Government of Nunavut

Hamlet of Arviat Solid Waste Audit Results

Project Name
Hamlet of Arviat Solid Waste Audit

Project Number
V00605109-A0

Prepared By: Jean-Louis Gaudet

Reviewed By: John Smith

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1 Introduction

In the fall of 2013, the Government of Nunavut (GN) retained exp Services Inc. (exp) to conduct a waste audit in the Hamlet of Arviat. The purpose of the waste audit was to provide a characterization of the Hamlet's municipal solid waste and to project estimated annual quantities. This report presents the methodology for and results of the waste audit.

2 Audit Methodology

2.1 Residential Solid Waste

The waste audit was performed from Monday, September 16 to Thursday, September 19, 2013. Two staff members from exp presided over the waste audit. Four members of the community were hired to assist with the sorting. The sorters were trained in health and safety and in sorting techniques.

The Hamlet provided working space for the audit team in the public works garage. A sort table was established in the central area of the work space. Empty drums were set around the sort table, lined with plastic garbage bags and labelled with the waste audit sorting categories. Boxes were set closer to or on the sort table and lined with garbage bags for sorting frequently encountered items, such as garbage, food waste and diapers.

Figure 1: Waste Sort Area

Waste for the audit was collected by Hamlet waste collection staff, who also recorded the locations from where the garbage was collected. The first sample was dropped off on Monday afternoon. Based on the mapping, the waste material was collected from waste boxes used by 85 residential units and five businesses/institutions. The second sample was dropped off on Wednesday morning and included material from waste boxes used by 22 residential units and three businesses/institutions.

In Arviat, solid waste is collected roadside seven days a week. The garbage crews operate full-time from Monday to Friday and part-time on the weekends. There is no set schedule for collection; rather, collection staff drive through the hamlet and pick up waste from partially-full or full garbage boxes. As a result, the number of collections households receive will vary between households and depend on how often they fill up their garbage box. Additionally, some of the garbage boxes are shared by more than one household. Because there is no set schedule for collection, there is no way of knowing if the waste collected on a particular day came from one or all of the households served by the garbage box.

To estimate the total amount of waste generated by the residential sector (including the five businesses/institutions), the garbage crews tracked the number of garbage loads they dropped off at the landfill site over a period of two weeks. The Hamlet does not know the size of the disposal truck. Based on the site visit, the project team estimates that the truck has a volume capacity of 13 cubic yards, or about 9.9 cubic metres.

The sampled waste was sorted into 23 individual categories. These are listed in Table 1.

Table 1: Waste Audit Categories

Fibers
- Paper, magazines, and glossy paper
- Old corrugated cardboard (OCC)
- Boxboard (e.g., cereal boxes, cracker boxes, etc)
- Polycoat (including Tetra-Paks and milk cartons)
- Other paper: compostable (such as paper towels and paper plates
- Other paper: non-compostable (such as coated papers)

Metals
- Aluminum food and beverage, foil and other
- Steel food and beverage

Glass
- Glass: food and beverage

Plastics
- PET containers
- HDPE containers
- Polystyrene
- Film
- Empty garbage bags
- Other plastics

Organics
Wood Scrap
Electronics
Hazardous Waste
Toys
Textiles
Diapers
Other Unclassified Waste

Waste from the samples was placed on the sorting table and sorted into the appropriate drums/boxes. As liner bags became full, they were hung on a hand held scale and weighed. The hand held scale was accurate to +/-2oz.

Given the bulky nature of the old corrugated cardboard (OCC) and wood scraps, these waste items were placed in piles over the course of the audit. At the end of the sorting period, the sizes of the piles were measured and their volumes estimated. Volume-to-weight conversion factors were applied to the estimated volumes to calculate approximate weight of the sorted material. Similarly, at the end of the sorting period, a pile of loose waste remained on the tipping floor (from either bags broken in the truck or loose waste collected by the collection staff). Materials were sorted from this pile into their appropriate bins as much as possible (e.g., boxboard, OCC, pop cans, etc.). The volume of the remaining mixed waste was measured, and this in turn was used to calculate the pile's weight. The volume-to-weight conversion factors used are discussed below:

- **Old corrugated cardboard:** The conversion factor used for OCC was based on Appendix B of the US EPA's *Measuring Recycling: A Guide for State and Local Governments* (September 1997), which provides a range of 50 to 150 lbs for one yd^3 of uncompacted OCC. Given the loose nature of the sorted OCC piles, the least dense part of the range was used (50 lbs per yd^3, or 29.66 Kg per m^3).

- **Wood waste:** The conversion factor for wood waste was based on the value provided in the US EPA's *Standard Volume-to-Weight Conversion Factors* (www.epa.gov/smm/wastewise/pubs/conversions.pdf). The volume-to-weight conversion for "Wood scrap, loose" is 329.5 lbs per yd^3 (or about 195.48 Kg per m^3).

- **Mixed waste:** Appendix B of the US EPA's *Measuring Recycling: A Guide for State and Local Governments* estimates that 1 yd^3 of residential waste (uncompacted at curb) weighs approximately 150 to 300 lbs. Given that the loose mixed waste remaining at the end of the sort had been removed of OCC, boxboard material and other recyclable items, it was assumed that the density of this material would be in the higher end of that range. Therefore, a volume-to-weight conversion factor 300 lbs per yd^3 (or 177.98 Kg per m^3) was used.

The volumes of the piles were calculated using the formula for the volume of an elliptical cone:

$$V = pi * r * R * H * 1/3$$

where

V = volume;
r = radius of minor axis;
R = radius of major axis; and
H = height.

Table 2 presents the measurements of the piles, the calculated volumes, and the calculated weights

Table 2: Calculated Weight of Sorted Waste Piles

	OCC Pile 1	OCC Pile 2	Wood Waste Pile	Remaining Mixed Waste Pile
Diameter (minor axis) (m)	2.04	2.42	1.62	2.89
Diameter (major axis) (m)	3.81	2.62	1.85	4.15
Height (m)	1.01	1.32	0.54	0.69
Volume (m^3)	2.05	2.18	0.42	2.17
Weight (Kg)	60.82	64.69	82.03	385.81

2.2 Commercial Solid Waste

Waste generation rates and composition were estimated for the Padlei Co-op, the Northern Store and the lumber store based on interviews with their managers.

3 Audit Results

3.1 Residential Solid Waste

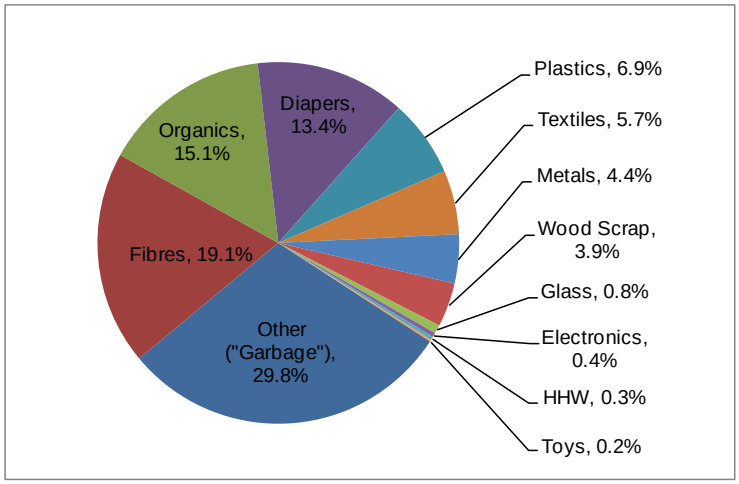
3.1.1 Overview

The four largest categories of sorted residential solid waste[1] included:

- Other waste (i.e., “garbage”) - 29.8%;
- Fibres - 19.1%;
- Organics - 15.1%; and
- Diapers - 13.4%.

Combined, these items made up approximately 77.4% of the sample material. A summary of the waste’s composition, by weight, is presented in Figure 2, followed by a table of results. A discussion of the results by audit category follows.

Figure 2: Composition of Residential Solid Waste (by Category)



[1] As noted earlier, including the five businesses/institutions whose waste was collected with the residential waste.

Table 3: Waste Audit Results – Residential

Material	Sampled Weight (Kg)	Percentage
Fibers		
• Papers, magazines, glossy	22.3	1.1%
• Old corrugated cardboard [1]	125.5	6.0%
• Boxboard	98.5	4.7%
• Polycoat	6.1	0.3%
• Other paper: compostable	139.2	6.7%
• Other paper: non-compostable	6.4	0.3%
Metals		
• Aluminum food and beverage, foil and other	53.1	2.5%
• Steel food and beverage	38.2	1.8%
Glass (food and beverage/alcohol)	15.9	0.8%
Plastics		
• PET containers	32.3	1.6%
• HDPE containers	18.3	0.9%
• Polystyrene	8.3	0.4%
• Film	20.3	1.0%
• empty garbage bags	28.7	1.4%
• Other plastics	36.3	1.7%
Organics	314.3	15.1%
Wood Scrap [1]	82.0	3.9%
Electronics	8.1	0.4%
Hazardous Waste	6.2	0.3%
Toys	3.4	0.2%
Textiles	119.1	5.7%
Diapers	279.4	13.4%
Other ("Garbage") [2]	620.7	29.8%
TOTAL WASTE SORTED	**2,082.8**	**100.0%**

Notes:
1. Based on volume estimates.
2. Includes 385.81 Kg calculated from volume estimates.

3.1.2 Fibres

At 19.1% of the residential waste stream, fibre is the largest category of material other than garbage measured during the audit.

The fibres category primarily consisted of OCC (6.0% of waste stream), boxboard (4.7%) and other compostable fibres (6.7%). While the types of other compostable fibres were not recorded, a large portion of this material was OCC used for preparing country food. For the purpose of waste diversion, the OCC contaminated with food waste would not be suitable for recycling, but it could potentially be composted.

Table 4: Divertible Fibers

Material	Percentage of Residential Waste Stream
Papers, magazines, glossy	1.1%
OCC	6.0%
Boxboard	4.7%
Polycoat	0.3%
Other fibers: compostable	6.7%
Total	**18.8%**

3.1.3 Organics

The next largest category of potentially divertible material was organics, which formed 15.1% of the audited material. While no sub-categories for organics were measured, it was observed that much of the organics was waste from the preparation of country-food (e.g., caribou legs, a few chunks of beluga hide/blubber) and meal wastes (e.g., leftover food scraps, chicken bones, etc).

Scraps from the preparation of vegetables were much less common in this audit compared to those in the rest of Canada or the United States. This may be due to purchased foods eaten in Nunavut communities being pre-processed and frozen, canned or in boxes. As such, this food is ready-to-eat with little preparation waste (e.g., peels, trimmings, etc.).

3.1.4 Diapers

Approximately 13.4% of the residential waste sorted was diapers. This is relatively high compared to other communities in Canada and the United States, but this is likely due to the high birth rates experienced in Nunavut (e.g., a 2011 total fertility rate of 2.97 children per woman in Nunavut compared to the Canadian average of 1.61[2]). Arviat is also considered to have one of the highest birth rates in Nunavut.

3.1.5 Plastics

Plastics formed about 6.9% of the audited waste. Less than half of the plastics sorted (about 2.8% of the waste stream) could potentially be recycled in a recycling program, with each type of recyclable material contributing between 0.4% to 1.6% of the entire waste stream (see table 5).

While plastic film contributed 1.0% to the waste stream, there were many different types of film accounted for; therefore, this would not be an easily recyclable material. The Padlei Co-op and the Northern Store both charge fees for grocery bags, which may be a factor encouraging local residents to use cardboard boxes to package grocery purchases rather than plastic bags. As most residents commute within the Hamlet on ATV's, boxes may also be a more easier method of transporting grocery purchases than bags.

[2] Statistics Canada, CANSIM, table 102-4505.

Table 5: Divertible Plastics

Material	Percentage of Residential Waste Stream
PET containers	1.6%
HDPE containers	0.9%
Polystyrene	0.4%
Total	**2.8%**

3.1.6 Textiles

Textiles (including some footwear) contributed to 5.7% of the waste stream. While the textiles could potentially be recycled for their fibres, it was unclear whether the clothing was in good enough condition to allow for reuse.

3.1.7 Metals

Approximately 4.4% of the waste stream sorted was metal, which included 2.5% for aluminum products and 1.8% for steel food and beverage containers. The vast majority of sorted aluminum consisted of pop cans, although there were some aluminum foil products.

3.1.8 Wood Waste

Some wood waste was found loose within the waste samples and formed about 3.9% of the waste audited. The wood waste generally consisted of mixed pieces of lumber and plywood. Sizes and condition of the wood varied. The sorted wood waste pile is depicted in Figure 3.

Figure 3: Sorted Wood Waste Pile

3.1.9 Other Materials

Other waste materials included in the sort were:

- Glass (0.8% of the total waste sorted);
- Electronics (0.4%)
- Household hazardous waste (0.3%); and
- Toys (0.2%).

The toys collected appeared to be in generally good condition and suitable for reusing. They were mostly made from plastic and would therefore be included in the "other plastics" category if they were not fit for reuse.

3.1.10 Projected Tonnage of Residential Solid Waste Stream

After the waste audit was conducted, the garbage crews tracked the number of times they unloaded garbage at the Hamlet's landfill site over a two week period. On average, the crew dropped off three garbage truck loads per day between Monday to Friday, two loads on Saturday, and one load on Saturday. This amounts to about 936 loads of waste deposited annually.

The capacity of the disposal truck was estimated to be about 13 yd^3, or about 9.9 m^3. Based on 936 loads of waste disposed per year, approximately 9,304 m^3 of waste is being disposed in the Hamlet's landfill annually.

The density of uncompacted waste as reported in the 2003 MACA guidelines (0.099 tonnes/m^3) is often used in Nunavut when converting a known volume of waste to tonnes. However, in this case, the waste material being disposed has been compacted in the garbage truck. Appendix B of the US EPA's *Measuring Recycling: A Guide for State and Local Governments* estimates that 1 yd^3 of municipal solid waste compacted in a truck weighs approximately 500 to 1,000 lbs. This translates to a compaction density in the range of 0.30 tonnes/m^3 for less compacted waste or 0.59 tonnes/m^3 for more compacted waste. Given the high frequency of waste collection in Arviat, it is assumed that the waste is not highly compacted, and therefore the lower density of 0.30 tonnes/m^3 was used to convert the volume of waste collected to tonnes.

Based on 9,304 m^3 of waste disposed annually with an in-truck compaction rate of 0.30 tonnes/m^3, it is estimated that the Hamlet disposes of 2,760 tonnes of residential solid waste per year (see Table 7).

Table 6: Comparison of Compaction Densities

Level of Compaction	Estimated Density (tonnes/m^3)
Uncompacted waste [1]	0.099
Compacted in truck (lower range) [2]	0.30
Compacted in truck (higher range) [2]	0.59

[1] Department of Municipal and Community Affairs Government of the Northwest Territories. *Guidelines for the Planning, Design, Operations and Maintenance of Modified Solid waste Sites in the NWT*. Ferguson Simek Clark Engineers & Architects. April 21, 2003.
[2] United States Environmental Protection Agency. *Measuring Recycling: A Guide for State and Local Governments. Appendix B.* September 1997.

Table 7: Residential Municipal Solid Waste Disposed

Number of Waste Loads per Week	Number of Loads Annually	Estimated Volume of Truck (m^3)	Calculated Volume of Waste Disposed Annually (m^3)	Estimated In-truck Waste Compaction (tonnes/m^3)	Calculated Tonnes of Waste Disposed (tonnes)
18	936	9.94	9,304	0.30	2,760

3.2 Commercial Solid Waste

The managers of the Padlei Co-Op, the Northern Store and the lumber store were each interviewed about the type and volume of waste they generate. The manager of the lumber store indicated that the amount of waste they generate is negligible. The results for the Padlei Co-op and the Northern Store are discussed in the following paragraphs.

3.2.1 Padlei Co-op

The manager of the Padlei Co-op reported that the store used a half-ton pick-up truck to send three or four loads of waste a week to the landfill site for disposal. Of this material, 75% is OCC and the remaining 25% is an equal mix of wet waste and mixed waste. Assuming an average volume of 2,220 L of cargo space in the pick-up truck (with an 8-foot bed), this amounts to about 404 m^3 of waste sent for disposal from the Padlei Co-op annually.

The conversion factor for OCC described in Section 2.1 was used to estimate the amount of OCC disposed by the Padlei Co-op (i.e., 29.66 Kg per m^3 for uncompacted OCC). For the remaining portion of mixed waste and wet waste, the average density for uncompacted commercial-industrial waste as listed in Appendix B of the US EPA's *Measuring Recycling: A Guide for State and Local Governments* (September 1997) was used. Converted to metric, this provides a volume-to-weight conversion factor of 267 Kg per m^3. The calculations used are provided in Appendix A. The calculated amount of waste disposed by the Padlei Co-op is provided in Table 6.

Table 8: Estimated Waste Disposed – Padlei Co-op

Material	Percent of Load	Annual Volume (m3) *	Volume to Weight Conversion (kg per m3)	Est. Annual Weight (tonnes)
OCC	75.0%	303	29.66	9.0
Wet Waste **	12.5%	50	266.97	13.5
Mixed Waste	12.5%	50	266.97	13.5
Total	**100%**	**404**	**-**	**35.9**

* Based on a pick-up truck bed volume of 2.2 m^3 and an average of 3.5 trips per week.
** Wet waste is predominantly food waste with some compostable paper.

3.2.2 Northern Store

The manager of the Northern store reported that they shipped 6 to 12 bags of wet waste to the landfill each week. He also reported that the OCC piled in their garbage room was

shipped to the landfill site daily. The garbage room measures 3 m by 3.5 m, and the pile of OCC achieves an approximate height of about 0.5 m before the OCC is shipped to the landfill.

An average of 9 bags of wet waste (with an average volume of 105 L per bag) was used to estimate how much waste the Northern Store ships to the landfill on an annual basis. The same volume-to-weight conversion factors used in the Padlei Co-op waste estimates were used for the Northern Store estimates. The calculations are provided in Appendix A. The calculated amount of waste disposed by the Northern Store is provided in Table 9.

Table 9: Estimated Waste Disposed – Northern Store

Material	Annual Volume (m3)	Volume to Weight Conversion (kg per m3)	Est. Annual Weight (tonnes)
OCC	1,638	29.66	48.6
Wet Waste *	49	266.97	13.1
Total	**1,687**	**-**	**61.7**

* Wet waste is predominantly food waste with some compostable paper.

3.2.3 Summary of Commercial Solid Waste Stream

Combined, the Padlei Co-op and the Northern Store generate about 98 tonnes of solid waste annually. Of this, 58 tonnes (59%) is OCC, 27 tonnes (27%) is wet waste, and 13 tonnes (14%) is mixed waste. Table 10 provides a summary of the uncompacted volumes and weights for the material disposed.

Table 10: Estimated Waste Disposed – Padlei Co-op and Northern Store Summary

Material	Est. Annual Volume (m3)	Est. Annual Weight (tonnes)	Percentage (by weight)
OCC	1,941	58	59%
Wet Waste	100	27	27%
Mixed Waste	50	13	14%
Total	**2,091**	**98**	**100%**

3.3 Summary of Arviat's Municipal Solid Waste

Table 11 presents the waste characterization for the Hamlet's residential and commercial solid waste. The total amount of solid waste generated annually is approximately 2,858 tonnes. This includes:

- 585 tonnes of fibres (20% of total);
- 121 tonnes of metals (4% of total);
- 21 tonnes of glass (1% of total);
- 191 tonnes of plastics (7% of total);
- 443 tonnes of organics (16% of total);
- 290 tonnes of other wastes, including wood scraps, electronics, household hazardous waste, textiles and reusable toys (10% of total); and
- 1,206 tonnes of various mixed wastes, including diapers (42% of total).

It is important to note this estimate does not include:

- Scrap metal from sources such as appliances, discarded oil drums or tanks, end-of-life vehicles, construction or demolition sites, or large pieces of scrap metal that may be disposed by residents on an occasional basis (e.g., bicycles, metal shelving, etc);
- The Hamlet's existing stockpile of liquid hazardous wastes, liquid hazardous wastes disposed by municipal or commercial shops and garages, or used oil from within the community;
- Construction and demolition wastes;
- Episodic influxes of wood or cardboard container waste, such as boxes or crates from the summer sealifts; or
- Other wastes that would not routinely be disposed by households or the Hamlet's commercial enterprises.

Table 11: Estimated Municipal Solid Waste Composition (2013)

Material	Residential	Commercial	Total (tonnes)	Total (%)
Fibres				
Papers, magazines, glossy	30		30	1.0%
Cardboard	166	58	224	7.8%
Boxboard	131		131	4.6%
polycoat	8		8	0.3%
Other paper: compostable	184		184	6.5%
Other paper: non-compostable	9		9	0.3%
Metals				
aluminum food and beverage, foil and other	70		70	2.5%
Steel food and beverage	51		51	1.8%
Glass				
Glass food and beverage/alcohol	21		21	0.7%
Plastics				
PET containers	43		43	1.5%
HDPE containers	24		24	0.8%
Polystyrene	11		11	0.4%
Film	27		27	0.9%
Empty garbage bags	38		38	1.3%
Other plastics	48		48	1.7%
Organics	417	27	443	15.5%
Wood Scrap	109		109	3.8%
Electronics	11		11	0.4%
Hazardous Waste	8		8	0.3%
Toys	5		5	0.2%
Textiles	158		158	5.5%
Diapers	370		370	13.0%
Other ("Garbage")	822	13	836	29.3%
TOTAL	**2,760**	**98**	**2,858**	100.0%

4 Diversion Potential

A review of the Hamlet's estimated municipal solid waste composition shows that about 53.5% (or 1,530 tonnes) of the Hamlet's waste could potentially be diverted from disposal, while about 46.5% (or 1,328 tonnes) would still require disposal (see figure 4). Some of the material could potentially be diverted from disposal using local means, while others would require being shipped south for recycling.

Figure 4: Potentially Divertible Residential Waste from Landfill

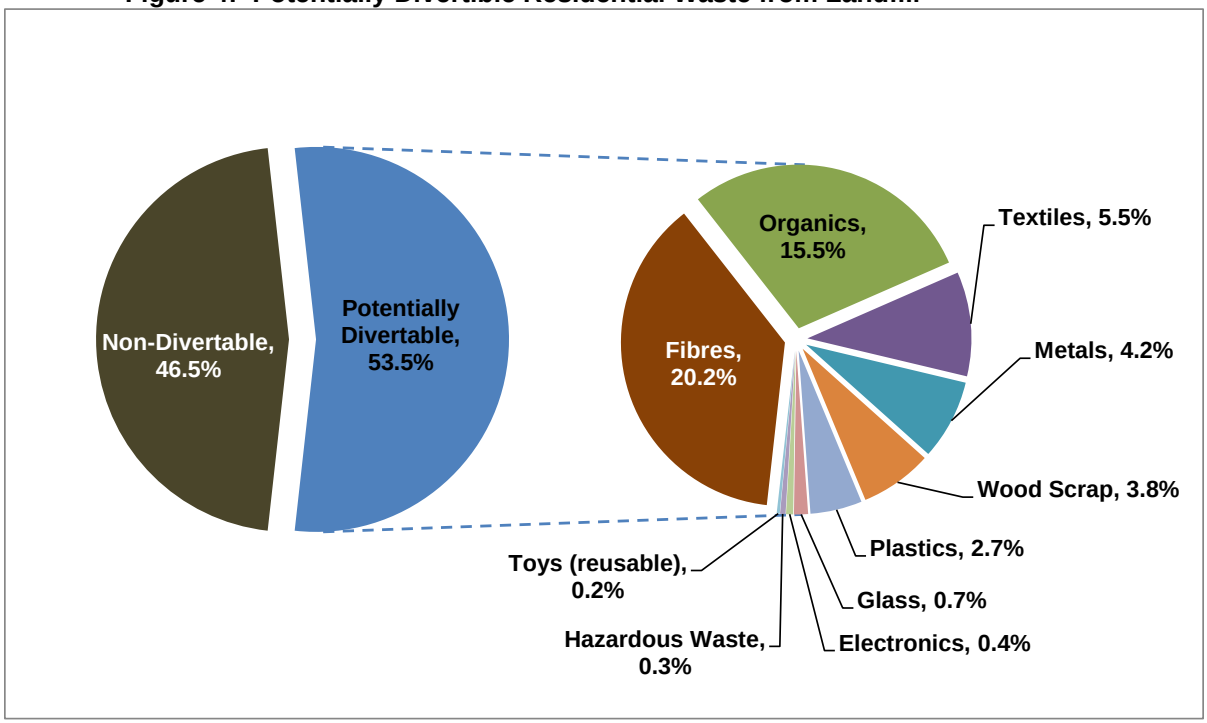


Table 12 lists some potential options for diverting specified wastes from the Hamlet's landfill site. While controlled combustion is included for some materials, incineration or waste-to-energy as whole has not been included, as incineration/waste-to-energy is considered by the project team as a broader potential disposal option. It is important to note that some of the items included in the list of potentially divertible material may be more feasible to divert than others. Table 12 is not meant to be a complete list of diversion options.

Table 12: Possible Means of Material Diversion

Stored/Shipped for Recycling or Safe Disposal	Composting	Source for Alternative Daily Cover	Controlled Combustion
Fibres (including OCC) **Textiles** **Metals** **Plastics** **Glass** **Electronics** **Hazardous waste** Some materials may be more suitable for this option than others, such as fibres and metals. The current market for textile recycling may not be sufficient to make feasible. Low amounts of glass and high costs associated with recycling may make recycling glass unfeasible.	**Organics/Wet waste** **Fibres (including OCC)** **Wood Scrap** Organic content could be composted. A portion of shredded fibres and wood scrap could be used as an amendment.	**Organics/Wet Waste** **Fibres (including OCC)** **Wood Scrap** **Glass** Composted organics and fibres, shredded (or composted) wood scrap and crushed glass could be used as an alternative daily cover (ADC). The ADC would not replace the natural cover material; rather, the ADC would be used to amend the natural cover in order to reduce the demand for this natural resource and to maximize the efficient use of landfill airspace.	**Fibres (including OCC)** **Wood Scrap** Can be safely combusted using burn cages or other controlled burning equipment. Pile burning not recommended. Residual ash would require disposal in landfill. Controls would be required to ensure that mixed waste is not included in combustion, as the mixed waste would include materials such as plastics, painted or coated materials, and hazardous waste.

5 Conclusion

Based on the average number of waste loads deposited at the Hamlet's landfill site estimated volumes of waste transport vehicles and storage rooms, the annual amount of waste disposed of at the Hamlet's landfill site is approximately 2,858 tonnes. It should be noted that this is an estimated value only due to:

- A short time frame within which waste tips at the landfill site were counted;
- Broad estimates for the volumes of the garbage truck and of the trucks used to take the commercial waste to the landfill;
- Commercial waste estimates based on reported average number of trips to the landfill, based on recollection; and
- Working within a range of densities for volumes of waste.

These estimates could be improved by employing the tracking procedures as described in the Hamlet's Solid Waste Operations and Maintenance Manual.

The waste audit sorts show that about half of the Hamlet's solid waste could potentially be diverted from disposal, although some may be more easily diverted than others. Key divertible materials are fibres (20% of the waste stream) and organics (16% of the waste stream), which combined make up more than one-third of the total waste stream and could potentially be managed locally in a manner other than landfilling.

Appendix A –
Waste Estimate Calculations for Padlei Co-op and Northern Store

Padlei Co-op Waste Estimate Calculations

Table: Volume of Cargo Box, Half-ton truck

Reference Truck	Cargo volume (L)
2013 Ford F-150 (8.0 ft styleside) [3]	2,301
2013 Chevy Silverado (Regular Cab, Long Box) [4]	2,138
Average volume	**2,220**

Number of truck loads per week:	3.5
Weeks per year:	52
Volume of material per load (L):	2,220
Volume of material per load (m3):	2.22
Total volume to landfill annually (m3)	3.5 x 52 x 2.22 = 404

Table: Volume to Weight Conversion for Commercial-Industrial Mixed Waste (uncompacted)

Material	Volume (yd^3)	Vol (m^3)	Estimated Weight (lbs)	Estimated Weight (kg)	Volume to Weight Conversion (kg per m3)
Uncompacted Commercial-Industrial Waste (low range) *	1.00	0.765	300	136	178
Uncompacted Commercial-Industrial Waste (high range) *	1.00	0.765	600	272	356
Average					*267*

Based on: United States Environmental Protection Agency. *Measuring Recycling: A Guide for State and Local Governments. Appendix B.* September 1997.

Table: Waste Estimates (Padlei Co-op)

Material	% of Load	Annual Volume (m3)	Volume to Weight Conversion (kg per m3)	Est. Annual Weight (kg)	Est. Annual Weight (tonnes)
OCC	75.0%	303	29.66	8,986	9.0
Wet waste	12.5%	50	267	13,481	13.5
Mixed waste	12.5%	50	267	13,481	13.5
Total		**404**		**35,947**	**35.9**

[3] Ford Motor Company. 2013 F-150 Specifications. http://www.ford.ca/trucks/f150/specifications/exterior/. Accessed Oct. 18, 2013.
[4] General Motors of Canada Ltd. 2013 Silverado Options & Specifications. http://www.gm.ca/gm/english/vehicles-2013/chevrolet/silverado/compare-options-and-specifications#. Accessed Oct. 18, 2013.

Northern Store Waste Estimate Calculations

Number of bags of wet waste weekly:	6 to 12
Average number of bags weekly:	9
Approximate volume of bags (L)	105
Weeks per year	52
Volume per year (L)	9 x 105 x 52 = 49,140
Volume per year of wet waste (m3)	49

Dimensions of garbage room (m):	3 x 3.5
Average height of cardboard (m):	0.5
Daily volume of cardboard (m^3):	3 x 3.5 x 0.5 = 5.3
Days per week:	6
Weeks per year:	52
Volume of cardboard to landfill annually (m3):	5.3 x 6 x 52 = 1,638

Table: Waste Estimates (Northern Store)

Material	Annual Volume (m3)	Volume to Weight Conversion (kg per m3)	Est. Annual Weight (kg)	Est. Annual Weight (tonnes)
OCC	1,638	29.66	48,583	48.6
Wet waste	49	267	13,119	13.1
Total	**1,687**			**61.7**