geographical remoteness, etc.), the following data are based on mathematical estimation models used in a study on solid waste landfills prepared for the NWT government[11].

The authors of the study determined that each NWT resident produces an average of .015 m^3 of residual materials per day, with an uncompacted density of 0.099 t/m^3. In reality, the compaction quality of waste varies widely within each site and from one site to another. By applying the study's formula **(population × 0.015 m^3 × 0.099 t/m^3 × 365 days/year)** to the populations of Nunavik, the amount of residual materials produced by each village's municipal sector is obtained. These data are compiled in Table 10.

The composition of residual materials generated by Nunavik communities differs somewhat from the rest of Québec[12]. A number of factors can explain these differences, including broad differences between types of organic matter (lack of green waste; traditional Inuit diet) and final waste (lack of recovery process to reduce final waste quantities). This is why comparison with NWT communities is more appropriate in characterizing this composition. The composition mentioned in the NWT study is restated here to conform to categories used in Québec (Table 7).

Table 7: Description of residual materials categories in Nunavik

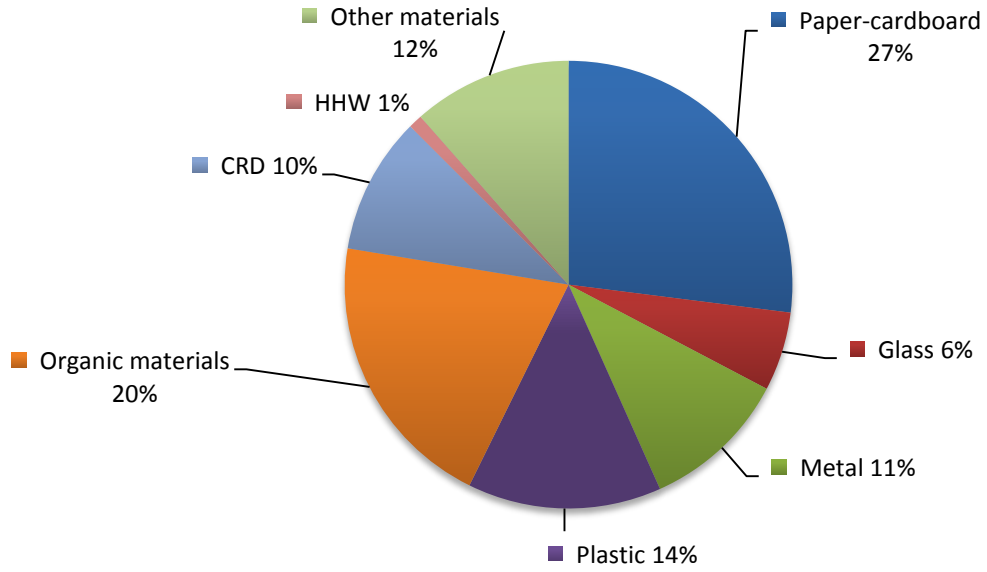
Residual materials categories[1] (Québec and Nunavik)	Description of categories based on NWT study[2]
Paper-cardboard	Paper, cardboard and other paper products
Glass	Glass
Metal	Iron and other metals
Plastic	All types of plastic and rubber
ICT	Information and communication technologies
Organic waste	Organic matter (no green waste)
CRD	Construction-renovation-demolition
HHW	Household hazardous waste
Other materials	Tires, textiles, earth, bulky items, composites (diapers, items containing both plastic and metal)

Source: [1] Dessau and NI Environnement, 2009 and [2] FSC Group, 2003

[11] FSC Group, 2003.
[12] Dessau and NI Environnement, 2009.

The residual materials components commonly found in NWT communities are similar to those found in Nunavik (Figure 11).

FIGURE 11: ESTIMATED RESIDUAL MATERIALS GENERATED BY NUNAVIK'S MUNICIPAL SECTOR



Source: FSC Group, 2003

2.2.2 Estimated quantity and composition of ICI residual materials

Industrial-commercial-institutional residual materials in Nunavik is produced by the following subsectors: school, healthcare, public administration, businesses and financial institutions.

The methodology used to estimate the quantities and composition of industrial-commercial-institutional residual materials in Nunavik is derived from two studies, *Portrait de la gestion des matières résiduelles dans le sous-secteur institutionnel au Québec 2004-2009* (snapshot of residual materials management in Québec's institutional sub-sector)[13] and *Caractérisation des matières résiduelles du sous-secteur commercial au Québec, 2008-2009* (characterization of residual materials from Québec's business sub-sector)[14]. Both studies identify the average amount of residual materials produced by employee in their respective sectors. Some changes were made in order to better characterize the composition and quantity of residual materials produced by employee and by sector in Nunavik.

- The components for the public administration, financial institution[15] and education sub-sectors tables were modified to reflect the absence of food waste, green waste and other organic waste in the residual materials categories under study. The change in the total amount of waste resulted in a downward revision of the average amount of residual materials produced by employees in these sectors.

[13] NI Environnement, 2009.
[14] RECYC-QUÉBEC, 2009.

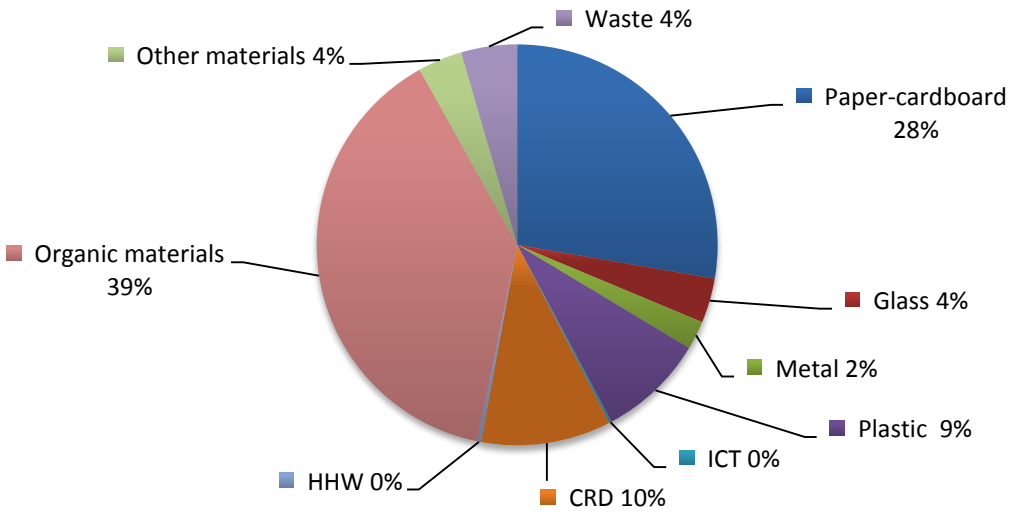
- The components of the health sector table[14] were modified slightly to take into account the absence of green waste in total municipal residual materials (without any notable effect on the average result for residual materials generated by employees in this sector).

- The components of the business sector table were largely changed to reflect the fact that several businesses mentioned in the RECYC-QUÉBEC study[15] are not found in the territory under study. The following types of businesses were thus included: hotels-motels, full-service restaurants, fast-food restaurants, grocery stores, service stations and others. As a result, the average waste quantities tabulated for employees in this sector are higher.

The estimates thus obtained better reflect the amount of industry-commerce-institution residual materials generated in Nunavik. The results are compiled in Table 10.

The chart for industrial-commercial-institutional residual materials produced in Nunavik shown in Figure 12 is also derived from tables in the foregoing studies.

FIGURE 12: ESTIMATED ICI WASTE PRODUCED IN NUNAVIK



Sources: NI Environnement, 2009 and RECYC-QUÉBEC, 2009

2.2.3 Estimated quantities and composition of construction, renovation and demolition waste

The methodology used to estimate the quantities and composition of construction-renovation-demolition residual materials in Nunavik is derived from the RECYC-QUÉBEC study entitled *Profil de la gestion des débris de construction, rénovation et démolition au*

Québec en 2009[15] (profile of construction, renovation and demolition waste management in Québec), although the composition of construction-renovation-demolition residual materials in Nunavik is very different from that described in the study.

Based on information provided by the KRG Municipal Public Works Department, it was possible to estimate percentages that better reflect the profile of construction-renovation-demolition residual materials in the territory. The estimates take into account the absence of heavy materials such as stone, brick, asphalt and earth, and higher quantities of wood in view of the large amounts that are used to package materials for sealift. The net difference in heavy materials has the effect of increasing the proportion of other materials (plastic, shingles and gypsum), as shown in Table 8.

Table 8: Comparison of approximate proportions of different types of CRD residual materials generated in Québec and in Nunavik

Type of residual materials	Percentage in Québec [1] (%)	Percentage in Nunavik[2] (%)
Stone, brick, asphalt	40 to 60	0
Wood	10 to 25	25 to 30
Metals	3 to 15	3 to 10
Paper-cardboard	3 to 10	3 to 10
Earth	2 to 10	0
Other (plastic, shingles, gypsum)	10 to 20	40 to 50

Source: [1] Vachon, J. et al., 2009 and [2] KRG Municipal Public Works Department

The estimated quantity of construction-renovation-demolition residual materials generated in Nunavik is based on the table of construction-renovation-demolition residual materials generated by Québec region.[16] Estimated tonnage and quantities for each village, shown in Table 10, take into account the population of Nunavik and the reduction of total tonnage by 40% in view of the absence of brick, stone, asphalt and earth in the region's construction-renovation-demolition residual materials.

The reasons for the absence of brick, stone and asphalt in the composition of construction-renovation-demolition residual materials in Nunavik are:

- The use of asphalt to pave roadways is fairly recent in Nunavik. The first asphalting took place in 1994. As well, only roads within or near villages have been asphalted. Since asphalting began, the KRG has been in charge of this work (in partnership with the northern villages) and it possesses the equipment necessary for this purpose.
- The equipment used for asphalting permits 100% of old asphalt to be recycled in all upgrading work.
- Regarding brick, this material is not used for construction in Nunavik.

[15] Vachon, J et Al., 2009.

- Stones and earth are also rare materials. They are used for asphalting, building-pad construction, road construction and cover material in landfills.

2.2.4 Estimated quantities of scrap vehicles

Motorized vehicles are usually included as a category in a residual materials management plan. However, the Association of Auto Parts Recyclers, which is responsible for their recovery in southern Québec, has no recycler member in the region. Large numbers of vehicles are therefore accumulating in Nunavik landfills and must be dealt with. Measures will be proposed to decrease the impact they have on the current and future management of the landfills. The estimated number of vehicles in northern landfills is presented in the table in Appendix 9.

Table 9: Estimated number of vehicles in m³

	Villages														
	Akulivik	**Aupaluk**	**Inukjuak**	**Ivujivik** (site 1: flammable)	**Ivujivik** (site 2: nonflammable)	**Kangiqsualujjuaq**	**Kangiqsujuaq**	**Kangirsuk**	**Kuujjuaq**	**Kuujjuarapik** (site 1: non-flammable)	**Kuujjuarapik** (site 2: flammable)	**Puvirnituq**	**Quaqtaq**	**Salluit**	**Tasiujaq**	**Umiujaq**
Number of vehicles (m³)	**1610**	**2240**	**4290**	**0**	**1600**	**620**	**1930**	**5400**	**5420**	**7230**	**0**	**1900**	**1860**	**2110**	**2100**	**2690**

Sources: Table 3 from the characterization study performed by Poly-Géo in 2012. Refer to Appendix 4.

As motorized vehicles are not formally registered in Nunavik, a current inventory is not possible. However, sealift companies can provide information on new vehicle arrivals. For example, the NEAS shipping company delivered 174 vehicles to the region in 2010[16]. Since there are two sealift companies in the region, it can be estimated that about 15 new vehicles are shipped to the smaller communities, and 30 to 50 to the large communities, both on an annual basis.

Another possible reason for the number of vehicles in northern landfills or strewn around the villages is the shortage of mechanic services in the communities, resulting in the scrapping of numerous vehicles that are still serviceable.

[16] Information obtained by the KRG Municipal Public Works Department, 2011.

2.2.5 Summary of residual material quantities and composition across sectors

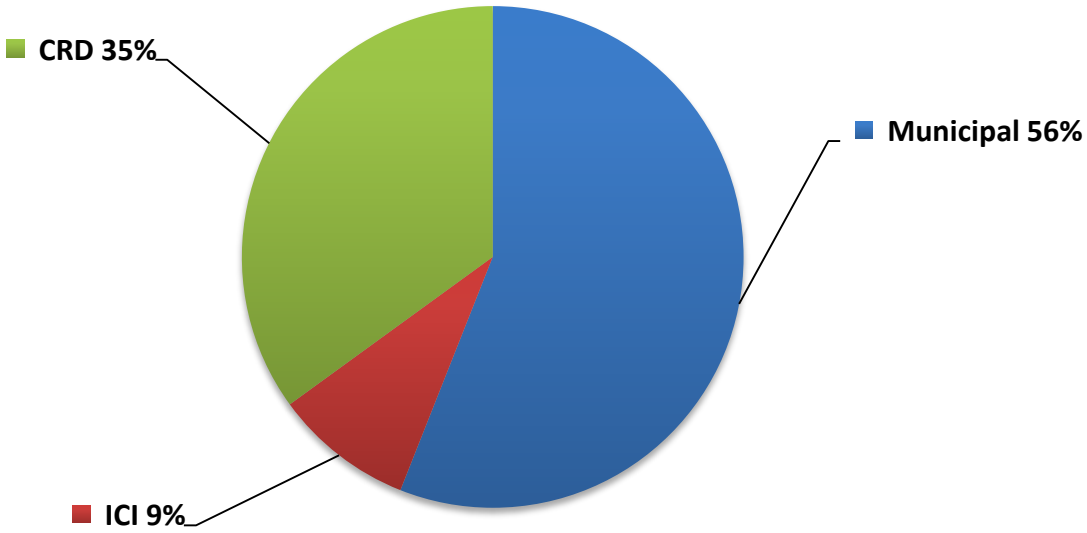
Table 10 presents the estimated aggregated quantities of residual materials sent for disposal by village by sector (municipal, industrial-commercial-instiutional and construction-renovation-demolition). In total, the Nunavik region produces more than 12,000 tonnes of residual materials annually. Since reduction, reuse, recycling, and reclamation are not currently being implemented across the region and in a combined effort, almost all residual materials accumulate in village landfills.

Table 10: Total estimated annual quantities of residual materials by sector and by village

		Municipal		ICI		CRD		TOTAL	
Village	**Population**	t	m³	t	m³	t	m³	t	m³
Kangiqsualujjuaq	767	416	4,199	60	608	261	2,636	737	7443
Kuujjuaq	2,336	1,266	12,779	269	2,714	795	8,030	2,330	23 523
Tasiujaq	256	139	1,04	33	335	87	879	259	2618
Aupaluk	192	104	1,051	31	315	65	657	200	2023
Kangirsuk	489	265	2,677	35	356	166	1,677	466	4710
Quaqtaq	333	180	1,818	33	335	113	1,141	326	3294
Kangiqsujuaq	634	344	3,474	58	588	216	2,182	618	6244
Salluit	1,364	739	7,465	77	780	464	4,687	1,280	12 932
Ivujivik	370	201	2,030	33	335	126	1,273	360	3638
Akulivik	548	297	3,000	36	366	187	1,889	520	5255
Puvirnituq	1,532	830	8,384	99	1,002	521	5,263	1,450	14 649
Inukjuak	1,735	940	9,495	84	851	591	5,970	1,615	16 316
Umiujaq	441	239	2,414	35	356	150	1,515	424	4285
Kuujjuarapik	1,441	781	7,889	224	2,267	490	4,950	1,495	15 106
Totals	12,438	**6,741**	**68 079**	**1,109**	**11,208**	**4,232**	**42,749**	**12,082**	**122 036**

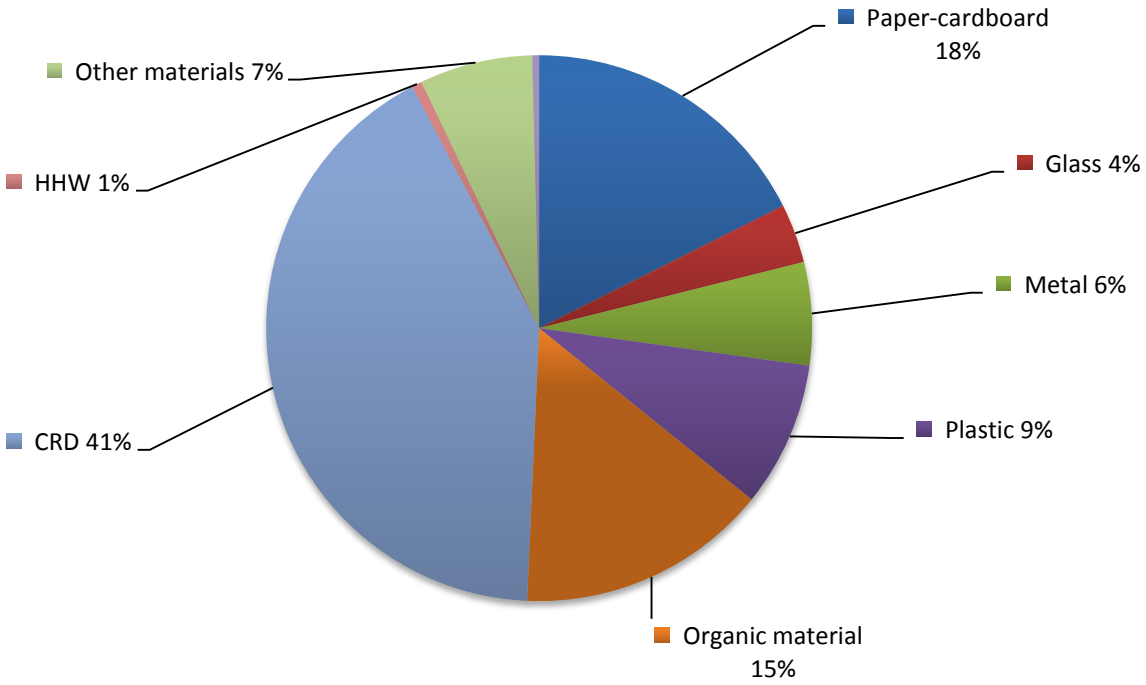
Sources: FSC Group, 2003; NI Environnement, 2009; RECYC-QUÉBEC, 2009; Vachon, J. et al., 2009

FIGURE 13: ORIGIN OF RESIDUAL MATERIALS IN NUNAVIK LANDFILLS BY SECTOR



Sources: Ibid, Table 7

FIGURE 14: ESTIMATED RESIDUAL MATERIALS IN NUNAVIK LANDFILLS BY CATEGORY



Source: Ibid, Table 7

Table 11: Summary of estimated quantities (m³) of residual materials by category and by sector in Nunavik

Category of residual materials (m³) / Production sector	Paper-cardboard	Glass	Metal	Plastic	CRD	HHW	Organic materials	Other materials	Ultimate wastes	Total (m³)
Municipal	18,381	3,881	7,216	9,531	6,740	681	13,820	7,829	0	68,079
ICI	3,105	403	258	964	1,210	34	4,337	403	504	11,208
CRD	-	-	-	-	42,749	-	-	-	-	42,749
Total	21,486	4,284	7,474	10,495	50,699	715	18,157	8,231	504	122,036
%	17.6	3.5	6.1	8.6	41.5	0.6	14.9	6.8	0.4	100%

Source: Ibid Table 10

3. Management Plan

3.1 Orientations, objectives and priorities

The major orientations and general objectives to be fostered to achieve the objectives set out in the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy* will be developed according to Nunavik's distinct characteristics.

3.1.1 Orientations

The orientations of the *Nunavik Residual Materials Management Plan* reflect the main issues and problems identified with residual materials management in the territory. These orientations will serve as the framework for the development and understanding of objectives, as well as measures to implement the Management Plan.

1) **Improve knowledge on residual materials management.**

2) **Foster management methods applicable in Nunavik in line with concepts of sustainable development.**

3) **Deliver regional support to the northern villages for measures implemented to achieve set objectives.**

4) **Maintain residual materials processing and management costs at levels that are economically and socially acceptable.**

3.1.2 Québec objectives

This section makes reference to the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*[17] which has the following objectives:

- Reduce the quantity of residual materials sent for disposal to 700 kilograms per capita, for a decrease of 110 kilograms per capita compared to 2008.
- Recycle 70% of paper, cardboard, plastic, glass, and metal waste.
- Recycle 60% of organic putrescible waste.
- Recycle or reclaim 80% of concrete, brick, and asphalt waste.
- Sort at the source or send 70% of building construction, renovation, and demolition waste to a sorting centre.

It is important to point out that in Nunavik, as described in the preceding sections 1 and 2, no residual materials management plan is yet in effect. In this context, the creation of any

[17] Refer to Appendix 5.

residual materials management measures will necessarily result in a reduction in the quantity of waste being generated per capita and contribute to the targets set for Québec.

3.1.3 Regional priorities and objectives

1) **Improve knowledge on residual materials management.**

a) Increase knowledge on the characterization of residual materials.
b) Implement measures to promote broad awareness and participation among residents, institutions, businesses and industries with a view to achieving targets.

2) **Foster management methods applicable in Nunavik in line with the concepts of sustainable development.**

a) Improve the management of northern landfills.
b) Modify the methods for burning residual materials.
c) Establish source-reduction protocols and reuse.
d) Promote selective collection.
e) Ensure follow-up on RECYC-QUÉBEC programs and implement the *Regulation respecting the Recovery and Reclamation of Products by Enterprises.*

3) **Deliver regional support to the northern villages for the measures implemented to achieve set objectives.**

a) Establish partnerships with different organizations for the management of residual materials.
b) Create municipal and regional by-laws that support the achievement of objectives.

4) **Maintain residual materials processing and management costs at levels that are economically and socially acceptable.**

a) Identify objective and quantifiable parameters for establishing the financial feasibility of measures.

3.2 Measures to reach regional residual materials management objectives

Each of the measures and scenarios selected will include deliverables to permit monitoring, assessment of their effectiveness in relation to the set objectives, and adjustments as necessary.

Steps will be taken to secure funding for each of the measures and scenarios, such as by prioritizing projects in line with the strategies and actions targeted under the *Québec Residual Materials Management Policy*, following up under the program for the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*, lobbying regional and Québec organizations, as well as implementing and monitoring RECYC-QUÉBEC programs.

Certain measures for achieving regional residual materials management objectives have already been selected since they will be applied across the region. However, given the size of Nunavik and the distinct characteristics of the different northern villages (populations, locations, existing infrastructure, etc.), other actions will require the northern villages involved in the pilot projects to select a scenario. The KRG will provide assistance to the northern villages to ensure the selection of the most suitable option. To guide these selections, the following factors will be taken into account:

- Estimated quantity of residual materials to be managed.
- Required human resources.
- Required training.
- Required material resources.
- Existing infrastructure.
- Infrastructure to be constructed.
- Cost estimates.
- Available funding sources.
- Timetable.

The process of selecting scenarios will include public consultations in the concerned northern villages.

The KRG Environment Section and the KRG Municipal Public Works Department will perform final scenario analysis in cooperation with the concerned northern villages and select the scenario that best meets the specific needs of each village.

3.2.1 Improve knowledge on residual materials management

a) Increase knowledge on the characterization of residual materials

As mentioned above, because they are based on estimates, residual materials data are inexact. Pursuant to Action 37 of the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*, an important objective under the *Nunavik Residual Materials Management Plan* is to ensure that the implementation of residual materials management measures will generate further knowledge on this topic.

The MDDELCC mandated the research chair on eco-counselling at the Université du Québec à Chicoutimi to prepare a portrait of residual materials management in the north and at remote sites, including Nunavik. The research chair is to propose a research strategy to the MDDELCC following its analysis. The knowledge generated by these studies will very likely lead to specific residual materials management measures for Nunavik.

Identifying the quantities of residual materials is paramount. The selected method should make it possible to more accurately quantify residual materials by category as well as be adapted to climatic conditions and residual materials management methods for the north. It will be implemented first in every community running residual materials management pilot projects to ensure quantitative monitoring of the residual materials generated.

Intermediate deliverable under this objective:

- Prepare an annual report beginning in 2016 containing the selected quantification methods, descriptions and the quantities of residual materials recorded under each pilot project and at new northern landfills. For the purposes of the report, a database will need to be created to compile the data collected by the northern villages in charge of the pilot projects with the assistance of the KRG Environment Section.

Final deliverable under this objective:

- Prepare a five-year report in 2019.

Costs:

The costs for knowledge improvement are included in the follow-up and support costs shown in Table 21. Some financial support might also be accessible through actions 25 and 37 of the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*.

b) Implement measures to promote broad awareness and participation of residents, institutions, businesses and industries with a view to achieving targets

Since the implementation of the different measures proposed under the *Nunavik Residual Materials Management Plan* will lead to major changes in residual materials management practices throughout the region (i.e. the practices of residents, institutions, businesses and industries), each measure will need to include educational, information and awareness tools pursuant to actions 6 and 38 of the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*. Through its Environment Section and Communications Section, the KRG will be responsible for adapting, modifying and producing information materials.

The implementation of each information campaign will be carried out according to the specific timetables of each measure:

Information campaign		Target schedule
Teaching materials for schools	→	Summer of 2015 and in parallel with the implementation of new measures.
Composting	→	Beginning in the summer of 2015.
ICI (reduction at source/reuse and NRMMP)	→	Beginning in the winter of 2016.
Selective collection	→	Winter of 2017 and/or before the implementation of pilot projects.
CRD sector	→	Fall of 2015 and during construction call for tenders.
Halocarbons	→	Beginning in the spring of 2016, annual reminder.
HHW	→	Beginning with the implementation of the NRMMP.
Refundable containers	→	Beginning in the summer of 2015, annual reminder.

Each information campaign will be addressed to the clientele targeted by the measure. The success of new measures will depend to a large degree on public participation.

The approaches selected to promote a new measure will be as distinct are as the different proposed measures. The KRG will however have to focus on the design of information tools available in the three languages spoken in Nunavik, adapted to a large public audience and accessible through different media (radio, Internet brochures, guides, information meetings, etc.).

Intermediate and final deliverables under this objective:

- Create an information campaign for each of the selected residual materials management measures as it is implemented.
- Modify or create municipal and regional by-laws that encourage residents to participate in the different residual materials management measures.

Critical factor:

The KRG will identify funding sources for the production of information materials.

Costs:
Costs for the production of information material and campaigns are indicated in the following table:

Table 12: Estimate of costs for the production of information material

Details	Awareness and education	
	KRG	
Translation of documents/campaign 35¢/word French to English 50¢/word English to Inuktitut	**$2,000**	**X 7 campaigns**
Printing of pamphlets and posters French-English-Inuktitut/campaign	**$7,000**	**$68,425**
Newspapers/campaign	**$775**	
Travel expenses X 2 employees		**X 7 campaigns**
Airfare (average $1,380/ticket)	**$1,380**	
Accommodations($260/night x 3 nights/trip)	**$780**	**$32,760**
Per diem ($60/day)	**$180**	
Total costs under the management plan	**$101,185**	

3.2.2 Foster management methods applicable in Nunavik in line with the concepts of sustainable development

a) Improve the management of landfills

Northern landfills play an important role in the *Nunavik Residual Materials Management Plan*. The implementation of prioritized measures will depend on the improved management of these landfills.

The KRG Municipal Public Works Department prepared in 2013 the *Guide for the Operating/Management of Solid Waste Sites in Nunavik*. Refer to the summary in Appendix 7. The Guide describes in detail procedures for the effective management of landfills. In order to ensure their implementation, the KRG Municipal Public Works Department will provide information to landfill staff in each northern village and conduct the necessary follow-up.

Several critical factors are identified in the Guide that, if not taken into account, will jeopardize several new measures proposed in the *Nunavik Residual Materials Management Plan*.

As mentioned above in section 2.1.4, the populations of the northern villages vary and these differences directly influence the quantity of residual materials generated and the size of landfills.

The size of each landfill determines the equipment and labour required to improve landfill management practices.

The **critical factors** identified by the KRG Municipal Public Works Department for the improved management of landfills are:

1. **Organization of northern landfills into four separate zones:**

    1. Household residual materials
    2. Bulky items
    3. Construction materials
    4. Metal:
        4.1 Scrap metal
            4.1.1 Iron
            4.1.2 Non-iron

        4.2 White metal (household appliances)
        4.3 Vehicles
            4.3.1 Cars
            4.3.2 Trucks
            4.3.3 ATVs
            4.3.4 Snowmobiles

The selective collection described in Section 3.2.2 d) will depend largely on the creation of these zones at landfills. Currently, there exists no infrastructure to protect residual materials from bad weather. Given that, even before the implementation of selective collection winter accumulation is significant, it will be necessary to organize zones for each type of residual material (recyclable, construction-renovation-demolition) and to construct required infrastructure (concrete slab floor, access ramp, unheated storage garage or containers, etc.).

2. **Landfill staff and access control**

In several respects, site staff are at the heart of landfill activities. To date, only Kuujjuaq and Kuujjuarapik employ landfill staff, and this is on a seasonal basis.

The following duties must be performed by landfill staff to ensure the proper management of landfills:

1. Assess and manage residual materials sorting.
2. Restrict access to the site in order to control the materials brought to the site and ensure safety.
3. Supervise and organize operations at the site, in particular burning.
4. Keep a log of vehicle entries and exits.
5. Communicate with site users.

3. Basic operations in the household residual materials zone

1. Residual materials compacting.
2. Covering of residual materials if backfill material is available.

These operations make it possible to reduce the space used and increase the service life of sites. The assignment of a heavy equipment operator at each landfill will be assessed according to the work to be carried out, the size of the site and the season.

4. Surface runoff and leachate control

To reduce the risk of surface runoff and ground water contamination, water leachate control must be prioritized. An effective drainage system diverts surface water away from residual materials in order to prevent its contamination.

5. Fence maintenance

Fences keep waste from becoming scattered. Proper maintenance helps to extend their service life. Maintenance work includes cleaning and repairing, improvements and the installation of new fencing when required.

6. Monitoring of open-air burning

Pursuant to section 99 of the *Regulation respecting the Landfilling and Incineration of Residual Materials*, "[c]ombustible residual materials deposited in northern landfills must be burned at least once a week, weather conditions permitting." This burning must be performed solely by landfill staff when weather conditions will not impact on the air quality of nearby residents. If residual materials are sorted upstream, the amount of combustible materials at landfills will be diminished and less, or no burning, will be required.

Intermediate deliverables under this objective:

- Release the *Guide for the Operating/Management of Solid Waste Sites in Nunavik* (KRG Municipal Public Works Department) with a companion summary and checklist for landfill staff in each northern village.
- Deliver training to landfill staff on operations and access control.

Final deliverables for critical factors 1 and 2:

- Set up four separate zones at landfills: first, in the three northern villages where new landfills are being built (Kangirsuk, Kuujjuarapik and Inukjuak) and, then, in the other northern villages as pilot projects for the selective collection of recyclable and construction-renovation-demolition materials are implemented. The same applies for the creation of landfill staff positions and the setting up of access control.

Final deliverables for critical factors 3, 4, 5 and 6:

- Gradually introduce basic operations, water leachate control, fencing maintenance and the monitoring of open-air burning as landfill-management training is delivered by the KRG. Within five years, all the northern villages should be following proper practices in the landfill zone for household residual materials.

Costs:

Table 13: Estimate of costs to improve landfill management
(For the three northern villages where new landfills are being set up.)

Details	Improved landfill management	
	KRG	Northern village
Wages: landfill staff member Seasonal – 4 months full-time + 10 hours/week for 8 months (based on annual wages of $144,667)	---	$75,226
Heavy equipment operation (fuel, parts, etc.)	---	$63,369
New power ram	$400,000*	---
Construction of a shelter for landfill staff	$20,000	---
Gate at the site entrance	$5,000	---
Structure for hazardous material	$65,250	---
Costs for the first year by sector	$490,250	$138,595
Total costs/village/first year	$579,596	
Subsequent years (wages, operation costs)/village	---	$138,595
Estimated total costs (New landfills and selective collection pilot projects)	$4,283,930[1]	

* Some villages will not require a power ram assigned specifically for landfill management.

** This estimate does not take into consideration possible revenue from the improved management of construction-renovation-demolition residual materials.

b) Modify methods for burning residual materials

Although it is stipulated in the *Regulation respecting the Landfilling and Incineration of Residual Materials* that residual materials must be burned before they are buried in a northern landfill, every effort must be made to mitigate the adverse effects of this practice on the environment and nearby populations. Currently, household, institutional, commercial and industrial waste contains numerous materials that, when burned at low temperatures, emit high levels of particles, acid gases, heavy metals, carbon monoxide, dioxins, furan, and other chemical products.

The only burning option that is less harmful for the environment and feasible for northern villages involves the purchase of incinerators. This technology has in fact been tested in the north were it has been used, for example, at the Raglan mine, in the James Bay village of Wemindji and in Greenland. Incinerators use the heat capacity of the residual materials being burned to significantly reduce their volume and transform them into ashes, CO_2 and water vapour. Adding used oil increases the heat capacity of the residual materials to be incinerated and represents an avenue for managing and eliminating this material, i.e. used oil. The monitoring and control procedures applicable are however much more extensive. The estimated volume of combustible household residual materials explains why incineration is a possible option in Nunavik.

According to a review of existing literature performed by Catherine Ménard[18], discontinuous batch-operation type incinerators are the most appropriate for northern regions and the quantity of residual materials to be incinerated. Notwithstanding, the extensive procedures for each stage of incinerator use require qualified staff. As well, the facilities, including a building to shelter the equipment and staff from bad weather, would need to be located near the landfill for logistical reasons.

In order to evaluate the possibility of this option for the northern villages, the KRG Municipal Public Works Department and the KRG Environment Section will need to carry out an exhaustive study of the incinerator pilot project. If the study demonstrates that the project is feasible, an incinerator pilot project will be carried out in one of the northern villages.

[18] Master's student in Environment, Université de Sherbrooke.

Intermediate deliverable under this objective:

- Prepare a technical, operational, financial and organizational feasibility study for an incinerator pilot project.

Final deliverable under this objective:

- Implement an incinerator pilot project based on the recommendations of the feasibility study within five years.

Critical factor:

Preparation of the feasibility study by the KRG Municipal Public Works Department and the KRG Environment Section, and funding for the pilot project.

Costs:

Table 14: Estimate of costs for the incinerator pilot project

Details	Modify the types of burning Incinerator pilot project	
	KRG	NV
Incinerator	$550,000	
Building	$45,000	---
Related equipment	$75,000	
Training and technical support	$25,000	
Wages (one full-time* at $144,667 annually and one part-time at 50% of $144,667)		$217,000
Costs for the first year by sector (2018)	$695,000	$217,000
Total costs for the first year (2018)	$912,000	
Subsequent years (wages)	$0	$217,000
Total costs by sector	$695,000	$434,000
Costs for the pilot project	**$1,129,000**	

* Average salary including employee benefits.

c) Establish protocols for reduction at source and reuse

As indicated in the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy* (Strategy 2, actions 5 and 6), reduction at source is a key component of residual materials management because it reduces the volume of residual materials to be processed (recycled and eliminated). Reduction at source measures are complicated to implement since they demand that residents, businesses and institutions change consumption patterns. As well, in order to encourage and support reuse measures, the KRG through the KRETC and in cooperation with the KSB will:

- Promote maintenance and repair trades for electronic, electrical and mechanical devices and appliances.
- Increase training for related maintenance workers in the regional industrial-commercial-institutional sector.

These measures will over the long term foster the reuse of defective devices and appliances, and serve to directly reduce the accumulation of residual materials at landfills.

As well, under the Climat Municipalité program, the KRG conducted in November 2011 an inventory of greenhouse gas emissions for the corporate and public sectors. An action plan based on this work was produced in the fall of 2013 for use by environmental committees in the industrial-commercial-institutional sector.

In order to ensure the success of each reduction at source measure, a solid awareness campaign will need to be created and municipal by-laws might be required.

Table 15: Proposed measures to encourage reduction at source

Sectors	Measures	Details
In homes	Avoid over-packaging.	Purchase food items that have very little or no packaging. Reduce the purchase of single-use water bottles. Use reusable containers instead of single-use ziploc-type bags. Buy bulk and economy-size formats. Shop with reusable bags instead of single-use plastic bags. Avoid throw-away products (plastic utensils, paper towels, disposable cloths, etc.). Buy products in concentrated forms.
	Encourage household composting.	Assembly of compost boxes and public information session.
	Encourage the use of reusable diapers.	Emphasize both the financial and environmental advantages. Avoid the use of disposable cloths.
In institutions	Establish purchasing directives to promote waste prevention (ex.: durability, potential reuse, quality).	
	Encourage paper savings.	Promote two-sided printing. Encourage the purchase of paper made from 100% recycled material (copies, toilet paper, paper towels, tissues, etc.). Limit unnecessary printing; promote electronic media. Reuse as much as possible file folders, paper (note pads) and other office supplies.
	Avoid the use of disposable containers.	Make available to staff and clients durable dishes. Make available drinking water equipment instead of water bottles (ex.: pitchers, water fountains, water coolers). Discourage the use of disposable utensils at ceremonies and special events.
In businesses	Establish purchasing directives to promote waste prevention (ex.: durability, potential reuse, quality).	
	Reduce over-packaging and the use of paper and cardboard. (Action 3 under the QRMMP)	Avoid as much as possible the production of advertising material. Encourage the reuse of cardboard boxes. Replace styrofoam containers. Develop return policies with distributers for shipping containers (for milk, ice cream, etc.).

Intermediate and final deliverables under this objective:

- Create an environmental committee at the KRG.
- Introduce reduction at source and reuse measures in the offices and buildings of the 14 northern villages.
- Conduct a public awareness campaign.
- Create environmental committees in the regional industrial-commercial-institutional sector.
- Promote maintenance and repair trades for electronic, electrical and mechanical devices and appliances (KRETC and KSB).
- Increase training for related maintenance workers in the regional industrial-commercial-institutional sector (KRETC and KSB).
- Study the possibility of introducing or modifying municipal by-laws concerning the implementation of different reduction at source measures (KRG).

Costs:

The costs for the implementation of reduction at source measures are included in the follow-up and support costs shown in Table 21.

d) Promote selective collection of recyclable materials

Even perfect selective collection measures will never be able to completely eliminate residual materials. Notwithstanding, the separation of different types of residual materials can effectively reduce the quantities that need to be handled, stored, processed and eliminated. As well, some residual materials can be reused for different purposes, at the same site or elsewhere.

The *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy* targets to reduce to 700 kg per capita the quantity of residual materials sent for disposal. One of the planned actions is to increase paper, cardboard, plastic, glass and metal recycling. It is important to point out that no selective collection system exists in Nunavik. Therefore, the creation of any residual materials management measures will necessarily result in a reduction of the quantity of residual materials for disposal per capita and contribute to the targets set for Québec.

Since the quantity of residual materials in the region can only be estimated[19], the achievement of quantitative objectives (tonnage or percentage) for recovered materials is not feasible at this time. For this reason, the acquisition of knowledge about the different materials and the implementation of selective collection through pilot projects are realistic targets for the region.

In order to achieve these goals, northern villages interested in implementing selective collection pilot projects will need to receive support. Preferably, the northern villages selected for this purpose will be of varying sizes and will represent different parts of the region (Ungava Bay, Hudson Strait and Hudson Bay) so that the pilot projects will generate useful knowledge for the implementation of measures for small, medium and large communities, as well as for those that are easily accessible by air and those that are best accessible by sea. Should several northern villages express interest in the same pilot projects, the KRG will prioritize projects in those communities which have already demonstrated good landfill management practices.

As indicated above in section 3.2.1 a), monitoring of the targeted materials will need to be carried out so that quantitative and qualitative data can be compiled and the estimated quantities of residual materials can be validated or adjusted. Various regional stakeholders will be consulted on the most suitable quantification method since the use of scales to quantify residual materials is not straight forward. Scales are currently only installed in Kuujjuaq and Inukjuak and are operated only intermittently (absence of qualified repair staff and long winter seasons). It would probably be simpler and more realistic in the short

[19] The current inventory (Section 2.2) is based on estimates using data from other regions of Canada and Québec.

term to record the number of loads of residual materials (containers, trucks, etc.) annually discharged at landfills, stored and shipped.

The materials separating stage is essential because it prevents mixing and ensures the reuse or recycling of residual materials, thereby increasing the service life of landfills by reducing the volume of materials that need to be sent for disposal.

Each of the following sections describes possible measures for different categories of recyclable residual materials which could be targeted for selective collection:

I. Selective collection of recyclable materials

- Glass, metal, plastic, paper and cardboard.

II. Other selective collection

- Organic waste.
- Construction, renovation and demolition materials.
- Wastewater sludge.
- Other residual materials: textiles, appliances, vehicles, scrap metal.
- Household hazardous materials.
- RECYC-QUÉBEC programs in Nunavik: refundable containers, tires.

I. Selective collection of recyclable materials

Glass, Metal, Plastic, Paper and Cardboard: Municipal and ICI

1) Recycling collection pilot projects

Glass, metal, plastic, paper and cardboard may be recycled if the proper set-up is in place : collection, transportation, adequate storage and shipping to recyclers in southern Québec. The villages that implement a recycling collection pilot project will have to first identify which kinds of materials are to be collected.

In the event that the recycling set-up is inadequate for some materials, other avenues can also be considered:

- Glass can be sorted, stored, crushed and reused as cover material at landfills.
- Paper and cardboard generate little harm when burned at landfills and could eventually be included in collection for composting.
- Metal could be shipped to recyclers since it has relatively good value on the recycling market.
- Plastic could be shipped to recyclers especially because when burned at low temperature it produces toxic gases (dioxins, furan, etc.) but also because it has relatively good value on the recycling market. Open-air burning of plastic should be avoided.

Two selective collection scenarios are proposed in this section. Both require the creation of adequate designated storage zones (section 3.2.2 a)).

Scenario 1: Drop-off bins

The first selective collection scenario involves drop-off bins for recyclable materials. With start-up, the northern villages will decide which materials to target. Each household will receive a home collection box and transparent bags to allow sorting to be done in the home, and recycling bins (Figure 15) will be placed at different locations (industrial-commercial-institutional, municipal garage, etc.) in the communities. Collection trucks will regularly pick up the materials deposited in the recycling bins. This option also requires a designated storage zone for recycling materials.

Pros:

- Drop-off bins are normally a first public awareness stage for recycling.
- This option generates lower transportation costs (fuel, wages, etc.).
- Residual materials do not have to be sorted. Sorting is done by residents.
- Drop-off bins are placed in areas that receive high public traffic.

Cons:

- This option requires greater participation on the part of residents, who must not only sort residual materials but carry them to recycling bins.
- It can be difficult to maintain operations in winter because residents may be required to walk a certain distance to recycling bins.

FIGURE 15: RECYCLING DROP-OFF BINS

Scenario 2: Home collection

The second selective collection scenario involves collecting recyclable materials from homes. Before home collection is undertaken however a few adjustments will need to be made to the garbage boxes outside homes that are traditionally used for waste. As well, each household will receive a home collection box and transparent bags for sorting recyclable materials in their home.

The garbage boxes outside homes will need to have a separator inserted to divide the boxes into two compartments: one compartment for garbage for the landfill and another for recycling (Figure 16). At homes where there are no garbage boxes, recycling bins will be added.

Recycling bins will be labelled to help garbage and recyclable materials collectors. The labelling will be done simply by painting a recycling symbol on every bin.

FIGURE 16: EXAMPLE OF CHANGES TO BE MADE TO GARBAGE BOXES

As is the case with the first scenario, collection trucks will regularly pick up the materials deposited and ensure the recycling materials are adequately stored to protect against bad weather.

Pros:

- This option is more accessible to residents, potentially increasing participation.
- The quantity of materials to be eliminated or incinerated are greatly reduced.

Cons:

- Collection methods are more complex and require training for staff.
- Additional equipment is required.
- Additional educational and awareness efforts for residents are necessary.

2) Post collection activities

After the recyclable materials are collected (from drop-off bins or homes), they need to be prepared for shipment to recyclers or for reuse on site. Action 30 of the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy* could assist with the creation of basic sorting centres in those northern villages implementing the selective collection of recyclable materials.

First, a designated storage zone must be created (backfill, fencing, cold-storage garage, etc.) and properly identified at the local landfill or elsewhere in the pilot-project village.

Municipal staff will regularly transport recyclable materials to the designated storage zone, which will be sheltered from bad weather. The materials can be accumulated over the winter months without risk of infestation by insects or other nuisances. The compacting of the materials intended for recyclers and the filling of shipping containers can be carried throughout the year or seasonally depending on the facilities, equipment and staff assigned to this service by the northern village.

Intermediate and final deliverables under this objective:

- According to Table 10 and Figure 14, glass, metal, plastic, paper and cardboard (all residual materials producers combined) make up 37% of the residual materials produced annually in the region. The goal of these recycling pilot projects* that are planned to start in 2016 will be to divert 10% of residual materials in the first year, 20% in the second year and 25% in the third year. For a village like Kuujjuaq, this represents 215 tonnes of residual materials recovered annually by the third year of a project.

* The implementation of several pilot projects in northern villages of varying sizes to maximize knowledge acquisition will depend on available funding.

Action 30 of the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy* could assist with the creation of basic sorting centres in those northern villages implementing the selective collection of recyclable materials.

Critical factor:

Regardless of the scenario selected, the feasibility of selective collection is dependent on the capacity to ship materials at a lower cost to recyclers and also on the promotion of local solutions (ex. the use of paper and cardboard for composting). Establishing agreements with sealift companies with low transportation rates is an integral component of this measure. If shipping costs prove to be too high, these materials will have to be burned, used as cover material or buried at landfills. Note that some financial support for this measure could be obtained through Action 30 of the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy.*

The indicator for tracking the quantities of residual materials recovered or diverted from landfills will be the number of containers shipped annually to recyclers under each pilot project.

Costs:

Table 16: Estimate of costs for a selective collection pilot project in a northern village (recyclable materials)

Details * Costs include sealift		Selective collection pilot project (recyclable materials)			
		Drop-off bins		Home collection	
		KRG	NV	KRG	NV
Designated zone	Equipment operations	$8,700	---	$8,700	---
	Fencing	$7,200	---	$7,200	---
	Backfill	$5,100	---	$5,100	---
	Staffing	$6,000	---	$6,000	---
10 roll-off type shipping containers (40 ft)		$80,000	---	$80,000	---
Materials compactor		$40,000	---	$40,000	---
Southbound sealift of containers with residual materials and northbound return		$55,000	---	$55,000	---
Storage shelter		$40,000	---	$40,000	---
Home collection boxes		$15,000	---	$15,000	---
10 drop-off bins		$80,000	---	---	---
Adjustment to exterior residential garbage boxes ($50) + and drop-off bins ($400)		---	---	$62,500	---
Transparent bags		$7,800	---	$7,800	---
Recycling collection		---	$24,000	---	$24,000
Wages for two full-time staff (based on annual wages of $144,667)		---	$289,334	---	$289,334
Costs for the first year by sector		$368,800	$313,334	$353,700	$313,334
Costs for the first year (2017)		**$682,134**		**$667,034**	
Subsequent years (2018–2019)		$110,000 (sealift)	$626,668	$110,000 (sealift)	$626,668
Total costs by sector		$478,800	$940,002	$463,700	$940,002
Total costs by pilot project		**$1,418,802**		**$1,403,702**	

* The costs under scenario 1 are slightly higher because the purchase of community drop-off bins will be more expensive than the modification of existing exterior residential garbage boxes.

II. Other selective collection

Organic Waste (Municipal and ICI)

Organic waste represents close to 15% of the total amount of residual materials that must be eliminated annually in northern landfills. If paper and cardboard are also counted, this percentage rises to 33%. When buried in landfills, these materials have very harmful effects on the environment. Through decomposition, they produce greenhouse gas emissions and leachates that are toxic for soil, streams and groundwater.

Current measures and planned pilot projects relate directly to several objectives under the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*, specifically:

- Recycle 60% of organic putrescible waste.
- Reduce the quantity of residual materials sent for disposal to 700 kilograms per capita.
- Recycle 70% of paper, cardboard, plastic, glass, and metal residual materials.

The implementation of various organic waste management projects will serve to enhance knowledge (Action 37 of the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*) on composting in the north and establish parameters as well as the technical, operational, financial and organizational feasibility of composting on a large scale, i.e. in all the villages.

Any compost produced could be used for various activities, such as the revegetation of residential lots and along roads (with attendant dust reduction and improved air quality) and as humus in municipal greenhouses, where applicable.

The two measures and the pilot project are in line with actions 5, 15, 25, 31 and 37 under the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy* and the Household and Community Composter Assistance Program.

Pile composting: Kuujjuaq Greenhouse Project

As mentioned above in section 2.1.5, the composting project being implemented as part of the Kuujjuaq Greenhouse Project will be continued, optimized and could eventually be converted from a seasonal to a year-round project. It is important to mention that this project involves organic materials originating from the industrial-commercial-institutional sector only.

With KRG support, the project could be enhanced to maximize all stages for optimal composting results: quantities, quality and maturation time, as well as the development of techniques best adapted to the north.

According to Figure 12, organic materials make up 39% of the estimated residual materials produced by the industrial-commercial-institutional sector in Nunavik. In Kuujjuaq, this represents an estimated 105 tonnes of material annually. In order to standardize and maximize the reclamation of organic materials for composting, in addition to the community's two grocery stores, project participants should gradually come to include restaurants, construction-camp cafeterias and the health centre cafeteria. The equipment for these activities will require investment and adjustments. If the participation of the industrial-commercial-institutional sector is optimized, it is possible to estimate that at least 25% of the organic materials produced by the sector will be reclaimed through composting within five years, i.e. 26 tonnes annually in Kuujjuaq.

The results of these projects will be analyzed by the KRG Environment Section and the decision to implement similar facilities in other villages will be evaluated.

Critical factor:

The project is dependent on partnership between the Northern Village of Kuujjuaq, which owns and operates the greenhouses, and the NRBHSS, which subsidizes staff wages. The clients who are currently responsible for the collection of organic materials are mental health patients under the supervision of the non-profit organization Hébergement communautaire Ungava. The organization receives an annual subsidy from the NRHBSS to carry out social reintegration activities for its clients and, since it creates jobs, has also received financial support from the KRG Regional and Local Development Department for the purchase of a new shredder (fall of 2014).

Residential composting initiative

In parallel with the Kuujjuaq Greenhouse Project, composting boxes will be built (from recovered wood if possible) and distributed to the residents of the community to encourage household composting. Public information sessions regarding this initiative will be delivered. According to Figure 11, organic materials make up 20% of the estimated residual materials produced by the municipal sector. In Kuujjuaq, this represents an estimated 253 tonnes of materials annually. The number of composting boxes to be distributed is estimated at 25 per year, or 125 over the course of the *Nunavik Residual Materials Management Plan*. At one box per household, this means that a quarter of Kuujjuaq homes will be carrying out residential composting with an estimated reduction in waste of 13 tonnes annually and about 50 tonnes of organic materials reclaimed through composting over five years. There will be no costs under this measure as the information sessions and box construction will be carried out on a volunteer basis and with local expertise.

Rotating composter pilot project

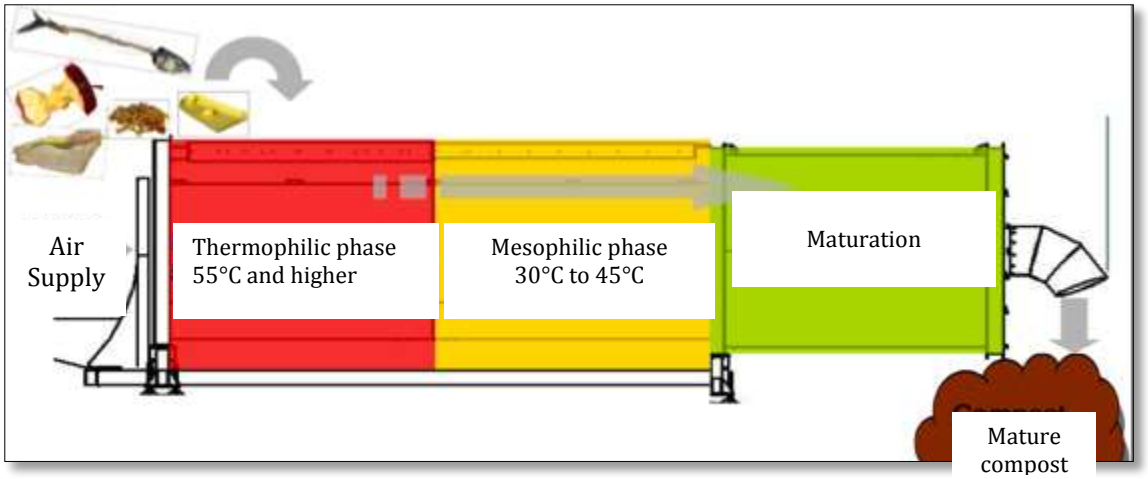
Rotating composters (Figure 17) can compost large quantities of organic materials from residual materials producers in every sector. The advantage of this option is that it permits the processing of all organic materials: animal waste (carcasses, meat, dairy, etc.) and vegetal waste (bread, pasta, fruit, vegetables, etc.). Paper and cardboard from the industrial-commercial-institutional sector will be used to provide the carbon necessary for this process.

Rotating composters require a relatively simple pre-processing of materials. They operate non-stop and require little power. After materials have been fed into a composter, about two weeks are needed before the compost is ready to be removed. Under optimal conditions, this option can divert up to 33% of residual materials (organic waste, paper and cardboard) currently destined for landfills. Poultry farms with less than 100 hens are being set up in Kuujjuaq, Akulivik and Salluit. Waste bedding and carcasses produced by these small-scale farms could be added to the organic materials for the composter.

Critical factor:

Generate interest in the northern villages for this new residual materials management method and identify funding sources.

FIGURE 17: ROTATING COMPOSTER



The indicator for tracking the evolution of organic material quantities varies according to the measure. With the pile composting for the Kuujjuaq Greenhouse Project and the rotating composter, it involves the quantity of compost produced in cubic metres. The quantity of compost produced with residential boxes will be more difficult to evaluate since it depends on many factors that cannot be controlled.

Intermediate and final deliverables under this objective:

- Continue the operation of the pile composting for the Kuujjuaq Greenhouse Project and support stakeholders to improve knowledge on pile composting in the north. The targeted result is a 5% decrease in organic materials sent to the landfill for disposal in the first year, 10% in the second year and so on until a rate of 25% or 26 tonnes is achieved annually after five years.

- Promote residential composting with expertise provided by the stakeholders of the pile composting component of the Kuujjuaq Greenhouse Project. Build and distribute 25 residential composting boxes annually for a total of 125 boxes after five years. This initiative corresponds to roughly 50 tonnes of composted organic materials after five years.

- Implement at least one rotating composter pilot project in the first three years of the *Nunavik Residual Materials Management Plan* (i.e. by 2017) depending on community interest and available funding. Subsequently, the targeted result will start as a 20% annual decrease in organic materials sent to the local landfill for disposal and reach a 50% decrease by the third year. Tonnage cannot be estimated because the pilot project community has not yet been determined. In Kuujjuaq for example, 385 tonnes of organic materials would be diverted from the landfill annually after three years of a rotating composter pilot project.

Costs:

Table 17: Estimate of costs to manage organic waste measures

Details * Costs include sealift.	Composting measures			
	Rotating composter		Pile composting (Kuujjuaq greenhouse)	
	KRG	NV	Community organizations, NRBHSS and KRG	NV
Shredding machine	$10,000	---	$10,000	---
Mixer	$30,000	---	---	---
Two conveyors	$18,000	---	---	---
Rotating composter	$95,000	---	---	---
Operator training	$3,000	---	---	---
WEB calculator	$3,000	---	---	---
Set-up and shipping	$9,000	---	---	---
Dome-type shelter	$40,000	---	---	---
Wages: two part-time staff (2.5 days/week) (rotating composter)	---	$144,667	---	---
Wages: two part-time staff, community social reintegration program (Kuujjuaq greenhouse)	---	---	$40,000	---
Costs for the first year by sector	**$208,000**	**$144,667**	**$50,000**	**$0**
Total costs for the first year	**$352,667 (2017)**		**$50,000**	
Subsequent years	**$0**	**$289,334 (2018-2019)**	**$160,000 (4 years)**	**$0**
Total costs by sector	**$208,000**	**$434,001**	**$210,000**	**$0**
Total costs by measure	**$642,001**		**$210,000**	
Total cost for the measures	**$852,001**			

Construction, Renovation and Demolition Materials

According to the *2011–2015 Action Plan* under the *Québec Residual Materials Management Policy*, construction, renovation and demolition materials must be covered by residual materials management plans.

Residual materials generated by construction, renovation and demolition activities represent 41% of all the residual materials that end up in landfills annually. The absence of related by-laws (municipal and regional) reflects weak management practices for this type of residual materials on the part of the northern villages, which are responsible for landfill operations.

Currently, construction, renovation and demolition materials are roughly sorted and take up a good deal of space at landfills. One reason for this situation is that little or no monitoring is carried out at the sites and, at several landfills, the zones designated for this type of residual materials are poorly defined or inexistent. As well, the absence of communications between contractors and the northern villages can explain the gaps in management practices.

Two measures are proposed to improve the management of residual materials produced in the construction, renovation and demolition sector.

Measure 1: Amendments to call-for-tender documentation in the CRD sector

The KRG Legal, Socio-Judicial and Municipal Management Department and the KRG Municipal Public Works Department will work together on clauses to be added to contract call-for-tender documentation in the construction, renovation and demolition sector. The clauses will deal with full responsibility and the return shipping of household hazardous waste generated by construction companies but not covered under the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*. This is one of the major issues identified by the regional review. Other construction-renovation-demolition residuals materials will be dealt with pursuant to measure 2.

Measure 2: Adoption and enforcement of municipal by-laws

The adoption of by-laws by the northern villages, like By-Law No. 2008-02 of the Northern Village of Kuujjuaq, will provide a better management framework for construction, renovation and demolition residual materials. The northern villages will then be able to require contractors to comply with municipal by-laws and, if applicable, to pay any fees stipulated in the by-laws.

The proper management of construction, renovation and demolition residual materials can only be achieved by separating materials throughout the various production stages. The municipal by-laws will specify that these residual materials must be sorted by the contractors at their sites. The main categories to be contemplated for sorting are:

- Granular materials (brick, asphalt, concrete, etc.).
- Non-treated wood.
- Metal.
- Others (composite materials, insulation, gypsum plaster board, treated wood, etc.)

Following this initial sorting, the construction, renovation and demolition residual materials will be transported by the contractors and piled by category in the designated landfill zones (section 3.2.2 a)).

The northern villages will first have to determine and designate zone(s) for construction, renovation and demolition residual materials (wood, metal, granular material and others) and then control access to the landfill (schedule and gate) and assign a staff member to direct contractors to the designated zone(s). At landfills, contractors will sort their residual materials according to the directions provided by the municipal staff member and onsite signage. If residual materials are not sorted by the contractor, they will be obliged to pay a fine.

The metal produced through construction, renovation and demolition activities will be placed in the zone designated for household metals. Wood will be reused by residents, or shredded and used as cover or compost material or burned. (Burning poses no risk as long as the wood is non-treated.) Granular materials will be crushed and used as cover material. Other types of residual materials will be eliminated at the landfills since their quantity will be much reduced. Sorting will facilitate the reuse of materials by the general public.

Intermediate and final deliverables under this objective:

- Set up a separate construction-renovation-demolition zone at local landfills pursuant to section 3.2.2 a). Priority would be given to new landfills and northern villages hosting pilot projects.
- As shown in Figure 14, construction-renovation-demolition materials make up 41% of overall residual materials. The objective in communities where construction-renovation-demolition zones are set up at local landfills will be to recover 10% more of these materials every year. Since the northern villages will create construction-renovation-demolition zones at their local landfills at different stages during the implementation of the *Nunavik Residual Materials Management Plan* and they each produce differing amounts of construction-renovation-demolition materials, it is impossible for the moment to calculate exact tonnage. In Kuujjuaq for example, 96 tonnes of construction-renovation-demolition materials could be recovered in the first year (10% of the total amount of construction-renovation-demolition materials), 192 tonnes in the second year, and so on.
- Implement the two measures proposed to improve the management of residual materials produced by the construction-renovation-demolition sector.

Critical factors:

Although the implementation of municipal by-laws and contract clauses for the management of these residual materials will be vital, the most important factors will be to establish clearly designated zones at landfills, to communicate information to the construction companies that use the landfills, and to hire staff to exercise control at the landfills.

The indicator for tracking the evolution of construction-renovation-demolition material quantities will be the number of loads sent to landfills annually by construction companies in each of the northern villages. The adoption of municipal by-laws will facilitate this process. It should be noted that the implementation of these measures will improve the reuse of materials locally, and likely serve to reduce even further the total quantity of construction-renovation-demolition materials at landfills.

Costs:

The costs related to the management of construction-renovation-demolition residual materials are included in landfill management improvement costs (designated zones, gate, staff) or in those for follow-up and support, i.e. tables 13 and 21. It should be noted that any profits generated through the management of construction-renovation-demolition residual materials will be re-injected into landfill management.

Wastewater Sludge

As mentioned above in section 2.1.10, no wastewater sludge will be ready for processing within the next twenty years. It will therefore be possible to detail the management of this type of residual materials in the next version of the *Nunavik Residual Materials Management Plan*.

Other Residual Materials

Textiles

Textiles represent about 2% of residual materials in Québec. In Nunavik, the Wellness Centre in Kuujjuaq and the women's centre in Inukjuak already promote the reuse of textiles.

Target:

- Create a partnership between the KRG Environment Section and the not-for-profit organizations indicated above in order to maintain and promote theses services and to identify funding sources.

Critical factor:

The involvement of not-for-profit organizations with the management of this residual material will be vital.

Costs:

Textile management costs are covered by the Wellness Centre in Kuujjuaq and the women's centre in Inukjuak (staff and volunteers).

Bulky items (with and without) halocarbons

Bulky items are already stored in designated zones in landfills; however, some household appliances may still contain halocarbons. Since the *Regulation respecting Halocarbons* applies in the region, the northern villages are required to create protocols for the recovery of these gases prior to the elimination of household appliances at landfills.

To this end, the KRG Environment Section must set up a halocarbon recovery procedure and deliver technical assistance to the northern villages. A technician will regularly travel around the region to remove halocarbons from bulky items. Ideally, one or more residents from the region would receive environmental training for halocarbons. The development of local expertise in Inuktitut would be a benefit to the region. It will be the responsibility of

the northern villages to create a safety buffer zone for bulky items and vehicles containing harmful gases until halocarbon recovery can be performed by a technician. Once halocarbons are removed, these bulky items would be moved to the zone of the local landfill designated for scrap metal disposal.

The metal carcasses of household appliances emptied of household hazardous waste will be included in a broader recycling project developed by the KRG Municipal Public Works Department for metal materials and described in the scrap metal section below.

Deliverables under this objective:

- Develop and implement a recovery procedure for halocarbons from household appliances, air-conditioning units and vehicles through a partnership of the KRG, the northern villages and different organizations.
- Set up a designated zone in each northern village or landfill to store bulky items until halocarbons can be removed.

Critical factor:

The participation of different partners (northern villages and organizations) in the management of bulky items will be vital.

The indicator for tracking the evolution of recovered halocarbon quantities will be the number of containers shipped annually to recyclers from each of the northern villages.

Costs:

Table 18: Estimate of costs for halocarbon recovery

Details	Bulky items with halocarbons	
	KRG	NV
Wages : refrigeration specialist for 20 visits annually	---	$48,000
Airfare (20 return trips* annually)	$27,600	---
Accommodations (3 nights) = $675/trip x 20 trips	$13,500	
Per diem (3 days) = $180/trip x 20 trips	$3,600	
Materials shipping (20 shippings* annually	$10,000	---
Costs by sector/year	$54,700	$48,000
Costs for all the NVs, first year (2017)	**$102,700**	
Total costs for all the NVs, three years (2017, 2018 and 2019)	**$308,100**	

* Several villages will require two removals annually.

Vehicles

Vehicles are already stored in designated zones in landfills. Notwithstanding, as not even one related by-law has ever been adopted, fluids and batteries are not automatically removed from scrap vehicles. Some vehicles therefore still contain hazardous materials when they are brought to landfills.

To begin, a procedure will be developed for scrap vehicles by the KRG Environment Section in cooperation with the northern villages. The procedure will cover the removal of fluids, batteries and halocarbons. An information campaign will be carried out to improve awareness among organizations, businesses and residents to the effect that hazardous materials must be removed from scrap vehicles before they are taken to landfills.

Organizations, businesses and individuals are responsible for paying for the purchase and transportation of their vehicles to the region, but the management of scrap vehicles falls to the northern villages. This situation generates some costs for the northern villages. Municipal and regional by-laws regarding the importing and disposal of vehicles, including the creation of a vehicle import tax, could be contemplated to cover the costs related to residual materials management (removal of hazardous materials, transportation to and storage at landfills, sealift for recycling of metal and parts).

Vehicles with their hazardous materials removed will be stored at landfills in order to make their parts accessible to residents for reuse. Vehicle carcasses will also be included in a broader recycling project developed by the KRG Municipal Public Works Department and described in the following section.

Deliverables under this objective:

- Develop a procedure for scrap vehicles.
- Given the size of the region, implement the procedure for scrap vehicles with the proper equipment in two new villages annually starting in 2016, i.e. in at least six villages within five years.
- Create municipal and regional by-laws regarding the importing and disposal of vehicles.

Critical factor:

The participation of the northern villages in the development and implementation of the protocol regarding scrap vehicles will be important.

The indicator for tracking the evolution of the quantities of hazardous materials recovered from scrap vehicles will be the number of containers shipped annually to recyclers from each of the northern villages.

Costs:

Table 19: Estimate of costs to remove hazardous materials from vehicles

Details * Costs include sealift	Hazardous materials removal	
	KRG	NV
Hazardous materials removal equipment	$35,000	---
Wages: one part-time staff (10% of duties)	---	$14,466
Staff training	$3,000	---
Costs by sector for the first year	**$38,000**	**$14,466**
Total cost for the first year / village	**$52,466**	
Year 2017 (two villages)	**$76,000**	**$28,932**
Year 2018 (two villages) + wages of 2017 villages	**$76,000**	**$57,864**
Year 2019 (two villages) + wage of 2018-2019 villages	**$76,000**	**$173,392**
Costs by sector / six villages / three years	**$228,000**	**$173,592**
Total cost / six villages	**$401,592**	

Scrap metal

Scrap metal from bulky items, vehicles, construction metals, barrels and tanks has been piling up at landfills in all the northern villages for more than 50 years, and on average covers 29% of the area of these sites[20]. Almost every community in the Canadian arctic is dealing with an increasing volume of scrap metal in local landfills. Due to the absence of any AAPR member in Nunavik, responsibility for the management of scrap metal falls to the northern villages and the KRG.

To date, only one scrap vehicle recycling pilot project has been implemented in two Nunavut villages, Arviat and Gjoa Haven in the summer of 2014. At the close of the first season, the project proponents (funded in part by Summerhill Impact a Toronto-based non-profit organization) plan to have removed 200,000 kg of metal, 1000 tires, 500 kg of lead and 127 g of mercury from scrap vehicles accumulated since the 1950s.

[20] Poly-Géo, 2012.

As the processing of accumulated scrap metal was identified as a priority during public consultations on the *Nunavik Residual Materials Management Plan*, a pilot project to help rid the northern villages of this metal waste through recovery is included among the measures to be implemented within two years. The pilot project will permit scrap metal to be recycled and extend the service life of landfills by significantly increasing available space. To this end, the KRG will follow up with the AAPR to obtain the logistics and expertise assistance required for such a project.

The pilot project will be implemented by the KRG Municipal Public Works Department beginning in the fall of 2015 in partnership with the village of Kangirsuk. This village has been prioritized on account of the rehabilitation of the old landfill. The pilot project proposes to remove scrap metal from landfills: i.e. to prepare it for transportation (compacting and cutting) and to ship it to recyclers in southern Québec. Funding will mainly cover shipping of necessary equipment (a metal compactor, specialized heavy equipment), operation costs (wages for supervisors and operators), as well as the shipping of recovered metal. The (limited) profits generated by the sale of the recovered metal will be re-injected into the project.

The northern village and the KRG will take responsibility for the entire project and assume the related costs: equipment, equipment and recovered metal shipping, and wages. The revenue generated from the sale of the recovered metal will fund part of the project. It should be noted that the equipment will remain KRG property and will subsequently be used to implement the project in the other northern villages. It is expected that, within twenty years, scrap metal will have been removed from the landfills of all the northern villages. Several years of work will be required in some of the larger villages, such as Kuujjuaq, Puvirnituq, Inukjuak and Salluit.

Deliverables under this objective:

- Proceed with the purchase and shipping of the necessary equipment, and provide training to the staff of the first project.
- Remove accumulated scrap metal from at least two landfills within five years.

Critical factors:

The main obstacles to implementing this measure will be the high costs for scrap metal shipping and the necessary financial contribution (staff wages) of any northern village interested in the pilot project.

The indicator for tracking the evolution of the quantities of scrap metal recovered will be the number of containers shipped annually to recyclers from each of the northern villages or the number of m^3 (compacted) on site if the shipping cost turns out being too expensive.

Costs:

Funding for the purchase of the necessary equipment and the operation of the scrap metal recycling program could initially be provided under the Isurruutiit Program for municipal infrastructure improvements, which is administered by the KRG. In fact, new northern landfill construction projects involve the rehabilitation of existing sites. Rehabilitation must necessarily include the processing of all accumulated scrap metal.

The revenue that could be generated from the recycling of scrap metal has not been included in the budget since the amounts are too difficult to forecast. As stated above, revenue from the sale of scrap metal will be re-injected into the scrap metal recycling program for other landfills.

Table 20: Estimate of costs for a scrap metal recycling pilot project
Based on eight 60-hour weeks (for large communities)

-1- Human resources				
Item	**Quantity**	**Unit**	**Cost**	**Total**
Specialized staff	2	unit	$75.00	$72,000.00
Airfare	2	unit	$2,500	$5,000.00
Accommodations	56	days	$225	$25,200.00
Per diem	56	days	$60	$6,720.00
Truck rental	56	days	$150	$8,400.00
Municipal staff	3	unit	$30	$43,200.00
Subtotal -1-	**$160,520.00**			
-2- Equipment purchase				
Item	**Quantity**	**Unit**	**Cost**	**Total**
Bailing machine	1	unit	$600,000.00	$600,000.00
Hydraulic claws	1	unit	$60,000.00	$60,000.00
Cutting torch	1	unit	$4,000.00	$4,000.00
Compressor and hydr. drill	1	unit	$2,000.00	$2,000.00
Spare parts	1	unit	$10,000.00	$10,000.00
Tools	1	unit	$5,000.00	$5,000.00
Subtotal -2-				**$681,000.00**
-3- Equipment shipping				
Item	**Quantity**	**Unit**	**Cost**	**Total**
Bailing machine	1	unit	$21,230.30	$21,230.30
Hydraulic claws	1	unit	$1,673.14	$1,673.14
Container	1	unit	$3,500.00	$3,500.00
Subtotal -3-				**$26,403.44**
-4- Local equipment rental				
Item	**Quantity**	**Unit**	**Cost**	**Total**
Loader CAT 950H- 20122	--	hours	$179.51	$86,164.00
Excavator CAT 320B	--	hours	$169.40	$81,312.00
Dump truck / flatbed	--	hours	$158.70	$19,044.00
Subtotal -4-				**$186,520.80**
-5- Scrap metal shipping (north–south)				
Costs to ship to recyclers: • $257.00/tonne Bale (2' x 3' x 5') = 1.36 tonne				
Estimated quantities	3,500 tonnes			$899,500.00
Shipping port–recycler	$14.00/tonne			$49,000.00
Subtotal -5-				**$948,500.00**
			Grand total	**$2,002,944.24**
			GST	**$100,147.21**
			QST	**$199,793.69**
TOTAL for the first village				**$2,302,885.14***
Total for subsequent villages				**$1,321,944.24***
Grand total				**$3,624,829.38***

* Costs will vary largely depending on the quantities of scrap metal in each northern village.

Household Hazardous Materials

As mentioned above in section 2.1.6, household hazardous materials will be handled by the northern villages using the guides already distributed. The *Regulation respecting the Recovery and Reclamation of Products by Enterprises*, however, provides added support for the management of these materials.

Regarding the management of other household hazardous materials not covered under the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*, for example vehicle and industrial batteries, the KRG will continue its support for the northern villages to ensure that household hazardous materials no longer accumulate at landfills but are shipped instead to recyclers.

Deliverables under this objective:

- Set up zones for the storage of household hazardous materials in each of the northern villages. Priority.
- Establish and publicize public access procedures in every northern village and repeat the information campaign annually.

Critical factor:

The implementation of the measures contained in household hazardous waste management guides will depend largely on the support received by the KRG from those organizations responsible for implementing under the supervision of RECYC-QUÉBEC the *Regulation respecting the Recovery and Reclamation of Products by Enterprises.*

The indicator for tracking the evolution of the quantities of household hazardous materials recovered will be the number of containers shipped annually to recyclers from each of the northern villages.

Costs:

Costs for the management of household hazardous materials appear in Table 13 regarding costs to improve landfill management (structure for hazardous materials) and in Table 21 regarding costs for follow-up and support for the *Nunavik Residual Materials Management Plan*.

RECYC-QUÉBEC Programs in Nunavik

The following programs are implemented by RECYC-QUÉBEC in Nunavik:

- Refundable containers program [21] (*Act respecting the Sale and Distribution of Beer and Soft Drinks in Non-Returnable Containers*).
- Program for the Integrated Management of Scrap Tires 2015–2020 that will be in effect for six years.

The KRG will ensure follow up on the materials covered under these programs.

Refundable containers

Even though refundable containers are recyclable, it is important that they be sorted separately due to their greater value. Recovery procedures are already in place in Nunavik. It will nonetheless be important to make sure that follow-up is done with and support is offered to retailers who offer a recycling service so that the service is maintained and promoted, and the quantity of containers recovered increases, which will in turn reduce the quantity of containers needing to be buried at landfills.

To begin, it will be important to ensure that a can and plastic bottle compactor is available and operational in every northern village. It should be noted that these containers do not necessarily need to be compacted to be recovered.

The KRG will ensure monitoring along with BGE. It should be noted that, if the recycling of refundable containers is done in a coordinated manner, participating retailers will need to be reimbursed for a large part of the shipping charges for the refundable containers.

[21] Refer to Appendix 10.

Deliverables under this objective:

- Maintain or increase the number of containers shipped to recyclers in all the northern villages.
- Organize a regional awareness campaign for this type of residual material.

Critical factor:

The recovery of refundable containers will depend on the level of compliance of regional retailers with the *Act respecting the Sale and Distribution of Beer and Soft Drinks in Non-Returnable Containers*. Follow-up conducted by the KRG with retailers could improve the level of recovery. Public awareness will also positively influence the quantities of refundable containers recovered.

Scrap tires

The purpose of the Program for the Integrated Management of Scrap Tires 2015–2020 is to recover all the scrap tires produced in Québec every year, to direct them to remoulding, recycling or energy reclamation facilities. The burying and storage of used tires is prohibited in Québec. The role of RECYC-QUÉBEC is to manage this program together with the Program for the Removal of Scrap Tires from Storage Sites, and to ensure the fulfilment of the objectives of both programs

As mentioned above in section 2.1.5, under previous RECYC-QUÉBEC programs, several shipments of scrap tires from Nunavik were transported to southern Québec. Despite these activities, no recovery point, transporter or recycler is present in the region, and scrap tires are continuing to accumulate at landfills in a more or less organized manner. It is therefore important that the return procedure for scrap tires be maintained with RECYC-QUÉBEC to ensure that their removal from landfills is performed regularly with the financial and logistical support of different Québec programs.

Intermediate and final deliverables under this objective:

- Continue to fund and implement the procedure for the shipping of tires (Figure 7) and promote the initiative in the northern villages in order to increase the number of containers shipped to recyclers from every northern village.
- Set up a separate tire-recovery zone in the landfills of every northern village.

Critical factor:

The recovery of used tires will depend entirely on the financial support provided under the Program for the Integrated Management of Scrap Tires 2015–2020 for the costs of marine shipping.

The indicator for tracking the evolution of the quantities of refundable containers and scrap tires recovered will be the number of containers shipped annually to recyclers from each of the northern villages.

Costs:

The costs for following up on and implementing RECYC-QUÉBEC programs (refundable containers and scrap tires) are included in the follow-up and support costs shown in Table 21).

e) Implement the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*

The *Environment Quality Act* (R.S.Q., c. Q-2: s. 31, 1st para., subpara. e.1; sect. 53.30, 1st para., subpara. 1, 2, 6 and 7; s. 70.19, 1st para., subpara. 14 and 15; and s. 109.1) provides for the implementation of the *Regulation respecting the Recovery and Reclamation of Products by Enterprises* according to the following provisions:

An enterprise referred to in section 2 or 3 that markets products in the territories of the regional municipalities of La Minganie, Caniapiscau and Golfe-du-Saint-Laurent, the territory of the James Bay region, as described in the schedule to the James Bay Regional Development and Municipal Organization Act *(R.S.Q., D-8.2), the territory governed by the Kativik Regional Government, as described in paragraph v of section 2 of the* Act respecting Northern Villages and the Kativik Regional Government *(R.S.Q., c. V-6.1), as well as any territory not referred to in subparagraph 2 of the first paragraph of section 16 may, instead of setting up drop-off centres in accordance with subparagraph 1 of the first paragraph of that section, set up, for each municipality, city, town, urban agglomeration, locality or Native community in those territories, collection equipment appropriate for those territories, in sufficient quantities to recover the products marketed there and installed in adequate premises accessible to consumers. The products thus recovered must be transported at least once a year to a treatment location indicated in the recovery and reclamation program.*

Such equipment must be installed at the beginning of the first full calendar year of implementation of the program in the case of municipalities, cities, towns, urban agglomerations, localities or Native communities of more than 1,000 inhabitants, and not later than the second anniversary of the program in the other cases. D. 597-2011, s. 17.

Products covered under the Regulation or recognized management organizations[22]:

- Electronic products (ARPE).
- Batteries (Appelarecycler).
- Mercury lamps (Recyc-Fluo).
- Paint and paint containers (Eco-Peinture).
- Oils, coolants, anti-freeze, their filters and containers, and other similar products (Société de gestion des huiles usagées).

The KRG Environment Section will work with recognized management organizations to ensure that this regulation is fully implemented. An agreement was reached with the ARPE. Refer to the details of the agreement in Appendix 11. A first shipment of used electronics from Kuujjuaq, Salluit and Puvirnituq should take place in the summer of 2015. Discussions with four other associations responsible for products covered under the *Regulation respecting the Recovery and Reclamation of Products by Enterprises* took place in the fall of 2014 and set out the logistics for implementing producer responsibility measures in Nunavik.

[22] Refer to Appendix 7.

Deliverable under this objective:

- Create a residual materials recovery zone in all the northern villages within five years for products covered under the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*.

Costs:

All storage, shipping and handling costs must be assumed by the associations responsible for these residual materials under the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*.

3.2.3 Deliver regional support to the northern villages for measures implemented to achieve objectives

Regional follow-up and support provided to the northern villages to implement the different measures and pilot projects proposed under the *Nunavik Residual Materials Management Plan* will be a critical factor for the implementation of the Plan.

The follow-up will permit the KRG to more exactly monitor the evolution of residual materials in the region. This knowledge will help the KRG to measure the progress being made, to target the strengths and weaknesses of the *Nunavik Residual Materials Management Plan* and, if applicable, to take adequate steps to improve the situation.

The main duties of the existing KRG environmental specialist and technician will be to implement the *Nunavik Residual Materials Management Plan*. These resources will have to ensure that the activities described in the Plan are implemented in accordance with the set timetable. Each year, the environmental specialist will prepare a report on the residual materials in the region generated, recovered and sent for disposal. This resource will offer support to the northern villages that are implementing pilot projects and liaise with various stakeholders (municipal, regional and provincial).

Regarding technical support under the *Nunavik Residual Materials Management Plan*, the KRG Municipal Public Works Department will provide support for residual materials management infrastructure and equipment (landfills, wastewater lagoons).

The KRG is aware that the adoption and implementation of measures still to be selected could require the amendment of the *Nunavik Residual Materials Management Plan*.

a) Establish partnerships with organizations for residual materials management

Residual materials management is the business of everyone. The implementation of the measures proposed in the *Nunavik Residual Materials Management Plan* will require the participation of many regional stakeholders, which all generate residual materials.

The KRG Environment Section will also be responsible for establishing partnerships with the industrial-commercial-institutional sector, and for promoting the *Nunavik Residual Materials Management Plan* to the sector and signalling obligations regarding residual materials management. The head offices of most regional industrial-commercial-institutional stakeholders are in Kuujjuaq, which will facilitate the sharing of information.

The KRG Environment Section will serve as a link between Québec and local stakeholders. It will ensure that provincial regulations are followed and applied in the region.

b) Create municipal and regional by-laws to back up objectives

Some measures proposed in the *Nunavik Residual Materials Management Plan* will require the creation of new municipal and regional by-laws. The KRG Environment Section and the KRG Legal, Socio-Judicial and Municipal Management Department will be responsible for delivering support to the northern villages for this purpose.

Costs:

Table 21: Estimate of costs for follow-up and support under the NRMMP

Details	Follow-up, support
	KRG
Travel by the KRG environmental specialist and technician to deliver support to the northern villages for the implementation of pilot projects and measures under the NRMMP. Airfare (average $1,380/ticket) Accommodations ($260/night x 5 nights /trip) Per diem ($60/day)	**$2,980/trip**
Total costs under the NRMMP (Five trips annually x 2 staff)	**$149,000**

3.2.4 Maintain residual materials processing and management costs at economically and socially acceptable levels

Ensure that costs remain reasonable for the communities. As mentioned above, the achievement of the objectives proposed under the *Nunavik Residual Materials Management Plan* is of course conditional on the identification of funding sources for the different measures. Given the socio-economic and geographical context of the region, the control of residual materials costs is vital.

Table 22: Summary of costs to implement the orientations and objectives of the NRMMP

Orientations	Objectives		Measures	Total costs
1) Improve knowledge on residual materials management	**a) Improve knowledge**		• Quantify materials • Complete annual reports and a five-year overview	**$0** [1]
	b) Awareness and education		• Information campaigns	**$101,185**
2) Foster management methods applicable in Nunavik in line with sustainable development concepts	**a) Improve landfill management**		• Separate zones • Operators • Fence repairs • Basic operations • Leachate control • Monitoring of burning	**$4,283,930**
	b) Modify burning methods		• Incinerator pilot project (conditional on feasibility study)	**$1,129,000**
	c) Reduction at source and reuse		• KRG and ICI sector environmental committees • Reduction at source measures: offices and municipal garages • Public awareness	**$0** [1]
	d) Selective collection	**Selective collection (recyclables)**	• Scenario 1: Drop-off bins	**$1,418,802**
			OR	
			• Scenario 2: Home collection	**$1,403,702**
		Composting	• Pile composting (Kuujjuaq Greenhouse Project)	**$210,000**
			• Rotating composter pilot project	**$642,001**
		CRD	• Call for tender changes • Set-up of zones in landfills	**$0** [1 and 2]
		Wastewater sludge	• No measure for another 20 years	**$0**
		Textiles	• Partnerships with non-profit organizations	**$0** [1]
		Halocarbons	• Develop procedure for halocarbon recovery (for all villages)	**$308,100**
			• Set up storage zones in the villages or at landfills	**$0** [2]
		Vehicles	• Develop a scrap vehicle procedure (for six villages)	**$401,592**
		Scrap metal	• Scrap metal recycling project (for two villages)	**$3,624,829**
		HHW	• Storage zones for all villages • KRG support for all villages • Monitoring of implementation of the RRRPE • Information campaign	**$0** [1 and 2]
		Recovery programs (refundable containers and tires)	• Protocol for the shipping of refundable containers • Maintain funding and the implementation of the procedure for tire recycling • Public awareness campaign (refundable containers) • Support for retailers (refundable containers) • Set up tire recovery zones in landfills	**$0** [1 and 2]
	e) RRRPE implementation		• The KRG Environment Section will coordinate the implementation of the RRRPE with the associations of producers	**$0** [1]
3) Deliver regional support to the northern villages for measures implemented to achieve set objectives	**a) Establish partnerships with the ICI sector for residual materials management**		• The KRG Environment Section and the Municipal Public Works Department will work with the ICI sector and the northern villages to ensure support, monitoring and partnership regarding residual materials management.	**$149,000**
	b) Create municipal and regional by-laws that support achievement of objectives		• The KRG Environment Section and the Legal, Socio-Judicial and Municipal Management Department will work with the northern villages to ensure the adoption of by-laws based on residual materials management objectives.	
4) Maintain residual materials processing and management costs at levels that are economically and socially acceptable	**a) Identify objective and quantifiable parameters for establishing the financial feasibility of measures**		• Identify funding sources • Negotiate the reduction of shipping charges • Selection of measures in line with strategies and actions under the QRMMP	**$0** [1]
				Total **$12,260,889**

[1] = The costs of these measures are included in the costs of regional follow-up to be performed by KRG staff (Orientation 3). [2] = The costs of these measures are included in landfill management improvement initiatives (Objective 2 a)).

Table 23: Annual costs to implement the orientations and objectives of the NRMMP

Years / Objectives		2015	2016	2017	2018	2019	Total per project
Awareness and education		$57,820	$28,910	$14,455	-	-	$101,185
Improve landfill management		$856,786	$856,786	$856,786	$856,786	$856,786	$4,283,930
Modify burning methods		-	-	-	$912,000	$217,000	$1,129,000
Selective collection	Recyclables Scenario 1	-	-	$682,134	$368,334	$368,334	$1,418,802
	Recyclables Scenario 2	-	-	$667,034	$368,334	$368,334	OR $1, 403,702
	Pile composting (Kuujjuaq Greenhouse)	$50,000	$40,000	$40,000	$40,000	$40,000	$210,000
	Rotating composter	-	-	$352,667	$144,667	$144,667	$642,001
	Halocarbons	-	-	$102,700	$102,700	$102,700	$308,100
	Vehicles (HHW)	-	-	$104,932	$133,864	$162,796	$401,592
	Scrap metal	$2,302,885	-	$1,321,944	-	-	$3,624,829
Regional monitoring		$29,800	$29,800	$29,800	$29,800	$29,800	$149,000
Annual total		$3,298,291	$955,496	$3,497,868	$2,588,151	$1,922,083	**$12,260,889**

3.3 Timetable

The timetable proposed aims to spread the costs for the implementation of the *Nunavik Residual Materials Management Plan* over five years. Refer to Table 24. The dots indicate periods when work will be carried out.

Table 24: Timetable for the implementation of the NRMMP (W: Winter S: Spring Su: Summer F: Fall)

*The process for selecting northern villages to implement pilot projects is described in section 3.2.2 d).

Actions \ Year	Lead	2015				2016				2017				2018				2019				Intermediate and final deliverables
		W	S	Su	F	W	S	Su	F	W	S	Su	F	W	S	Su	F	W	S	Su	F	
Improve knowledge on residual materials management																						
Establish method for quantifying residual materials	KRG: *Environmental specialist	•	•	•																		Select the quantification method Prepare three annual reports
Prepare annual report									•				•				•					
Awareness and education																						
Prepare teaching materials	KRG: *Environmental specialist *Communications officer			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Create and implement seven information campaigns. Produce teaching materials related to the pilot projects or the information campaigns. Amend or adopt municipal by-laws to support selected residual materials pilot projects and measures.
Conduct information campaign in the ICI sector (reduction at source and NRMMP)						•	•															
Conduct information campaign, selective collection										•	•	Annual reminder / each pilot project										
Conduct information campaign, composting				•				•				•				•				•		
Conduct information campaign, CRD sector					•	and as part of new CRD call for tenders																
Conduct information campaign, halocarbons							•				•				•				•			
Radio spots, HHW information				•	Repeat from time to time																	
Conduct information campaign, refundable containers				•	Repeat from time to time																	
Amend or adopt municipal by-laws	KRG: *Environmental specialist *Legal staff		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Improve landfill management																						
Identify landfill shortcomings	KRG: *Project manager, MPW Department	•	•	•	•	•	•	•	•													**Intermediate deliverables** Release of the solid waste site management guide. Train landfill staff in all the villages. **Final deliverables** Create four separate zones in the landfills at Kuujjuarapik, Kangirsuk and Inukjuak, and in villages with pilot projects. Implementation of basic operations in all landfills.
Identify funding sources				•	•	•	•															
Create separate zones for sorting				•	•			•	•			•	•			•	•			•	•	
Release of the solid waste site management guide		•																				
Organize landfill management training and promote best practices		•With the construction of new landfills and/or visits to landfills by engineer (Municipal Public Works Department)																				
KRG support for landfill management		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Amend or adopt municipal by-laws	KRG: *Environmental specialist *Legal staff			•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Modify methods for burning residual materials																						
Study the feasibility of an incinerator pilot project	KRG: *Environmental specialist *Project manager, MPW Department								•	•												**Intermediate deliverable** Carry out the feasibility study. **Final deliverable** Implement the incinerator pilot project
Identify funding sources										•												
Identify an interested northern village*											•	•										
Purchase equipment and ship to the village													•	•	•	•						
Install the equipment, train staff and launch projects																	•	•	•	•	•	

Table 24: Timetable for the implementation of the NRMMP (W: Winter S: Spring Su: Summer F: Fall)

Actions \ Year	Lead	2015				2016				2017				2018				2019				Intermediate and final deliverables
		W	S	Su	F	W	S	Su	F	W	S	Su	F	W	S	Su	F	W	S	Su	F	
Establish reduction at source and reuse protocols																						
Set up a KRG environmental committee	KRG: *Environmental specialist	•	•	•	•																	Set up environmental committees at the KRG, in the ICI sector and at municipal offices and garages in all the villages. Promote maintenance and repair trades (devices and appliances). Amend or adopt municipal by-laws to support selected pilot projects and measures.
Set up environmental committees in the ICI sector						•	•	•	•													
Reduction at source and reuse: KRG, offices and buildings in 14 northern villages								•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Promote maintenance and repair trades	KSB and KRETC		•		•		•		•		•		•		•		•		•		•	
Amend or adopt municipal by-laws	KRG: *Enviro. specialist *Legal staff					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Selective collection pilot project (recyclable materials)																						
Identify funding sources	KRG: *Environmental specialist *Project manager, MPW Department					•	•															Implement at least one pilot project within two years. Once implemented: 1st year = 10% reduction; 2nd year = 20% reduction; 3rd year = 25% reduction.
Identifier interested northern village(s)								•	•													
Select collection method for the northern villages									•													
Study equipment and logistics										•	•											
Purchase equipment and ship to the NVs										•	•	•										
Install equipment and launch project(s)											•	•	•	•	•	•						
Composting pilot project																						
Kuujjuaq Greenhouse Project	KRG: *Enviro. specialist	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•		Involve as many ICI organizations as possible within five years. Divert 25% of organic materials sent for disposal at landfill within five years.
Identify funding sources, rotating composter	KRG: *Environmental specialist *Project manager, MPW Department						•	•														Implement one pilot project within two years. Once implemented: 1st year = 20% reduction; 2nd year = 40% reduction; 3rd year = 50% reduction.
Identify the pilot project village, rotating composter								•	•													
Study equipment and logistics, rotating composter								•	•													
Purchase equipment and ship to northern village										•	•											
Install equipment and launch project												•	•	•	•							
Distribute residential composting boxes	KRG: *Enviro. specialist		•	•			•	•			•	•			•	•			•	•		Distribute 25 boxes annually and 125 boxes within five years.
Deliver compost information sessions			•				•				•				•				•			
CRD materials management																						
Add clauses to call-for-tender documentation	KRG: *Legal staff *MPW Department staff *Enviro. specialist				•	•	•	•														Create zones in landfills in Kuujjuarapik, Kangirsuk and Inukjuak, and pilot project villages. Once implemented: 1st year = 10% reduction; 2nd year = 20% reduction; 3rd year = 30% reduction. Modify the clauses of call-for-tender documentation. Standardize municipal by-laws.
Standardize municipal by-laws					•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Create zones at landfills*	KRG: *Project manager, MPW Department			•	•			•	•			•	•			•	•			•	•	
Gate, operator, etc.				•	•			•	•			•	•			•	•			•	•	
Other materials																						
Support for organizations that promote the reuse of textiles	KRG: *Enviro. specialist	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Support non-profit organizations.

Table 24: Timetable for the implementation of the NRMMP (W: Winter S: Spring Su: Summer F: Fall)

Actions \ Year	Lead	2015				2016				2017				2018				2019				Intermediate and final deliverables
		W	S	Su	F	W	P	É	W	S	Su	F	W	H	P	W	S	Su	F	W	A	
HHW management																						
Construction of HHW shelters	KRG: *Project manager, MPW Department			•	•			•	•			•	•			•	•			•	•	Construct zones in all the villages (HHW shelter or container) in accordance with the RRRPE.
Develop a halocarbon management protocol	KRG: *Enviro. specialist				•	•																Develop a halocarbon procedure. Set halocarbon zones in all the villages.
Identify funding sources						•	•															
Set up zones for bulky items with halocarbons								•	•			•	•			•	•			•	•	
Remove halocarbons	KRG: *Enviro. specialist *Expert									•	•	•	•	•	•	•	•	•	•	•	•	
Develop a protocol for scrap vehicles (HHW)	KRG: *Enviro. specialist *Project manager, MPW Department							•	•													Develop a scrap vehicle procedure. Install equipment and implement the procedure in two villages every year and in six villages within five years.
Identify funding sources								•	•													
Study equipment and logistics for vehicles (HHW)								•	•													
Purchase equipment and ship to the villages										•	•											
Train mechanics for vehicles (HHW)											•	•	•									
Study by-laws regarding vehicle imports	KRG: *Enviro. specialist *Legal staff								•	•												Feasibility study; by-law regarding vehicle imports.
Scrap metal recycling pilot project																						
Identify a village for the first pilot project	KRG: *Project manager, MPW Department *Environmental specialist	•																				Purchase and ship equipment, and train staff for the first project. Remove scrap metal from at least two landfills within five years.
Purchase equipment and ship to the village		•	•	•	•																	
Set up and launch the pilot project					•			•	•													
Shipping of equipment for scrap metal recovery at other landfills									•				•				•				•	
Recovery programs (refundable containers and tires)																						
Develop a protocol for the shipping of refundable containers	KRG: *Environmental specialist	•	•																			Maintain or increase the number of containers shipped to recyclers from all the northern villages.
Set up a zone in landfills for tires				•	•			•	•			•	•			•	•			•	•	Maintain funding and the implementation of the tire shipping procedure. Set up safety zones for tires in all the northern villages within five years.
Continue to implement the tire recycling procedure				•	•			•	•			•	•			•	•			•	•	
Monitor implementation of the RRRPE		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Set up recovery zones for the RRRPE in all the northern villages within five years.
Set up collection points for the RRRPE		•	•	•	•	•	•	•	•	•	•	•	•									
Coordination and monitoring of the NRMMP																						
Implement and coordinate the NRMMP	KRG: *Environmental specialist	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	Support the northern villages with residual materials management and the implementation of pilot projects. Create partnerships for residual materials management, and modify or adopt municipal by-laws.
Prepare a five-year overview																					•	
Analyse and monitor different pilot projects		•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	

Appendices

Appendix 1: Municipal by-laws in force

NORTHERN VILLAGE OF KUUJJUAQ

By-law No. 2008 - 03

Concerning single-use plastic shopping bags

WHEREAS by virtue of section 174 (14) of *An Act respecting Northern villages and the Kativik Regional Government* (R.S.Q., c. V-6.1; hereinafter the Kativik Act), the Municipal Council may make by-laws to define what shall constitute a nuisance and to regulate or prohibit the same, including noise;

WHEREAS single-use plastic shopping bags are a visible component of litter throughout municipal boundaries and are considered a nuisance;

WHEREAS single-use plastic shopping bags have a negative impact on wildlife habitat and are difficult to recycle;

WHEREAS the municipality incurs significant expense each year to clean up single-use plastic shopping bags;

WHEREAS multiple-use shopping bags are often considered environmentally better than single-use plastic shopping bags;

WHEREAS the Council deems it advisable to prohibit the use of single-use plastic shopping bags;

WHEREAS a notice of motion for this by-law was duly given during the preceding sitting of the Council held on June 25, 2008.

THEREFORE, the Council of the Northern Village of Kuujjuaq, by this by-law, enacts and decrees as follow:

1. DEFINITIONS

1.1 **"Authorized officer"** shall mean any officer or municipal by-laws enforcement officer of the municipality whose duty is notably to be in charge of the enforcement of the present by-law within the territory under the jurisdiction of the municipality.

1.2 **"Person"** shall mean any physical person aged 18 years or older, whether a municipal citizen or not, a company, partnership, firm, corporation, association or politic body.

2. GENERAL PROVISION

2.1 All trades, businesses and industries of all kinds shall provide only the following as checkout bags to customers: recyclable paper bags, and/or compostable bags, and/or reusable multiple-use bags.

3. INSPECTION OF PROPERTY

3.1 An authorized officer has the right, if he believes on reasonable grounds that an offence against this by-law has been committed, to visit and examine all moveable and immovable property, as also the interior or exterior of any house, building or edifice, in order to ascertain if this by-law has been contravened.

3.2 The owner, lessee or occupant of the property shall allow the authorized officer to make such a visit or examination.

4. PENALTIES

4.1 Every person who contravenes any provision of this by-law commits an offence and is liable, upon penal proceedings, to a fine of three hundred dollars ($300), with costs.

4.2 The Court convicting a person for the breach of any section of this by-law may, in addition to any fine it may impose, issue an order to enjoin that person to refrain from committing any further such offence and/or cease to carry on any activity specified in the order and/or, if such person is the holder of a permit, license or certificate granted under this by-law, suspend such permit, license or certificate for the period that it deems appropriate, or revoke the same, or prohibit the renewal thereof during the period that it deems appropriate.

4.3 An authorized officer may issue a statement of offence pursuant to this by-law.

4.4 Delays for the payment of penalties and costs imposed by virtue of the present section and consequences of failure to pay aforementioned penalties and costs are established in accordance with the *Code of penal procedure of Québec* (R.S.Q., c. C-25.1).

5. APPLICATION

5.1 The provisions of this by-law apply to the whole territory under the jurisdiction of the municipality.

6. REPEAL OF PREVIOUS BY-LAW

6.1 This by-law supersedes and replaces any previous by-law enacted by the Council, wholly or partially for the same purposes, and any such by-law is hereby repealed to the extent of any inconsistencies with this by-law.

7. COMING INTO EFFECT

7.1 Should any section of this by-law be totally or partially voided by a Court, its other provisions shall remain valid and still be in force.

7.2 The present by-law shall come into effect on September 1st, 2008.

8. VERSIONS

8.1 In the event of a discrepancy between the English, French and Inuktitut versions, the English version shall prevail.

IN FAVOUR:	**7**
OPPOSED:	**0**
ABSTENTIONS:	**0**
ABSENTEES:	**0**
DATE OF ADOPTION:	**June 26, 2008**
MAYOR'S SIGNATURE:	_____
SECRETARY-TREASURER'S SIGNATURE:	_____
DATE OF PUBLICATION:	**June 30, 2008**

NORTHERN VILLAGE OF KUUJJUAQ

By-law No. 2008 - 02

Concerning the use of the municipal solid waste disposal site and the dumping of waste

WHEREAS the Municipal Council has the power to secure the peace, order, good government, health, general welfare and improvement of the municipality by virtue of section 166 of *An Act respecting Northern villages and the Kativik Regional Government* (R.S.Q., c. V-6.1; hereinafter the Kativik Act);

WHEREAS by virtue of section 174 of the Kativik Act, the Council has the power to

- construct, equip and operate plants for the elimination or recycling of waste and to regulate or prohibit the use of places as dumps [subsection 174 (12)]
- prohibit the dumping of waste or garbage [subsection 174 (11) a]
- define what shall constitute a nuisance and to regulate or prohibit the same, including noise [subsection 174 (14)]

WHEREAS this by-law must be adopted and interpreted in light of the laws and regulations in effect in the Province of Québec;

WHEREAS notice of motion of this by-law was duly given during the preceding sitting of the Council held on March 26, 2008.

THEREFORE, the Council of the Northern Village of Kuujjuaq, by this by-law, enacts and decrees as follow:

1. DEFINITIONS

1.1 **"At cost"** shall mean the equipment rental and manpower at municipal rates, as adjusted from time to time, and any administrative overhead costs plus 15%.

1.2 **"Authorized officer"** shall mean any officer or municipal by-laws enforcement officer of the municipality whose duty is notably to be in charge of the enforcement of the present by-law within the territory under the jurisdiction of the municipality.

1.3 **"Construction debris and waste"** shall mean any unwanted, useless, abandoned, discarded or rejected goods or materials of any kind, other than hazardous materials, that are normally generated on a construction site.

1.4 **"Hazardous material"** shall mean a material which, by reason of its properties, is a hazard to health or to the environment and which is explosive, gaseous, flammable, poisonous, radioactive, corrosive, oxidizing or leachable or is designated as a hazardous material, and any object classed by any law or regulation as a hazardous material.

1.5 **"Household waste"** shall be used in its usual meaning and includes, without in any way limiting the generality of the foregoing, any solid materials, other than hazardous materials, generated in or from residential domiciles.

1.6 **"Industrial waste"** shall mean any garbage other than household waste and hazardous material and includes, without in any way limiting the generality of the foregoing, general construction debris and waste as well as industrial, commercial and institutional waste.

1.7 **"Person"** shall mean any physical person aged 18 years or older, whether a municipal citizen or not, a company, partnership, firm, corporation, association or politic body.

1.8 **"Waste container"** shall mean a garbage box or dumpster.

2. MUNICIPAL SOLID WASTE DISPOSAL SITE

2.1 A municipal solid waste disposal site is hereby officially created.

3. HOURS OF OPERATION

3.1 The hours of operation of the municipal solid waste disposal site shall be as follows:

Summer hours (from May to November)

Monday to Friday: from 9:00 a.m. to 6:00 p.m.

Saturday: from 10:00 a.m. to 4:00 p.m.

Winter hours (from December to April)

Monday to Friday: from 9:00 a.m. to 4:00 p.m.

Saturday: from 10:00 a.m. to 4:00 p.m.

3.2 The municipal solid waste disposal site shall be closed on Sundays and on all statutory holidays.

3.3 Service outside regular hours shall be referred to as a recall, and each recall shall be subject to an extra charge of one hundred fifty dollars ($150).

4. OPERATION OF THE MUNICIPAL SOLID WASTE DISPOSAL SITE

4.1 The municipality is in charge of the operation of the municipal solid waste disposal site and, without in any way limiting the generality of the foregoing, the only person allowed to monitor the burning of garbage.

4.2 Containers for different types of household waste shall be accessible to the public at the entrance to the municipal solid waste disposal site. Waste deposited in these containers must be sorted and placed in the appropriate container for each type of waste as identified thereon. These containers shall be used solely for the purposes they are intended for.

4.3 No person shall be allowed to dump industrial waste in the public containers as mentioned in section 4.2.

4.4 Whoever wants to personally dump household waste into the municipal solid waste disposal site must obtain the prior approval of the authorized officer.

4.5 Whoever wants to personally dump industrial waste at the municipal solid waste disposal site must obtain the prior approval of the authorized officer and must pay the rate set forth in Appendix I, which forms an integral part of this by-law.

4.6 All recoverable or salvageable materials must be stored by type of material in the identified areas within the municipal solid waste disposal site.

4.7 Whoever damages the roads, signage, fencing or the infrastructures found within the municipal solid waste disposal site will be held responsible and will be charged "at cost" for work performed by or on behalf of the municipality in order to repair the damages.

5. OBLIGATIONS

5.1 Every owner of a construction, house or building shall maintain, in good condition, sufficient covered or enclosed waste containers to contain the solid waste normally originating from that building in the course of one week.

5.2 All waste containers shall be accessible from the public roadway.

5.3 All waste deposited in a waste container must first be placed in a garbage bag.

5.4 Each person shall maintain, at his own expense, unimpeded access to his waste containers.

5.5 The owner, lessee or occupant of each building must keep the yards and dependencies attached to the building properly clean and free of all waste water, garbage and putrid substances.

6. CONSTRUCTION DEBRIS AND WASTE

6.1 Any construction or building material being used or stored on private property must be stored on the said property, in a neat and orderly fashion or it may be defined as construction debris and waste under the terms of this by-law.

6.2 Whoever is required to dump construction debris and waste at the municipal solid waste disposal site must obtain the prior approval of the authorized officer and must pay the rate set forth in Appendix I, which forms an integral part of this by-law.

6.3 Subject to subsection 6.4, all debris and waste on a construction or work site must be segregated and placed in covered containers, on a daily basis, then hauled in a covered conveyance to the municipal solid waste disposal site within reasonable delay.

6.4 Where a waste container is not available, all debris and waste on a construction or demolition site shall be segregated, hauled in a covered conveyance and disposed of at the municipal solid waste disposal site on a daily basis, except for Sundays.

6.5 The municipality may dispose of construction debris and waste if it has not been properly disposed of within twenty-four (24) hours of notification to do so, and the person or agency responsible for its disposal charged "at cost" for work performed by or on behalf of the municipality.

7. HAZARDOUS MATERIAL

7.1 No one shall indiscriminately dispose of hazardous material.

7.2 No one is allowed to dump hazardous material into the municipal solid waste disposal site.

7.3 No person shall dispose of hazardous material in any waste container or any other place without the express authority of the authorized officer who shall designate the manner and place in which it shall be disposed of.

7.4 Household hazardous material shall be stored by the householder until the municipality holds a "household hazardous material round-up" when these wastes shall be brought to an area prescribed by the authorized officer for the disposal.

7.5 Collection, transportation, handling, storage and disposal of industrial hazardous material is the sole responsibility of the person generating waste and must be done in accordance with the laws and regulations in effect in the Province of Québec.

7.6 Whoever wants to store any hazardous material at the municipal solid waste disposal site must obtain the prior approval of the authorized officer who will ensure that this material is, at the user's expense, shipped to the proper place and treated in accordance with the laws and regulations in effect in the Province of Québec.

The municipality shall however not make any charge to householders for shipment and treatment of hazardous material.

7.7 The municipality may dispose of hazardous material if it has not been properly disposed of within twenty (24) hours of notification to do so, and the person or agency responsible for its disposal charged "at cost" for work performed by or on behalf of the municipality.

8. MOTORIZED VEHICLES

8.1 No person shall keep, or tolerate the presence of, outside of a building one or more motorized vehicles fabricated more than seven (7) years previously, which are not in working condition.

8.2 No person shall keep tires outside of a building, or tolerate such an act.

9. NUISANCE CAUSED ON PUBLIC PROPERTY

9.1 Any person who soils public property, including but not limited to roads, streets, laneways, alleys, or public buildings, by depositing or throwing waste, paper, empty bottles, empty cans, foul substances, scrap metal, dirty waters, oil, contaminants, construction materials or any other object, material or substance shall constitute a nuisance

9.2 Any person who soils public property must clean the said premises.

9.3 Cleaning must be immediately performed or, depending on circumstances, within a deadline prescribed by the authorized officer.

9.3 The municipality may clean up the soiled premises if it has not been done or properly done within twenty-four (24) hours of notification to do so, and the person responsible charged "at cost" for work performed by or on behalf of the municipality.

10. INSPECTION OF PROPERTY

10.1 An authorized officer has the right, if he believes on reasonable grounds that an offence against this by-law has been committed, to visit and examine all moveable and immovable property, as also the interior or exterior of any house, building or edifice, in order to ascertain if this by-law has been contravened.

10.2 The owners, lessees or occupants of the property shall allow the authorized officer to make such a visit or examination.

11. PENALTIES

11.1 Every person who contravenes any of sections 4.2, 5.1 to 5.5 and 9.1 of this by-law commits an offence and is liable, upon penal proceedings, to a fine of fifty dollars ($50), with costs. Each day of infringement constitutes a separate offence.

11.2 Every person who contravenes any of sections 4.1, 4.3 to 4.6, 6.1 to 6.3, 7.1 to 7.4, 7.6, 8.1 and 8.2 of this by-law commits an offence and is liable, upon penal proceedings, to a fine of three hundred dollars ($300), with costs. Each day of infringement constitutes a separate offence.

11.3 The Court convicting a person for the breach of any section of this by-law may, in addition to any fine it may impose, issue an order to enjoin that person to refrain from committing any further such offence and/or cease to carry on any activity specified in the order and/or, if such person is the holder of a permit, license or certificate granted under this by-law, suspend such permit, license or certificate for the period that it deems appropriate, or revoke the same, or prohibit the renewal thereof during the period that it deems appropriate.

11.4 An authorized officer may issue a statement of offence pursuant to this by-law.

11.5 Delays for the payment of penalties and costs imposed by virtue of the present section and consequences of failure to pay aforementioned penalties and costs are established in accordance with the *Code of penal procedure of Québec* (R.S.Q., c. C-25.1).

12. APPLICATION

12.1 The provisions of this by-law apply to the whole territory under the jurisdiction of the municipality.

13. REPEAL OF PREVIOUS BY-LAW

13.1 This by-law supersedes and replaces any previous by-law enacted by the Council, for the same purposes, and any such by-law is hereby repealed.

14. COMING INTO EFFECT

14.1 Should any section of this by-law be totally or partially voided by a Court, its other provisions shall remain valid and still be in force.

14.2 The present by-law shall come into effect the date of its publication in accordance with section 138 of the Kativik Act.

IN FAVOUR:	**7**
OPPOSED:	**0**
ABSTENTIONS:	**0**
ABSENTEES:	**0**
DATE OF ADOPTION:	**June 26, 2008**
MAYOR'S SIGNATURE:	_____
SECRETARY-TREASURER'S SIGNATURE:	_____
DATE OF PUBLICATION:	**June 30, 2008**

NORTHERN VILLAGE OF KUUJJUAQ

By-law No. 2008 - 02

APPENDIX I

RATES APPLICABLE TO INDUSTRIAL AND CONSTRUCTION WASTE DUMPING UNDER SECTIONS 4.5 AND 6.2

RATES PER LOAD

1.	Pick-up truck (4 X 8 X 2 feet)	$20
2.	Pick-up truck with extension (trailer or equivalent)	$40
3.	Six-wheel truck ($6m^3$)	$80
4.	Ten-wheel truck ($12m^3$)	$160
5.	Articulated truck ($24m^3$)	$320
6.	Loader (Bucket)	$20
7.	Appliance (each)	$10

OTHER RATE PER LOAD

1. The rate is of fourteen dollars ($14) per cubic meter.

N.B.: The above does not include rates for equipment rental and manpower.

Contract prices available upon request.

NORTHERN VILLAGE OF KUUJJUAQ

BY-LAW No. 2010-01

WHEREAS the Northern Village of Kuujjuaq provides the population with water delivery, wastewater and garbage collection and general administration services, such as road maintenance and public security;

WHEREAS according to An Act Respecting Northern Villages and the Kativik Regional Government (R.S.Q. c. V-6.1), the Northern Village has the power to impose an annual compensation in respect of a construction, house or building for the administration of the Corporation and for all municipal services on which a specific tax or compensation has not been imposed;

WHEREAS according to An Act Respecting Northern Villages and the Kativik Regional Government (R.S.Q. c. V-6.1), the Northern Village has the power to impose an annual tax in order to meet the expenditures for the water delivery systems and the maintenance of reservoirs;

WHEREAS the Northern Village wants to establish the rates of compensation and state what conditions shall be applicable for the provision of these services;

WHEREAS notice of motion of this by-law was given at the sitting of the council held on December 21st, 2009.

It is therefore decreed that:

1. Municipal services be rendered in the Northern Village of Kuujjuaq and the municipality shall raise the necessary taxes to pay the costs related to these services according to the present by-law.

2. Definitions

2.1 **Building**: means any immovable asset such as a hospital, office building, house, store, warehouse, garage, hangar, including any structure for the storage of solid or liquid goods or materials except those of a personal nature. Building also means a trailer used as an immovable asset.

Building also includes any satellite antenna, radar antenna, microwave antenna installed one hundred (100) meters away from the building containing related electronic devices. Building does not included telephone poles, or street light poles.

2.2 **Commercial, industrial and institutional** category: this category includes any building used by a person, corporation, company, partnership or any other organization for the purpose of carrying on any commerce, trade, manufacture, occupation, arts, profession, calling or other means of earning a profit. Also included in this category is any building used by a government, a para-governmental body, a private non-profit organization, or a religious organization. This category shall include any staff-house operated by an organization.

2.3 **Municipality**: means the Northern Village of Kuujjuaq.

2.4 **Public road**: means a road that is ordinarily used for vehicular traffic.

2.5 **Residential** category: this category includes all and only residential units with the exception of staff-houses.

2.6 **Staff-house**: means any building used by an employer to actually provide accommodation for five or more employees who share a common toilet or cooking facilities or both.

2.7 **Storage shed**: means any structure used for the purpose of storing the personal effects of an occupant of a residential unit, including a garage used for the personal vehicle or vehicles of such persons.

2.8 **Floor Surface area**: The total surface of all floors in any buildings, includes the part under any walls or staircases.

When a satellite antenna, radar antenna or microwave antenna is not located within one hundred (100) meters of the building containing its electronic devices, the total floor surface is the widest of the following areas:

1. the area between the supports of the antenna;

2. the ground surface covered by the antenna.

3. the area within the perimeter of the protective fence installed around the antenna.

2.9 **Water delivery systems and the maintenance of reservoirs**: Means the acquiring, maintenance, management and regulation of reservoirs and the acquiring, maintenance, management and regulation of water delivery systems to supply water in the territory of the municipality, including the filtering and purifying water;

2.10 **Annual tax**: The amount determined by the Council of the Municipality.

2.11 **Usual consumer** of the municipal water-supply services: an owner of a building which is not equipped with an independent water supply and/or alimentation and which is dependant of the Municipality for the supply of fresh water.

2.12 **Recall**: a delivery of water and wastewater pick-up;

3. **General administration**

3.1 Administrative services

Administration, fire-protection, and public road maintenance and improvement services shall be provided by the municipality to all of the buildings in the municipality. The owner of the building shall be responsible for removing snow and ensuring access to the building for water delivery and sewage and garbage collection.

3.2 Roads

No vehicle, snowmobile, bicycle or any other obstacle should be left on the public roads that have to be maintained regularly by the equipment of the municipality.

3.3 Fire protection

A brigade of volunteers must be trained to fight fires in the municipality. The fire protection brigade shall respect any by-law concerning fire protection as soon as it is in effect.

3.4 Compensation

The owner of a building shall pay compensation for the services indicated in section 3.1, according to the rates set forth in Appendix I, annexed to the present by-law and forming an integral part hereof, as if it were herein presented in its entirety.

4. Water delivery and wastewater collection

4.1 Service - regular hours

Water delivery and wastewater collection services shall be provided according to the schedule given in Appendix II, which is an integral part of the present by-law, as if it were herein presented in its entirety.

4.2 Service outside regular hours

Any consumer requiring water delivery or wastewater collection services outside the hours and days set forth in Appendix II hereof, may receive such service upon application to the officer designated by the municipality for that purpose. Any service requested under this section shall be provided at such time and under such conditions as the municipality shall determine.

4.3 Recalls and extra charge

Service outside regular hours as defined in Appendix II shall be referred to as a "recall", and each recall shall be subject to an extra charge to the owner, lessee or occupant of the building where the said service is provided, in accordance with the rate set forth in Appendix II. Recalls shall be invoiced to the owner, lessee or occupant, showing the period covered by the invoice, the number of recalls, and the rate and charge for each recall.

4.4 Compensation

The owner of every building shall pay compensation for water supplying and for wastewater collection according to the rate set forth in Appendix II. The municipality cannot impose this compensation if the building is not equipped with a water system.

4.5 Invoicing of consumption

4.5.1 The owner of every building, excluding any ratepayer that is not a usual consumer of the Municipal water supply services, shall receive a bill for an invoicing of the yearly consumption of water based on the water-meter reading done the previous year. The 2010 invoicing is based on actual consumption from October 2008 to September 2009, or on an estimation by the municipality of such consumption.

4.5.2 The owner of every building, excluding any ratepayer authorized by virtue of acquired rights, shall receive a bill for the wastewater collection based on the water-meter reading done the previous year. The 2010 invoicing is based on actual consumption from October 2008 to September 2009, or estimation by the municipality of such consumption in case of, among others, defective water-meter.

4.6 High consumption.

Water delivery service and/or wastewater collection service to any consumer for the purposes of construction, skating rinks, school, or any other use where it is considered by the municipality that the ordinary consumption of water is exceeded, shall be made in accordance with such arrangements that may be entered into by the municipality and the consumer for such purposes.

4.7 Quantity - no warranty

The municipality is not bound to warrant the quantity of water to be supplied, and no person may refuse on pretense of the insufficiency of the water supply, to pay compensation for the use of the water.

4.8 Equipment maintenance

The owner, lessee or occupant of each building to which water is delivered or wastewater collection is provided shall be responsible for the maintenance of all water input, overflow or return lines, access doors or hatches necessary for the storage and consumption of water within the building.

4.9 Spilling - service discontinued

If any person causes or allows any apparatus to be out of repair, or to be used so that water supplied from the water delivery system is wasted, or unduly consumed, or if this person refuses or neglects to pay compensation lawfully imposed for the water supplied to them, for 30 days after the same is due and payable, the municipality may discontinue the supply as long as the person is in default. This shall not however, exempt such persons from the payment of such compensation as it will be deemed that water has been supplied without interruption.

4.10 Inspections and access to property

The officers appointed to manage the water delivery system may enter into any building for the purpose of ascertaining that the water is not being wasted and that the by-law regarding water is respected, as well as for the purposes of reading the water-meter.

4.11 Fire - service suspended

In case of a fire in the municipality, all water deliveries may be suspended for the duration of the fire in order to ensure an adequate supply of water for fire-fighting purposes.

4.12 Water-meter malfunctions

If a meter fails to register or to properly indicate the flow of water, the owner, lessee or occupant of the building must advise the municipality as soon as they have detected the failure. However, should the water-meter reading be impossible due to repairs, replacement or temporary absence of a water-meter, the municipal officer shall estimate the water consumption for the purpose of establishing a service charge according to the consumption of a building used for similar purposes in the municipality or in another municipality.

4.13 Building without running water

The municipal officer shall estimate the water consumption of a building without running water for the purpose of establishing a service charge according to the consumption of a building used for similar purposes in the municipality or in another municipality.

5. Garbage

5.1 Garbage disposal

Every occupant of a house or building must keep the yards and dependencies attached to that unit properly clean and free of all wastewater, garbage and putrid substances. All garbage must be placed in a sealed container.

5.2 Service

The collection and disposal of garbage shall be provided to all of the buildings in the municipality, according to the schedule given in Appendix III, which is an integral part of the present by-law, as if it were herein presented in its entirety.

Any consumer requiring garbage collection service outside of regular hours and days, may receive such service upon application to the officer designated by the municipality for that purpose. The service requested under this section shall be provided at such time and under such conditions as the municipality shall determine.

5.3 No litter

No person may throw any paper, glass, scrap, rubbish, trash, household waste, refuse from yards or gardens, or garbage of any kind into the street or a public place.

5.4 Recalls - extra charge

Service outside regular hours as defined in Appendix III shall be referred to as a recall, and each recall shall be subjected to an extra charge in accordance with the rates set forth in the Appendix III. Recalls shall be charged to the owner, lessee or occupant on an invoice showing the period covered by the invoice, the number of recalls and the rate charged for each recall.

5.5 Service discontinued

If any person refuses or neglects to pay compensation lawfully imposed for the service supplied to them for thirty (30) days after the same is due and payable, the municipality may discontinue the service as long as the person is in default, which shall not however, exempt a person from the payment of such compensation, as it will be deemed that garbage collection and disposal has continued without interruption.

5.6 Compensation

The owner, lessee or occupant of every house, store or building, shall pay compensation for using the garbage collection and disposal service, according to the rates set forth in Appendix III. No person may refuse to pay compensation on the pretense that they have assumed their own garbage collection and disposal. The rate is based on the number of units that correspond to every building.

5.7 Garbage disposal

No person may break or damage any container or bag, search through it or spill out its contents once it has been placed in a place to be emptied by the garbage collectors, nor may any person untie or open any package placed near any container. Furthermore, no person may put cinders or garbage in a container belonging to someone else. It is forbidden to dump waste or garbage in the dump site without the approval of the municipality.

6. Payment

6.1 Payment to the municipality

The compensation stipulated in this by-law shall be paid annually to the secretary-treasurer of the municipality, within thirty (30) days of invoicing. Outstanding bills shall bear interest at an annual rate of twenty percent (20%) from maturity.

7. Penalties

7.1 Fine

Every person who infringes this by-law is liable to a fine of three hundred dollars ($300) with costs for any offense. Each day of infringement constitutes a separate offense. This penalty is cumulative and not alternative to the right of the municipality to end the service.

8. Financing

8.1 The expenditures generated by the services provided by the municipality will be paid from the Quebec Government subsidy given for these purposes and by the taxes raised by the municipality as calculated by the methods given in the schedules of this by-law. These schedules are an integral part of this by-law, as if they were herein presented in their entirety.

9. The preamble and any attached documents shall be an integral part of this by-law.

10. This by-law shall come into effect on the day of its publication in accordance with the law.

11. This by-law supersedes and replaces any previous by-law enacted by the council whole or partly for the same purposes, and, without in any way limiting the generality of the foregoing, the by-law 2009-01 is hereby replaced.

Approved by the Municipal Council of Kuujjuaq at the Special Sitting held on January 12th, 2010

Ian D. Robertson
Secretary-treasurer

Paul Parsons
Mayor

APPENDIX I

GENERAL TAX RATE

1. For the purpose of the present Appendix, a Unit means one (1) square meter of the total floor surface of a building. Any fraction of a square meter shall be calculated as one (1) square meter.

2. Rate
The rate of the general tax is twenty three dollars and three cents ($23.03) per unit.

APPENDIX II

WATER DELIVERY AND WASTEWATER COLLECTION TAX RATE

1. Rate for water delivery

1.1 The rate of the water supply is eighteen dollars and eighty cents ($18.80) per cubic meter (m3) of yearly water consumption as invoiced according to section 4 of this by-law.

1.2 The minimum amount of consumption payable by the owner of a building of a usual consumer of the municipal services of water supply shall be forty cubic meters (40 m3) of water consumption.

2. Rate of waste water collection

2.1 The rate of the wastewater collection and treatment is fourteen dollars and twenty one cents ($14.21) per cubic meter (m3) of yearly water consumption as indicated by the meter fixed on the water alimentation of the ratepayer and invoiced according to section 4 of this by-law.

2.2 The minimum amount of wastewater collected payable by the owner of a building shall be forty cubic meters (40 m3).

3. Recall: an amount of one hundred and fifty dollars ($150.00) shall be charged to the owner, lessee or occupant of the building for each service, namely the water supply or the wastewater collection.

2. Schedule

Water shall be delivered according to the following schedule:

Between 8 a.m. and 4 p.m., Mondays through Fridays, and on Saturdays from 8 a.m. to 1 p.m. There will be no regular delivery on Sundays.

2.1 Frequency

2.1.1 Residential units:

a) without running water: a minimum of four (4) days a week;

b) with running water: a minimum of four (4) days a week;

2.1.2 Schools: a minimum of four (4) days a week;

2.1.3 Hospitals: a minimum of six (6) days a week;

2.1.4. Nursing stations: a minimum of five (5) days a week;

2.1.5 Commercial, industrial and institutional: a minimum of four (4) days a week.

APPENDIX III

GARBAGE COLLECTION TAX RATE

1. Rate

1.1 The rate of the garbage tax is one hundred and eighty three dollars and twenty seven cents ($183.27) per unit, for all building categories.

1.2 Recall: an amount of one hundred fifty dollars ($150.00) shall be charged to the owner, lessee or occupant of the building for each recall.

2. Schedule

Garbage shall be removed according to the following schedule:

Between 8 a.m. and 4 p.m., Mondays to Fridays. There will be no regular collection on Saturdays and Sundays.

2.1 Frequency:

2.1.1	Residential units:	two (2) days a week;
2.1.2	Schools:	three (3) days a week;
2.1.3	Hospitals:	three (3) days a week;
2.1.4	Nursing stations:	three (3) days a week;
2.1.5	Commercial, industrial and institutional buildings:	five (5) days a week.

Appendix 2: Breakdown of residual materials management costs in Kuujjuaq

NV Kuujjuaq — Operating Budget Estimates — Garbage — 2012

	Nov '11	Projected '11	Budget '12
Garbage			
	-	-	-
SALARIES	-	341,408	349,602
FRINGE BENEFITS	-	70,924	72,626
	-	-	-
	-	-	-
	-	-	-
TELEPHONE	-	-	-
INTERNET	-	-	-
INSURANCE	-	2,308	2,363
	-	-	-
	-	-	-
MAINTENANCE - BUILDINGS	-	-	-
	-	-	-
	-	-	-
MATERIALS	-	-	-
	-	-	-
VEHICLE PARTS	-	7,855	8,043
	-	-	-
ELECTRICITY	-	-	-
HEATING	-	-	-
	-	-	-
FUEL - VEHICLE	-	42,244	43,258
	-	-	-
OTHER EXPENSES	-	992	1,016
		-	-
		-	-
TOTAL - ACTIVITY	-	465,733	476,908

5 Camions

10 employés

Appendix 3: Breakdown of wastewater management costs in Kuujjuaq

NV Kuujjuaq — Operating Budget Estimates — Sewage — 2012

	Nov '11	Projected '11	Budget '12
Sewage			
	-	-	-
SALARIES	-	723,249	740,606
FRINGE BENEFITS	-	123,643	126,610
	-	-	-
	-	-	-
TELEPHONE	-	-	-
INTERNET	-	-	-
INSURANCE	-	5,416	5,546
	-	-	-
	-	-	-
MAINTENANCE - BUILDINGS	-	-	-
	-	-	-
	-	-	-
MATERIALS	-	-	-
	-	-	-
VEHICLE PARTS	-	24,304	24,887
	-	-	-
ELECTRICITY	-	-	-
	-	-	-
HEATING	-	-	-
	-	-	-
FUEL - VEHICLE	-	188,557	193,082
	-	-	-
OTHER EXPENSES	-	17,670	18,094
		-	-
		-	-
TOTAL - ACTIVITY	-	1,082,840	1,108,825

2 Canada - 6 employés

Appendix 4: Landfill characterization tables, analysis of georeferenced images and LIDAR data

ASSESSMENT OF THE VOLUME OF WASTE IN THE LANDFILLS OF THE 14 NORTHERN VILLAGES OF NUNAVIK

Table 1: Assessment of the area and volume of waste

Village	Landfill area (fenced zone) (m^2)	Area of waste inside the fenced zone (m^2)	Volume of waste inside the fenced zone (m^3)	Area of waste outside the fenced zone (m^2)	Volume of waste outside the fenced zone (m^3)	Total volume of waste (m^3)	Comments
Akulivik	20,200	10,150	28,460	3,050	24,400	52,860	The 24,400 m^3 of waste outside the fenced zone is backfilled waste to the west of the landfill.
Aupaluk	12,100	9,240	9,950	2,300	4,770	14,720	
Inukjuak	45,180	25,580	52,860	60	80	52,940	
Ivujivik (site 1)	6,720	3,890	5,050	0	0	5,050	
Ivujivik (site 2)	3,780	2,660	3,990	1,820	1,930	5,920	
Kangiqsualujjuaq	7,600	4,490	8,450	480	680	9,130	
Kangiqsujuaq	32,000	7,560	12,130	380	500	12,630	
Kangirsuk	19,000	13,360	37,280	6,060	6,200	43,480	The volume of waste outside the landfill includes ~5,330 m^3 of scrap vehicles and metal and ~870 m^3 of barrels, containers and contaminated soil situated respectively ~1 km and ~500 m to the east of the landfill.
Kuujjuaq	28,280	28,700	81,200	750	1,500	82,700	
Kuujjuarapik (site 1)	24,000	14,900	61,240	0	0	61,240	
Kuujjuarapik (site 2)	23,150	11,490	32,940	0	0	32,940	
Puvirnituq	33,670	15,390	27,760	5,030	21,260	49,020	The volume of waste outside the fenced zone is a considerable pile of backfilled waste and vehicles.
Quaqtaq	11,900	7,070	9,410	370	740	10,150	
Salluit	20,270	12,240	30,690	970	2,280	32,970	
Tasiujaq	15,310	12,350	18,900	670	920	19,820	
Umiujaq	16,220	6,290	13,590	160	190	13,780	

ASSESSMENT OF THE VOLUME OF WASTE IN THE LANDFILLS OF THE 14 NORTHERN VILLAGES OF NUNAVIK

TABLE 2: Area of waste according to the category of material

	Area according to the category of material (m²)												
Village	**Household**	**Construction material**		**Metal**			**Tires**	**Barrels**	**Containers and tanks**	**Contaminated soil**	**Backfilled waste[1]**	**Unidentified**	**Total area of waste (m²)**
		Wood	**Other**	**Appliances**	**Vehicles**	**Other**							
Akulivik	2,160	0	0	210	750	270	40	0	70	0	6,550	3,150	13,200
Aupaluk	670	0	790	50	750	0	20	430	150	0	6,890	1,790	11,540
Inukjuak	9,730	140	240	250	2,140	290	210	380	1,640	60	0	10,560	25,640
Ivujivik (site 1)	590	0	0	0	0	130	0	10	40	0	1,400	1,720	3,890
Ivujivik (site 2)	1,330	0	0	0	880	1,110	0	0	230	0	0	930	4,480
Kangiqsualujjuaq	3,200	240	0	0	420	440	0	180	0	420	0	70	4,970
Kangiqsujuaq	4,520	0	230	210	860	680	0	140	280	570	0	450	7,940
Kangirsuk	6,900	120	150	0	5,400	460	90	250	340	120	4,100	1,490	19,420
Kuujjuaq	4,700	90	30	1,880	2,660	9,840	230	1,040	580	0	8,400	0	29,450
Kuujjuarapik (site 1)	7,370	200	0	300	2,070	1,540	300	100	1,060	0	0	1,960	14,900
Kuujjuarapik (site 2)	2,490	0	0	0	0	0	0	0	0	0	9,000	0	11,490
Puvirnituq	6,730	270	0	0	950	950	0	0	180	910	7,390	3,040	20,420
Quaqtaq	3,170	30	0	290	930	1,310	0	60	360	370	0	920	7,440
Salluit	2,370	0	0	150	850	980	0	0	110	0	0	8,750	13,210
Tasiujaq	3,850	0	60	60	1,050	0	40	70	80	160	7,250	400	13,020
Umiujaq	1,720	0	300	280	1,140	1,620	190	330	470	0	0	400	6,450

[1] The type of backfilled waste is not known.

ASSESSMENT OF THE VOLUME OF WASTE IN THE LANDFILLS OF THE 14 NORTHERN VILLAGES OF NUNAVIK

TABLE 3: Volume of waste according to the category of material

Village	Volume according to the category of material (m³)												
	Household	Construction material		Metal			Tires	Barrels	Containers and tanks	Contaminated soil	Backfilled waste[1]	Unidentified	Total area of waste (m²)
		Wood	Other	Appliances	Vehicles	Other							
Akulivik	6,500	0	0	210	1,610	100	20	0	70	0	34,900	9,450	52,860
Aupaluk	580	0	1,240	50	2,240	0	10	840	380	0	6,890	2,490	14,720
Inukjuak	20,880	70	250	250	4,290	220	850	300	3,250	60	0	22,520	52,940
Ivujivik (site 1)	1,260	0	0	0	0	60	0	10	60	0	700	2,960	5,050
Ivujivik (site 2)	2,830	0	0	0	1,600	750	0	0	280	0	0	460	5,920
Kangiqsualujjuaq	6,400	240	0	0	620	660	0	180	0	960	0	70	9,130
Kangiqsujuaq	7,460	0	340	210	1,930	850	0	140	540	850	0	310	12,630
Kangirsuk	16,480	80	230	0	5,400	610	90	250	450	190	16,400	3,300	43,480
Kuujjuaq	13,600	170	30	3,500	5,420	31,450	350	1,790	1,190	0	25,200	0	82,700
Kuujjuarapik (site 1)	37,610	300	0	750	7,230	3,320	900	100	3,680	0	0	7,350	61,240
Kuujjuarapik (site 2)	14,940	0	0	0	0	0	0	0	0	0	18,000	0	32,940
Puvirnituq	18,240	140	0	0	1,900	870	0	0	270	1,770	22,790	3,040	49,020
Quaqtaq	4,550	20	0	290	1,860	1,290	0	60	630	740	0	710	10,150
Salluit	4,960	0	0	220	2,110	1,910	0	0	220	0	0	23,550	32,970
Tasiujaq	8,710	0	60	60	2,100	0	40	70	80	250	7,250	1,200	19,820
Umiujaq	6,820	0	150	500	2,690	1,260	350	580	830	0	0	600	13,780

[1] The type of backfilled waste is not known.

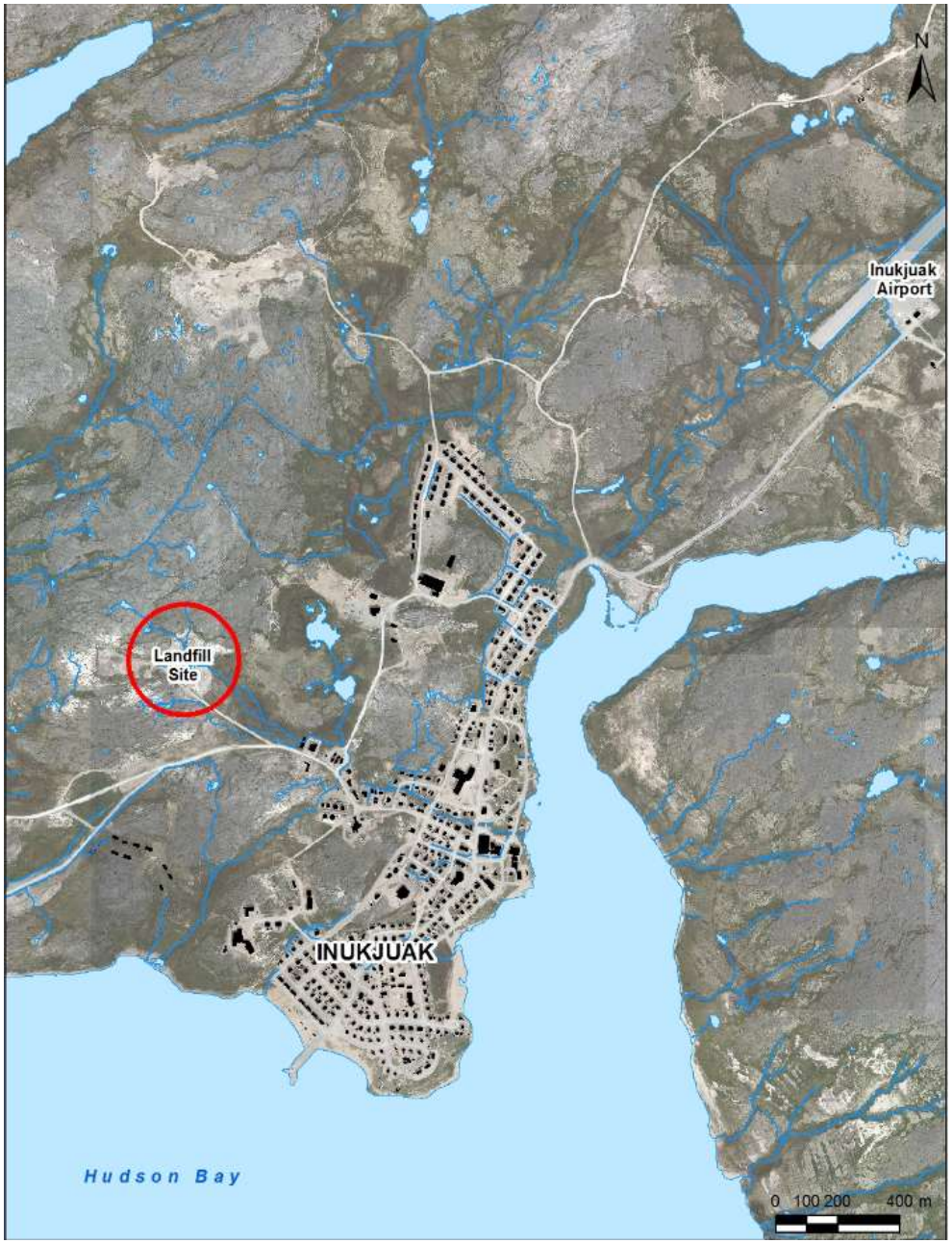
Appendix 5: Location and aerial photo of the landfills in each northern village

Akulivik

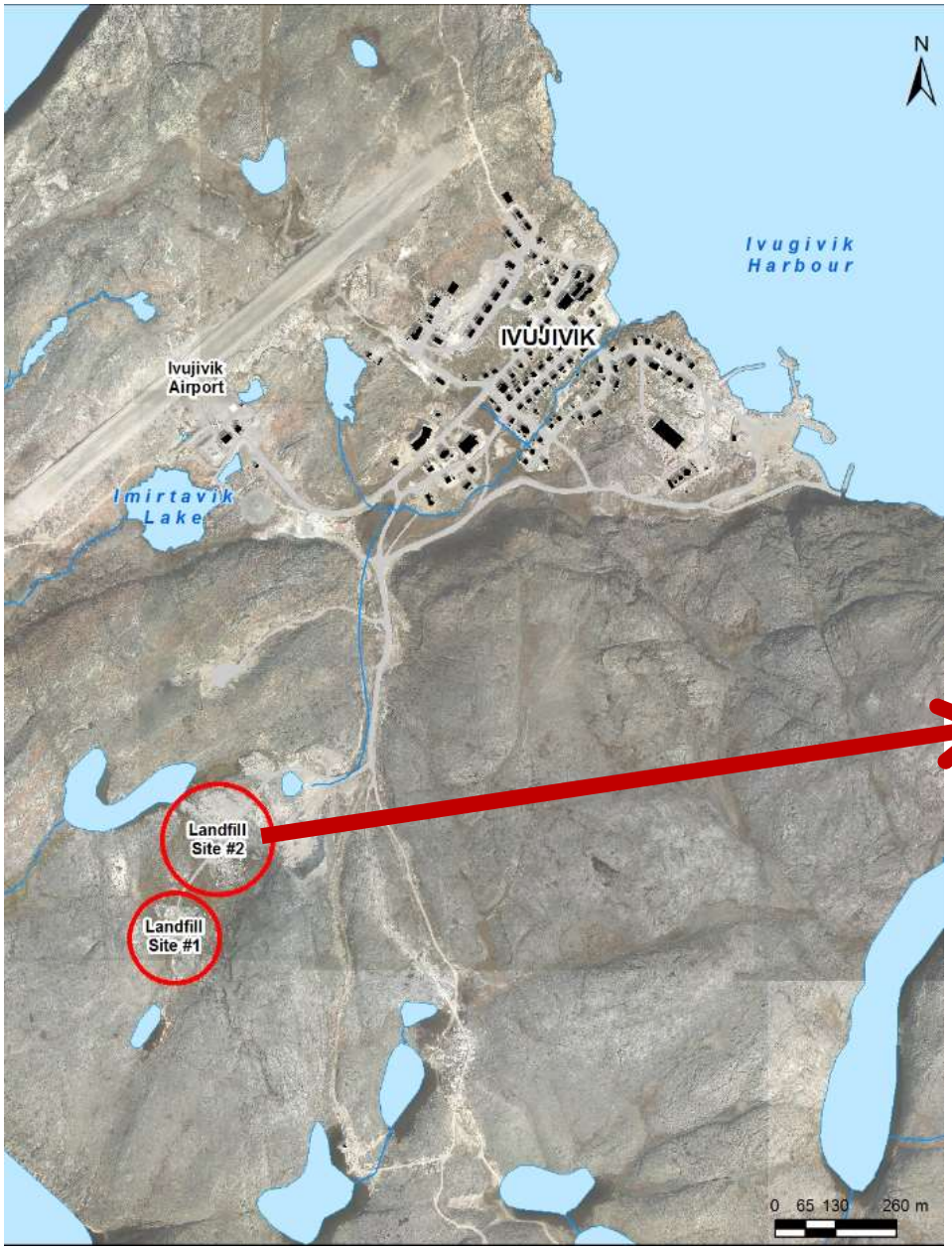
Aupaluk


N
Landfill Site
Funnel Cove
AUPALUK
Aupaluk Airport
0 100 200 400 m

Inukjuak


N
Inukjuak Airport
Landfill Site
INUKJUAK
Hudson Bay
0 100 200 400 m

Ivujivik


N
Ivugivik
Harbour
IVUJIVIK
Ivujivik
Airport
Imirtavik
Lake
Landfill
Site #2
Landfill
Site #1
0 65 130 260 m

Kangirsualujjuaq

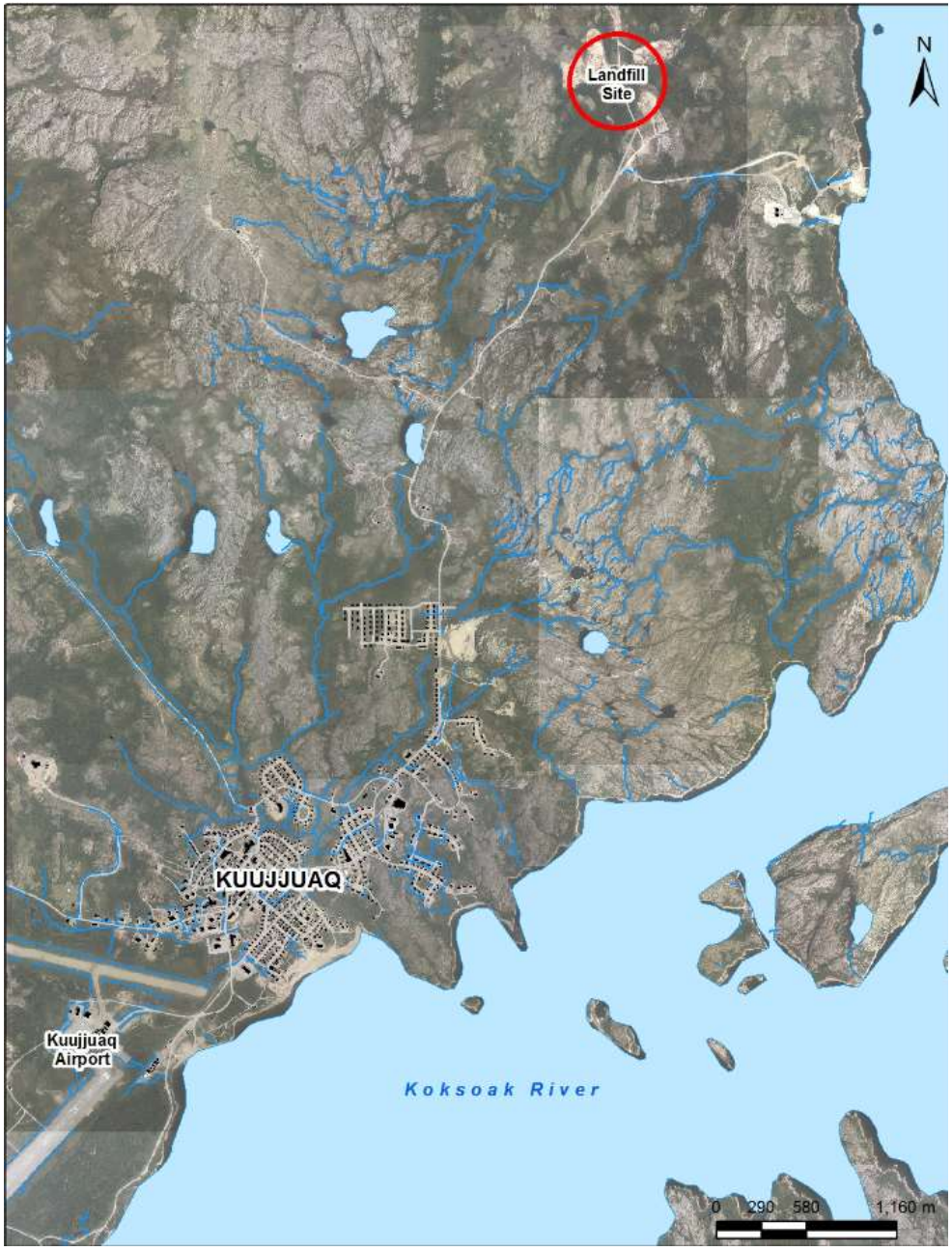
Kangirsujuaq

Kangirsuk


N
Hardy Lake
Kangirsuk Airport
Landfill Site
KANGIRSUK
Kanik Cove
Arnaud River
0 125 250 500 m

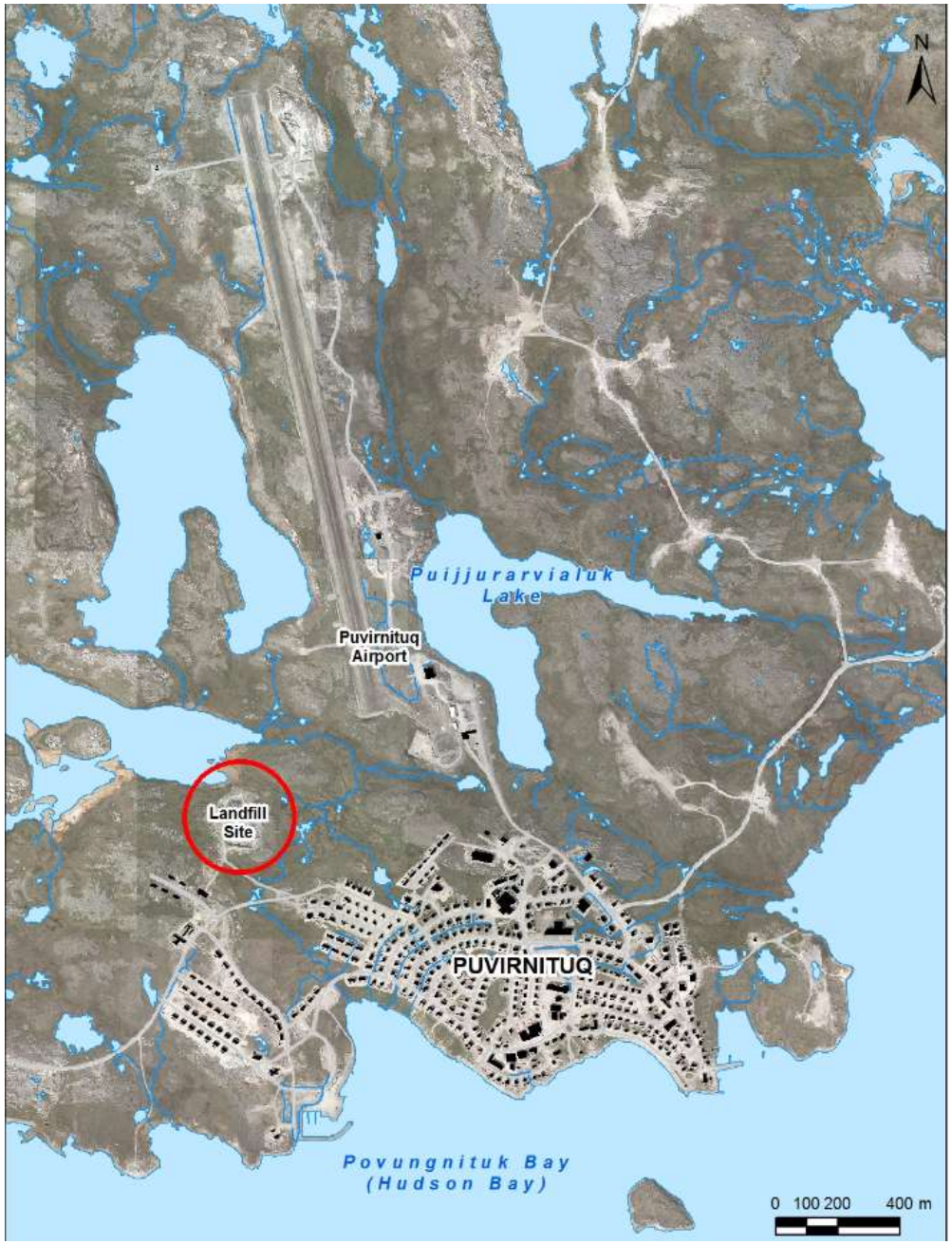

0 15 30 60 90 120 m

Kuujjuaq

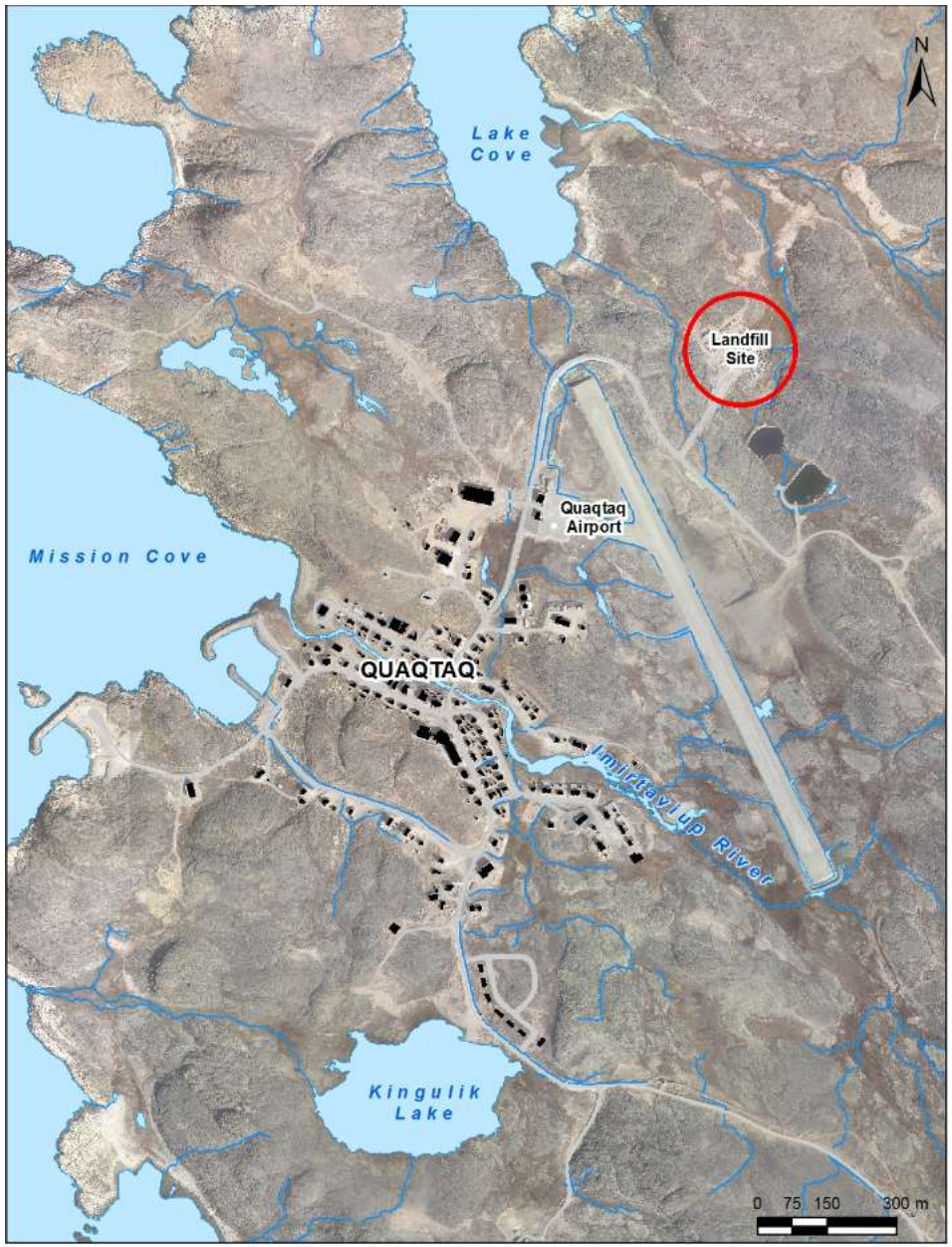

Landfill Site
N
KUUJJUAQ
Kuujjuaq Airport
Koksoak River
0 290 580 1,160 m

Kuujjuarapik

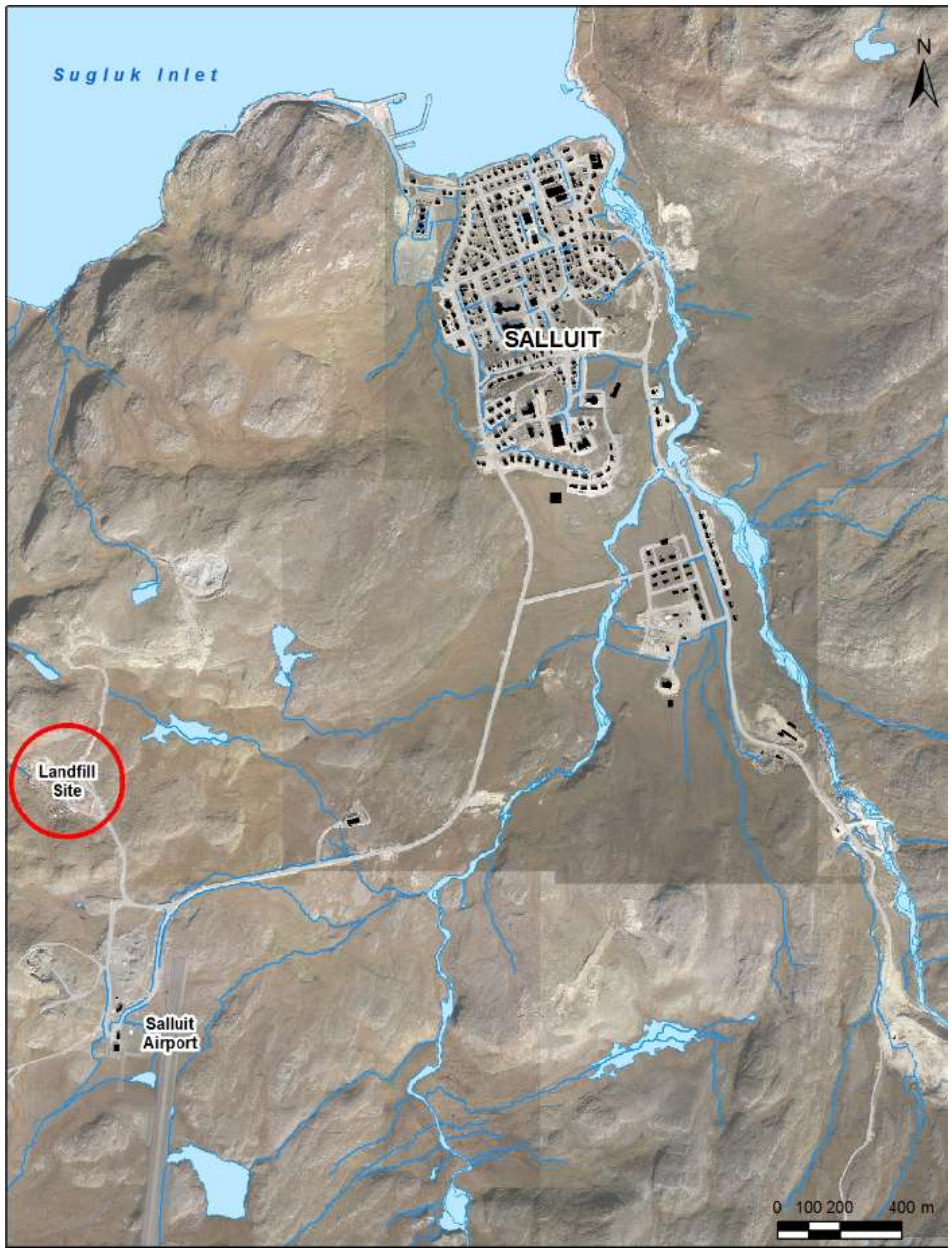
Puvirnituq


N
Puijjurarvialuk Lake
Puvirnituq Airport
Landfill Site
PUVIRNITUQ
Povungnituk Bay (Hudson Bay)
0 100 200 400 m

Quaqtaq


N
Lake Cove
Landfill Site
Quaqtaq Airport
Mission Cove
QUAQTAQ
Imiqtaviup River
Kingulik Lake
0 75 150 300 m

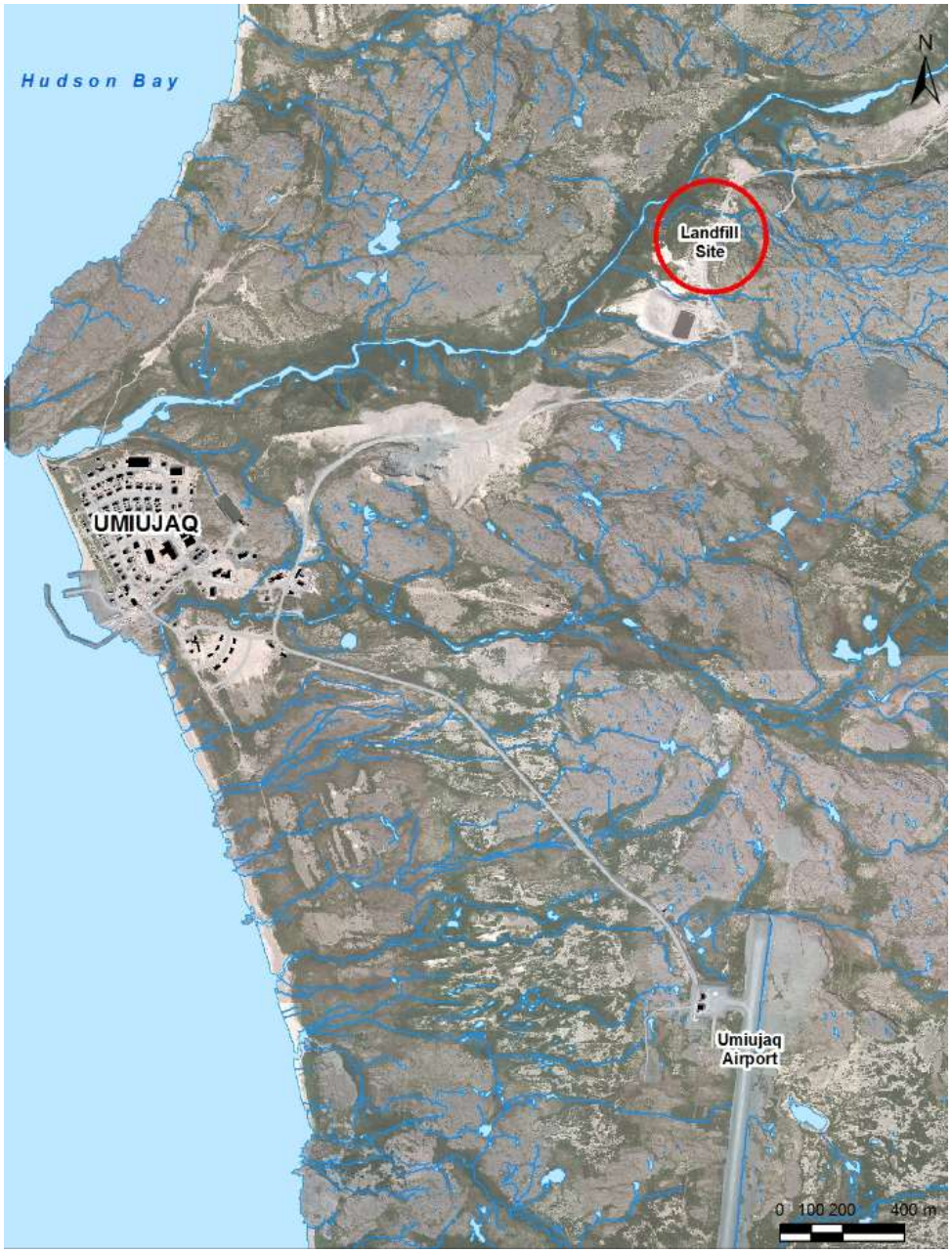
Salluit


Sugluk Inlet
N
SALLUIT
Landfill Site
Salluit Airport
0 100 200 400 m

Tasiujaq


N
Landfill Site
Deep Bay
TASIUJAQ
Berard River
Tasiujaq Airport
0 200 400 800 m

Umiujaq


Hudson Bay
N
Landfill Site
UMIUJAQ
Umiujaq Airport
0 100 200 400 m

Appendix 6: Québec Residual Materials Management Policy, 2011–2015 action plan objectives

The underlying objective of the residual materials management policy is to achieve the disposal of a single residual material in Québec: ultimate waste.

Ultimate waste is what is left over after sorting, conditioning and reclamation. Waste that can be processed no further under available technical and economic conditions to extract any more valuable part or to reduce any further its polluting or hazardous character.

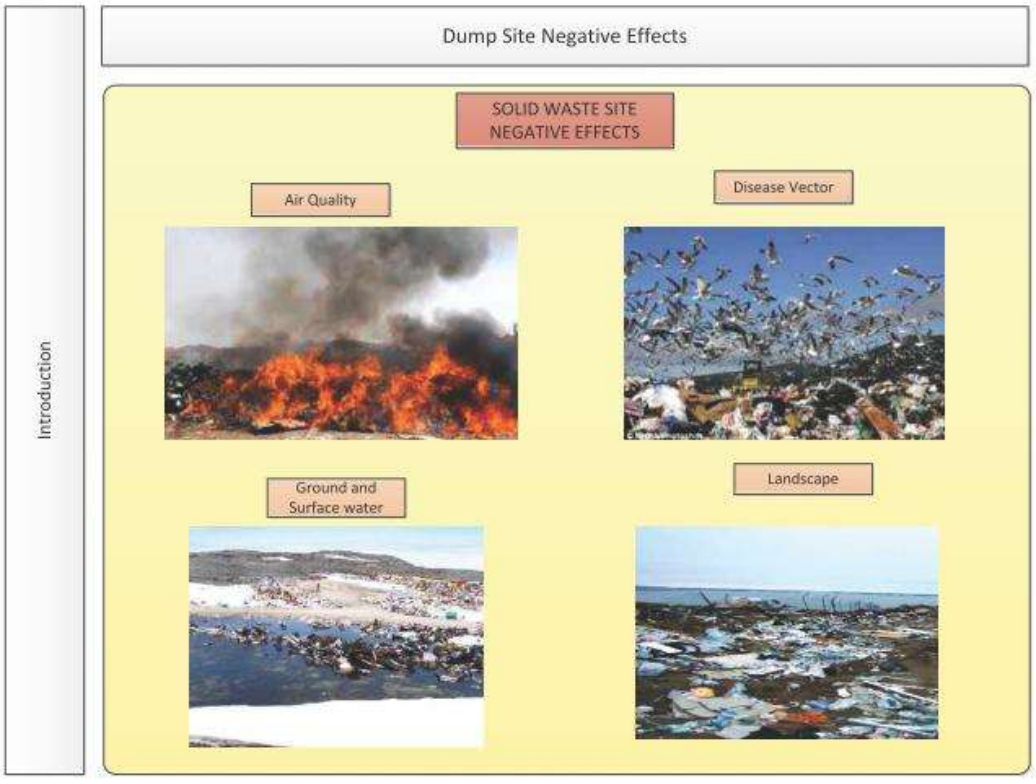
The intermediate, quantifiable objectives of the first action plan are by 2015 to:

- Reduce the quantity of residual materials sent for disposal to 700 kg per capita, for a decrease of 110 kg per capita compared to 2008.
- Recycle 70% of paper, cardboard, plastic, glass and metal waste.
- Recycle 60% of organic putrescible waste.
- Recycle or reclaim 80% of concrete, brick and asphalt waste.
- Sort at the source or send 70% of building construction, renovation and demolition waste to a sorting centre.

These objectives represent a national average to which everyone must contribute. The first objective, which is expressed in kilogram per capita, takes into account reduction at source, reuse, recycling and other forms of residual material reclamation.

Each residual materials management plan must include measures that are compatible with all the targeted objectives in the territory covered by the plan.

Appendix 7: *Guide for the Operating/Management of Solid Waste Sites in Nunavik*, summary



Section 2
Waste Segragation

The solid waste site facility is organized into several separate disposal areas in which certain type of waste are to be disposed. The following is a summary of the areas of the site, the types of waste to be disposed and waste receiving controls.

Waste Segregation

Acceptable Waste

Acceptable Waste

Regular, non-hazardous waste

Treated, hazardous waste

Metal

Plastic

Clothing and textiles

Ferrous and non-ferrous metal

Construction and demolition material

Paper, cardboard, newsprint

Animal and vegetable waste

Tires

Household furnishings and appliances

Treated biomedical waste (incinerated, enclaved)

Contaminated soils (Acceptable for landfill disposal)

Section 3
Household/Domestic Waste

The domestic waste is the area that needs the biggest attention and most of the maintenance work. This is also the section that receives most of the waste and the one that is susceptible to have an impact on the environment.

Depending of the community size, the maintenance in this section should be done **minimally once a week.**

Domestic Waste Area

Example: Well maintained site

The building block common to all landfills is the cell. All solid waste received are spread and compacted in layers within a confined area. A cell is constructed by compacting waste on a slope in several layers. The waste is dumped at the toe of a **working face** and pushed up the slope.

Compaction and covering operations are essential for a well maintained site

Waste Segregation

Non-Acceptable Waste

Non-acceptable Waste

Commercial/ Industrial Hazardous waste	Household Hazardous waste	Others
Antifreeze	Cleaning products	Explosive/Highly combustible materials
Battery	Propane tanks and cylinders	Radioactive materials
Solvents (Varsol, turpentine)	Aerosol Sprays	Mercury
Used Paint	Electronic products	Drum with unidentified contents
Used Oil/Fuel		PCB (Polychlorinated biphenyl) contaminated materials
Automotive fluids (brake fluids, transmission fluids)		Pharmaceutical waste
		Untreated septic tank waste/ sludge
		Biomedical waste (that are not incinerated or autoclaved before disposal)

Waste Segregation

Basic Disposal Area

Potentially contaminant waste

2 SECTIONS

Domestic Waste

Hazardous Waste

Bulky Waste

4 SECTIONS

Appliances

Metal

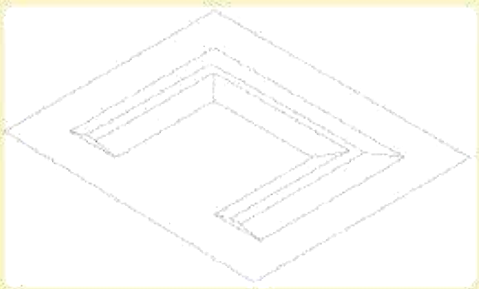
Construction Material

Used vehicles

Domestic Waste Area

Site Preparation

The location of the dump site doesn't always allows the use of the *Depression Method*. The *Area Method* is easily adaptable to any kind of terrain and allows easy maintenance.

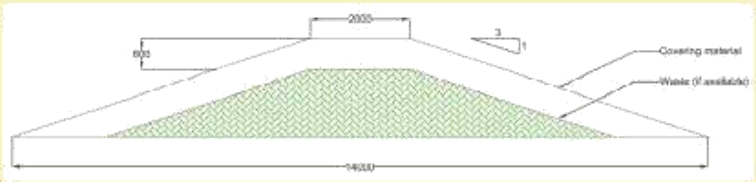


Delimit and enclosed the domestic waste section with berms.

Considering that most of the dump site are already existing, it is possible to use the domestic waste on site to make the core of the berm

Cover the domestic waste core with 600 mm (2 feet) of granular material

The domestic waste core should be well compacted



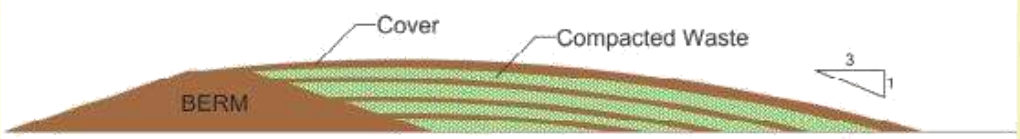
Domestic Waste Area

Compaction

Good compaction is achieved when the equipment is operated up and down the working face between three and five times on a 1 foot (300 mm) to 2 feet(600 mm) layer of waste on a slope 3:1 or less.

ADVANTAGES

- Extends the life of the site
- Reduce the quantity of covering material
- Reduce litter problems
- Provide smoother working areas
- Eliminate voids, reducing rats and insects presence



3 to 5 passes for good compaction
Keep a 3H : 1V slope

Essential points

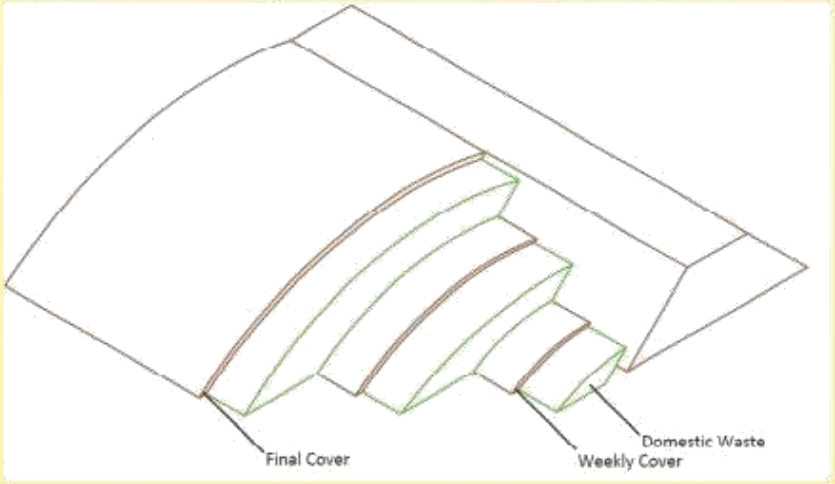
- 1 to 2 feet layer
- 3 to 5 passes
- 3H : 1V slope

Domestic Waste Area

Covering operations

ADVANTAGES

Reduce leachate production	Control/Prevent fires	Control litter
Reduce odors	Eliminate voids, reducing rats and insects presence	Reduce the visual impact of the site



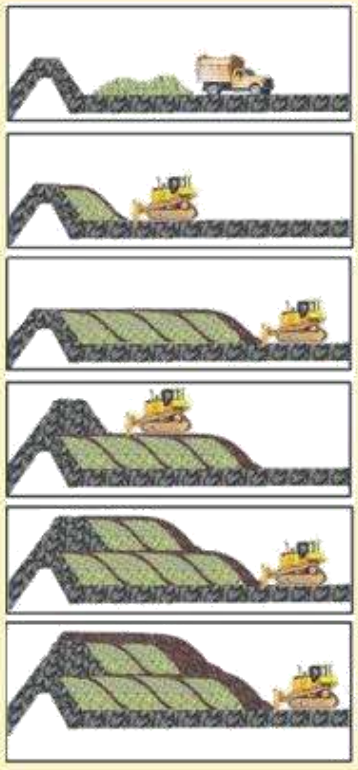
Weekly Cover	Final Cover
150mm / 6 inches	600mm / 12 inches

Domestic Waste Area

Area Method

Area method:

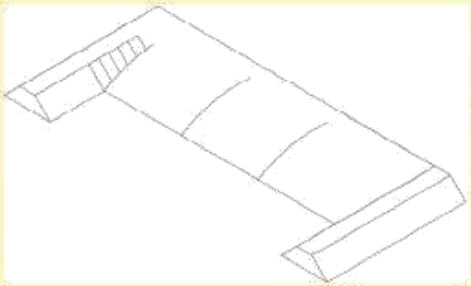
1. To begin a working face, build up a berm approximately 1.5 – 2 meters high using covering material. The berm should be approximately between 6 and 9 m wide at the base.
2. Dump waste near the berm.
3. Using the bulldozer, drive over the waste 3 to 5 times. Always drive in an up and down direction to avoid toppling over. Push small amounts of garbage at a time for more efficiency. Waste should be compacted approximately to ¼ of its original volume.
4. Alternate between dumping and compacting garbage until the compacted garbage is approximately 1.5m high.
5. Cover the compacted waste with a minimum 150 mm of the cover material (could be mulch of dry construction waste). Cover waste once per week during the summer months and once per month during the winter.
6. Repeat steps 2-5 until the site is full. Cover all waste with an additional 300mm of cover material. Grade the top to provide effective drainage.
7. Build a new berm on top of the bottom row of cells. Again, build the berm 1.5 m high and 9 m wide at the base. Waste can be used to build up this berm in order to conserve covering material.
8. Repeat steps 2-7.
9. Once the landfill has reached maximum height, put a final 600 mm layer of cover material over the entire area. Ensure that the final cover is compacted and sloped evenly to allow water to easily run off.



Domestic Waste Area

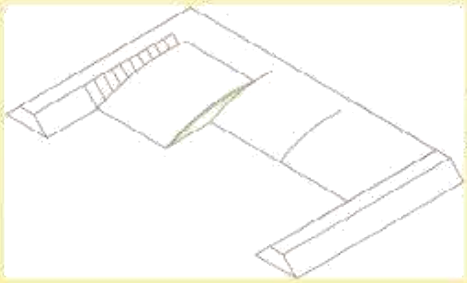
Domestic Waste disposition

Additional explanations concerning the *Area Method*



Use the complete length of the berm

When the domestic waste and the covering materials have reach the top of the berm, start a new working face on the side of the old one



The old working face will act as berms.

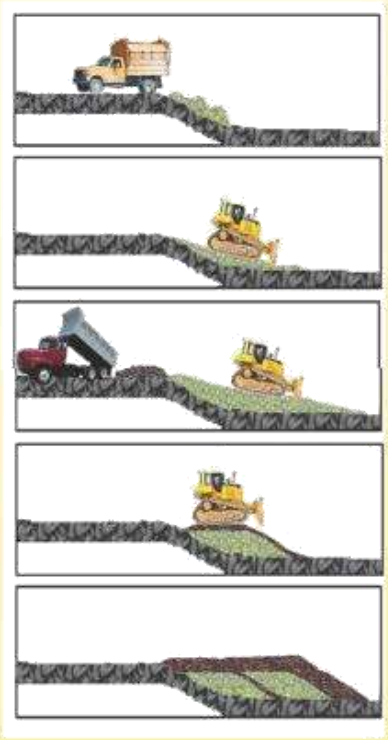
Domestic Waste Area

Depression Method

Depression method:

1. Dump waste near the slope.
2. Spread the garbage down the slope. Using the bulldozer drive over the waste 3 to 5 times. Only drive up and down the working face, not along the sides. Waste should be compacted approximately to ¾ of its original volume.
3. Alternate between dumping and packing garbage until the packed garbage is approximately 1.5m high.
4. Cover the compacted waste with a minimum 150 mm of the cover material (could be mulch of dry construction waste).

   Cover waste once per week during the summer months and once per month during the winter.
5. Repeat steps 2-5 until the site is full. Cover all waste with an additional 150mm of cover material.
6. Once the landfill has reached maximum height, put a final 300 mm layer of cover over the entire area. Ensure that final cover is compacted.



Domestic Waste Area

Waste Burning

Compaction and cover operation represent a better and more safe way to manage the domestic area. Open burning should be completely avoided.

Burning procedure

- **Burning operations should always be done by a qualified person (site operator)**
- **Burn on days when winds are light and blowing away from the community**
- Non-Combustible materials should be kept apart (Burning waste such as metal and glass decreases the efficiency of the burning process.)
- Burn in a confined place and in manageable volumes
- After burning, combustion residues must be compacted and covered

Domestic Waste Area

Domestic Area Procedure - Summary

Waste placement

- Create an active zone/working face delimited with a berm to contain waste
- Make the rest of the area innaccessible wih barricades (Berms, big rocks)
- The working face should be clearly indicate by a sign
- Concentrate the dumping in the working face until it's full
- When full, close the zone properly, then open an other working face beside

Advantages:
- Better management of the area space
- No loss of space
- Keep the control of the section
- Safer for fire
- Better for operating

Waste treatment

Waste burning

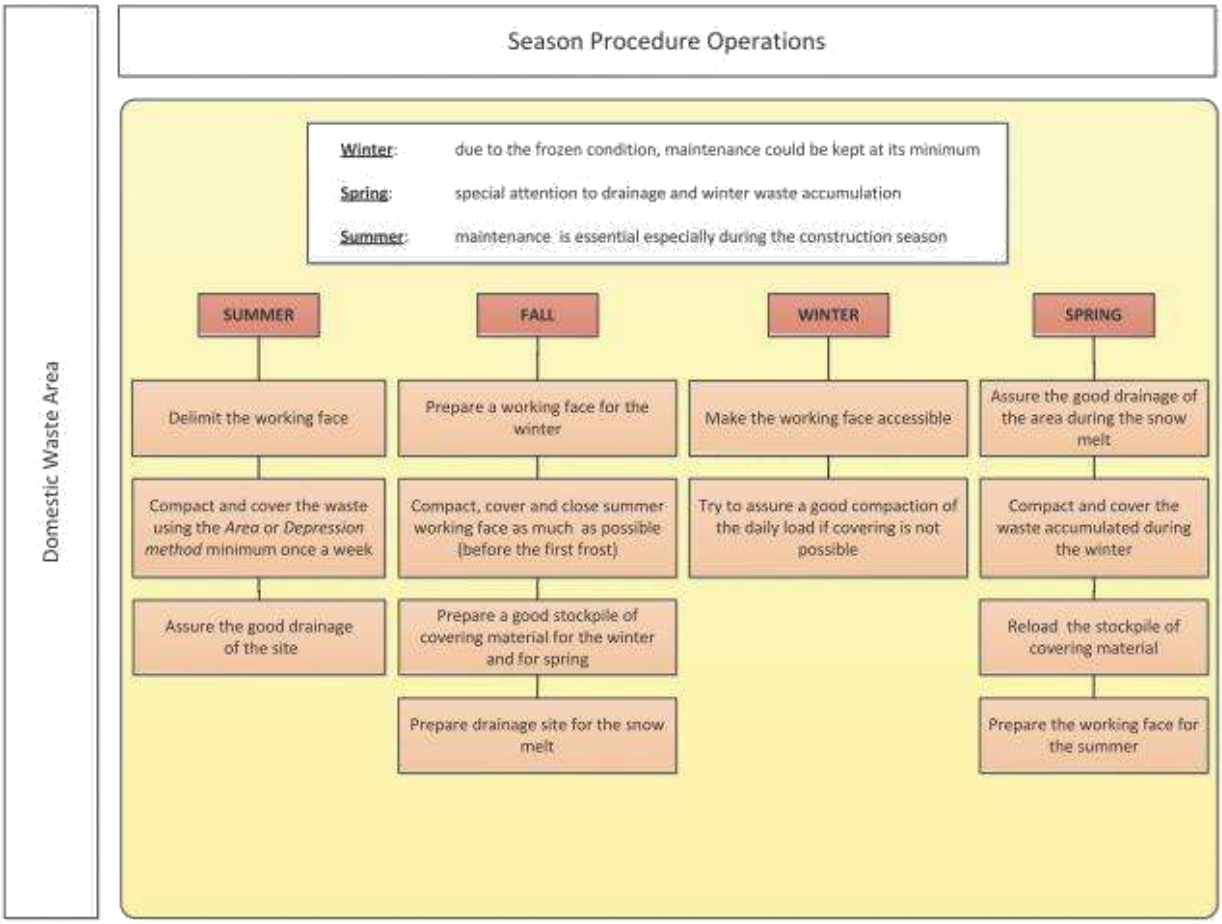
- Not the best option
- Only the site operator decide when to start the fire
- Non-combustible materials should be keep apart
- Burn in manageable volume and in a confined place
- Only burn when winds are light and blowing away from the community
- After burning, residues must be compacted and covered

Advantages :
- Reduce the volume of waste
- Reduce sanitary risk

Compaction and covering

- Compact waste by passing (not only pushing) on it with the bulldozer
- Use the area or the depression method
- Cover regularly with soil (once a week when possible)
- Waste, compaction and covert should be organize in gentle slope for drainage
- Tire chip or dry construction material chip could be used as first cover layer
- Stockpile of different covering material should be maintain on the site

Advantages :
- Reduce the volume of waste
- Maximize the space in the area
- Reduce sanitary risks
- Prevent odors and diseases


Domestic Waste Area
Season Procedure Operations
Winter: due to the frozen condition, maintenance could be kept at its minimum
Spring: special attention to drainage and winter waste accumulation
Summer: maintenance is essential especially during the construction season
SUMMER
FALL
WINTER
SPRING
Delimit the working face
Compact and cover the waste using the Area or Depression method minimum once a week
Assure the good drainage of the site
Prepare a working face for the winter
Compact, cover and close summer working face as much as possible (before the first frost)
Prepare a good stockpile of covering material for the winter and for spring
Prepare drainage site for the snow melt
Make the working face accessible
Try to assure a good compaction of the daily load if covering is not possible
Assure the good drainage of the area during the snow melt
Compact and cover the waste accumulated during the winter
Reload the stockpile of covering material
Prepare the working face for the summer

Section 4
Bulky Waste

The storage of bulky items in a separate and designated area of the site facilitates recycling, allows better control of the material admitted to the site and permits a more efficient use of the space.

Bulky Waste

Bulky Waste Procedure

Separate bulky waste by type

Metal Section

Appliances Section

Used Vehicles Section

Construction Waste Section

Place bulky waste in an organized manner, starting from the back of the site and working towards the front

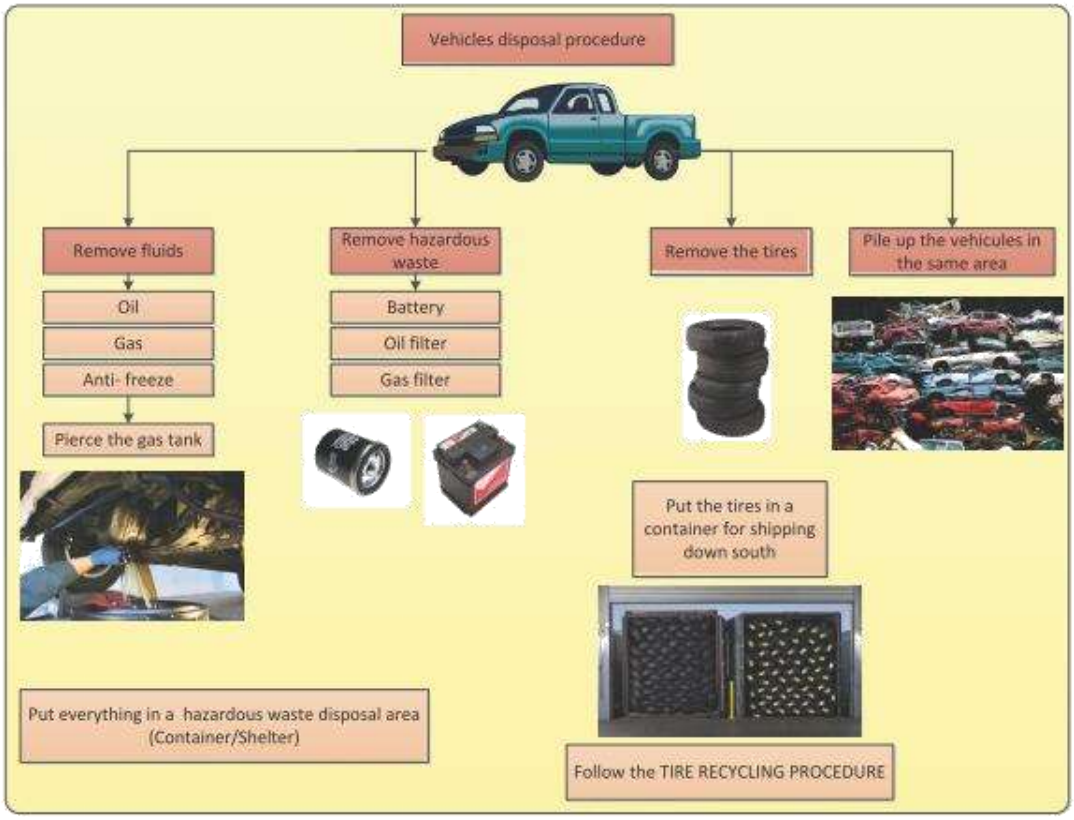
Stack and collapse bulky waste whenever possible to conserve space

Ensure that waste are stacked in such a way that it is safe to walk through the site

Hazardous materials associated with bulky waste such as fuel or ozone depleting substances must be removed by the waste generator prior to disposing the material at the landfill

Bulky Waste

Vehicle Disposal Procedure



Bulky Waste

Tire Recycling Procedure

TIRE RECYCLING PROCEDURE

Step 1: Sort and prepare an inventory of each category of tires that you want to send south (from car & pick-up, heavy truck, grader, motorcycle, ATV, etc.):

Step 2: Contact KRG Environment your inventory in order to confirm that the financial support is available from Recyc-Québec:

Step 3: Put the tires in a container to be shipped south in a way that respects the requirements[1] and make sure everything is confirmed and arranged with KRG before shipping.

The Requirements:

- **No oversized tires** (maximum rim diameter of 48.5")[2]
- **No rims**
- **No tire full of mud, dirt or rocks:** they need to be clean[3]
- **Confirmation from KRG before Shipping**

To contact KRG:

Melissa Gagnon
KRG - Environmental specialist
Renewable Resources Dep.
(819) 964-2961 poste 2322
mgagnon@krg.ca

Monica Nashak
KRG - Environmental Technician
Renewable Resources Dep.
Tel: 819-964-2961 ext. 2276
mnashak@krg.ca

1: If requirements are not respected, reimbursement for transport or related fees will not be made.
2: If you have oversized tires, please put them aside and give us the inventory for those tires as well.
3: Recyclers do not accept dirty tires as they may contain rocks that may damage the blades of the knives

Bulky Waste

Dry Construction Material Procedure

Dry construction material procedure

Wood
Bricks
Roofing Material
Tiles
Insulation
Plastic pipes

Roughly shred the material by rolling on it with a bulldozer

Shred it once again with an industrial shredder (if available)

Use the mulch as a recovering material in the domestic section

If no shredder is available, compact and spread

Bulky Waste

Metal Procedure

You can determine if a metal is ferrous or non ferrous by using a magnet. Magnet will stuck to ferrous metal.

Ferrous

Separate bulky items from the rest

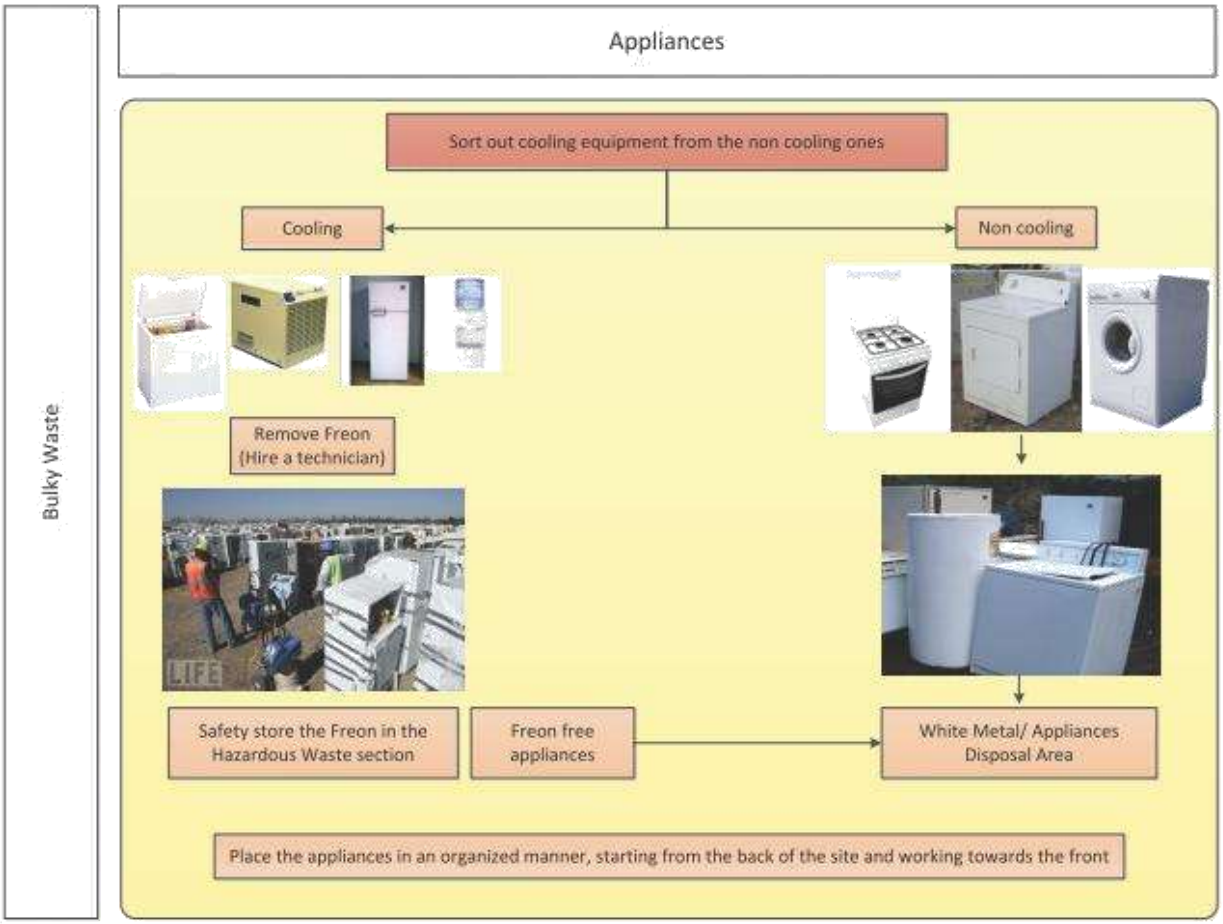
Regroup bulky items by kind (tank, drum, pipe, etc)

Make pile with small pieces

Keep the area accessible

Non ferrous

When possible, regroup non ferrous metal by kind (copper, aluminum, stainless, etc.)


Bulky Waste
Appliances
Sort out cooling equipment from the non cooling ones
Cooling
Non cooling
Remove Freon
(Hire a technician)
Safety store the Freon in the Hazardous Waste section
Freon free appliances
White Metal/ Appliances Disposal Area
Place the appliances in an organized manner, starting from the back of the site and working towards the front

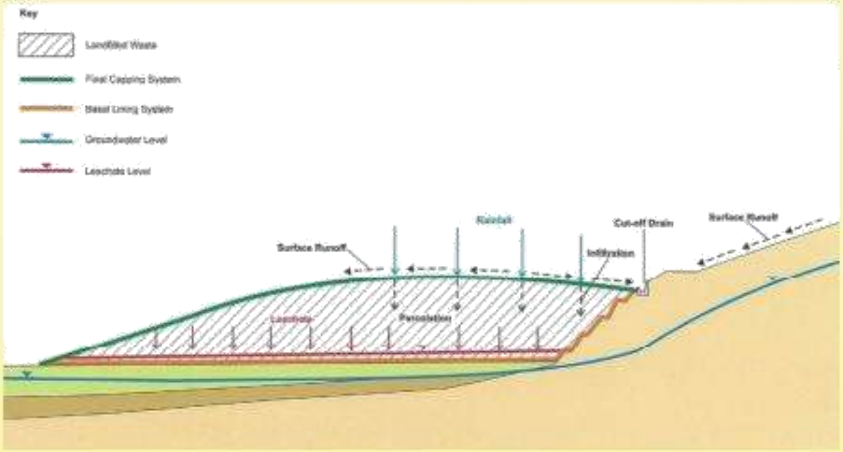
Section 5
Surface Water Management

Municipal waste disposal site operators must ensure that surface water does not flow through the waste. Water infiltration in the waste would contribute to the formation of leachate (contaminated water) which can lead to groundwater river and lake contamination. Water falling on and running across the site has the potential to spread disease and contaminate the environment. In addition, storm water runoff can cause erosion.

Surface Water Management

Leachate

Landfills produce leachate when water runs (percolates) through the waste materials. Leachate is a high strength liquid that can be hazardous to human health and the environment. Basically, it's water that contains the dissolved chemicals and compounds from the garbage (like a garbage soup).



Surface water and ground water contamination principle in a solid waste site

Water + Garbage = Leachate

Surface Water Management

Drainage Work

Water control is essential in the domestic waste section

Prevent water from:

- Pooling
- Reaching erosive velocities
- Soaking through the covered landfill
- Reaching exposed waste and contaminate the water

Water control structures include:

- Berms
- Ditches
- Swales

Additional actions for water control

- Final cover of domestic active area, a gentle slope allows surface water to be drain in the ditch.
- Ditch is reinforced by gravel and rock to avoid erosion at the base.

Section 6
Litter Control

Litter, while not a major environmental or health concern, can be significant issue at some landfills. Landfills are seen by the majority of the public as nuisances, regardless of how well the operation is managed. If litter is seen on roads leading to the landfill, or if the landfill itself has a major problem with blowing litter, the public perception will be that the site is environmentally unfriendly.

Litter Control

Maintenance for litter control

Litter, while not a major environmental or health concern, can be significant issue at some landfills. It greatly affects public perception.

Actions to reduce littering:

- Covering and compacting in the active cell
- Litter collection by the operator
- Perimeter site fences well maintained

Perimeter fencing well maintained
Note the space between waste and perimeter fence

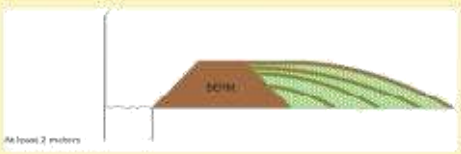
Litter Control

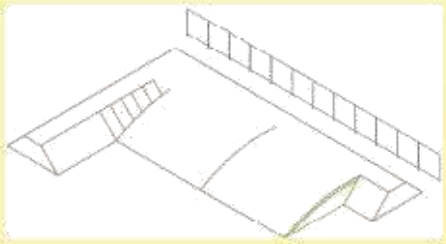
Maintenance for litter control

Fences

- **Solid** — Create turbulence and don't catch litter
- **Chain Link** — Let the wind flow and catch litter

At least 2 meters should be kept between the waste and the fence at any time





Proposed equipment for fences

1	Corner post	Diameter : 3''-1/2
		Height : 14'
		Schedule 40 Steel
2	Intermediary post	Diameter : 2''- 3/8
		Height : 14'
		Schedule 40 Steel
3	Mesh roll #9 1,20± Height : 8'	
4	Wire #6	
5	Top Bar	
6	2'' 3/8 cap adapted for barb wire	
7	3`1/2 cap	
8	Barb wire	
9	Hardware, ligatures, clips	

Section 7
Odors, Birds and other Nuisances control

Odors are normally associated with warm weathers and others local atmospheric conditions. Temperature inversions and breezes affect the movement of odors from the site. Odors sometimes lead to complaints from the community and change of the public perception about the dump site. Solid waste disposal facilities also attract birds due to the availability of food. When there is an airport at proximity, bird control is very important if not mandatory. Insects of concern include flies and mosquitoes. The potential problem from insects includes spread of disease and nuisance.

Odors, birds and other nuisances control

Maintenance for odors, birds and insects control

Odors sometimes lead to complaints from the community and change of the public perception about the dump site.

Odors are caused by:	Birds presence is caused by:	Insects presence is cause by:
Decay of organic materials (animals, plants)	Availability of food in the domestic waste section	Landfills provide food, shelther and breeding area
Chemical reactions in the domestic waste section		Standing water
Landfill gases escaping from the domestic waste pile		
Uncorrected leachate seeps		

Control can be accomplished by:

Using the Area or the Depression method in the domestic waste section	Regular soil covering operations	Covering waste to eliminate food, shelter and breeding areas
Using tight soils (sand instead of gravel) for covering	Collect litter weekly or more if needed	Minimize ponding and standing water
Immediately correct any leachate seeps		

Section 8
Safety, Security and Regulation

Safety and security is essential at the dump site. Since landfills are hostile environment, special measures should be taken to avoid any injuries to the public and to the operator.

Safety, security and regulation

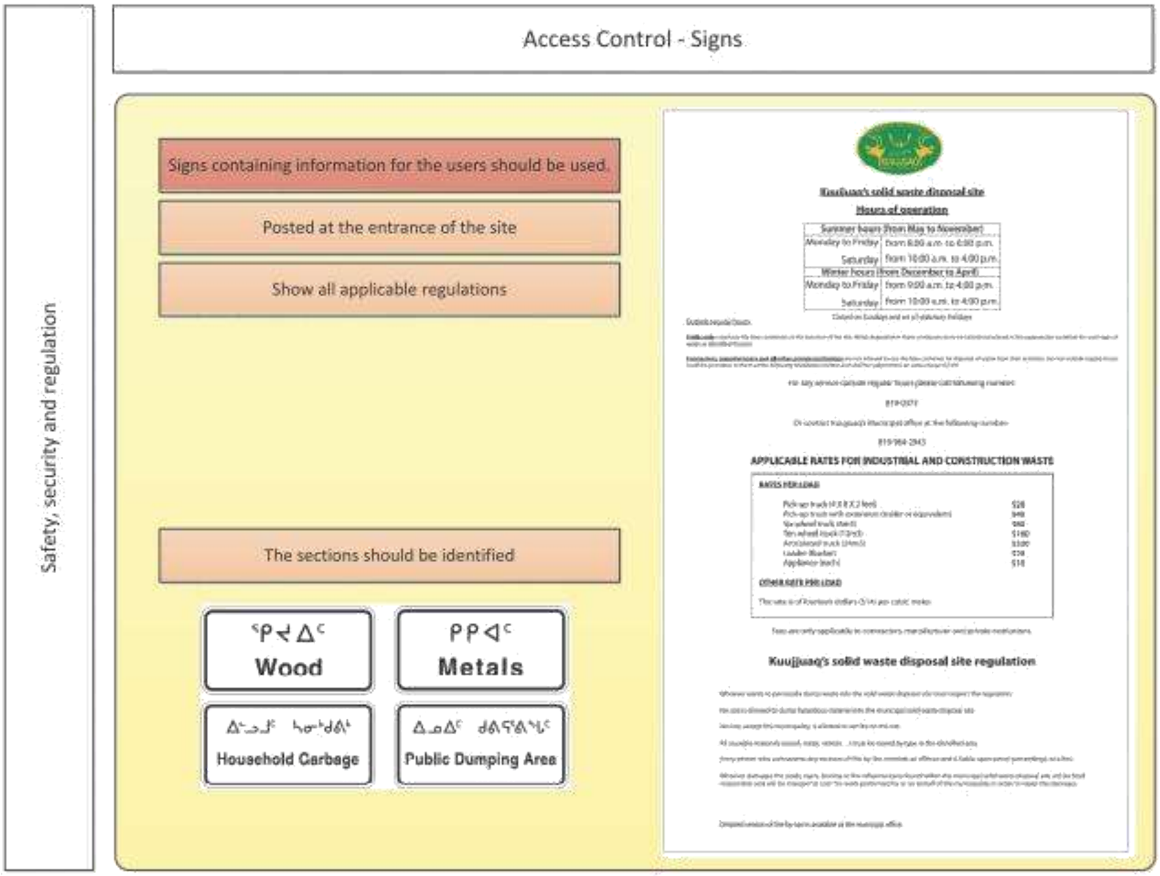
Access Control

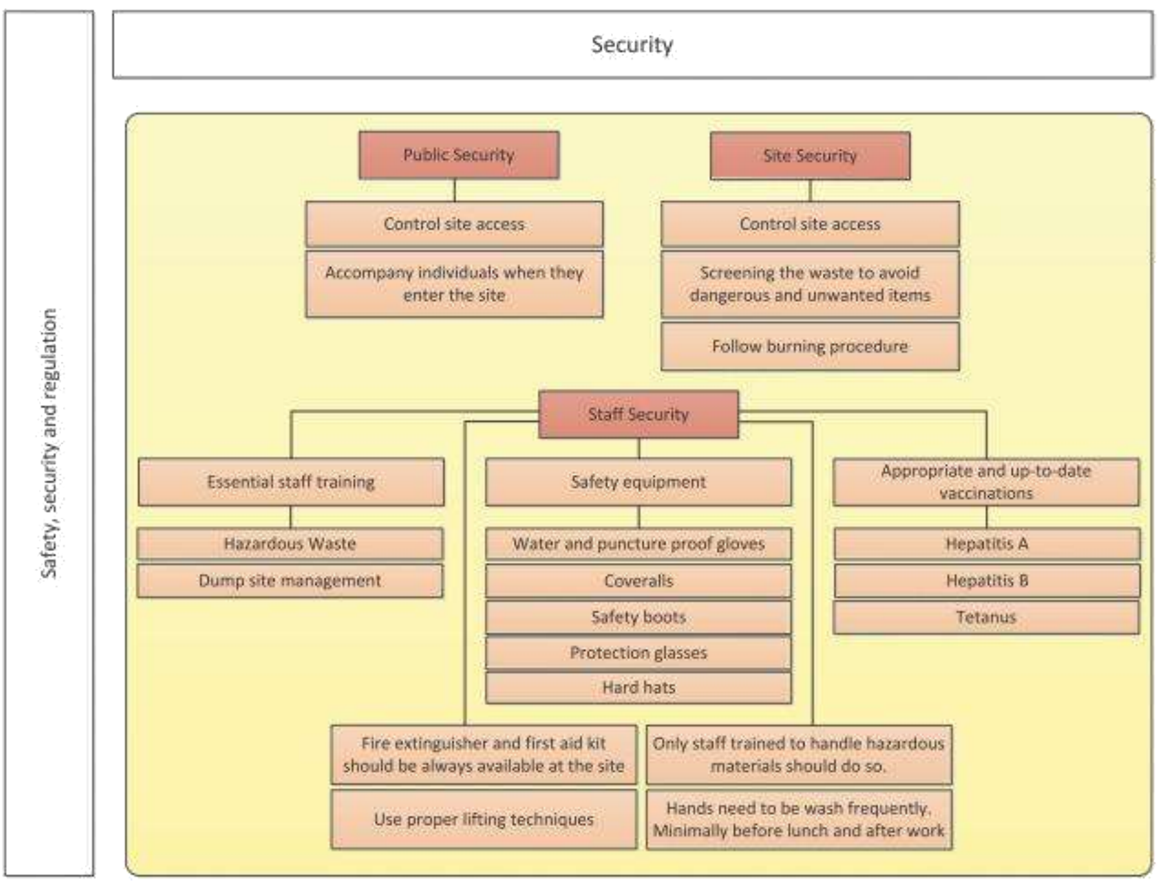
Controlling the access to the site

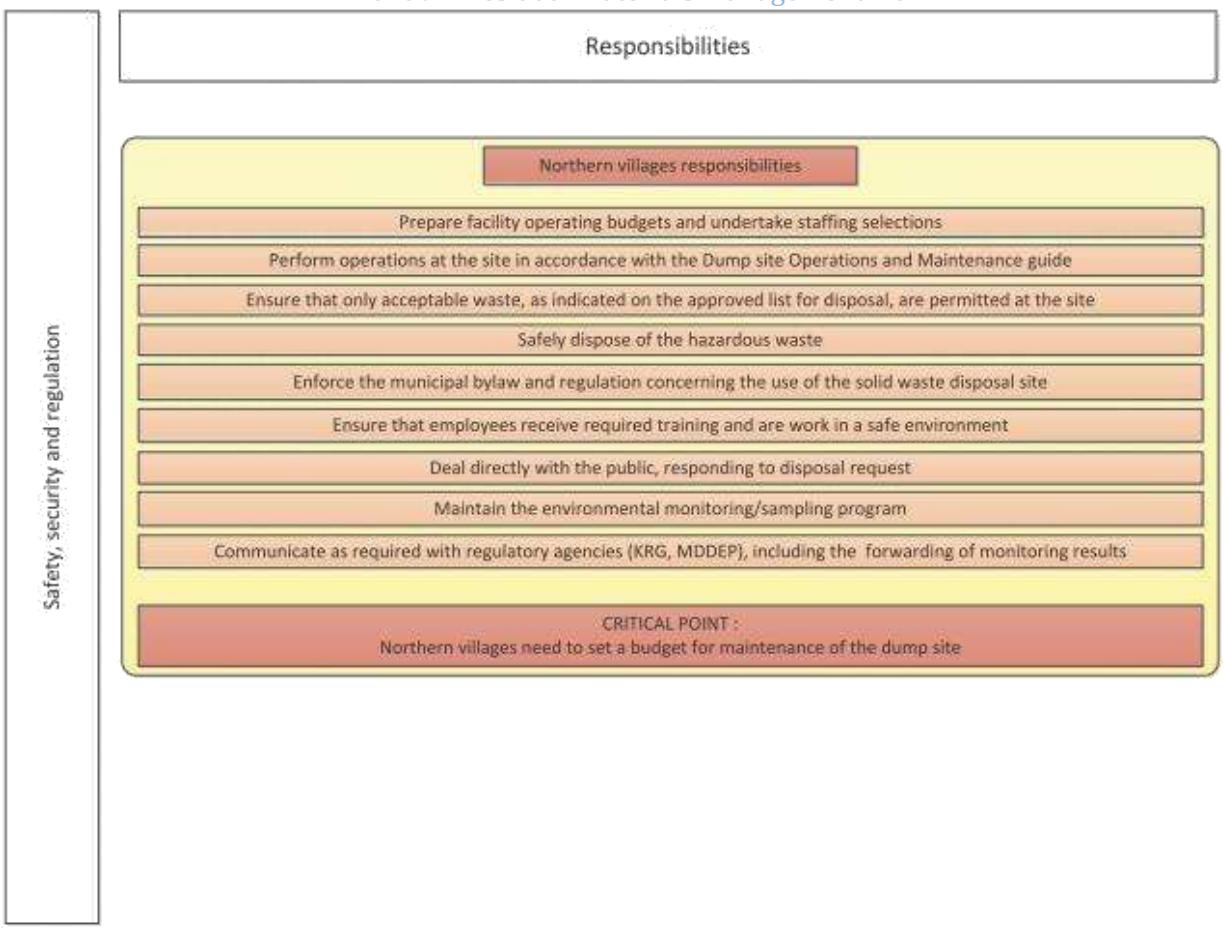
Opening hours established by the NV

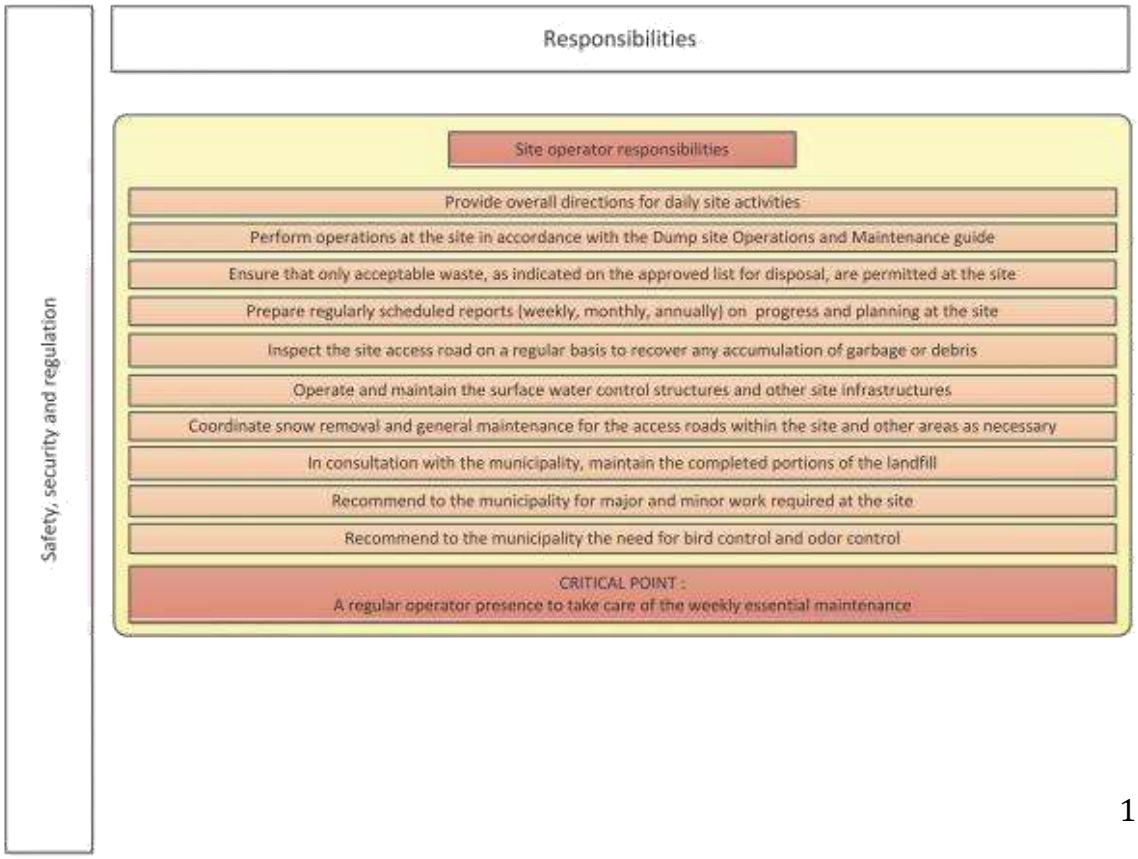
Fences and entrance gates with lock

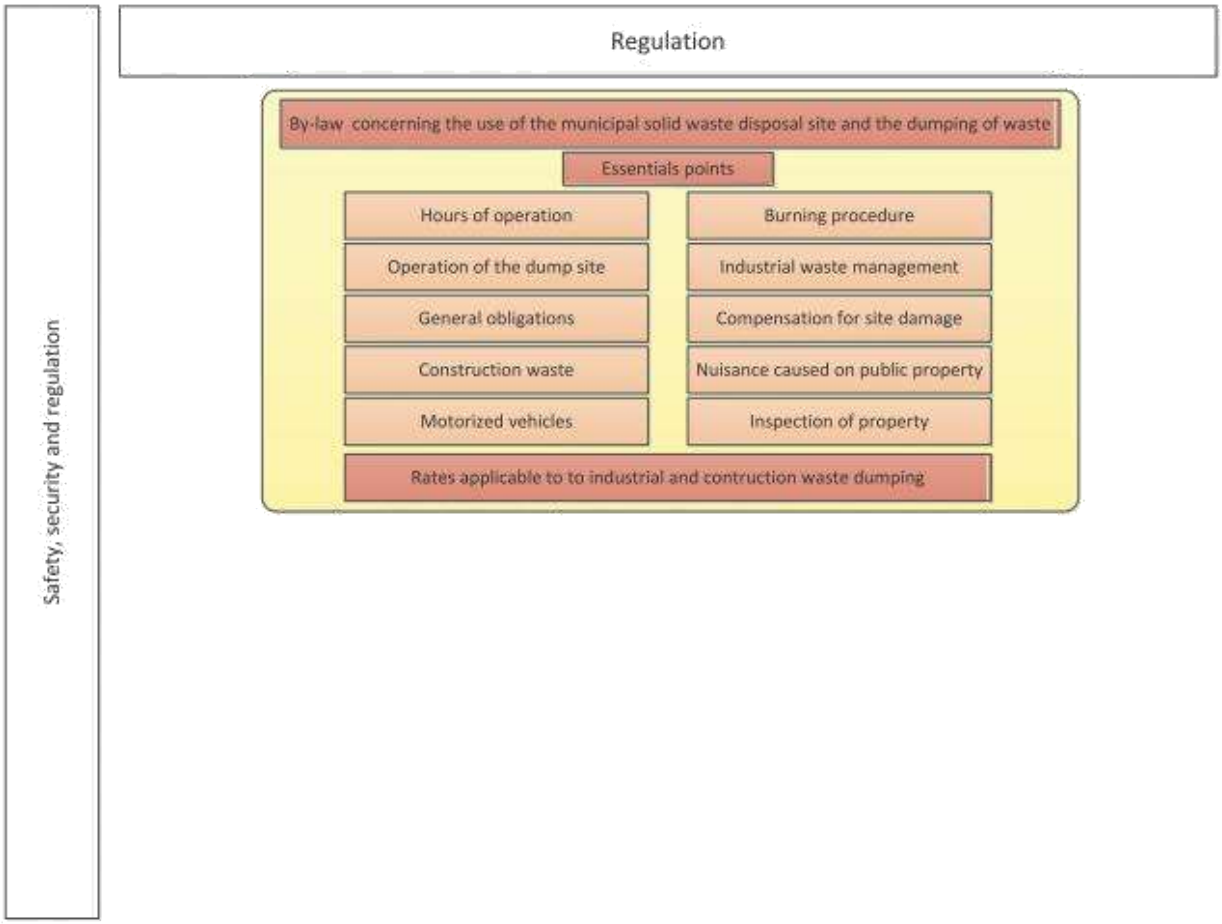
Informative signs should be place on site


Safety, security and regulation
Access Control - Signs
Signs containing information for the users should be used.
Posted at the entrance of the site
Show all applicable regulations
The sections should be identified
ᕿᔪᐃᑦ
Wood
ᑭᑭᐊᑦ
Metals
Household Garbage
Public Dumping Area
Kuujjuaq's solid waste disposal site
Hours of operation
Summer hours (from May to November)
Monday to Friday from 8:00 a.m. to 6:00 p.m.
Saturday from 10:00 a.m. to 4:00 p.m.
Winter hours (from December to April)
Monday to Friday from 9:00 a.m. to 4:00 p.m.
Saturday from 10:00 a.m. to 4:00 p.m.
819-964-2943
APPLICABLE RATES FOR INDUSTRIAL AND CONSTRUCTION WASTE
RATES PER LOAD
OTHER RATE PER LOAD
Kuujjuaq's solid waste disposal site regulation


Safety, security and regulation
Security
Public Security
Control site access
Accompany individuals when they enter the site
Site Security
Control site access
Screening the waste to avoid dangerous and unwanted items
Follow burning procedure
Staff Security
Essential staff training
Hazardous Waste
Dump site management
Safety equipment
Water and puncture proof gloves
Coveralls
Safety boots
Protection glasses
Hard hats
Appropriate and up-to-date vaccinations
Hepatitis A
Hepatitis B
Tetanus
Fire extinguisher and first aid kit should be always available at the site
Use proper lifting techniques
Only staff trained to handle hazardous materials should do so.
Hands need to be wash frequently. Minimally before lunch and after work


Safety, security and regulation
Responsibilities
Northern villages responsibilities
Prepare facility operating budgets and undertake staffing selections
Perform operations at the site in accordance with the Dump site Operations and Maintenance guide
Ensure that only acceptable waste, as indicated on the approved list for disposal, are permitted at the site
Safely dispose of the hazardous waste
Enforce the municipal bylaw and regulation concerning the use of the solid waste disposal site
Ensure that employees receive required training and are work in a safe environment
Deal directly with the public, responding to disposal request
Maintain the environmental monitoring/sampling program
Communicate as required with regulatory agencies (KRG, MDDEP), including the forwarding of monitoring results
CRITICAL POINT :
Northern villages need to set a budget for maintenance of the dump site


Safety, security and regulation
Responsibilities
Site operator responsibilities
Provide overall directions for daily site activities
Perform operations at the site in accordance with the Dump site Operations and Maintenance guide
Ensure that only acceptable waste, as indicated on the approved list for disposal, are permitted at the site
Prepare regularly scheduled reports (weekly, monthly, annually) on progress and planning at the site
Inspect the site access road on a regular basis to recover any accumulation of garbage or debris
Operate and maintain the surface water control structures and other site infrastructures
Coordinate snow removal and general maintenance for the access roads within the site and other areas as necessary
In consultation with the municipality, maintain the completed portions of the landfill
Recommend to the municipality for major and minor work required at the site
Recommend to the municipality the need for bird control and odor control
CRITICAL POINT :
A regular operator presence to take care of the weekly essential maintenance


Safety, security and regulation
Regulation
By-law concerning the use of the municipal solid waste disposal site and the dumping of waste
Essentials points
Hours of operation
Burning procedure
Operation of the dump site
Industrial waste management
General obligations
Compensation for site damage
Construction waste
Nuisance caused on public property
Motorized vehicles
Inspection of property
Rates applicable to to industrial and contruction waste dumping

Section 9
Maintenance Procedures and Schedule

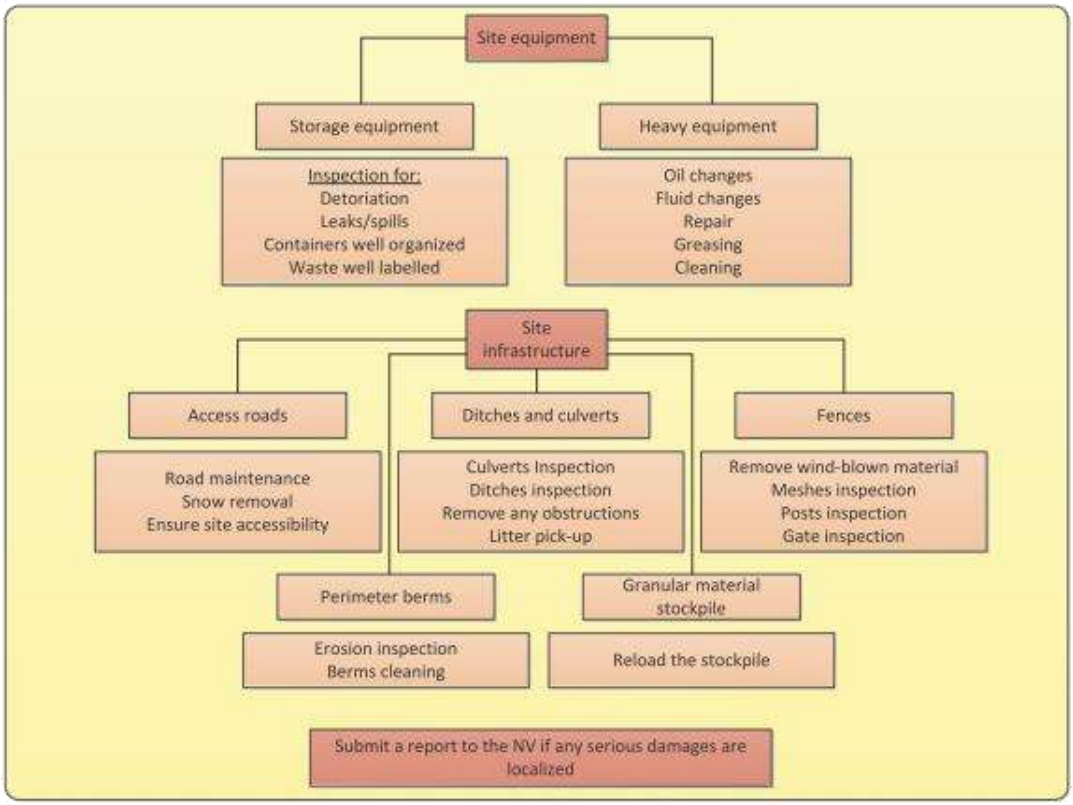
Proper maintenance of the site is crucial to ensure efficient operations. Items which require maintenance procedures include:

- Site equipment
- Site infrastructure

Some maintenance tasks can be schedule weekly, monthly and yearly depending of its nature

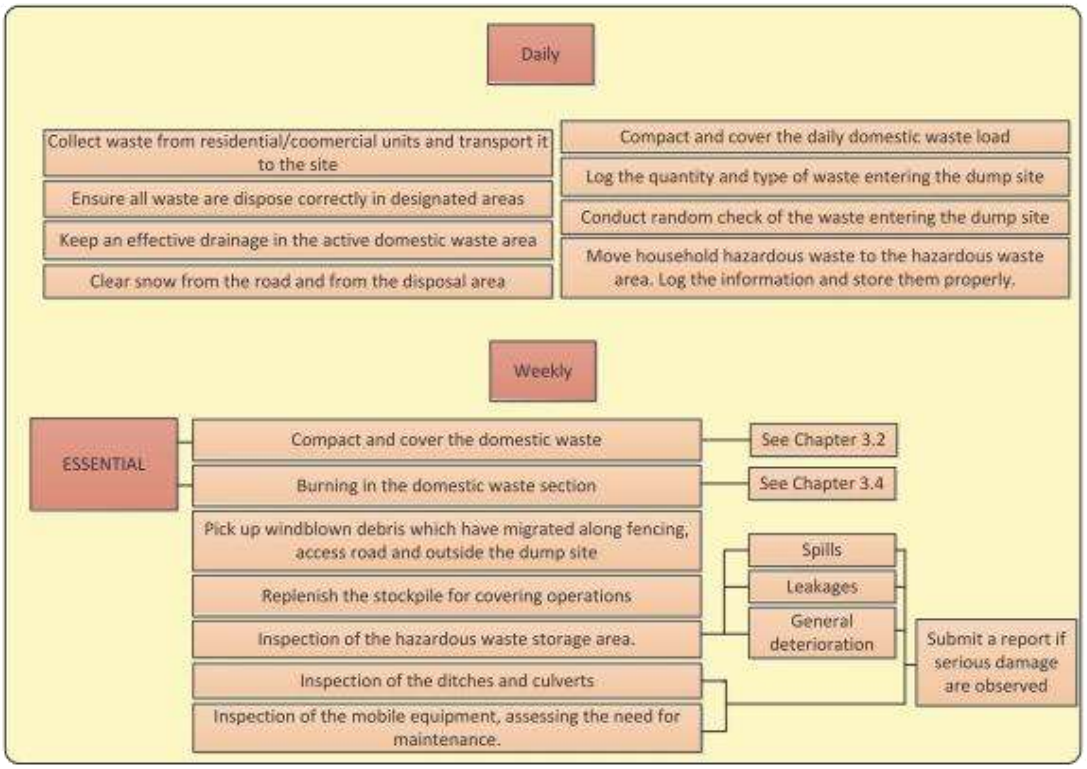
Maintenance Procedure

Maintenance summary



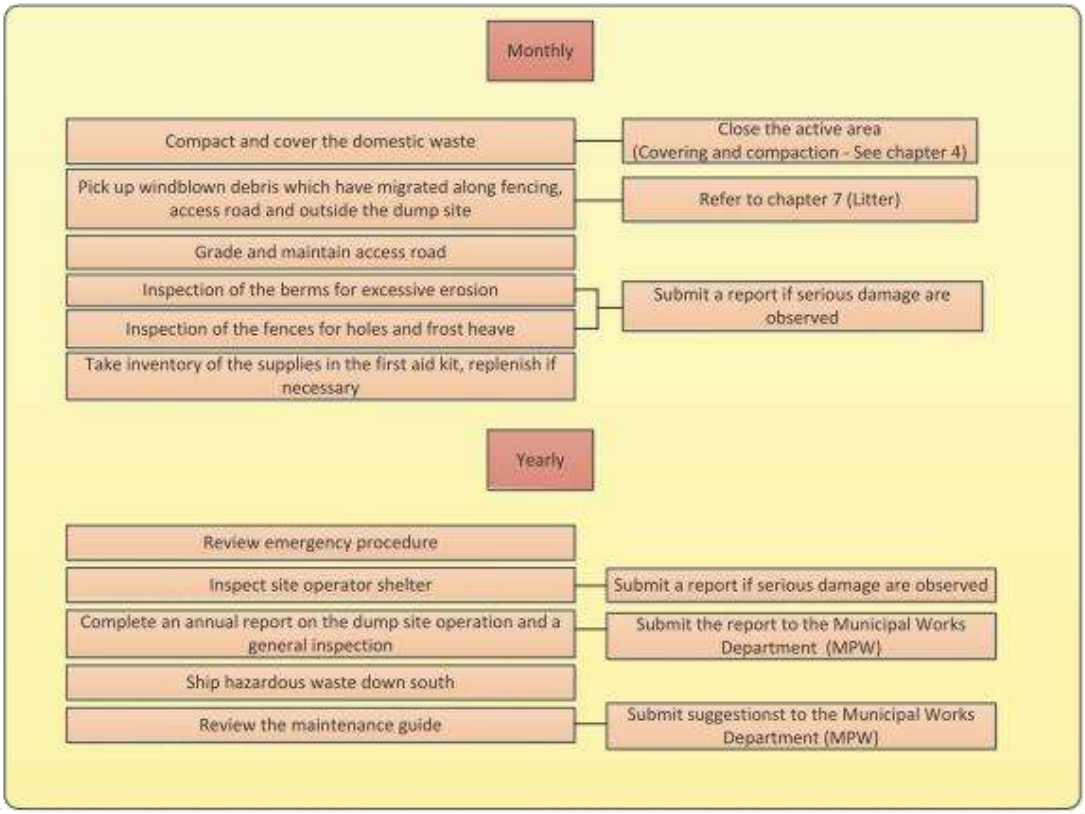
Maintenance Procedure

Schedule (Daily and Weekly)



Maintenance Procedure

Schedule (Monthly and Yearly)



Appendix 8: *Regulation respecting the Recovery and Reclamation of Products by Enterprises*

CATEGORIES OF PRODUCTS COVERED

ELECTRONIC PRODUCTS

22. The products covered by this Division are electronic appliances used to send, receive, display, store, record or save information, images, sounds or waves, and their accessories, except cases, decorative or transportation accessories and products designed and intended to be used exclusively in an industrial, commercial or institutional environment.

The category of electronic products is composed of the subcategories provided for in the following subparagraphs, which include the types of products listed therein:

(1) desktop computers;

(2) laptop computers, electronic pads and e-book readers;

(3) computer screens and television sets;

(4) printers, scanners, fax machines and photocopiers;

(5) cellular and satellite telephones;

(6) wireless and conventional telephones, pagers and answering machines;

(7) keyboards, mouses, cables, connectors, chargers and remote controls designed to be used with a product covered by this Division;

(8) video game consoles and their peripherals, projectors designed to be used with electronic equipment, readers, recorders, burners or sound, image and wave storage devices, amplifiers, equalizers, digital receivers and speakers designed to be used with an audio video system; the types of products referred to in this subcategory include those marketed as part of a set such as home theatre systems;

(9) portable digital players, radio receivers, docking stations for portable digital players and other portable devices, walkie-talkies, digital cameras, digital photo frames, camcorders and global positioning systems;

(10) routers, servers, hard drives, memory cards, USB keys, speakers, webcams, earphones, wireless devices and other accessories and spare parts not covered by an other subcategory provided for in this section and designed to be used with a product covered by this category.

For the purposes of this Division, a desktop computer that is integrated into a screen is considered as a product in the subcategory referred to in subparagraph 1 of the second paragraph and a multi-purpose pocket electronic device that includes a telephone function is considered as a product in the subcategory referred to in subparagraph 5 of that paragraph.

O.C. 597-2011, s. 22.

BATTERIES

29. The battery category is composed of the subcategories provided for in the paragraphs below, and comprising the types of products listed therein:

(1) rechargeable batteries of any shape and batteries composed of such batteries, except lead-acid batteries, batteries designed to be used in motorized vehicles and batteries exclusively designed and intended for industrial purposes;

(2) single use button cells, batteries composed of such cells, other single use batteries and batteries composed of such batteries.

O.C. 597-2011, s. 29.

MERCURY LAMPS

35. The mercury lamp category is composed of the subcategories provided for in the paragraphs below, and comprising the types of products listed therein:

(1) fluorescent tubes;

(2) compact fluorescent lamps;

(3) any other type of lamp that contains mercury.

O.C. 597-2011, s. 35.

PAINT AND PAINT CONTAINERS

41. For the purposes of this Division, stains, primers, varnishes, lacquers, metal, wood or masonry treatment or protection products and any preparation of the same nature intended for maintenance, protection or decoration are considered to be paint.

O.C. 597-2011, s. 41.

42. The products covered by this Division are paint marketed in containers of not less than 100 mm and not more than 50 l and such paint containers, except paint designed and intended to be used exclusively for industrial or artistic purposes. Paints marketed in aerosol containers and such containers are also covered.

The paint and paint container category is composed of the subcategories provided for in the subparagraphs below and comprising the products listed therein:

(1) latex paint;

(2) alkyd or enamel paint, metal and rust paint, the other types of paint other than those in paragraphs 1 and 3, stains, primers, varnishes, lacquers, metal, wood or masonry treatment or protection products and any preparation of the same nature intended for maintenance, protection or decoration;

(3) aerosol paint and aerosol containers, as well as all types of containers used for marketing the products referred to in subparagraphs 1 and 2.

O.C. 597-2011, s. 42.

OILS, COOLANTS, ANTIFREEZE, THEIR FILTERS AND CONTAINERS AND OTHER SIMILAR PRODUCTS

48. The category of oils, coolants, antifreeze, their filters and containers and other similar products is composed of the subcategories provided for in the paragraphs below and comprising the types of products listed therein:

(1) mineral, synthetic or vegetable oils intended for lubrication, insulation or heat transfer in motorized vehicles or equipment, or in the operation of hydraulic or transmission systems, as well as brake fluids, except oils that combust when used such as oils intended to be blended with combustion engine fuel, machine tool slideway lubricants, chainsaw chain oils, drawing, stamping, shaping or form oils, drilling oils, conveyor lubricating oils, dust control oils, penetrating oils and rustproof oils;

(2) containers of 50 l or less used for marketing the products referred to in paragraph 1, including containers used for marketing oils that are excluded in that paragraph, as well as aerosol containers used to market brake cleaners;

(3) oil filters intended for internal combustion engines, hydraulic systems and transmissions, filters for heating systems using light heating oil and for oil storage tanks, coolant and antifreeze filters and diesel filters that are considered to be oil filters for the purposes of this Regulation;

(4) coolants and antifreeze intended for use in vehicles, machinery or motorized equipment, except vegetal coolants and antifreeze, as well as coolants and antifreeze used for aircraft deicing;

(5) containers of 50 l or less used for marketing the products referred to in paragraph 4.

O.C. 597-2011, s. 48.

Appendix 9: Program for the Integrated Management of Scrap Tires 2013–2014

While scrap tires used to represent a major environmental problem, the Québec tire recycling industry is now well established. The Program for the Integrated Management of Scrap Tires helps maintain jobs in the industry by ensuring an adequate and steady supply of scrap tires.

RECYC-QUÉBEC has targeted in particular the development of an industry that can handle beyond any doubt the most difficult residual material to recycle, despite its strong potential, with a view to self-financing and viability.

The new Program for the Integrated Management of Scrap Tires 2013–2014 was created for this purpose.

The Program's objectives remain as follows:

- Recuperate scrap tires generated every year in Québec.
- Direct recovered tires to remoulding, recycling and energy reclamation industries.
- Promote the development of these industries.

The Program's four principles are to:

a. Protect the environment.
b. Promote partnership.
c. Develop leadership.
d. Ensure sound management of public funds.

The new Program for the Integrated Management of Scrap Tires has been in effect since January 1, 2013. It is the fifth government program targeting the management of scrap tires generated every year in Québec. It contains tools for good management and protection of the environment.

The Program for the Integrated Management of Scrap Tires is the continuation of an ambitious project carried out with businesses and stakeholders involved in tire management, which agreed to discuss candidly their respective needs and evaluate possible options to achieve, under the new Program, all the progress possible.

The new Program for the Integrated Management of Scrap Tires has also permitted the creation of not less than 15 recycling businesses that employ roughly 400 individuals, not including the 110 jobs related to tire transportation.

Appendix 10: Refundable containers program, RECYC-QUÉBEC,

Act respecting the Sale and Distribution of Beer and Soft Drinks in Non-Returnable Containers

Under the Act, the products targeted by the container deposit are beer and soft drinks. As well, any distributer of beer or soft drinks in non-returnable containers must hold a permit, which is to say all distributers must hold a permit. To obtain a permit, distributers must be part to an agreement with RECYC-QUÉBEC and BGE, as the case may be.

It is the responsibility of RECYC-QUÉBEC and BGE to ensure that there are no beer and soft drink distributers in Québec that do not possess a permit and do not consequently transfer to them collected deposits. RECYC-QUÉBEC and BGE must also ensure that there are no products on the market of which they do not know the origin and for which consequently they are not transferred collected deposits.

All agreement applications from new distributers are analyzed to ensure that the products distributed comply with the agreement provisions and to determine whether the distributer should receive a status of recuperator or non-recuperator.

Since June 1996, the Act places two obligations on retailers. The first obligation requires retailers to sell only non-returnable containers with a refundable label. The second obligation requires retailers to accept the return of empty containers by consumers and to reimburse the deposit.

RECYC-QUÉBEC and BGE must ensure that retailers comply with the two obligations.

RECYC-QUÉBEC and BGE must also carry out inspections to ensure that retailers sell only refundable containers and that they accept empty containers from consumers with reimbursement of the deposit. Inspections are carried with retailers against whom complaints have been lodged, with retailers who RECYC-QUÉBEC and BGE have grounds to suspect of violations, and with other retailers selected randomly.

Appendix 11: Electronic device recycling pilot project

Recycling Used Electronics in Nunavik

PILOT-PROJECT DESCRIPTION

Introduction

Analysis of current residual materials management reveals that the 14 northern villages in Nunavik generate close to 12 000 tonnes, or 122 000 m^3, of residual materials annually. Almost all of these residual materials are deposited in the community landfills where they are burned, buried or stored. No definite recycling system exists.

In February 2013, the Kativik Regional Government (KRG) drafted a residual materials management plan in which four guidelines were developed to ser ve as a reference for the development and implementation of management measures (Section 3.1.1):

- Improve knowledge of residual materials management;
- Foster management methods applicable in Nunavik based on the concepts of sustainable development;
- Deliver regional support to the northern villages to ensure that the measures implemented reach the set objectives;
- Maintain residual materials processing and management costs at levels that are economically and socially acceptable.

The selective collection of different categories of residual materials will contribute to knowledge acquisition and help the northern villages to extend the service life of local landfills and to improve the quality of the environment. The various selective collection measures will, for the most part, be implemented as pilot projects in communities that are prepared to invest the needed time and funding.

In July 2013, Québec implemented the *Regulation respecting the Recovery and Reclamation of Products by Enterprises,* which will contribute positively to the management of hazardous household waste, providing funding for part of the costs related to the transportation and processing of these materials. As a result of this regulation RECYC-QUÉBEC concluded an agreement with Electronic Products Recycling Association (EPRA), mandating the organization to implement and operate, on behalf of its stewards, a responsible program for the recovery and recycling of electronic products. As an industry-led not-for-profit organization recognized by RECYC-QUÉBEC, EPRA-Québec represents manufacturers, distributors and retailers of electronic products marketed in Québec.

Objectives
In partnership with EPRA, the KRG proposes to develop a pilot project for 2014-2015, in 3 communities, That would allow for the collection, transportation and recycling of used electronics while providing technical support and community awareness with regards to residual material management.

This pilot project, if proven successful, can then be carried over to each of the remaining villages with the intention that each community, with no cost to them, can continuously offer a collection depot for used electronic products to its citizens.

Evaluation
Although the ultimate goal of this project is to have every village successfully operating a collection depot for used electronics, a pilot project would allow EPRA and KRG to test the project's method of collection and to gain a better understanding of accumulating volume and the tasks needed to assure the products are properly collected, packaged for transportation, delivered to a recycling facility in Montréal and will determine the overall participation rate. Once the pilot project is established, the success of the project can be accessed through the following quantitative measures:

- Volume of used electronics at the collection site each week, month, year etc.;
- Volume of used electronics transported to a recycling facility;
- Reduced volume of waste at landfill;
- Number of participating villages.

Workplan
In order to initiate and successfully maintain this pilot project and have it continue in the future, the following steps need to be considered:

a) Establish Community Participation

Before the project moves forward, it will have to be decided in which of the 14 Northern Villages the 2014-2015 pilot project will be implemented. In light of past initiatives involving paper and tire recycling as well as hazardous waste management, it is proposed that the villages of Salluit, Puvirnituq and Kuujjuaq participate in the pilot project. The larger population in these villages could also lead to a greater participation rate and a larger volume of used electronics being collected.

The chosen villages would need to delegate a collection site, be willing to inform the population of its whereabouts and purpose, and have someone be responsible for its security and its preparation for transportation when the time comes. The KRG Environmental Specialist can provide assistance to this person.

b) Establishment of Collection Depot

In a meeting held in April 2014, EPRA committed to covering all costs associated with this project, including the purchase of collection bins that could be placed in each of the villages considered for the pilot project. Several types of bins were proposed however, considering they may be stored outside and the extreme weather in Nunavik; metal cages and reinforced sacks (supersacs) were the most favorable options (See photos below).

Each participating community will have 2 types of collection bins for different types of used electronics being collected. The metal cage will be used to collect larger items such as television, computers and stereo equipment. The supersac will be used to collect smaller items such as cell phones, remotes, and digital cameras. These bins will need to be placed in a secure, easily accessible location, preferably inside a building such as the municipal office, garage or warehouse. Each community will need several metal cages and supersacs sent to them at the beginning of the project in order to sustain the collection of material throughout the winter and spring, while awaiting shipment in 2015.

c) Packaging and Transportation

Once the collection bins are full they will need to be properly packaged and prepared for transportation south via cargo ship. Once full, the metal cage needs only to be moved to a sheltered location and stored until ready to be transported by ship and they are stackable. The supersac will need to be secured to a pallet with metal strapping or plastic wrapping, ensuring none of its contents can easily spill. The full supersacs should also be stored in a safe, sheltered location until ready for shipment. In Kuujjuaq, it is suggested that these bins be stored in a container due to the volume of cages and supersacs that will be needed. The container itself will than be shipped.

The supersacs and/or container will need to be properly identified and shipping documents prepared. Either the community representative responsible for the collection site or the Environmental Specialist at KRG can do this. A correspondence

should be sent to the shipping company, in this case NEAS. The Nunavik contact for NEAS is Richard Jones (rjones@neas.ca).

The bins containing the used electronics should therefore be addressed to:

EPRA-QUÉBEC
650 boul. Gerard-Cadieux
Salaberry-de-Valleyfield, Qc. J6T 6L4

Once the material arrives in Montréal, an EPRA transporter will pick up the electronic products from the port and will bring it to a qualified recycler. The contact at EPRA is Sacha Des Serres (sacha.desserres@eprassociation.ca).

Below is a lost of electronic material that is accepted at the collection sites: (http://recyclemyelectronics.ca/qc/what-can-i-do/recycle-what/)

- Desktop/Countertop Computers
  - Computer terminals
  - Desktop computers used as a server
  - Desktop/tower servers
  - Blade servers installed in a blade enclosure
  - Rack mount servers
- Portable Computers
  - Laptop computers
  - Notebook computers
  - Tablet computers
  - Netbook computers
  - Mini computers
- Computer and Video Game Peripherals
  - Mouse
  - Trackballs
  - Keyboards
  - Keypads
  - Touchpad mouse
  - Media readers
  - Routers/Modems
  - External hard drives
  - External floppy disk drives
  - External optical disk drives
  - Numeric keypads
  - Graphic tablets without display
  - HDMI switches
  - Joysticks
  - Video game console controllers, balance boards, sensors and other input devices
  - Hard drive duplicators
  - Network-Attached Storage Devises (NAS)
  - Embedded Multimedia Terminal Adapters (EMTA)
  - Bridges, wireless access points, switches, range extenders
  - Cables
  - Connectors
  - Chargers
  - Remotes

  - Memory cards
  - USB Keys
  - Toner cartridges
- Display Devices
  - Televisions
  - Computer monitors
  - Professional display monitors
  - Closed circuit monitor screens
  - TV with built-in DVD and/or VCR player/recorder
  - All-in-one computers
  - Electronic white boards with display
  - Graphic tablets with display >10''
  - Portable display devices >10"
- Non-Cellular Telephones and Answering Machines
  - Telephones (corded and cordless, VoIP, satellite phones)
  - Speaker/Conference phones
  - Telephone line answering machines (cassette and digital)
- Cellular Devices and Pagers
  - Cellular phones, including those offering camera, video recording and/or audio functions
  - Smart phones (cell-enabled)
  - Cell-enabled PDAs utilizing touch-screen technology
  - Cell-enabled handheld devices
  - Pagers
- Desktop Printers, Scanners, Fax Machines, Copiers and Multi-Function Devices (MFDs)
  - Desktop printers
  - Camera dock printers
  - Desktop label, barcode, card printers
  - Thermal printers
  - Desktop scanners
  - Desktop business card scanners
  - Desktop cheque scanners
  - Desktop photo and negative scanners
  - Desktop fax machines
  - Desktop MFDs
- Floor-Standing IT Equipment
  - Floor-standing printers
  - Floor-standing scanners
  - Floor-standing fax machines
  - Floor-standing fax machine drum scanners
  - Floor-standing photocopiers
  - Floor-standing multi-function (MFD) or "all-in-one" devices that perform different tasks such as copy, scan, fax, print
  - Floor-standing servers and routers
- Personal/Portable Audio/Video Systems
  - Portable AM/FM and satellite radios
  - Clock radios
  - Portable stereos, including those enabled to connect to wireless Internet
  - Portable tape players/recorders
  - Portable disc (CD, DVD, VHS, Blu-ray, etc.) players/ recorders
  - MP3 players
  - Portable digital players

  - Docking stations for portable digital players, smart phones and other portable devices
  - Portable docking/ compact/folding speakers (wired and wireless including Wi-Fi or Bluetooth)
  - Portable cassette or digital audio/voice recorders
  - Headphones, earphones and microphones
  - Headsets (wired and wireless, including Bluetooth)
  - Digital cameras
  - Digital photo key chains
  - Video cameras/camcorders
  - Personal Digital Assistants (PDAs)
  - Multi-function satellite radios that include CD, MP3, FM radio or other audio functions
  - Portable scanners (business card/photo negative scanners)
  - Portable printers (e.g., portable photo printers)
  - Web cameras
  - Digital frames
  - Portable Displays– screen size < 10''
  - Sound, image and wave storage devices
  - Handheld barcode scanners
  - Portable two-way radios/FRS radios /GMRS radios/walkie-talkies/CB radios
  - Handheld video game systems
  - E-book readers
  - Handheld satellite radio receivers
  - Portable multimedia projectors
  - Handheld GPS receivers designed to be used for leisure or sport (e.g. hiking GPS)
  - HD antennas
  - Baby video monitor and camera systems
  - Odometers
- Non-Portable Audio/Video Systems
  - Video cassette players (VCRs)/video projectors
  - Digital projectors
  - Digital Video Recorders (DVRs)
  - Personal Video Recorders (PVRs)
  - Non-portable Disc players/recorders (DVD, Blu-ray, etc.)
  - Laser Disc players/recorders
  - Cable and satellite digital receivers /Set-top boxes
  - Converters
  - Non-portable AM/FM and satellite radios
  - Non-portable combination multimedia players
  - Analog and digital video cameras for home security or other closed circuit home use
  - Amplifiers
  - Frequency equalizers
  - Turntables/record players
  - Audio speaker systems
  - Other digital music recorders/players
  - Non-portable combination cassette
  - Karaoke machines
  - Non-portable multimedia projectors
  - Multimedia players/recorders
  - Audio speaker systems packages
  - Non-portable/Non-commercial video game consoles (TV or screen required)
- Vehicle Audio/Video and Navigation Systems
  - In-dash radio, DVD, CD and/or cassette players (including those with integrated satellite radio and/or GPS/navigation functions)

  - Amplifiers
  - Frequency equalizers
  - Speakers
  - Video player systems
  - Video displays (including those with built-in tuners)
  - Rear vision cameras
  - Standalone or in-dash GPS or other navigation systems designed for use in a vehicle (e.g. automotive or marine GPS receivers and components)
  - Ceiling speakers
  - Wall recessed speakers
- Home Theatre in a Box
  - Peripheral audio devices
  - Audio and video equipment sold as a package/bundle that is used in residential and non-residential locations

d) Public Awareness Campaign

At the April meeting with EPRA, they also committed to funding an awareness campaign as part of the project. A budget has been set aside for the production and printing of posters that will provide simple and direct instructions concerning where the collection bins are located in their community, the types of material that can be deposited in the collection bins (metal cage or supersac) and who they can contact should they have any questions. Other sources of public announcements included in the budget are newspaper articles and radio spots. All communication material will be made available in Inuktitut, English and French.

Budget

As part of the *Regulation respecting the Recovery and Reclamation of Products by Enterprises*, the budget for this project will be covered in total by EPRA. This includes the cost of the collection bins, transportation of the collection bins to and from the communities by cargo ship, any communication materials, and employee time for the preparation of material for shipment.

Timeline

In order to facilitate the collection of used electronics in the communities of Salluit, Puvirnituq and Kuujjuaq, during the 2014-2015 seasons, the following timeline is proposed:

July 2014

- Finalize and present project description to potential communities, discussing details and level of interest in participating.

August 2014

- Determine number of metal cages and supersacs needed for each participating community;
- Production and printing of trilingual posters and other forms of communication campaign.

September/October 2014

- Delivery of metal cages, supersacs and posters by ship to each community;
- Installation of bins at collection location in each community;
- Distribution of posters and advise population of collection bin location and collection program.

November 2014-May 2015

- Continue with the collection of used electronics. Store filled cages and supersaces in safe, secure location during winter.

June 2015

- Prepare full collection bins for transportation (proper packaging and identification);
- Inform KRG Environmental Specialist of how many of each type of collection bin will be ready to transport south by ship;
- Complete shipping documentation and inform NEAS;
- Inform KRG Environmental Specialist regarding number of metal cages and supersacs needed for 2015-2016.

July 2015

- Bring collection bins to ship;
- Collect replacement metal cages and supersacs from ship
- Continue with collection of used electronics.

Other Partnerships

The list of material covered by the *Regulation Respecting the Recovery and Reclamation of Products by Enterprises* includes light bulbs and fluorescent tubes. RecycFluo is a non-profit program that accepts mercury-containing light bulbs and fluorescent tubes from Quebec consumers and businesses, and responsibly recycles them free of charge. The program is operated on behalf of the manufacturers, distributors and retailers of these products. Currently RecycFluo is willing to participate in a similar pilot-project. It remains to be seen whether these material can be collected in tandem with the used electronics. A meeting with RecycFluo should be organized to better understand their objectives and budget capacities.

Conclusion

If this pilot project succeeds, the communities implicated will have less electronics waste being sent to their landfills and better yet, a greater appreciation for how simple recycling can be. Furthermore, the partnership between EPRA, KRG and the communities will hopefully serve as a model for other communities and for other residual material management projects in the future.

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