NORTHLANDS DËNESŲŁINÉ FIRST NATION
WASTE & RECYCLING INITIATIVE
DRAFT REPORT & PLAN

November 5, 2018

created for

Northlands Dënesųłiné First Nation

by

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SUMMARY

In 2016, after extensive consultation and discussion among its leadership and community members, Northlands Dënesųłiné First Nation (NDFN) published a Sustainable Development Strategy[1]. The priorities of sustainable waste management and recycling appear a number of times in this Strategy. From the *Introduction*[2]:

> "The Dene people have a tradition of self-reliance. For thousands of years, our ancestors accepted what the land had to offer and made a living that was passed from generation to generation….The path to sustainability, self-reliance, and resilience in the 21st century is not to return completely to the old ways, rather to incorporate our teachings and values to solve contemporary problems….Modern principles of sustainability and sustainable development echo traditional Indigenous concepts….There is no waste in nature; every output is an input….To be sustainable, we know that nothing new is created. We need to respect mother earth again. We must not pollute or degrade her….We believe that this initiative to build systems and complete projects is not just for environmental sustainability but is also the best path to economic development and long term local employment in the community."

This current document outlines the steps taken to date—and plans for the future—to live up to the ideals spelled out in the Sustainable Development Strategy. This document summarizes:

1. The state of recycling and waste management in and around the NDFN community before the start of this project.

2. Steps taken during the current project to improve recycling and waste management in and around the community.

3. A Waste & Recycling Management Plan for NDFN. If implemented, this Plan will enable NDFN to manage and recycle all the community's wastes in a sustainable, cost-effective manner, as envisioned in the Sustainable Development Strategy.

[1] Available for download at http://bokeconsulting.com/wp-content/uploads/NDFN-Sustainable-Development-Strategy.pdf.

[2] Page 4.

1. RECYCLING & WASTE MANAGEMENT TO DATE

The Northlands Dënesųłiné First Nation (NDFN) has a little over 1,100 members. Its main community is situated on reserve land on the north shore of Lac Brochet and has approximately 1,000 residents.[3]

Most of the waste generated by this community is transported to a waste collection area on provincial Crown Land approximately 2 km north of reserve land.

The handling of waste by the community has both strengths and weaknesses, which are detailed in the following sections. There have been some attempts at recycling in recent years although, before the start of this project, there was not a systematic or comprehensive approach in the community.

1.1. Current Waste Collection Process

Northlands Dënesųłiné Public Works provides a semi-regular scheduled waste collection service. Until the start of this project, while individuals and the school were involved in some recycling initiatives, there was no community-wide recycling program.

1.1.1. WASTE SOURCES

There are just under 200 homes and about a dozen community institutions which produce waste. The community businesses and institutions include:

- Petit Casimir Memorial School
- Public Works Garage and Warehouse
- Manitoba Hydro generating station
- Northern Store
- Band Office and Arena
- Church
- Band Hall
- Airport
- Health Centre offices
- Health Clinic
- Head Start Building

There are no businesses or institutions that generate waste on a regular basis that need special handling (*e.g.* no oil change shops or businesses producing toxic or dangerous waste).

[3] Source: http://fnp-ppn.aadnc-aandc.gc.ca/fnp/Main/Search/FNRegPopulation.aspx?BAND_NUMBER=317&lang=eng

The Public Works Garage is the primary generator of used oil within the community. The Manitoba Hydro facility also generates considerable used oil, but this is currently shipped out by winter road and handled in Winnipeg.

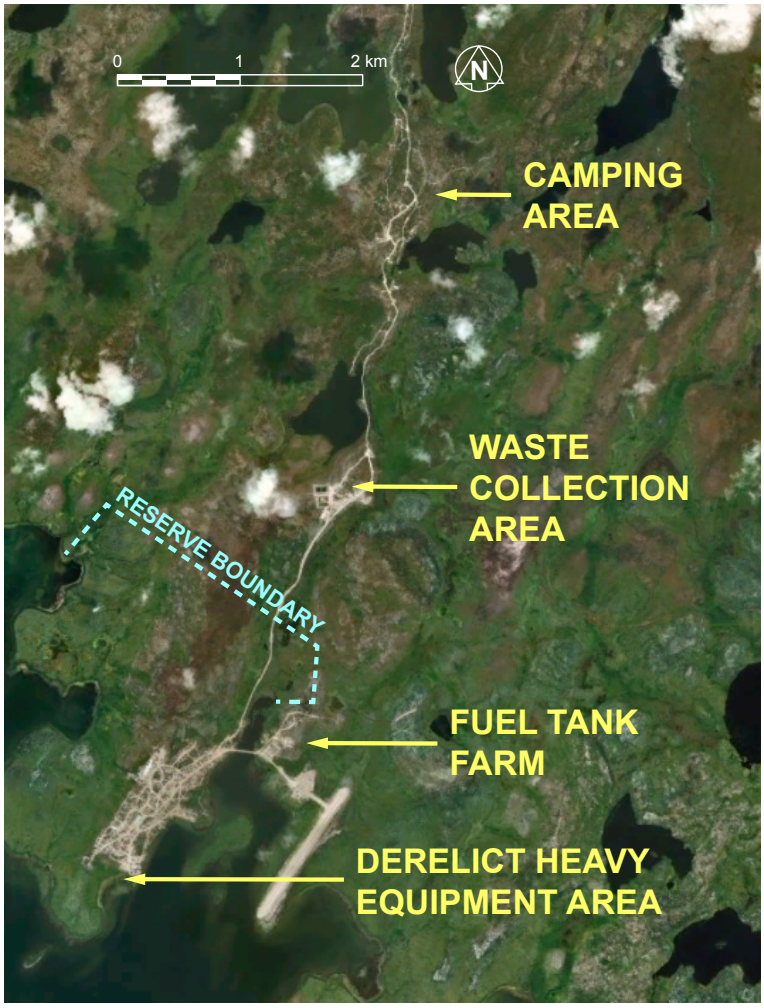
A used-oil furnace system and an in-vessel composter were sent up on the winter road in February 2018.

1.1.2. WASTE COLLECTION

Although Public Works staff collects trash, there is no consistent system for how people make their trash available for collection and there are no standardized residential collection containers.

1.2. Waste Sites

Figure 1: Northlands Dënesųłiné Waste Areas of Concern



Most of the waste material from the community is gathered in a waste area approximately 1 km north of the reserve boundary (marked “Waste Collection Area” in Figure 1, above). This is on provincial Crown Land.

1.2.1. DERELICT HEAVY EQUIPMENT AREA

Approximately 30 derelict heavy vehicles are located on reserve area in a field just south of the community (marked "Derelict Heavy Equipment Area" in Figure 1), adjacent to the Band's Public Works Garage.

Figure 2: Derelict Trucks & Heavy Equipment

While similar in some ways to the "Derelict Equipment Area" in Sayisi Dene (Tadoule Lake)[4], the area in Northlands is considerably smaller, and has much less derelict equipment in it.

With the recent increase in capital and infrastructure projects in the community, some effort has been made to clean up this area. Further work remains to be done to remove all derelict equipment and ensure that no contaminating fluids (such as motor oil and hydraulic fluid) is leaking into the soil in this area.

[4] *Sayisi Dene First Nation Waste & Recycling Initiative Report & Plan*, available for download at http://bokeconsulting.com/green-profits/sayisi-dene-waste-recycling/

1.2.2. FUEL TANK FARM

The Fuel Tank Farm (also marked on Figure 1) contains waste oil, collected in barrels and exposed to the elements. This area is on provincial Crown Land.

Figure 3: Oil Drums in Tank Farm

Along with two tanker trucks, these barrels will need to be cleaned up. This can only be properly done once the new tank farm and the waste oil burner are operational—both expected by 2019.

1.2.3. CAMPING AREA

Prior to the start of the current project, a moderate amount of waste had accumulated in the Camping Area (also marked on Figure 1, and also on provincial Crown Land) that community members use for retreats and summer camping.

1.3. *Current Waste Collection Area*

The current Waste Collection Area[5] (also marked in Figure 1) had both positive and negative aspects prior to the start of the current project.

Some improvements were made to this area during the current project (noted in section 2, below), but more remains to be done.

Figure 4: Waste Collection Area, Showing Approximate Limits of Loose Materials

Figure 5: Sub-Areas Within Current Waste Collection Area

[5] If this area was functioning properly, it would be called a "Waste Management Facility" (WMF). Because it is currently more of a collection area than a management area, this report refers to it as a "Waste Collection Area" (WCA). Once it is functioning properly (as described in section 3), a portion of the WCA will be a WMF, and the remainder will be cleaned and, where necessary, decontaminated.

The primary problems with the Current Waste Collection Area prior to the start of this project included:

- Unrestricted public access
  - No set hours
  - No fencing
  - No gate
- No signage informing residents of appropriate dumping areas
- No separation of recyclables from the general waste stream
  - Neither organic nor inorganic recyclables are separated
- Frequent, uncontrolled burning of household waste
  - No Burn Cage
  - Burning not conducted by trained personnel
  - Ongoing risk of forest fires
- Deposited waste is not covered
  - Winds blow lighter pieces of waste into surrounding areas
- Waste is spread out over wide area
- Waste is often mixed with sand and gravel, resulting in low density of garbage
- Waste has blown into a former quarry near the Active Dumping Area
- Land farm not managed or monitored

Figure 6: Land Farm

Figure 7: Derelict Metal Just North of Sewage Drying Beds

Figure 8: Derelict Vehicles

Figure 9: Former Quarry

Figure 10: Waste Blown and Dumped into Former Quarry

Figure 11: Active Dumping Area

Figure 12: Loose Materials Blown Just North of Active Dumping Area

Figure 13: Loose Materials Blown Just South of Active Dumping Area

Figure 14: Older Waste Mixed with Sand and Gravel

1.4. Waste Issues in Community Area

The waste problems within the community area (around homes and community buildings) are fairly modest.

- Only a small number of garbage or recycling collection boxes are available within the community.
    - The wooden ones are only able to withstand the climate for a few years.
    - There are four steel "dumpster" bins in the community that members put waste into. These have been battered and burnt numerous times and are not easily emptied.
- Numerous community members have also expressed frustration with the lack of recycling activities.
- There are two old oil tanks in the community that need to be removed.
- As noted above, the area around the Public Works garage, where the Derelict Heavy Equipment is located also needs attention.

Figure 15: Garbage Bin Near Houses

Figure 16: Garbage Bin Near Teacherages

Figure 17: Derelict Oil Tank in Community

1.5. Reasons for Optimism

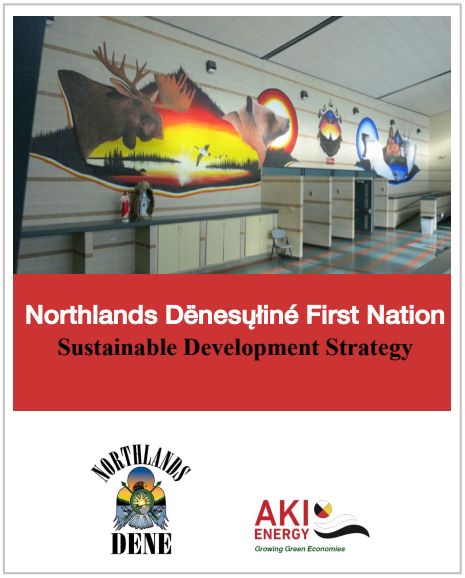
Although there a number of waste and recycling challenges in Northlands Dënesųłiné, there are strong reasons for optimism.

- Proper management of waste—and a robust recycling program—are priorities in the Sustainable Development Strategy.
- There are no derelict vehicles around the homes or along the side of roads in Northlands.
- In an average year, roads and paths within the community have only a small amount of litter.
    - It's worth noting, however, that litter was more of a problem this year than in previous years. This may have been due to a sandstorm which blew through the community in early summer this year.

1.5.1. PRIORITY IN THE SUSTAINABLE DEVELOPMENT STRATEGY

As noted in this document's Summary, Northlands Dënesųłiné published a Sustainable Development Strategy in 2016[6].

Figure 18: Northlands Dënesųłiné First Nation Sustainable Development Strategy



In addition to the Strategy's Introduction (quoted in the Summary, above) the priorities of sustainable waste management and recycling appear a number of times in this Strategy.

[6] Available for download at http://bokeconsulting.com/wp-content/uploads/NDFN-Sustainable-Development-Strategy.pdf.

- *Waste*[7] is one of three main areas of focus in this Strategy:
    - "The Waste Focus will concentrate on goals that seek to reduce, reuse, recycle, or repurpose material of all kinds and sources. This group will reduce the amount of material that needs to end up in the landfill. This focus area includes remediation of contaminated soil and removal of existing waste.
- *Goal 1* in the *Waste* section is "*Develop alternatives to landfill*"[8]
    - **"…**Instead of landfill, we need to develop collection, sorting, storage, and transport systems for recyclable materials.…
    - We will measure our success in meeting this goal in these ways:
        - An increase in the amount of recyclable materials removed from the community
        - A decrease in the number of End-of-life Vehicles (ELV) in the community
        - An increase in the amount of electronic waste removed from the community
        - An increase in the amount of organic waste that is composted
    - Decrease in the amount of disposable but non-recyclable items (e.g. styrofoam cups) brought into the community."
- The *Local Green Jobs Strategy*[9] includes two key questions on waste:
    - "Why allow everything that comes into the community to end up in the landfill? Why not pay people to sort, decommission, and transport materials that were once considered waste but could be recycled, repurposed, or reused?"
- The *Solid Waste Management Strategy*[10] outlines three reasons for concern with the current Waste Collection Area:
    - "Recyclable products are not being properly separated and processed
    - Hazardous materials such as batteries and paint cans are not properly disposed of, resulting in possible contamination of soil and water.
    - The current landfill site is unlicensed, leading to concerns related to proper containment of materials."[11]

[7] Page 25. (The other two areas of focus are energy and food.)

[8] Pages 25-26.

[9] Page 30.

[10] Pages 51-55.

[11] Page 51.

- The *Solid Waste Management Strategy* also addresses issues of organic wastes[12]:
    - "*One of the longer-term opportunities is to find ways to recycle organic waste, turning this waste into compost. The waste that could be treated would include the following:*
        - *household waste*
        - *material left over from cleaning fish*
        - *material left over from caribou*
        - *food waste from the Northern store, school and medical centre*
    - *We probably can't do an open compost system, because:*
        - *composting microbes don't function well at lower temperatures*
        - *open systems aren't good at handling animal materials*
        - *an open compost system will attract animals.*
    - *Instead, we have a closed-cylinder composting system. These are used in the hog industry and can take virtually any organic waste and, if it's mixed properly with wood chips, turn it into soil. This compost product could be used in small gardens, or in greenhouses…*
    - *Recommendations:*
        - *Investigate bringing up a closed-cylinder composter.*
        - *Develop a system for collecting organic waste and delivering it to the composter.*
        - *Develop a system for making use of the resulting compost."*

The activities reported in in Section 2: The Current Project of this document, and the plan laid out in Section 3: Waste and Recycling Operations Plan are, essentially, turning the priorities of the 2016 Sustainable Development Strategy into action.

[12] Page 54.

2. THE CURRENT PROJECT

2.1. Project Startup

This project was initiated in Summer 2017 by NDFN Chief and Council in discussions with members of the Boke Consulting team, as a means of implementing the priorities and strategies for waste in the Sustainable Development Strategy, outlined above.

An application was made on August 30, 2017 to Indigenous Services Canada under the Lands & Economic Development Service Program (LEDSP) using the First Nation Solid Waste Management Initiative Proposal Form.[13]

Funding of $393,608 was committed by Indigenous Services Canada on October 5, 2018.[14]

Table 1: Budget Summary[15]

cost category	*budget amount*
Professional and technical services	$92,500
Meetings	$4,500
Communications	$700
Training delivery and trainee costs	$8,280
Work experience initiatives	$15,600
Salaries and wages	$18,000
Travel	$38,400
Overhead	$28,328
Minor machinery and equipment	$164,000
Other	$23,300
total	*$393,608*

2.2. Project Components

2.2.1. LEARNING ABOUT WASTE AND RECYCLING

During visits to Northlands from August 2017 to January 2018 (made as part of the ERAAES Project[16]) Bruce Duggan, a member of the Boke Consulting team, spent time with local community members touring the community and the surrounding area, taking an inventory of derelict vehicles, equipment, and materials, and looking at current waste management practices.

In February 2018, Eleanor Veuillot and Curt Hull, another member of the Boke Consulting team, attended the Northern Manitoba Sustainable Waste Management Workshop in Thompson.

[13] Attached as Appendix 1: LEDSP Application.

[14] Attached as Appendix 2: Award Notification Letter.

[15] A detailed budget breakdown is given on the last page of Appendix 1: LEDSP Application.

[16] This is the implementation of the "Energy" component of the Northlands Sustainable Development Strategy. Details can be found at: http://bokeconsulting.com/northlands-denesuline-first-nation/

Figure 19: Agenda – Northern Manitoba Sustainable Waste Mgmt Workshop, Day 1

Day 1 – Tuesday, February 13, 2018		
Time	**Agenda Item**	**Details**
8:30am	Registration	Registration
9:00am	Welcome and Introductions	Opening remarks and introduction (Moderator: Mike Fernandes)
		Opening Prayer (community elder to be invited by KTC)
		Greetings & Welcome • Keewatin Tribal Council representative (George Neepin, CEO) • Indigenous & Northern Affairs Canada (Tebesi Mosala, INAC) • City of Thompson (Mayor Dennis Fenske)
		Workshop Participants to introduce themselves
9:45am	Sustainable Waste Management – The challenge and opportunity for Northern Manitoba communities	Video – Solid Waste Management (INAC Manitoba)
		Benefits of Recycling and Overview of What Can be Recycled in Manitoba (Mike Fernandes)
		Starting a Recycling Program - A Toolkit for Manitoba First Nations and Northern Communities (Beth McKechnie, Green Action Centre)
10:30am	Morning Break	
10:45am	Facilitated Table Work & Group Discussion	Handout: Developing a focused vision and priorities for moving forward (Mike Fernandes)
		Exercise Questions (Each community to work on filling out their own sheet)
		Full Group discussion: Sharing our experiences, our community vision, and ideas of who might be good champions
11:30am	Planning Collection and Storage of Recyclable and Divertible Materials (Practical Options for northern communities)	RM of Rockwood – An example of a simple, effective and sustainable waste management site (Art Goudy)
		Community Clean Up Events – A Practical Way for Smaller Communities to Start Recycling (Christa Rust, CBCRA)
12:10pm	Lunch & Networking	
1:00pm	Planning where and how you'll send the recyclable materials out of your community	Sending materials to a Regional Processor (Billie Jo Thompson, TRC)
		Arranging direct pickup of certain materials (Dennis Neufeld, EPRA)
		Shipping materials from your community through back-haul arrangements and special considerations for winter road and remote communities (Cameron Graham)
2:15pm	Afternoon Break	
2:30pm	Old, abandoned cars (End-of-Life Vehicles) – A big waste problem for many northern communities	Managing End-of-Life Vehicles in an environmentally sustainable manner (Scout Environmental)
		Managing Lead Acid Batteries (Colin McKean)
3:20pm	Success Stories – Northern Communities who have started on the path to sustainable waste management	St. Theresa Point (CBC News clip and representative from St. Theresa and Solomon Mason)
		City of Flin Flon and area (Deb Odegaard)
		City of Thompson's recycling activities and future plans (pending Wayne Koversky or alternate)
		OCN – past success and future plans (pending Zacc Moore)
4:20pm	Closing Comments	Instructions for Day 2 tours ***Meet back here at Army Navy Hall (Please don't be late. Bus will leave at 9:10am with or without you.)***

This was followed by a comprehensive review of relevant regulations, publications and websites to review the waste and recycling requirements relevant to Northlands Dënesųłiné, as well as examples and best practices in northern Canada that could be relevant to this project, conducted by Rachel Hammerback, another member of the Boke Consulting team.

This material is assembled Appendix 6: **An Overview of the Literature on Waste Management in Northern and Remote Communities in Manitoba**

Figure 20: Agenda – Northern Manitoba Sustainable Waste Mgmt Workshop, Day 2

Day 2 - Wednesday, February 14, 2017		
Time	**Agenda Item**	**Details**
8:30am	Sign in/Gathering	Registration
9:00am	Tour (Bus will leave Army & Navy Hall at 9am)	City of Thompson Waste Management Site
		Thompson Recycling Centre
12:00pm	Lunch & Networking	
1:00pm	Group Working Session 1 – Communities will work directly with support teams to develop action plans for moving forward in implementing recycling/diversion of the highest priority materials	At this point in the workshop, communities will be split into groups, according to the priority they identified in Day 1. Each group will be assigned the appropriate stewardship program operator, relevant technical experts in attendance, INAC support person(s) and other supports. The discussion will be community led (with support and prompts from group facilitator as needed) and they will work on specific questions they need answered in order start recycling the materials they've chosen as their top priority (ex. what equipment and supplies will we need? how do we complete the registration forms for your program? How exactly do we set up the collection site? Who do we call when we're ready to have the material picked up?)
2:10pm	Afternoon Break	
2:20pm	Funding for sustainable waste management in FN and Northern communities	INAC funding and assistance – how to complete an application for funding for the program you want to start (INAC representative)
		Group Working Session 2 – Communities will return to their support team to brainstorm how they can put together a funding proposal/application that includes the information they worked through in Group Working Session 1
3:15pm	Educating and Engaging the people in your community	Getting the right people on board (Mike Fernandes)
		Educating and engaging students and youth (Green Action Centre)
4:00pm	Closing	Prizes and Appreciation to participants (to save time, winners may be drawn at the break)
		Closing Prayer

2.2.2. STARTING A COMMUNITY CONVERSATION

A community engagement and discussion meeting, titled "Let's Talk Trash", was held in the Band Hall the following month.

Figure 21: Poster for "Let's Talk Trash" Community Meeting

Figure 22: Agenda for "Let's Talk Trash" Community Meeting

Agenda

1. Welcome / Opening Prayer
2. What brings me here
3. What brings us together today
4. What we hope for today
5. What is proposed
6. Discussion
7. Next steps

During this meeting, Curt Hull gave a slide presentation, outlining potential waste and recycling options for NDFN, and putting the management of waste into the broader contexts of economic development and sustainability, as well as outlining relevant activities in other communities.

Community members shared their aspirations about waste and recycling in their community.

Figure 23: Let's Talk Trash Community Meeting

Although attendance was less than hoped, those who attended were interested and involved.

Figure 24: Form for Survey on Waste & Recycling

Waste & Recycling Survey

Question	I'm not concerned / interested	I'm sort of concerned / interested	I'm quite concerned / interested	I'm very concerned / interested
The landfill (dump) is not managed. Is the current state of the dump a concern to you?				
Is the way we manage waste and recycling in the community now of concern to you?				
Does it concern you that the only thing we do with waste is put it in the dump?				
Would you like to see a system for recycling established in our community?				
If a recycling system was established, would you bring things to a recycle depot?				
If a recycling system was established, would you like to have household pick up?				
If we set up a recycling depot, there would be jobs sorting material. Would you be interested in this kind of employment?				
Share your ideas / Comments				

Name:	Phone:	E-mail:

Nine people filled out this survey.

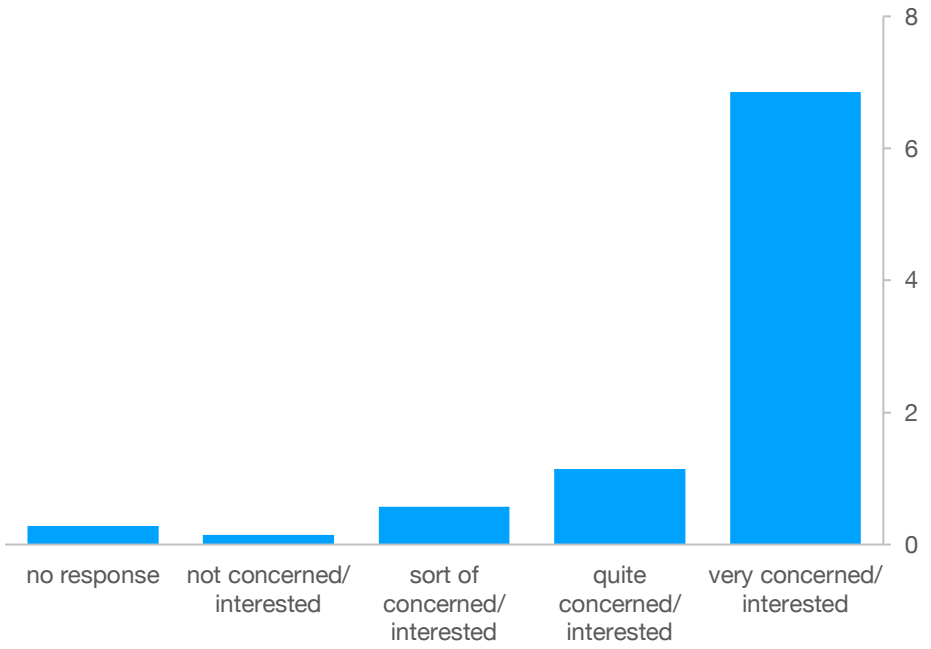
Table 2: Survey Results

question	*no response*	*not concerned/ interested*	*sort of concerned/ interested*	*quite concerned/ interested*	*very concerned/ interested*
The landfill (dump) is not managed. Is the current state of the dump a concern to you?	0	0	2	2	5
Is the way we manage waste and recycling in the community now of concern to you?	0	1	1	1	6
Does it concern you that the only thing we do with waste is put it in the dump?	0	0	1	3	5
Would you like to see a system for recycling established in our community?	1	0	0	0	8
If a recycling system was established, would you bring things to a recycle depot?	1	0	0	1	7
If a recycling system was established, would you like to have household pick up?	0	0	0	0	9
If we set up a recycling depot, there would be jobs sorting material. Would you be interested in this kind of employment?	0	0	0	1	8

comments:
- It would be nice to recycle in our community rather than dumping it all at the dump
- This sounds very interesting, for something like this to change in our community. Thumbs up to all.
- I'm very concerned about garbage being thrown away. It should be recycled. Too much garbage.
- Keep the earth clean!
- Save Mother Earth.
- Would be nice to have a recycling system, here in our community.

The results of the survey show a consistent, high level of interest and concern.

Figure 25: Averaged Responses to Survey Questions



An expression of concern or interest may (or may not) be a reliable indicator of the actual level of concern or interest. This is especially problematic if, as in this case, the sample size is small. To determine the actual level of concern and interest, we offered an opportunity for action.

2.2.3. RECRUITING A CLEANUP CREW

Work on the ground began with recruiting a Cleanup Crew.

Community members were invited to sign up to join a Cleanup Crew. The Crew was hired on a casual basis—which meant that a person could work a half day, a full day, or a series of days, as they chose. Any community member currently on Income Assistance was eligible to join the Crew.

On the recommendation of the Chief, Clifford Tssessaze was recruited as Crew Lead.

Seven people responded to the initial invitation to become Crew Members. Others joined the Crew in the following days, while some of the initial respondents only worked for a short period.

All were trained on the basics of safe work and separating recyclables.

2.2.4. STARTING TO CLEAN UP THE COMMUNITY & SURROUNDING AREA

The Cleanup Crew began by working their way systematically through the community, cleaning up litter and other small waste items.

Because the work was casual, not everyone worked every day. Over the life of the project, 19 people worked on The Fix-Up Crew.

Table 3: Project Work Record

		Week												*Total Houses Worked*
		1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
Crew Lead	Clifford Tssessaze	41	39	46	17		60	57	55	57	53	58	52	531
Crew Members	Anthony Tssessaze	41	39	43	41	40	15	4			50	57	52	380
	Leo Wesley Tssessaze			40	41	40	34	25						178
	Joseph Josie	18	34	31	41	16		20	22		11			191
	Jake Tssessaze	26	6	28	8									68
	Christopher Antsanen	41	16		29	8								93
	Justin Denechezhe	31	1											32
	Tyron Denechezhe	31	19	26	25	40	5							144
	Travis Tssessaze	27	39											66
	Gaberlie Tssessaze		30											30
	Tyrell Dettanikkeaze			14	28	40	18	6						106
	Danny O-Tennadzahe					8								8
	Elie Joey Tsannie						35	57	51	29				171
	Jonah Samuel						16	39	37	41	44	24	16	217
	Johnathan Antsanen						25	45	15	40	46	58	52	280
	Corey Tssessaze							36	44	24				103
	Donovan Denechezhe						6							6
	Russell Hyslop									24	46	56		126
	Greg Denechezhe										49	52	16	117
	total hours worked	253	223	225	227	192	211	287	223	213	298	305	188	2,844

It is difficult to know for sure, but turnover may have been higher than "normal" because there was a significant amount of other work available in the community during this period on the construction projects.

The Crew spent a significant portion of its time cleaning up the roads leading to and in the camping area. They worked under difficult conditions. The weather was unusually hot, and mosquitoes, "horse" flies, and small biting "sand" flies were out in force.

Figure 26: Cleaning Up Along Roadway North of Community

Figure 27: Cleaning Up in Camping Area

Figure 28: A Cleaned-Up Camping Area (1)

Figure 29: A Cleaned-Up Camping Area (2)

Figure 30: A Cleaned-Up Camping Area (3)

The most ambitious part of the Crew's efforts was the collection of derelict appliances ("white goods") and other recyclable materials from community members' homes.

It would appear that a significant number of community members had been hanging onto this material in the hopes that recycling would begin.

Figure 31: Collected Derelict Appliances

The Crew also collected and segregated a significant amount of plastics, eWaste and loose metal.

Figure 32: Plastics Collected & Segregated in the Recycling Area

Figure 33: E-Waste Collected & Segregated in Reusable Gabions in the Recycling Area

Figure 34: Plastics & Cans Collected in Derelict Semi-Trailer

Figure 35: Derelict Metal Collected from the Community and Segregated in the Recycling Area

Figure 36: Derelict Steel Collected for Recycling

During this period, the Cleanup Crew chose a name for themselves and their initiative—"Fix-Up Crew".

They also agreed on a logo.

Figure 37: Fix-Up Crew Logo

It is worth emphasizing that the purpose of this work wasn't to "end the waste problem". Clearly, that will require a longer-term, sustained effort. This project component had three purposes:

1. To move from a situation where the accumulation of waste in the community and particularly in the Waste Collection Area is seen as "a fact of life on reserve" to one where it is seen something that can be managed.
2. To develop a group of people within the community, who had put in the hard work of cleaning, who could become leaders and advocates for recycling and waste management in the community.
3. To make the work of that group visible to the wider community.

2.2.5. STARTING TO CLEAN UP AND SEPARATE RECYCLABLES AT THE WASTE MANAGEMENT FACILITY

The Cleanup Crew made a start on cleaning up the area in and around the current Waste Collection Area (WCA).

They focused their efforts on:

- litter along the roadway leading to the current WCA
- litter on the entrance road of the WCA

The Crew focused on hand-sorting materials into basic categories:

- *Wood, wood products, cardboard and paper*
  - Wood and wood products suitable for reuse (including shipping pallets) were collected.
  - Wood products and wood not suitable either for reuse was taken to the WCA and separated from the general waste, in anticipation of burning in the Burn Cage.
  - A start was made on separating paper and cardboard from the general waste.
    - Most paper and cardboard can be suitable for composting (see below).
    - Soiled or contaminated paper and cardboard not suitable for composting was set aside for burning in the Burn Cage
- *Plastics, including drink bottles*
  - These were separated and bagged, in preparation for compaction.
- *Small metals (including drink cans)*
  - These were bagged separately from the plastics, also in preparation for compaction.
- *Unrecyclable material*
  - Some of the material gathered up was not recyclable ("disposable" diapers, for example). This material was bagged and separated.

Given the scale of the problem, the Crew obviously did not complete all of the cleaning up needed at the WCA before the current phase of this initiative ended. But they made an important start.

Work conditions at the WCA were more difficult than in the community cleanup. In addition to the heat, mosquitoes and flies, on most days, one to two bears were present.

Members of the community commented on how much better the area in and around the WMF looked.

2.2.6. CREATING A BURN CAGE

In the next phase of this initiative, much of the "waste" paper and cardboard can be used to make soil for raised-bed gardens—both by mulching it directly and by mixing it with organics for processing through the In-Vessel Composter. However, some of it—primarily because it is mildly contaminated in some way, will need to be burned.

The only safe way to burn these materials is in a Burn Cage.

Figure 38: Typical Burn Cage

Photo source: Alaska Department of Environmental Conservation[17]

The most important benefit of a Burn Cage it to ensure that embers do not float away and cause forest fires. A Burn Cage will also prevent the fire from spreading to the rest of the WMF.

[17] Photo published in: Department of Environment, Government of Nunavut. *Environmental Guideline for the Burning and Incineration of Solid Waste.* 2012 (revised). Page 10. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiT9YTVwurcAhVKyYMKHblUAb4QFjAAegQIAhAC&url=https%3A%2F%2Fwww.gov.nu.ca%2Fsites%2Fdefault%2Ffiles%2Fguideline_-_burning_and_incineration_of_solid_waste_2012.pdf&usg=AOvVaw1tJ_HABtZyDEv4l4JjkPjr

The Fix-Up Crew built a burn cage out of derelict steel and fencing and began using it to burn paper, cardboard and wood that could not be recycled.

Figure 39: Northlands Burn Cage

2.2.7. BUILDING COMMUNITY COLLECTION BINS

Once the Crew had cleaned up the community and made a significant difference in the WCA, the next challenge was to begin to extend recycling activities into the community.

Using only salvaged materials and materials left over after previous years' construction projects, they worked together to design and build six Community Collection Bins.

Figure 40: Building Bins In Crew Lead's Driveway

Figure 41: First Version of Bin Lid and Handle

Figure 42: Crew Discussing Bin Design

Figure 43: New Lid Design Using Salvaged Top of Derelict Appliance

Figure 44: Integrating the New Lid Design in Larger Bins

Figure 45: Finished Large Community Collection Bin

Figure 46: Finished Bin by Band Office

Figure 47: First Version of Bin by Airport

Figure 48: Finished Version of Bin by Airport

These bins are designed to serve multiple purposes:

1. Provide a convenient alternative to littering
2. Be a visible reminder of the change in how the community handles its waste
3. Serve as a collection point for both recyclables and non-recyclables

As important as having sturdy exteriors to the bins is, the interiors also needed to be figured out. If they were simply left as shown above, community members would throw materials into them and then the Crew—or others—would need to clear out their interiors.

A much better solution would be to have bags inside that would collect the materials as they are dropped in.

Although the Crew hand-lettered the Bins to indicate what should be put in each slot, as with the WMF signage, these will need to be translated into Dene, and permanent, high-visibility signs will need to be created and installed.

Perhaps even more important than the bins themselves was the collaborative process of designing, building, redesigning and rebuilding bins. It marked a small but significant turning point for the Crew—from being employees in a recycling initiative, to beginning to design a recycling system for their community.

In future stages of this initiative, particularly if the Crew has access to a basic woodworking shop, these Bins could be made out of locally-available trees harvested from nearby burn areas.

Alternatively, the closest available equivalent to the larger bins are probably bear-resistant recycling bins. These would clearly be useful in this community, but they are expensive and would have to be sent up on the winter road.

Figure 49: BearSaver™ Recycling Enclosure

Ideally, Multi Materials Stewardship Manitoba will be able to fund the making of Bins in the community.

2.3. Mentoring Process & Management

This Project developed a mentoring process and management that was designed build a waste and recycling system that could be self-sustaining, and would not present a further management burden on Band Administration staff. Band Administration is already overburdened and understaffed; adding another management responsibility would not be sustainable.

Instead, Boke Consulting staff, working with the Crew Lead developed a reporting process that included:

- A one-page Crew Member Agreement that was filled out for every new person hired.
    - This was photographed and emailed to Boke's General Manager, Kate Poole. A paper copy was kept by the Crew Lead in a binder.
- A one-page daily Work Record
    - This was also photographed and emailed by the Crew Lead to Boke's General Manager. A paper copy of this was also kept by the Crew Lead in the binder.
- A cash disbursement form
- A short emailed daily update from the Crew Lead to Boke's President, Bruce Duggan, who served as Mentor for the Crew Lead and Crew.
- Daily photographs of work done
    - Also sent by email, to both the General Manager and the Mentor.
- Multiple visits to the community by the Mentor
    - Each of these visits was short (3 to 4 days). They were designed to focus efforts and enable the Crew to plan upcoming activities, without making them dependent on the Mentor for ongoing, in-person supervision.
- Frequent phone calls and emails between Boke's General Manager, Kate Poole, Bruce Duggan, the Crew Lead, and Crew Members

This system was designed to:

1. Function even if the Crew Lead does not have access to a computer, printer or scanner.
2. Secure daily records suitable for review and reporting.
3. Document work done—and progress made—accurately.
4. Enable timely and accurate weekly payments to all Crew Members based on actual hours worked.

5. Set the groundwork for the ongoing functioning of a Waste & Recycling Crew.

    - The intention was to allow for options for future administrative arrangement. Those arrangements could include:

        - A department within the Band Administration structure
        - A social enterprise operating on behalf of the community
        - A department of a larger economic development corporation

2.4. *Project Expenditures*

Table 4: Project Expenditures - Summary

Cost Category	Budget	Actual To Date	Remaining	Total To Completion
Professional and technical services	$92,500	$21,500	$42,962	$64,462
Other personal services	$0	$0	$6,000	$6,000
Meetings	$4,500	$800	$800	$1,600
Communications	$700	$876	$0	$876
Training delivery and trainee costs	$8,280	$1,045	$0	$1,045
Work experience initiatives	$15,600	$11,714	$0	$11,714
Salaries and wages	$18,000	$46,743	$12,008	$58,743
Travel	$38,400	$6,209	$15,000	$21,209
Overhead	$28,328	$28,328	$0	$28,328
Minor machinery and equipment	$164,000	$138,564	$40,522	$179,086
Other	$23,300	$16,046	$4,500	$20,546
totals	***$393,608***	***$271,824***	***$121,792***	***$393,608***

Table 5: Project Expenditures - Detail

Cost Category	Budget	Actual To Date	Remaining Total	To Completion Total	variance
Professional and technical services					
project lead	$15,000	$15,000	*$0*	$15,000	
consultation on legacy waste site monitoring & remediation	$10,000		*$23,062*	$23,062	
recycling initiatives	$5,000		*$18,900*	$18,900	
waste project planning	$5,000		*$0*	$0	
community engagement	$7,500	$6,500	*$1,000*	$7,500	
soil & leachate sampling & testing	$50,000		*$0*	$0	
Professional and technical services subtotal:	*$92,500*	*$21,500*	*$42,962*	*$64,462*	*$28,038*
Other personal services					
electrical			*$6,000*	$6,000	
			$0	$0	
Other personal services subtotal:	*$0*	*$0*	*$6,000*	*$6,000*	*-$6,000*
Meetings					
2 community meetings @ $1000/meeting	$2,000	$800	*$800*	$1,600	
5 community team meetings @ $500/meeting	$2,500		*$0*	$0	
Meetings subtotal:	*$4,500*	*$800*	*$800*	*$1,600*	*$2,900*
Communications					
teleconferencing	$700	$876	*$0*	$876	
Communications subtotal:	*$700*	*$876*	*$0*	*$876*	*-$176*
Training delivery and trainee costs					
6 trainees for 80 hours each @ $15/hour	$7,200	$1,045	*$0*	$1,045	
6 trainees for 10 lunches each @ $18/lunch	$1,080		*$0*	$0	
Training delivery and trainee costs subtotal:	*$8,280*	*$1,045*	*$0*	*$1,045*	*$7,235*
Work experience initiatives					
4 work experience perticipants for 240 hours each @ $16.25/hour	$15,600	$11,714	*$0*	$11,714	
Work experience initiatives subtotal:	*$15,600*	*$11,714*	*$0*	*$11,714*	*$3,886*
Salaries and wages					
1 employee for 30 days @ $150/day	$18,000	$46,743	*$12,008*	$58,743	
Salaries and wages subtotal:	*$18,000*	*$46,743*	*$12,008*	*$58,743*	*-$40,743*
Travel					
16 rounds trips @ $2400/round trip	$38,400	$6,209	*$15,000*	$21,209	
Travel subtotal:	*$38,400*	*$6,209*	*$15,000*	*$21,209*	*$17,191*
Overhead					
5% of equipment expenses	$8,200	$8,200	*$0*	$8,200	
10% of non-equipment expenses	$20,128	$20,128	*$0*	$20,128	
Overhead subtotal:	*$28,328*	*$28,328*	*$0*	*$28,328*	*$0*
Minor machinery and equipment					
a) Trailers for transportng recycling materials	*$24,000*		*$0*	$0	
b) Collection boxes & signage	*$9,000*		*$0*	$0	
c) Paper shredder	*$6,000*	$5,645	*$0*	$5,645	
d) In-Vessel composter	*$35,000*	$30,800	*$0*	$30,800	
e) Recycling depot	*$60,000*		*$10,000*	$10,000	
Equipment	*$0*	$83,196	*$17,000*	$100,196	
Shipping container	*$8,000*		*$6,000*	$6,000	
Shipping (2 shipments)	*$22,000*	$18,923	*$7,522*	$26,445	
Minor machinery and equipment subtotal:	*$164,000*	*$138,564*	*$40,522*	*$179,086*	*-$15,086*
Other					
Accommodation	$10,800	$130	*$1,000*	$1,130	
Food	$7,500	$809	*$1,000*	$1,809	
Materials printing	$5,000	$152	*$1,500*	$1,652	
Misc		$927	*$1,000*	$1,927	
Vehicle rental		$13,907	*$0*	$13,907	
Banking costs		$120	*$0*	$120	
Other subtotal:	*$23,300*	*$16,046*	*$4,500*	*$20,546*	*$2,754*
totals:	***$393,608***	***$271,824***	***$121,792***	***$393,608***	***$0***

Money was shifted around as the Project developed, allocating more funds to hands-on training and work experience, shifting it away from some of the consulting expenditures and consultant travel.

Note: $121,792 of this grant's funding remain to be expended. This funding is sufficient to cover the expenditures anticipated in the current fiscal year (to March 31, 2019) and are detailed in the "Year 1" activities of the Waste and Recycling Operations Plan detailed in section 3.

2.5. Lessons Learned from this Project

Numerous lessons have been learned from this Project, all of which can be usefully carried forward into future initiatives.

- There are sufficient people willing and able to work on waste and recycling in the community
    - With a moderate amount of administrative support and mentoring, community members have the skills and motivation needed to run a sustainable waste and recycling initiative
- Community pride can be a motivator in improving waste and recycling practices
    - Generally, members of Northlands Dënesųłiné do not need to be convinced of the benefits of recycling and better waste management. Instead, what is needed is funding and programming to put the community's priorities into practise.
- It will take time to change the social norms regarding littering
    - While a significant portion of the community is committed to taking care of their environment, littering can be a significant community problem even if only a few people do it.
- Chief, Council and Band Administration must be involved to emphasize the priority placed on sustainable waste and recycling initiatives
- The willing participation of Band Operations & Maintenance staff is essential
- Training in waste facility operation and management is essential for waste and recycling staff
    - Bear Smart training is equally essential for these staff
- A Work Opportunities Program for Income Assistance recipients can play a significant role in supplementing staffing resources
- Significant amounts of summer student time can be used for waste and recycling operations in future years
- Potential waste and recycling employees need bank accounts so they can be paid regularly and easily, without having to pay cheque-cashing fees at the Northern Store
- Integration with the school curriculum is needed

- Practical demonstrations of recycling, reuse and upcycling are more convincing than discussions
- Significant amounts of discarded material currently in the community can be usefully recycled for waste and recycling activities in the future
- Anything brought into the community must either be:
    - recycled & reused
    - turned into soil through composting, or
    - shipped back out
- Shipping material out on the winter road will be expensive
    - When possible, material should be recycled within the community.
- Bringing in recycling materials—bins, barrels, boxes, bags, etc.—while necessary, should be kept to a minimum
    - A plastic garbage bin, for instance, is often not designed for the extreme cold conditions of a Lac Brochet winter. Even if it is, it eventually becomes garbage itself and must be shipped out again as waste.
- Large pieces of equipment—like a compacting garbage truck or an automated sorting system—are not needed in this situation. This type of equipment is:
    - expensive to purchase and ship
    - challenging and expensive to maintain and repair, particularly in a remote community
    - designed for communities considerably larger than Northlands Dënesųłiné
- The only large piece of equipment needed to properly operate the Waste Management Facility—a front-end loader—is already available in the community
    - The challenge is to ensure that it is operational
- Organics need to be composted
- Waste & Recycling initiatives need to be integrated with other initiatives, including Derelict Vehicle Decommissioning
- "Disposable" diapers will remain a significant problem, at least until a diaper service is established
    - Of all the items encountered during the cleanup of the WCA, these were the most difficult to deal with. They don't decay and cannot be recycled.

These lessons have been integrated into the Waste & Recycling Operations Plan, which follows in the next section of this Report.

3. WASTE AND RECYCLING OPERATIONS PLAN

3.1. Plan Purpose

This Plan is intended to establish a sustainable waste and recycling program for the Northlands Dënesųłiné community.

This Plan is designed to fulfill the vision and priorities of the Northlands Dënesųłiné First Nation Sustainable Development Strategy, discussed in the first part of this report.

The Plan in this document includes an outline of the proposed approach, a listing of materials, equipment and people needed, a proposed timeline, and capital and operational cost estimates.

3.2. Research & Discussions

In addition to the hands-on work that occurred in this project—detailed in the previous section—a considerable about of research discussion occurred behind the scenes. These discussions occurred with community members, Council members, Crew members and Boke consultants. All were focused on the best approach for sustainable waste and recycling management in Northlands Dënesųłiné.

Many questions and options were considered during the development of this Plan, including:

- What is the most appropriate waste & recycling equipment for use in the Northlands Dënesųłiné community?
- Where should the majority of the recycling sorting occur—in the community, at the WMF, or in some other location?
- What materials should be shipped out and what should be kept in the community?
- How can we best involve all parts of the Northlands Dënesųłiné community in sustainable waste and recycling management?
- What role should Producer Responsibility Organizations—including Multi Materials Stewardship Manitoba—play in enabling Northlands Dënesųłiné to operate a sustainable waste and recycling program?

Boke consultants—and some members of the Northlands Dënesųłiné community—visited a variety of waste and recycling facilities and brought the lessons learned from them into these discussions. These included visits to Thompson facilities, Brandon waste and recycling facilities, the Altona recycling program, and the Louise integrated waste and recycling facility in Pilot Mound.

As well, considerable research was done on waste and recycling initiatives in northern Canada and other remote communities.

All of this was considered in developing this Plan.

3.3. Plan Summary

1. Engaging the community
2. Reducing and reusing
3. Staffing and governance
4. Managing external agreements & relationships
5. Creating recycling & waste boxes and stations
6. Bringing the Waste Management Facility (WMF) into compliance
7. Implementing comprehensive collection & management system
8. Cleaning up waste backlog
9. Monitoring current and legacy waste sites

Table 6: Summary Timeline

		Year			
area of focus		*1*[18]	*2*	*3*	*4*[19]
1	*Engaging the community*	review & discuss Plan	review & improve Plan annually		
2	*Reducing and reusing*	develop school curriculum	work with Northern Store to reduce packaging	open swap "store"	review & improve
3	*Staffing and governance*	choose staff; begin operations; begin training	continue operations & training; supplement staff with WOP participants & summer students; develop mandate & governance		
4	*Managing external agreements*	secure agreements	prepare & ship materials; review agreements annually		
5	*Creating recycling & waste boxes and stations*	set up Recycling Depot & Transfer Station	build & distribute household boxes	repair & replace community & household boxes, as needed	
6	*Bringing WMF into compliance*	sub-cells	build fence & sub-cell separators	sub-cell capping	review operations with governments
7	*Implementing comprehensive collection & waste management system*	choose, purchase and ship equipment & supplies	begin in-vessel composting; begin using recycling shuttle	repair or take apart derelict buildings	review waste & recycling collection & management
8	*Cleaning up waste backlog*	set up vehicle decommissioning	vehicle, equipment and appliance decommissioning, staging and shipping		

[18] Year 1 covers October 2018 to March 2019.

[19] Year 4 is template for subsequent years.

9	*Monitoring current and legacy waste sites*	choose monitoring company	take & send samples for analysis annually

3.4. Plan Details

Table 7: Detailed Timelines[20]

Year 1			
area of focus		*Fall*	*Winter*
1	*Engaging the community*	review Plan with Chief & Council	distribute & discuss Plan with community
2	*Reducing and reusing*	continue discussion with school staff	develop school curriculum
3	*Staffing and governance*	choose and hire staff; waste oil burner operator training; vehicle decommissioning training;	safety training; SWANA operator training
4	*Managing external agreements*	secure agreement with Thompson & scrap metal companies	begin discussions with PROs
5	*Creating Recycling & Waste Bins, Boxes & Stations*	choose Recycling Depot; assemble trailers for Transfer Station	set up Recycling Depot for use; adapt trailers for use as Transfer Station; secure permission to use school workshop
6	*Bringing WMF into compliance*	use Burn Cage	
7	*Implementing comprehensive collection & waste management system*	choose equipment & supplies	ship equipment & supplies on winter road
8	*Cleaning up waste backlog*	set up Vehicle Decommissioning Station	set up oil burner
9	*Monitoring current and legacy waste sites*	get quotes on monitoring costs	choose monitoring company

Note: As noted in section 2.4 (Project Expenditures) above, funding for Year 1 activities has already been secured under the current LEDSP grant. These remaining Year 1 expenditures are listed in section 3.6 (Plan Cost Estimates), below.

[20] For the purposes of this timeline: Fall = Sep to Dec, Winter = Jan to Mar, Spring = Apr to Jun, Summer = Jul & Aug.

Year 2				
area of focus	*Spring*	*Summer*	*Fall*	*Winter*
1 Engaging the community		solicit suggestions for improvement from community	review Plan with community	improve Plan
2 Reducing and reusing	Implement school curriculum	work with Northern Store & shippers to reduce packaging		
3 Staffing and governance	BearSmart training	recruit & manage summer students; develop WOP program	decide mandate; recruit & manage WOP staff	decide governance structure; SWANA manager training
4 Managing external agreements	conclude discussions with PROs	prepare shipments to Thompson & PROs		ship to Thompson & PROs
5 Creating Recycling & Waste Bins, Boxes & Stations	build Platform & Ramp for Transfer Station	build Household Collection Boxes	distribute Household Collection Boxes	
6 Bringing WMF into compliance	create sub-cells; assemble materials for fence & sub-cell separators	build fence & sub-cell separators; set up permanent signage		separate materials currently in WMF
7 Implementing comprehensive collection & waste management system	train operators on equipment	begin using in-vessel composter	begin using recycling shuttle	offer organics recycling collection for households
8 Cleaning up waste backlog	begin using waste oil burner	begin vehicle decommission-ing	assemble derelict appliances for shipping	ship vehicles & appliances
9 Monitoring current and legacy waste sites	begin monitoring		send samples for testing	

Year 3					
area of focus		*Spring*	*Summer*	*Fall*	*Winter*
1	*Engaging the community*		solicit suggestions for improvement from community	review Plan with community	improve Plan
2	*Reducing and reusing*	review school curriculum	open swap "store"	make improvements to school curriculum, as needed	
3	*Staffing and governance*	hazardous waste training; management & governance training	recruit & manage summer students; develop WOP program	recruit & manage WOP staff	Part-time staff to take Landfill Operations training; review staffing & training
4	*Managing external agreements*	review first year of shipping	make changes as needed	prepare shipments to Thompson, PROs & scrap metal companies	ship to Thompson, PROs & scrap metal companies
5	*Creating Recycling & Waste Bins, Boxes & Stations*	Inventory Community Collection Bins & Household Collection Boxes	repair & replace Community Collection Bins & Household Collection Boxes, as needed		consider improvements to Recycling Depot & Transfer Station
6	*Bringing WMF into compliance*	Develop sub-cell capping plan	review WMF with Govt of MB & Govt of Canada	make any needed improvements	ship up supplies as needed
7	*Implementing comprehensive collection & waste management system*	conduct inventory of all derelict buildings	repair or take apart derelict buildings		offer salvaged material to community members
8	*Cleaning up waste backlog*	continue vehicle & equipment decommissioning		stage derelict vehicles & equipment for shipping	ship vehicles & equipment
9	*Monitoring current and legacy waste sites*			send samples for testing	

Year 4 & Subsequent Years				
area of focus	*Spring*	*Summer*	*Fall*	*Winter*
1 Engaging the community		solicit suggestions for improvement from community	review Plan with community	improve Plan
2 Reducing and reusing	review school curriculum	continue swap "store"	make improvements to school curriculum, as needed	
3 Staffing and governance	determine if additional training needed	recruit & manage summer students; develop WOP program	conduct management & governance review; recruit & manage WOP staff	Implement additional training, if needed
4 Managing external agreements	review first year of shipping	make changes as needed	prepare shipments to Thompson, PROs & scrap metal companies	ship to Thompson, PROs & scrap metal companies
5 Creating Recycling & Waste Bins, Boxes & Stations	Inventory Community Collection Bins & Household Collection Boxes	repair & replace Community Collection Bins & Household Collection Boxes, as needed		consider improvements to Recycling Depot & Transfer Station
6 Bringing WMF into compliance	Implement cell capping plan	conduct annual operations review	make changes as needed	ship up supplies as needed
7 Implementing comprehensive collection & waste management system	review waste & recycling collection & management	make changes as needed		
8 Cleaning up waste backlog	continue vehicle & equipment decommissioning – backlog to be cleared by year 4		stage derelict vehicles & equipment for shipping	ship vehicles & equipment
9 Monitoring current and legacy waste sites			send samples for testing	

3.4.1. ENGAGING THE COMMUNITY

The success of this program will largely depend upon how much support it receives from the community. Community support for sustainable waste management and recycling will build if:

- leadership make their commitment clear
- the Plan creates local jobs

- awareness is raised
- community members are offered opportunities for involvement
- the wider community is involved in ongoing decision making

3.4.1.1. Commitment of Leadership

Chief and Council made a decision to initiate this current Project. This commitment will need to be renewed at the beginning of the next phase of this initiative.

Band staff, particularly the Operations and Maintenance staff, are clear that the way waste has been dealt with in the past cannot continue. They have the support in this from Chief and Council and from a number of community members. The remaining challenge is gain widespread acceptance of this within the community.

The most immediate question to address is to secure cooperation from all community members that open burning cannot occur any more in the Waste Collection Area.

3.4.1.2. Creating Local Jobs

Implementing this Plan will increase local employment. (For details, see Staffing and Governance, below.)

3.4.1.3. Awareness

We can't assume that community members will know what is happening in waste and recycling on their own. The staff and leadership of the waste and recycling initiative must work systematically to build awareness of what is happening, and explicitly show how activities embody the values of the community and contribute to the community's quality of life. Some elements of the Plan that will help build awareness are:

- A Recycling Depot in the centre of the community, with cleanup and recycling initiatives run out of the Depot
- Recycling Bins in public places
- Visible examples of recycling and reuse of waste materials
- Events and activities advertised through posters in the community and Public Service Announcements (PSAs) on social media

3.4.1.4. Opportunities for Involvement

Getting people actively involved will help to build a sense of ownership and connection to the Plan. A primary way to get people involved will be through community events like Spring Cleanups and Recycling Drives to collect specific recyclables and derelict appliances.

3.4.1.5. Community Involvement in Decision Making

The Plan needs to be reviewed annually by the community, with suggestions for improvement asked for, and acted on.

Waste & Recycling Staff need to take the lead on this activity, with support from Band staff, and Chief and Council.

One of the first community decisions that needs to be made is a decision whether or not to have the Northern Store charge a 5¢ or 10¢ deposit on drink cans and bottles. This money would be given to the Waste & Recycling initiative, and then given back to anyone bringing in a drink can or bottle to the Recycling Depot or Transfer Station.

3.4.2. REDUCING & REUSING

Reducing the amount of waste produced—and reusing materials that might otherwise be considered waste—will require sustained effort.

3.4.2.1. Education

The ongoing involvement of the school will be essential to the success of this Plan.

The Green Action Centre's "Community Pathfinder First Nations Waste Minimization Project" may also be able provide support education activities.

3.4.2.2. Waste Reduction

Diverting recyclables and organics away from the landfill is a good thing to do - but what about taking steps to reduce the sources of waste? After the commencement of the implementation aspect of this project, we will continue to investigate and discuss initiatives to reduce waste. Here are some examples to consider:

- Working with the Northern Store to:
  - Replace styrofoam and plastic food containers with compostable alternatives
  - Sell perishable food in smaller portions (reducing the amount of food that spoils and is thrown away)
- Enabling community members to use reusable, non-plastic shopping bags
- Promoting and making available rechargeable sparkling water makers (using refillable bottles), instead of pop and sugary drinks (in nonrecyclable bottles and cans)
- Making rechargeable batteries available
- Making LED bulbs more available

3.4.2.3. Swap Days

At least once a year the Waste & Recycling staff should hold opportunities at the Recycling Depot for community members to get reusable materials—either by swapping or by choosing from available reclaimed items. These can range from baby clothes to vehicle parts scavenged from the Derelict Equipment Area, to surplus building materials left over after construction projects.

3.4.3. STAFFING AND GOVERNANCE

3.4.3.1. Staffing

A sustainable waste & recycling system for Northlands Dënesųłiné will require:

- Three permanent, full-time jobs, one focused primarily on recycling, one on waste, and one acting as an assistant to the other two, as well as filling in for them when they are on holidays, out of community, or otherwise unable to work on waste & recycling.
    - Currently, there is one O&M staff person focused primarily on waste, so this would mean a net increase of two permanent, full-time jobs.
- Seasonal, part-time and casual staff to:
    - Build Household Collection Boxes and Community Collection Boxes
    - Build structures like the Transfer Station
    - Prepare the Recycling Depot for public use
    - Construct WMF fencing
    - Work on Spring Community Cleanups, Summer WMF Cleanups, and Recycling Drives
    - In the first two years, as the Transfer Station, Bins and Fencing are being created, this would create approximately 4 person-years of employment each year.
    - In the following year, as the required upgrades are completed and the backlog of waste & recyclables are cleared, approximately 2 person-years of employment can be expected to be created.
    - Crews for each initiative should be set at 5 of 6 people per project, in addition to the permanent staff.
        - The experience of the Cleanup Crew in the Project (reported on above) indicates that Crews that are much smaller or much larger than this tend not to be as effective.

Training is needed for the Waste & Recycling staff—particularly the three permanent staff members. Initially, they need:

- Waste oil burner operator training
- Vehicle decommissioning training
- Safety training
- To take and pass the SWANA Certification as a Landfill Operator

In the second year, they need to:

- Take BearSmart training.
- Become certified through SWANA as Managers of Landfill Operations.

In the following years:

- Part-time staff will need to become certified as Landfill Operators
- Permanent staff will need:
  - Hazardous waste training
  - Management and governance training

3.4.3.2. Governance

As noted earlier, this initiative could have one of at least three governance structures:

- A department within the Band Administration structure (parallel to the Operations & Maintenance department)
  - It could also be operated as a sub-department of another department, perhaps of the O&M department.
- A social enterprise (co-op, non-profit, or for-profit) that could run waste and recycling activities on behalf of the community
- A department of a larger enterprise focused on community economic development

Depending on the governance structure chosen, resources that would be valuable in providing governance training are:

- Aki Energy
- The Centre for Indigenous Environmental Resources (CIER)

Some decisions will be dependent on the structure chosen:

- If the option of a social enterprise is chosen:
  - Should it be a co-op, a non-profit, or a for-profit?
  - Who should draw up the governing documents?
    - How are they amended
  - How are board members chosen?
    - Board members would be paid, at most, a small stipend for the hours worked.
    - There would be no need to spend money on Board travel.
  - How is the ownership by the community embodied in the organization's governing documents?
    - Does the Band hold the shares in trust for the community?
    - Does each community member own a share?
      - Do off-reserve Band members each own a share?
- If it is part of another department or economic development corporation:
  - How much involvement should the "parent" department or corporation

have in operations? In management?

A number of other decisions will need to be made no matter what governance structure is chosen:

- How do Chief and Council exercise their governance responsibilities?
- How does the Band Administration exercise its administrative responsibilities?
- How do we ensure Waste & Recycling works well with other relevant departments and programs, including:
  - The school
  - O&M
  - Gardening and other food projects
- Where does any revenue from selling scrap metal, and any funding from the PROs go?
- How is community involvement managed?
- How are staff hired, evaluated, disciplined and, if necessary, let go?
- Who handles payroll?
- What is Waste & Recycling's mandate?
  - Does waste remain within the responsibility of O&M?
  - Would Waste & Recycling be responsible for mould testing and remediation? Radon testing & remediation?
  - Would Waste & Recycling be responsible for building demolition

3.4.4. MANAGING EXTERNAL AGREEMENTS

Much of the diversion of waste into recycling can be internal to the Northlands Dënesųłiné community (see Implementing A Comprehensive Collection and Waste Management System below). However, some materials will have to be trucked out of the community on the winter road:

- Appliances that may contain refrigerants will need to be taken to either the Thompson recycling facility, PureSphera in Winnipeg, or an equivalent location that can accept and safely decommission them.
- Metals—including derelict vehicles and equipment, and non-refrigerant appliances can be sold, either for parts or for scrap.
- Items that are the responsibility of PROs, if they cannot be handled within the community, will need to be prepared for shipping according to their requirements

Agreements will need to be created and managed with:

- Trucking companies bringing in materials on flatbeds, to backhaul large or crushed metals, vehicles and equipment

- Trucking companies bringing materials in semis, to backhaul recyclables in the Bulk Bags and in Sealable Bulk Containers
- Every Producer Responsibility Organization
- Manitoba Sustainable Development
- Suppliers of Materials

Within the Northlands Dënesųłiné community, agreements will need to be developed and managed with:

- The O&M department
- School Administration & Teachers
- Nursing Station Staff
- The Northern Store

3.4.4.1. Producer Responsibility Organizations (PROs)

There are numerous Producer Responsibility Organizations (PROs) in Manitoba. Each has a responsibility for and receives funding to manage specific product wastes.

Figure 50: Producer Responsibility Organizations (PROs) in Manitoba

Table 8: Recyclable Products & Associated PROs[21]

product	*PRO responsible*
beverage containers	Recycle Everywhere
car batteries	Canadian Battery Association (CBA)
cell phones	RecycleMyCell.ca
electronics (eWaste)	Electronic Products Recycling Association (EPRA)
household batteries	Call2recycle
Household Hazardous Waste (HHW)	ProductCare
household recyclables	Multi-Material Stewardship Manitoba (MMSM)
medications & pharmaceuticals	Medications Return Programs (MRP)
mercury switches	Thermostat Recovery Program (TRP)
Tires	Tire Stewardship Manitoba (TSM)
used oil & oil filters	Manitoba Association for Resource Recovery Corporation (MARRC)

Each of these PROs has been collecting fees for products sold in the community. However, currently, they do not use those funds to collect and dispose of these materials from Lac Brochet.

Contact needs to be established with each of these PROs and secure their support in covering the costs of recycling their materials. This will offset some—but not all—of the costs of the Plan outlined here.

3.4.5. CREATING RECYCLING & WASTE BOXES AND STATIONS

3.4.5.1. Household Collection Boxes

As noted below, approximately 100 Household Collection Boxes will need to be constructed.

3.4.5.2. Community Collection Bins

As noted earlier, the Cleanup Crew built five large Community Collection Bins and two small ones.

Details of the Community Collection Bins that need to be built over the next few years are found below.

[21] An additional PRO—CleanFarms—is responsible for agricultural chemical containers and is not currently relevant to NDFNs waste and recycling activities.

3.4.6. BRINGING THE WASTE MANAGEMENT FACILITY INTO COMPLIANCE

Figure 51: Proposed Modifications

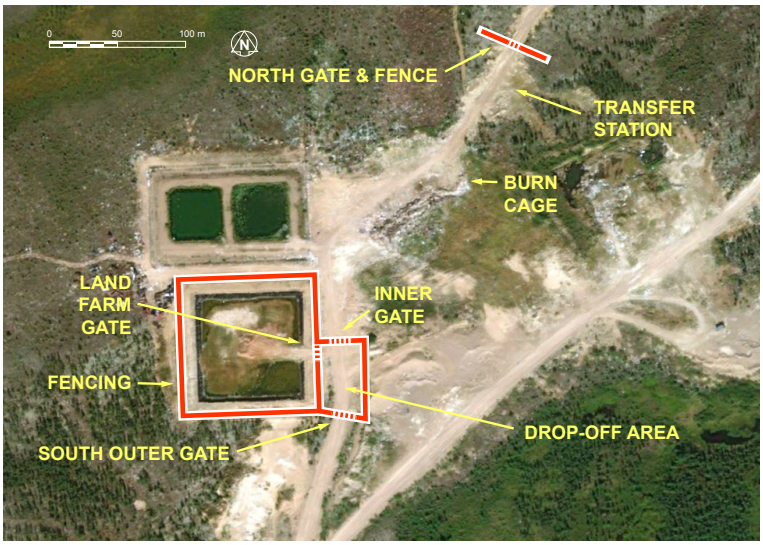
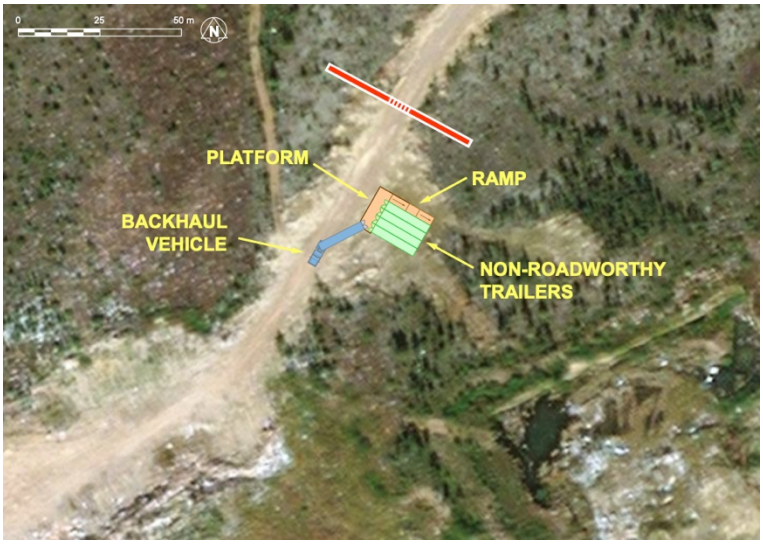


Figure 52: Proposed Transfer Station Location



The basic actions that need to be taken to bring the WCA into compliance include:

- Use of the Burn Cage
- Creation of a Transfer Station for recyclables
- Creation and use of Sub-Cells to separate waste and allow for ongoing capping of waste
- Fencing and gates
- Creation of a Drop-Off Area if community members have waste or recyclables they want to take to the WMF
- Sifting of old waste to separate it from sand and gravel

- Removal of derelict vehicles and metal
- Annual testing of monitoring wells
- Regular summer cleanup
- Weekly management
- Daily management
- Ongoing discussions with Manitoba Sustainable Development

3.4.6.1. Burn Cage

As noted above, a Burn Cage, which the crew has already constructed, needs to be used. Equally important, it needs to be used in a safe, professional manner. Some of the key elements of the safe operation of a Burn Cage are:

- Nothing is burnt except in the Burn Cage
  - No open fires at or near the WMF
- No plastics, metals, organics, or hazardous wastes are put into the Burn Cage; only paper, cardboard, wood and wood products
  - Clean, shreddable paper should not be burnt.
    - It should be put through the shredder and mixed in the In-Vessel Composter with organics to make soil for gardening. If needed to conserve space, the paper can be compacted in the Vertical Baler until needed.
  - Clean cardboard should not be burnt.
    - It should be used in gardening as the base of cold frames, raised beds and potato tire towers, as outlined in the Northern Foods Sovereignty Study.[22]
  - Clean wood should not be burnt in the Burn Cage.
    - If the wood can be reused for building, it should be stacked by the Transfer Station.
  - Pressure-treated, stained and painted wood can be burnt in the Burn Cage, as can wood-based materials like OSB, plywood, and MDF.
  - No chemicals, paints, waste oil or oil-based products should be burnt.

[22] See http://bokeconsulting.com/northern-foods-sovereignty-study/

- The guidelines for the safe incineration of solid waste should be followed.[23]
- The Burn Cage needs to be closed before the fire is lit.
- One of the Waste & Recycling Staff needs to stay beside the fire, with a working fire extinguisher, until the fire has burned down to embers.
- The door of the Burn Cage needs to be left closed until the fire is completely out and the embers have cooled. Only then should it be opened and another load of burnable material be put in.

3.4.6.2. Sub-Cells

The WCA does not currently have waste sub-cells. These are needed.

These sub-cells can be used to separate out materials. They can also be covered up, one at a time, as the WMF fills up.

The map of the Rockwood Transfer Station in the appendices provide a good example of a WMF that is separated into different uses.

3.4.6.3. Fencing and Gates

The fence around the Land Farm is in disrepair and needs to be replaced. The new fence needs to:

- Be able to contain lighter materials that get blown by the wind
- Be bear-resistant
- Keep smaller animals out
- Be repairable with local materials and local labour

It should be constructed using local materials. A design meeting the above criteria might include local fire-kill logs for fence posts and crossmembers. There are examples of this kind of fencing around many of the houses in Lac Brochet.

[23] Department of Environment, Government of Nunavut. *Environmental Guideline for the Burning and Incineration of Solid Waste.* 2012 (revised). This document should be followed to ensure the safe operation of the Burn Cage. However, because it was designed for communities even more remote than NDFN, it recommends burning of some materials that are not recommended for burning here. ***Only the materials listed for burning in this report should be burnt.***
https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKEwiT9YTVwurcAhVKyYMKHblUAb4QFjAAegQIAhAC&url=https%3A%2F%2Fwww.gov.nu.ca%2Fsites%2Fdefault%2Ffiles%2Fguideline_-_burning_and_incineration_of_solid_waste_2012.pdf&usg=AOvVaw1tJ_HABtZyDEv4l4JjkPjr

Figure 53: Fencing Example

This design allows for the fence to be repaired without having to depend on replacement materials coming on the winter road.

Fencing will also be need around the Drop-Off Area and at the North Gate.

Just as important as the fencing, four gates are required to properly manage access to the Waste Collection Area.

An Inner and an Outer Gate—with a Drop-Off Area between—them are needed at the south end of the WMF. The outer gate can be open during "regular operating hours"—perhaps 9 to 5, Monday to Saturday. There is no need for a Waste & Recycling staff person to be in attendance. The inner gate should only be open when access by the Waste & Recycling staff is needed.

3.4.6.4. Drop-Off Area

The Drop-Off Area between should have permanent signage showing community members where to drop of their separated materials. At minimum, signs should include:

- Paper, cardboard & wood
- Plastics
- Tires
- Organics
- Metals
- Everything else

If the other Waste & Recycling systems—Household Collection Boxes, Community Collection Bins, Cleanup and Recycling Drives, the Recycling Depot, and the Transfer Station—are all operating properly, there is no need for community members to come into the WMF to drop off materials at all.

However, old habits die hard. Some community members will still want to bring materials to the WMF. The Drop-Off Area allows that to happen, will reduce the incentive to dump waste materials outside the gate, and begins the process of separating materials.

For the Drop-Off Area to function properly, Waste & Recycling staff will need to empty it daily, taking non-recyclables into the WMF itself, and recyclables to the Transfer Station.

3.4.6.5. Sifting of Old Garbage from Sand and Gravel

As noted earlier, the garbage currently accumulated at the Waste Collection Area is mixed with sand and gravel. Over the next few years, this material needs to be sifted with the band-owned gravel separator. If any of the separated garbage can be recycled (probably only some metals and plastics), this should be done. The rest can be properly buried in the sub-cells.

This process will result in a gradual cleaning of the Waste Collection Area and the consolidation of non-recyclable legacy waste.

3.4.6.6. Annual Testing of Monitoring Wells

Annual testing of Monitoring Wells at the WMF is required and essential.

3.4.6.7. Summer WMF Cleanup

This Plan calls for employing summer students and casual staff to clean up the WMF every summer. Primarily, they will need to collect loose material around the sub-cells, along the fencing, and on the road and forest around the WMF.

This cleanup needs to include separating out material that can be diverted away from the WMF.

3.4.6.8. Weekly Management

Once a week, a member of the O&M staff needs to go to the WMF with a bulldozer, push the accumulated waste together, compress it by driving over it with the bulldozer, and then cover it up.

At least one of the Waste & Recycling staff will need to be there before this work to ensure that the accumulated waste contains only non-recyclables.

As well, the Burn Cage should be loaded and used at least once a week.

3.4.6.9. Daily Management

At least one of the Waste & Recycling staff will need to go to the WMF twice each workday--once in the morning to open the outer gate, and once in the evening to close it.

During one of those visits, they will need to move the material in the Drop-Off Area either into the WMF or to the Transfer Station, as appropriate.

3.4.6.10. Ongoing Discussions with Manitoba Sustainable Development

Becoming compliant—and staying compliant—will require ongoing discussions with Manitoba Sustainable Development. Initially, those discussions might be quite frequent. Once the WMF is being managed sustainably, those discussions will become simple and infrequent.

3.4.7. IMPLEMENTING A COMPREHENSIVE COLLECTION AND WASTE MANAGEMENT SYSTEM

In addition to bringing the Waste Management Facility into compliance, outlined above, a comprehensive collection and waste management system for NDFN includes:

- Purchasing, shipping, using, maintaining, and replenshing all Equipment and Materials listed below
- Training
- Weekly waste and recycling pickup
- Spring community cleanups
- Recycing drives
- Integrating the Derelict Vehicle Project into this Plan
- Recycling Organics

3.4.7.1. Needed Equipment and Materials

The needed Equipment and Materials—with a rationale for each—are outlined in the Requirements section, below.

3.4.7.2. Training

The needed training is listed in Staffing and Governance, above

3.4.7.3. Weekly Waste & Recycling Pickup

The three staff responsible for waste and recycling will, together, need to ensure that waste and recycling is picked up on a predictable, weekly schedule.

They will need to drop recyclable materials off at the Transfer Station, while non-recyclables will need to be taken out to the WMF.

3.4.7.4. Spring Community Cleanups

In the spring, a considerable amount of litter appears throughout the community when the snow melts.

Spring Cleanups need to be revitalized. In addition to hiring seasonal staff for this, volunteers, school staff and students, O&M staff, and Band leadership will all need to be involved.

Spring Cleanup should use the Recycling Depot in the community as its hub. The primary focus should be on:

- Cleaning up all litter
  - This would be a good opportunity to involve students in a raffle—perhaps giving a ticket for:
    - every 10 bottles, plastic containers, or cans
    - every pound of litter brought in
  - Care needs to be taken to ensure that community members involved in cleanup have the right safety equipment, including gloves, bags, and garbage pick-up "grabbers".
- Clearing away all larger waste and recyclable materials within the community, including derelict or unwanted:
    - Appliances
    - Furniture
    - Snowmobiles
    - Vehicles
    - Tires
    - Wood products (including pallets), metals, and plastics
  - Most of this can be removed to the Transfer Station or the WMF by the Waste & Recycling staff. Some (such as old vehicles) will need heavy equipment to move, and so will need the involvement of O&M staff.

The Canadian Beverage Container Recycling Association (CBCRA) has a program to work with 10 communities per year to assist them with spring cleanup events with their *Recycle Everywhere* people. We will apply to be one of those communities.

3.4.7.5. Recycling Drives

At selected points in the year, the Waste & Recycling staff, supplemented by additional seasonal, part-time and casual staff, will need to organize well-planned and well-publicized Recycling Drives.

On predetermined days, the Waste & Recycling Truck (for large items), and the Electric Runabout (for smaller items) will go around the community, each pulling their trailer, and collect specific recyclable materials. People will be invited to:

- Leave their recyclables out beside their Household Collection Boxes
- Bring their recyclables
  - out to the vehicles as they go by
  - to the Recycling Depot
  - to the Transfer Station

Materials that could be collected in such drives include:

- Electronic waste (eWaste) & household batteries
- Household Hazardous Waste (HHW)[24]
- Paper and cardboard
- Plastics
- Cans
- Tires

3.4.7.6. Integrating the Derelict Vehicle Project into this Plan

Although the Derelict Vehicle Project began as a separate initiative, to maximize the effectiveness of that initiative and this one, they need to be integrated.

The Derelict Vehicle Project is covered as part of the next section on cleaning up the waste metals backlog

3.4.7.7. Recycling Organics

Organics (also known as "organic material"), such as food waste, constitutes about 1/3 of the residential waste stream in most Canadian communities. Anything that can rot is organic material, including:

- Food thrown out by the store
- Scraps created when making meals
- Leftovers from meals
- Fish guts and other fish waste, including any fish caught that aren't eaten
- Anything left over from hunting or trapping
- Animal carcasses

If we divert organics away from landfills, we will achieve important environmental benefits:

- We will reduce methane gas emissions.
    - Methane is released when organic waste decomposes anaerobically (without oxygen). This happens when organic waste is deposited in a landfill. Methane has 25 times the global warming potential of carbon dioxide.
- We will reduce or eliminate leachate
    - Leachate is the liquid produced by rotting materials. It

[24] Household Hazardous Wastes (HHWs) are not the same as industrial waste (like body-shop paints) or contaminated waste (like mould-affected building materials). HHWs are materials left over from normal household activities that should not be put into a landfill. See the appendix Household Hazardous Waste (HHW) Items for a detailed listing

contaminates the soil and groundwater, and can damage nearby streams and lakes.

- We will extend the life of the WMF
    - The less material that goes into the WMF, the more slowly it will fill up.
- We will make the WMF less attractive to bears, birds, and other wildlife
    - Until organics are diverted from the WMF, animals will remain a serious problem.
- We can grow food
    - When mixed with shredded paper, sawdust or wood chips and put into the In-Vessel Composter, it becomes compost, which can be mixed with sand and muskeg to make rich soil.

We will work with the Green Action Centre and the In-Vessel Composter manufacturer to provide training to Waste & Recycling staff, and to interested community Members.

3.4.8. CLEANING UP THE WASTE BACKLOG

3.4.8.1. Metals Waste Backlog

A related project—the Derelict Vehicle Project—has purchased the equipment necessary to clean up the metals waste backlog in Northlands Dënesųłiné.

The bulk of the metals waste backlog is located in the Derelict Equipment Area around the Public Works Garage. Of course, not all of the material in this area is metal, but a majority of it is.

All equipment needed to safely decommission vehicles—including a vehicle hoist, air tools, and waste fluid handling equipment—was purchased by the Derelict Vehicle Project. This equipment was delivered to the community in March 2018 on the winter road. ***It must be installed by the Waste and Operations department in the Public Works Garage no later than Fall 2018***.

As well, a crusher was purchased and is waiting in Thompson to go into the Northlands Dënesųłiné community on the winter road in February 2019. This crusher will circulate between the three northwest Manitoba First Nations of Sayisi Dene First Nation (Tadoule Lake), Northlands Dënesųłiné (Lac Brochet), and Barren Lands First Nation (Brochet). ***If Northlands Dënesųłiné has the vehicle hoist and other equipment installed in its Public Works Garage this fall, they will be the first community to get the crusher.***

Every winter, the crusher will move on the winter road between these three communities. This means that vehicles can be crushed in Northlands Dënesųłiné every three years. However, vehicle decommissioning can occur throughout the year, every year, and derelict metals can—and should—be shipped out every year on the winter road:

- Many of the vehicles—and much of the other derelict metals—are too large to crush. They need to be drained of any fluids and stationed to be ready to load on a flatbed. They can then be shipped out. A crusher is not needed for them.

- Appliances that may contain refrigerant—fridges, freezers, air conditioners—should not have their refrigerant removed in the community, nor should they be crushed. Instead, they need to be assembled in one of the trailers in the Transfer Station.

The process for dealing with Derelict Vehicles is:

- *Collection*
  - Derelict Vehicles need to be assembled in an area where they can conveniently be dealt with.
    - This will begin with harvesting all salvageable parts.
  - Most of the derelict cars in Northlands Dënesųłiné are already in the Derelict Equipment Area. Others are gathered together at the Waste Collection Area.
- *Decommissioning*
  - The vehicles must be made safe to transport and the recyclables on them segregated.
  - Fluids need to be drained and properly stored.
    - Oils, gas and diesel can all be burnt in the waste oil boiler.
  - Electronics, batteries, tires and any mercury switches need to be removed and properly stored at the Transfer Station, ready for shipping out on the winter road to the appropriate PRO.
- *Crushing*
  - A mobile crusher will be brought into the community every third year.
  - Pickup trucks and cars can be crushed. Larger vehicles and equipment cannot be crushed.
- *Stacking*
  - Crushed vehicles need to be stacked, ready for loading.
- *Loading*
  - The flattened vehicles will need to be loaded onto flatbed trailers and secured for travel.
  - The larger vehicles and equipment—those too big to crush—will also need to be loaded.
  - Usually, the flatbeds will come into the community loaded with equipment and supplies. Once they are unloaded, the vehicles and equipment will need to be quickly stacked and secured on them.
- *Transporting*
  - It is expected that outside trucking companies will do most of the transporting.
- *Selling*

- Some of the vehicles and equipment can be sold for parts. Most, however, can only be sold for scrap. The revenue from these sales will offset the cost of transport, and *some* of the cost of paying people to decommission them.

Some training has already been done and further training is needed. ***Further training can occur as soon as the hoist is installed in the Public Works Garage.***

There are also derelict appliances ("white goods") that need to be dealt with. These can be crushed and shipped out with the crushed cars.

3.5. Requirements

A number of items are required to implement this Plan—including equipment, materials and facilities.

3.5.1. EQUIPMENT

3.5.1.1. In-Vessel Composter

Figure 54: In-vessel composter from Novid[25]

In-vessel composters are standard equipment in the hog industry and are often found in other commercial animal operations as well. They have a number of advantages over the alternatives:

- Windrow composting is more suitable for larger operations
  - Windrow composting is likely to attract animals at Northlands Dënesųłiné
  - For truly effective windrow composting, a large compost-turner is needed
- In-yard composting can only take pre-consumer vegetable waste
  - For Northlands Dënesųłiné, the composting operations will need to be able to take post-consumer and animal materials
  - Unless it is carefully managed, in-yard composting also attracts animals

An in-vessel composter has already been purchased and shipped to Northlands Dënesųłiné. It is currently waiting to be connected to the power grid.

[25] Source: https://novid.ca/index.php/products/novi-comp/

3.5.1.2. Compact-Track Loader

A skid-steer (also known as a Compact-Track Loader) is a versatile piece of equipment needed to implement this Plan. It is needed to:

- Move materials in the WMF
- Load the in-vessel composter
- With a forks attachment, transport pallets and bulk bags containing recyclables
- With an auger attachment, be used to build the perimeter fence and fencing separators in the WMF
- With a grappling attachment, move waste and recyclables collected in the community
- With a bumper hitch, to haul a trailer
- In addition to these uses, this Loader will also be useful for transporting logs and chips in the Renewable Energy Project and moving building supplies for new housing and housing renovations

Figure 55: Compact-Track Loaders


with Pallet Forks & Load

with Auger Attachment

with Grappler

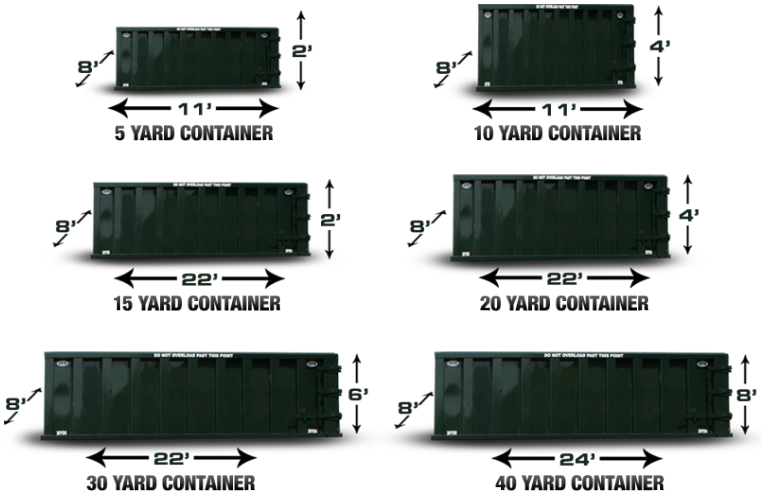
A Compact-Track Loader, with the attachments outlined above, was purchased as part of the equipment required in the Environmental Remediation And Alternative Energy Systems (ERAAES) project. It can serve double-duty for both the ERAAES project and for the waste and recycling initiative.

3.5.1.3. Roll-On-Roll-Off Trailer & Bin

Roll-On-Roll-Off Bins are versatile collection and storage bins that can be used as recycling collection bins, as construction waste bins, and as storage bins for recyclables.

Figure 56: Roll-On-Roll-Off Trailer

Figure 57: Roll-On-Roll-Off Bins[26]



This Plan will require a trailer, plus 6 small bins in the 5-to-15 yard size.

[26] Source: Moore Recycling http://moorescrapmetal.com/roll-off-containers/3257475

3.5.1.4. Electric Runabout

The Crew will need a small vehicle for transporting staff and materials. The most appropriate vehicle for this use in Northlands Dënesųłiné is an electric side-by-side off-road vehicle. The three best options are from Polaris, Textron, and Club Car.[27]

Figure 58: Electric Off-Road Side-By-Sides

Polaris
Ranger EV[28]

Textron
Prowler EV[29]

Club Car
Carryall 510 LSV[30]

Whichever vehicle is chosen, it would need some modification—the Polaris or Textron would need a cab enclosure; the Club Car would need a raised suspension and off-road wheels.

Because this runabout will be used, in part, to transport project staff to and from the WMF, the back section should have 2 seats, rather than the small carry-tray shown on the Club Car.

Either one of these vehicles can tow about 1,000 pounds. A small trailer to tow behind it would also be needed.

[27] There are, of course, many electric vehicle options. These three are recommended because they can operate on rough gravel roads, are easily serviced, have good sales support in Canada, and have proven track records.

[28] Source: https://ranger.polaris.com/en-ca/ranger-ev/

[29] Source: https://textronoffroad.txtsv.com/side-by-side/electric/prowler-ev

[30] Source: https://www.clubcar.com/us/en/commercial/street-legal-vehicles/carryall-510-lsv.html

Figure 59: Trailer Options for the Runabout

Yutrax
TX158[31]

ABI
Workman XL[32]

Country ATV
7550ATV[33]

If something is too large heavy to be transported with the Side-By-Side and its trailer, it can be transported with a pickup truck and either the roll-on-roll-off trailer and a container or the trailer available at the Public Works Garage

3.5.1.5. Paper Shredder

Paper can be shredded and used as "browns" for composting in the in-vessel composter. (See Recycling Organics, above).

A small paper shredder—like the ones typically sold at an office supply store—are only meant for use for small volumes. They also can take only a few pages at a time.

Given that it will be used to shred all the paper available from all sources in the community, a larger-volume shredder is needed.

[31] Source: https://www.amazon.ca/Yutrax-TX158-Warrior-Utility-Trailer/dp/B001O00WQW/ref=sr_1_18?ie=UTF8&qid=1534554200&sr=8-18&keywords=yutrax

[32] Source: https://www.abiattachments.com/atv-trailer/workman-xl-dump-trailer/#gallery

[33] Source: http://countryatv.com/7550atv.html

Figure 60: Larger-Volume Paper Shredder

A shredder of this type can take about 50 sheets at a time, and handle staples and paper clips, as well as thick paper. It will have a large-volume receptacle, so that the Large Recycling Bags can be put inside them to collect the shredded paper.

A larger shredder of this type was purchased and has been sent up to Northlands Dënesųłiné.

3.5.1.6. Vertical Baler

A small baler is needed to compact small plastics, metal drink cans and (when appropriate) paper and cardboard, into bales.

Figure 61: Vertical Balers

Harmony Enterprises[34]
M30HD

Latta Equipment[35]
B3

Cram-A-Lot[36]
VB-60

The bales can be stored at the Transfer Station, either for shipment out or for future in-community use, as appropriate.

A Baler of this type has been purchased and will be shipped up on the winter road in February 2019.

3.5.1.7. Pallet Jack

Figure 62: Pallet Jack

A Pallet Jack for Northlands Dënesųłiné has already been purchased as part of the Derelict Vehicle Project, and will go into the community on the 2019 Winter road.

[34] Source: https://harmony1.com/harmony-products/30-inch-baler-m30hd-vertical-baler/

[35] Source: https://lattaequipment.com/product/vertical-baler/

[36] Source: https://www.cram-a-lot.com/vb-balers

3.5.1.8. Weigh Scale

A weigh scale suitable for weighing Bulk Bags and Sealable Bulk Containers will be needed in the Transfer Station.

Figure 63: Pallet Weigh Scale

3.5.1.9. Replacement Truck

Garbage is currently collected and transported to the WCA with pickup truck. This vehicle is adequate to current needs, but will need to be replaced at some point during first few years of this Plan.

When the current truck needs to be replaced, if a viable electric pickup truck is commercially available, it would be the best choice.[37] A hybrid truck—if one is available would be an acceptable second choice.

This pickup truck would pull the Roll-On-Roll-Off Trailer for collection rounds.

[37] One of the important benefits of an electric truck is its ability to replace an electric generator which power tools are needed in the field.

3.5.2. MATERIALS

Materials are consumables that are required for waste and recycling activities. Some can be built in the community, either on site or in the Construction Shop, and some will need to be brought in on the winter road.

Some consumables (like Community Collection Bins) will last a number of years before they need to be replaced. Others (like Compostable Bags) will need to be replenished every year.

3.5.2.1. Household Collection Boxes

In order to ensure proper collection of recyclables and waste, houses need sturdy, permanent recycling and waste boxes outside near the road. Fourplex and duplex units can share a box, as can pairs of houses close together. More isolated houses will need individual boxes.

Figure 64: Typical Household Collection Box

These Household Collection Boxes can be made from local wood in the Construction Shop. A log version of these boxes will be relatively easy to make—using primarily logs 2" in diameter. They will not require trucked-in OSB or plywood, will be bear-resistant, will look good, and will last a long time. By reducing the design's dependence in imported plywood, they can be made more durable and easier to repair. This will also maximize local employment in construction.

Community members have extensive experience in building with logs. Fencing, docks, and smaller buildings are all by local people, using locally-sourced logs.

Figure 65: Dog House Built Mainly with Logs

Figure 66: New Small Log Building

Figure 67: New Dock Built with Small Logs

These skills and designs can be adapted to make Household Collection Boxes and Community Collection Bins almost entirely out of logs.

Approximately 100 will need to be made initially. Once an initial set is made, it can be expected that only five to ten will need to be built each year.

Each household will need to become responsible for separating their recyclables into two different bags, and putting both their waste and their recyclables in their Household Collection Box.

3.5.2.2. Community Collection Bins

Both large and smaller Community Collection Bins will be needed.

The larger Bins have three receptacles for materials, encouraging community members to begin the process of separating waste.

The smaller Bins are single-opening receptacles. These can be used either for comingled recyclables or for non-recyclable waste.

Depending on community preference, these can either be made in the Construction Shop from local wood, or contributed by Multi Materials Stewardship Manitoba.

If more are made in the community, a design upgrade to using local wood, trimmed to size (rather than scrap lumber) is needed. If MMSM contributes the Large Collection Bins, because they are outside, they must be Bear-Resistant bins.

Northlands Dënesųłiné will need about 8 Large and 14 Small Community Collection Bins:

- Large Collection Bin Locations include 1 each outside:
  - Petit Casimir Memorial School
  - Northern Store

- Beach and Camping Grounds
- Public Works Garage
- Nursing Station
- Nursing Residences
- Teacherages
- Airport

- Small Collection Bin locations (all inside buildings) include:
  - 2 each in:
    - Band Office
    - Band Hall
    - Arena
  - 1 each in:
    - Airport
    - Jordan's Principle
    - Church
    - Northern Store
  - 4 in Petit Casimir Memorial School

3.5.2.3. Wood Platforms for Roll-On-Roll-Off Containers

The Roll-On-Roll-Off Containers should be placed on a piece of OSB, plywood or other solid surface. Otherwise, they will sink into the gravel or dirt when it rains or the snow melts, clogging up the steel wheels of the trailer that picks them up. These platforms can be as simple as a sheet of salvaged OSB or a couple of pallets, or as elaborate as a small frame with logs attached on top, similar to the dock built with local materials at Lac Brochet.

3.5.2.4. Bulk Bags

Bulk bags will be needed to collect and store the recyclables received within the Transfer Station.

Figure 68: Bulk Bag on a Pallet

These bulk bags can be used for all non-toxic recyclables, including:

- Commingled recyclables
- eWaste
- Plastic containers
- Drink cans
- Cardboard
- Shredded paper

Some of what is collected in these Bulk Bags—such as drink cans—can be further compacted using the Vertical Baler. Other items (such as eWaste) will remain stored in these Bulk Bags until they are shipped out on the winter road.

3.5.2.5. Pallets

This Plan will need wooden pallets to store recyclables on, primarily in the Transfer Station. Approximately two dozen of these pallets were found discarded around the community during the Project and were collected by the Crew.

Some of the pallets the Crew collected were used to make Community Collection Bins; the remainder were stored for future use in this Plan.

Pallets will need to be systematically collected from truck shipments during and after the winter road season, as well as from cargo plane deliveries. Pallets last quite a while, but some will need to be replaced year by year.

3.5.2.6. Sealable Bulk Containers

Some materials cannot be stored in Bulk Bags, including:

- Household batteries
- Car batteries

- Household Hazardous Waste (HHW)
- Waste oil & waste oil products such as oil filters
- Tires

The waste oil will be collected and burned in the oil burner that was shipped up on the 2018 winter road, and is to be installed in the Public Works Garage in Fall 2018.

Tires will be assembled and either reused to make raised beds and tire towers for growing local food, or shipped south.

The remainder can be stored in Sealable Bulk Containers, as they are at the Brady WMF in Winnipeg.

Figure 69: Sealable Bulk Containers at Brady WMF in Winnipeg, Wrapped for Transport

10 to 20 of these (the exact number will depend on space in the shipping container that will need to go up on the 2019 winter road) will need to be shipped up on the 2019 winter road. After that, each year, the number that need to be shipped up empty will need to match the number that are shipped down full.

3.5.2.7. Stretch Wrap

Once they are filled with a particular waste, the lids of these Sealable Bulk Containers are sealed with stretch wrap.

Figure 70: Stretch Wrap and Dispenser

3.5.2.8. Large Recycling Bags

Once Northlands Dënesųłiné has an active biomass-based district heating loop, it will be possible to have a community laundromat—and use that laundromat to wash significant numbers of reusable bags. Until then, the most efficient bags to collect recyclables in are large, heavy-duty poly bags.

Figure 71: Large Recycling Bags

These need to be sized to fit the containers, about 55 to 60 gallons. They should be as thick as possible—at least 1.5 mm—and can be either clear or blue.

Based on the work done during the Project, Northlands Dënesųłiné will need 40 cartons (4,000 bags) to deal with the accumulated backlog, and then perhaps 10 cartons (1,000 bags) per year.

These bags are intended to be used for collection. The Bulk Bags and the Vertical Baler are better suited for storage.

If Compostable Bags can be found that can serve the same purpose, they should be preferred over the standard poly bags.

3.5.2.9. Trash Can Bands

These bands secure the Large Recycling Bags onto cylinders inside the large Community Collection Bins.

Figure 72: Trash Can Bands

One carton (400 bands) will be needed to start. After that, they can be ordered as needed.

3.5.2.10. Compostable Bags

Once the In-Vessel Composter is operating, community members will be invited to contribute materials to it. These materials will include household compostables, compostables from school food programs, and fish waste.

In most cases, these materials will need to be collected with compostable bags. Care will need to be taken in the sourcing of these bags to ensure that they are, in fact, compostable in an in-vessel composter. These need to be certified to ASTM D6400[38], or an equivalent standard.

Figure 73: ASTM Standard D6400 Compostable Bags

[38] See https://www.astm.org/Standards/D6400.htm for details of this standard.

The most active supplier in Manitoba specializing in these bags is Canada Green Natural Products[39]. This company can also supply biodegradable substitutes for styrofoam coffee cups, plastic cutlery & dishes, disposable gloves, and disinfectant wipes.

3.5.2.11. Safety Equipment

The people working on waste and recycling need appropriate equipment and clothing. This includes:

- Garbage gloves
- Boots
- Safety vests
- Trash Pickers
- Head bug nets
- Bug spray
- Gloves and aprons for handling batteries

Some of these will last more than a single year; most will need to be purchased each year.

3.5.3. **FACILITIES**

3.5.3.1. Access to the School Construction Shop

In order to maximize the amount of local labour and local materials that are used in this Plan, we will need access to the school's construction shop.

Additional small tools (air tools, wrenches, pliers, screwdrivers, etc.) were sent up as part of the Derelict Vehicle Project, and can be used in this shop as well, if needed.

3.5.3.2. Transfer Station[40]

Recyclables of all kinds will be received at the Transfer Station. Most will be brought in by the Waste & Recycling staff, but some will be dropped off by community members. They will be sorted at the Station and stored temporarily, before being either reused in the community or shipped out on the winter road.

[39] See http://www.cagreen.ca

[40] Technically, this should be called a "Reception, Sorting, Storage and Transfer Station". Calling it a "Transfer Station" is simpler but it should be remembered that it will serve all of these functions.

At least initially, this Transfer Station can be created from four semi-trailers that are currently in the community and that cannot be made road-worthy. They need to be assembled together on stable, level ground, and put up on blocks.[41]

The Transfer Station needs to be located where there is room for expansion. The area around the Station will need to accommodate vehicles dropping off and picking up materials. We are proposing to locate the Transfer Station where the recyclables have been assembled by the Crew, in the Waste Collection Area.[43]

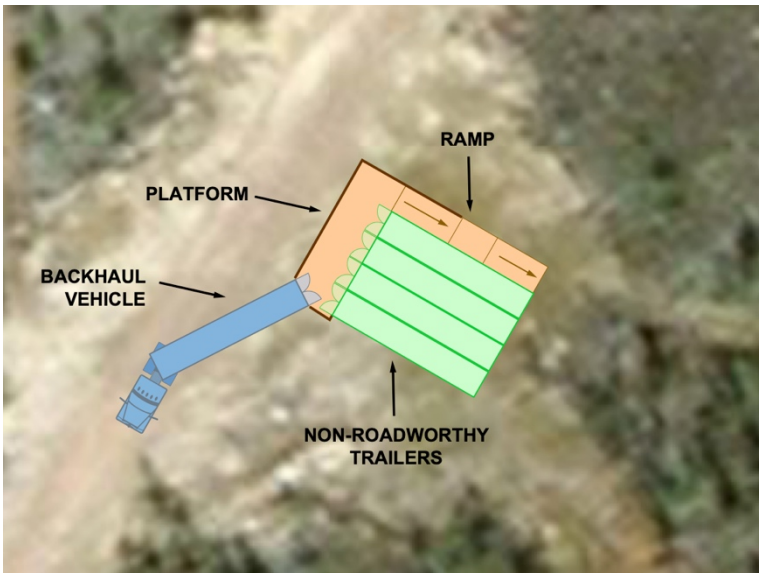
The four non-roadworthy trailers would hold all material scheduled to go out on the winter road. For ease of operation, once the trailers are assembled, the bulkheads between each of the trailer pairs can be opened up.

Figure 74: Three of the Four Non-Roadworthy Trailers for Transfer Station

[41] Larger communities have larger Transfer Stations, often with powered sorting tables. See the appendix Transfer Station Examples. It is conceivable that the recycling activities will exceed the capacity of these trailers. If that happens, two more trailers can be added alongside the two north trailers. It is not expected that, at least in the first four years of this initiative, Northlands Dënesųłiné will need more space than this—or a powered sorting table. By not spending money on a larger building, or a powered sorting table, Northlands Dënesųłiné can focus its spending on employing community members for this work

[43] In the long term, it may make sense to locate the Transfer Station where the Current Tank Farm is located. This would have the advantage of being more easily accessible to the winter road and would be easier to bring electricity to that location. It cannot be located there until the New Tank Farm is built and the ground under the Current Tank Farm has been decontaminated—approximately three years. The Transfer Station proposed here is designed to be relatively easy to dismantle and move to the Current Tank Farm location, if that proves to be preferable in a few years.

Figure 75: Close-Up of Proposed Transfer Station



The Ramp is to be sloped so that recyclables can be brought up to the trailers and placed either in Sealable Bulk Containers or Bulk Bags on Pallets, using either the Compact-Track Loader or the Pallet Jack. To aid off-loading, the Ramp should have a short level section at the same height as a bin sitting on the Roll-On-Roll-Off Trailer.

The Platform needs to be the same height as the semi-trailer floors, with a safety railing on its exposed sides. Once built, Backhaul Vehicles (semis that would otherwise go back empty) can back in and have recyclable goods transferred quickly and easily.

The frame underneath the Ramp and Platform can be made from local logs, cut and assembled on site. The surface of the Ramp and Platform can be made from Cross-Laminated Timber, also made from local wood. For increased stability,

A separate space needs to be set aside either within or beside the Transfer Station for:

- Appliances
  - that may contain refrigerants[44]
  - that do not contain refrigerants[42]
- Tires
- Derelict equipment and vehicles
  - Before they are decommissioned
  - After they are decommissioned
  - After they are crushed
- Construction waste

[44] These include fridges, freezers, air conditioners, and dehumidifiers. See Managing External Agreements for how different appliances are recycled

This Transfer Station should be operated in accordance with the Standards for Transfer Stations in Manitoba.[45] Although these standards may not be legally required on Dene territory, keeping to these standards will ensure that the waste and recycling services for the on-reserve Northlands Dënesųłiné members meet or exceed those provided off-reserve.

3.5.3.3. Recycling Depot

A small Recycling Depot is needed in the heart of the community. It will serve as:

- The hub for recycling activities by community members, raising awareness and ensuring that recycling is convenient and top-of-mind for community members[46]
- A place to give away materials that have been salvaged and can be reused, such as gardening soil (from the In-Vessel Composter) and salvaged wood suitable for building
- The Northlands Dënesųłiné Fix-up Crew staff office

3.5.3.4. Renewed Waste Management Facility

The Current Project section reported on initial steps taken to change the current Waste Collection Area into a properly-managed Waste Management Facility. If this Plan is followed, the upcoming years will set a new course for its operation.

The Detailed Timelines list activities to be undertaken in each of the next four years to bring the WMF to the state where it is being operated sustainably. The Facility itself does not need radical reinvention. However, a systematic approach, outlined earlier, is needed to bring the it into compliance.

[45] Department of Sustainable Development. "Standards for Transfer Stations in Manitoba". Government of Manitoba. https://www.gov.mb.ca/sd/envprograms/swm/pdf/standard_for_transfer_stationts.pdf

[46] It may seem like a good idea to use the Transfer Station as the Recycling Depot. Putting the Recycling Depot in the centre of the community is essential—at least in the first years of this initiative—if the goal is to make significant changes in how community members deal with waste and recycling

3.6. Plan Cost Estimates

Table 9: Summary Cost Estimates

	Year			
	1	2	3	4
Cost Category	2018-19	2019-20	2020-21	2021-22
Professional and technical services	$42,962	$27,500	$14,500	$12,000
Other personal services	$6,000	$0	$0	$0
Meetings	$800	$2,000	$2,000	$2,000
Communications	$0	$300	$300	$300
Training delivery and trainee costs	$0	$3,660	$3,660	$3,660
Work experience initiatives	$0	$14,400	$7,200	$7,200
Economic infrastructure	$0	$0	$0	$0
Salaries and wages	$12,008	$47,536	$35,776	$35,776
Travel	$15,000	$15,000	$15,000	$15,000
Overhead	$0	$19,460	$8,369	$11,619
Minor machinery and equipment	$40,522	$157,430	$10,500	$80,500
Capital (equity)	$0	$0	$0	$0
Other	$4,500	$5,480	$3,860	$5,300
totals	***$121,792***	***$292,766***	***$101,165***	***$173,355***

Note that the costs outlined for Year 1 are already covered by the LEDSP grant already secured.

Table 10: Detailed Cost Estimates – Year 1

Cost Category	Budget
Professional and technical services	
consultation on legacy waste site monitoring & remediation	$23,062
recycling initiatives	$18,900
community engagement	$1,000
Professional and technical services subtotal	*$42,962*
Other personal services	
electrical	$6,000
Other personal services subtotal	*$6,000*
Meetings	
1 community meeting @ $800/meeting	$800
Meetings subtotal	*$800*
Salaries and wages	
1 crew lead for 316 hours each @ $20/hour	$6,320
1 employees for 316 hours each @ $18/hour	$5,688
Salaries and wages subtotal	*$12,008*
Travel	
Winnipeg/Lac Brochet: 9 return flights @ $1666/flight	$15,000
Travel subtotal	*$15,000*
Minor machinery and equipment	
Recycling depot	$10,000
Electric runabout	$17,000
Shipping container	$6,000
Shipping	$7,522
Minor machinery and equipment subtotal	*$40,522*
Other	
Accommodation	$1,000
Food	$1,000
Materials printing	$1,500
Misc	$1,000
Other subtotal	*$4,500*
total:	***$121,792***

3.6.1. YEAR 1 EXPENDITURE DETAILS

3.6.1.1. Professional and Technical Services

Consultation is required from an engineering firm with expertise on waste facilities. We have asked for two proposals from companies with expertise in this area. The first has come in and the second should be received by the end of October. They will conduct their work and provide a report by the end of December 2018.

Support will be needed to the crew to begin building garbage bins for households, initiating the recycling initiatives, and beginning vehicle decommissioning this winter.

3.6.1.2. Other Personal Services

Electrical work is required to bring the facilities suitable for the derelict vehicle decommissioning station, the in-vessel composter and the paper shredder. A journeyman electrician (former Chief Leo Dettanikkeaze) lives in the community and is willing and able to do the work. He has been busy with electrical work on the new duplexes in the community this summer, but will be able to complete this work this winter.

3.6.1.3. Meetings

A second community meeting is required to review the plan outlined in section 3.

3.6.1.4. Salaries and Wages

We will be hiring a small number of crew members this winter to begin building garbage bins for households, initiating the recycling initiatives, and beginning vehicle decommissioning.

Travel

These are flights for consultants and staff supporting the in-community work to be done on building of garbage bins for households, initiating the recycling initiatives, and beginning vehicle decommissioning.

3.6.1.5. Minor Machinery and Equipment

Modest renovations are required to open a recycling depot.

We will be buying the Electric Runabout noted in section 3.5.1.4.

Materials need to be shipped up on the winter road in February.

3.6.1.6. Other

Food and accommodation will be needed for consultants and staff to support the building of garbage bins for households, initiating the recycling initiatives, and beginning vehicle decommissioning.

Some signage printing will be needed for the recycling depot and the Waste Management Facility.

Table 11: Detailed Cost Estimates – Year 2

Cost Category	Budget
Professional and technical services	
project lead	$7,500
waste site monitoring & remediation	$10,000
recycling initiatives	$2,500
community engagement	$2,500
governance & management	$5,000
Professional and technical services subtotal	*$27,500*
Meetings	
1 community meeting @ $800/meeting	$800
4 community team meetings @ $300/meeting	$1,200
Meetings subtotal	*$2,000*
Communications	
internet: 3 months @ $50/month	$150
phone: 3 months @ $25/month	$75
long distance: 3 months @ $25/month	$75
Communications subtotal	*$300*
Training delivery and trainee costs	
6 trainees for 40 hours each @ $13/hour	$3,120
6 trainees, 5 lunches each @ $18/lunch	$540
Training delivery and trainee costs subtotal	*$3,660*
Work experience initiatives	
4 work experience participants for 240 hours each @ $15/hour	$14,400
Work experience initiatives subtotal	*$14,400*
Salaries and wages	
1 crew lead for 632 hours each @ $20/hour	$12,640
1 employees for 632 hours each @ $18/hour	$11,376
4 person-years 392 hours each @ $15/hour	$23,520
Salaries and wages subtotal	*$47,536*
Travel	
Winnipeg/Lac Brochet: 9 return flights @ $1666.66666666667/flight	$15,000
to Thompson: 0 return flights @ $500/flight	$0
Travel subtotal	*$15,000*
Overhead	
5% of equipment expenses	$7,872
10% of non-equipment expenses	$11,588
Overhead subtotal	*$19,460*
Minor machinery and equipment	
Roll-On-Roll-Off Trailer & Bins	$61,530
Household Collection Boxes: 25 boxes @ $200 each	$5,000
Small Community Collection Bins: 10 bins @ $100 each	$1,000
Large Community Collection Bins: 5 bins @ $1000 each	$5,000
Wood Platforms for Roll-On-Roll-Off Containers: 6 platforms @ $200 each	$1,200
Bulk Bags: 5 bulk bags @ $50 each	$250
Sealable Bulk Containers: 2 sealable bulk containers @ $100 each	$200
Stretch Wrap: 1 stretch wrap @ $150 each	$150
Boxes of Large Recycling Bags: 10 boxes of large recycling bags @ $100 each	$1,000
Box of Trash Can Bands: 1 box of trash can bands @ $50 each	$50
Boxes of Compostable Bags: 0.5 boxes of compostable bags @ $100 each	$50
Safety Equipment	$2,000
Transfer Station Platform & Ramp	$10,000
WMF Fencing & Gates	$70,000
Minor machinery and equipment subtotal	*$157,430*
Other	
Accommodation: 12 days @ $180/day	$2,880
Food: 12 meals @ $100/day	$1,600
Materials printing	$1,000
Other subtotal	*$5,480*
total:	***$292,766***

Table 12: Detailed Cost Estimates – Year 3

Cost Category	Budget
Professional and technical services	
project lead	$5,000
waste site monitoring & remediation	$2,000
recycling initiatives	$2,500
community engagement	$2,500
governance & management	$2,500
Professional and technical services subtotal	*$14,500*
Meetings	
1 community meeting @ $800/meeting	$800
4 community team meetings @ $300/meeting	$1,200
Meetings subtotal	*$2,000*
Communications	
internet: 3 months @ $50/month	$150
phone: 3 months @ $25/month	$75
long distance: 3 months @ $25/month	$75
Communications subtotal	*$300*
Training delivery and trainee costs	
6 trainees for 40 hours each @ $13/hour	$3,120
6 trainees, 5 lunches each @ $18/lunch	$540
Training delivery and trainee costs subtotal	*$3,660*
Work experience initiatives	
2 work experience participants for 240 hours each @ $15/hour	$7,200
Work experience initiatives subtotal	*$7,200*
Salaries and wages	
1 crew lead for 632 hours each @ $20/hour	$12,640
1 employees for 632 hours each @ $18/hour	$11,376
2 person-years 392 hours each @ $15/hour	$11,760
Salaries and wages subtotal	*$35,776*
Travel	
Winnipeg/Lac Brochet: 9 return flights @ $1666.66666666667/flight	$15,000
to Thompson: 0 return flights @ $500/flight	$0
Travel subtotal	*$15,000*
Overhead	
5% of equipment expenses	$525
10% of non-equipment expenses	$7,844
Overhead subtotal	*$8,369*
Minor machinery and equipment	
Household Collection Boxes: 4 boxes @ $200 each	$800
Small Community Collection Bins: 10 bins @ $100 each	$1,000
Large Community Collection Bins: 5 bins @ $1000 each	$5,000
Bulk Bags: 5 bulk bags @ $50 each	$250
Sealable Bulk Containers: 2 sealable bulk containers @ $100 each	$200
Stretch Wrap: 1 stretch wrap @ $150 each	$150
Boxes of Large Recycling Bags: 10 boxes of large recycling bags @ $100 each	$1,000
Box of Trash Can Bands: 1 box of trash can bands @ $50 each	$50
Boxes of Compostable Bags: 0.5 boxes of compostable bags @ $100 each	$50
Safety Equipment	$2,000
Minor machinery and equipment subtotal	*$10,500*
Other	
Accommodation: 12 days @ $180/day	$2,160
Food: 12 meals @ $100/day	$1,200
Materials printing	$500
Other subtotal	*$3,860*
total:	***$101,165***

Table 13: Detailed Cost Estimates – Year 4

Cost Category	Budget
Professional and technical services	
project lead	$2,500
waste site monitoring & remediation	$2,000
recycling initiatives	$2,500
community engagement	$2,500
governance & management	$2,500
Professional and technical services subtotal	*$12,000*
Meetings	
1 community meeting @ $800/meeting	$800
4 community team meetings @ $300/meeting	$1,200
Meetings subtotal	*$2,000*
Communications	
internet: 3 months @ $50/month	$150
phone: 3 months @ $25/month	$75
long distance: 3 months @ $25/month	$75
Communications subtotal	*$300*
Training delivery and trainee costs	
6 trainees for 40 hours each @ $13/hour	$3,120
6 trainees, 5 lunches each @ $18/lunch	$540
Training delivery and trainee costs subtotal	*$3,660*
Work experience initiatives	
2 work experience participants for 240 hours each @ $15/hour	$7,200
Work experience initiatives subtotal	*$7,200*
Salaries and wages	
1 crew lead for 632 hours each @ $20/hour	$12,640
1 employees for 632 hours each @ $18/hour	$11,376
2 person-years 392 hours each @ $15/hour	$11,760
Salaries and wages subtotal	*$35,776*
Travel	
Winnipeg/Lac Brochet: 9 return flights @ $1666.66666666667/flight	$15,000
to Thompson: 0 return flights @ $500/flight	$0
Travel subtotal	*$15,000*
Overhead	
5% of equipment expenses	$4,025
10% of non-equipment expenses	$7,594
Overhead subtotal	*$11,619*
Minor machinery and equipment	
Electric or Hybrid Pick-Up Truck	$70,000
Household Collection Boxes: 4 boxes @ $200 each	$800
Small Community Collection Bins: 10 bins @ $100 each	$1,000
Large Community Collection Bins: 5 bins @ $1000 each	$5,000
Bulk Bags: 50 bulk bags @ $50 each	$250
Sealable Bulk Containers: 100 sealable bulk containers @ $100 each	$200
Stretch Wrap: 150 stretch wrap @ $150 each	$150
Boxes of Large Recycling Bags: 100 boxes of large recycling bags @ $100 each	$1,000
Box of Trash Can Bands: 50 box of trash can bands @ $50 each	$50
Boxes of Compostable Bags: 100 boxes of compostable bags @ $100 each	$50
Safety Equipment	$2,000
Minor machinery and equipment subtotal	*$80,500*
Other	
Accommodation: 8 days @ $180/day	$800
Food: 8 meals @ $100/day	$4,000
Materials printing	$500
Other subtotal	*$5,300*
total:	***$173,355***

4. APPENDICES

4.1. LEDSP Application

First Nation Solid Waste Management Initiative Proposal Form (313)
Lands & Economic Development Services Program

Fiscal Year 2017-2018 **1**

A PROGRAM IDENTIFICATION

Program identification and primary project objective
Primary project objective: Environment – Prevention Operations

Key activities (check all which apply)

- ■ Planning Studies
- ■ Education, training and capacity building
- ■ Coordination of waste programs and deployment of waste diversion programs, such as recycling or composting
- ☐ MTSA development or similar
- ☐ Other

Project name:	Date of application:
Northlands Dënesųłiné First Nation Waste Management Planning Phase 1	August 25, 2017

B APPLICANT/PROPONENT INFORMATION

1. Organization Contact Information

Name: Northlands Dënesųłiné First Nation	Applicant Eligibility: ◉ First Nation and Inuit communities and their governments, including Tribal Councils
Associated First Nation (if applicable or different from organization name):	○ Aboriginal organizations ○ Other: (Identify the applicant's relationship to First Nation, Inuit community or Tribal Council):

Contact name and title:	Phone (mobile):	Fax:
Chief Joe Antsanen	(204) 290-2044	
Mailing Address: Box 120, Lac Brochet, MB, R0B 2E0	Email: j.antsanen@hotmail.com	

2. Summary of Previous Funding (in relation to this project)

If this project is a continuation of a previously funded project please provide details of the project and funding received:
None.

C PROJECT INFORMATION

1. Description of the Project

a. Describe your project (*Include location, comments on industry and market studies and summarize attached relevant materials (feasibility study, management plan, training, business plan related to waste management, etc):*

Summary

- Develop a long-term, comprehensive community Waste Plan for Northlands Dënesųłiné First Nation to manage all our wastes in an environmentally-sustainable, cost-effective manner.
- Gather and prepare all material needed, including costs, to be ready to implement that Waste Plan.

Detail

1. Develop a comprehensive community waste and recycling plan (a "Waste Plan") for Northlands Dënesųłiné First Nation ("Northlands").
    - This Waste Plan would include plans (with costing) to:

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- Clean up the current waste dump and surrounding area.
- Clean up legacy waste materials not in the current waste dump.
- Properly collect all wastes in the future.
- Recycle everything that can be recycled within the community, including organics, paper, and waste vehicle oil.
- Send all recycling materials that cannot be recycled within the community to the appropriate Product Recycling Organization and other recycling end-users, including derelict vehicles and other metal, white goods, vehicle batteries and tires, household batteries, cell phones, and eWaste.
- Properly dispose of anything that cannot be recycled.

2. Hold two community consultations on this Waste Plan.
   - The first to solicit the aspirations and priorities of our community members in waste and recycling.
   - The second to receive community feedback on a draft Waste Plan.
3. Assemble a Community Recycling & Waste Team to champion the project and the Waste Plan:
   - This should include at least one of each from:
     - Elder
     - Youth
     - Band Council
     - Staff
     - Operations & Maintenance
     - Teacher
4. Review testing and assessments to date to determine the need for:
   - Further Phase 2 Environmental Site Assessment
   - Remedial Management Plan and/or Remedial Action Plan
5. Determine all equipment, facilities, and supplies required to implement the Waste Plan.
   a) Trailer(s) for transporting recycling materials, both within the community and to recycling reception locations in the south
   b) Collection boxes & signage
   c) A paper shredder
   d) A closed-vessel composting system
   e) A recycling depot
   f) Garbage truck
   g) Fencing
   h) Dumpsite liner
   i) Dumpsite sump pump and leachate handling equipment
6. Determine Capital costs of Waste Plan equipment, facilities, and supplies needed.
7. Begin to buy this equipment. Depending on costs, this could include items 5.a) to 5.e) above.
8. Ship all purchased equipment up on winter road in Feb & Mar 2018.
9. Determine what other equipment is required for waste management that cannot be purchased within this year's project budget. Depending on costs, this could include items 5.f) to 5.i) above.
10. Develop a capital plan for the equipment that cannot be purchased within this year's project budget.
11. Develop a training plan, with costing, for band staff, school staff, students, and community members to implement and manage the Waste Plan.
12. Begin training, work experience program and hiring of Waste & Recycling Coordinators to manage and operate eco-depot (transfer station) and landfill site.

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Lands & Economic Development Services Program

13. Develop a budget projecting waste and recycling Operations and Maintenance ("O&M") costs that will be incurred in future years.
14. Complete a financial and narrative report on this project.

b. How does the project meet your community or representative organization's priorities? *(as identified in any of the following plans: Land use plan, Strategic economic development plan, Environmental management plan, Community Profile Report (DCI #471935), or Comprehensive community plan):*

2. Project Activities and Deliverables

	Key Activities	Description (with Expected Start/End dates)	Expected Deliverables
1	Develop Waste Plan	2017 Sep – 2018 Feb	Draft & Finish Waste Plan
2	Hold two community consultations	2017 Oct & 2018 Jan	2 narrative reports on community consultations
3	Assembling Community Recycling & Waste Team	2017 Sep – 2018 Feb	Minutes of meetings
4	Determine need for monitoring of legacy waste dump sites	2017 Oct – 2017 Dec	Written report
5	Determine all equipment, facilities and supplies needed to implement Waste Plan	2017 Sep – 2018 Jan	Equipment list
6	Determine costs of Waste Plan equipment, facilities and supplies	2017 Sep – 2018 Jan	Budget
7	Begin to buy this equipment	2017 Sep – 2018 Mar	Receipts & report
8	Ship purchased equipment	2018 Feb – 2018 Mar	Receipts & report
9	Determine what equipment cannot be bought within this year's budget	2017 Sep – 2018 Jan	Equipment list
10	Develop a capital plan for the equipment that cannot be bought within this year's budget	2017 Sep – 2018 Jan	Written budget
11	Develop training plan to implement & manage Waste Plan	2017 Sep – 2018 Jan	Written training plan
12	Develop budget for waste & recycling O&M	2017 Dec – 2018 Feb	Written budget
13	Begin training, work experience & hiring	20187 Jan – Mar	Training, work experience & hiring report
14	Complete report	2018 Apr	Narrative & financial report (which includes all report elements of previous deliverables)

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3. Project Costs			
Costs: Eligible costs supported	**$**	**Breakdown of costs**	**Are quotes / estimates to confirm costs attached?***
Professional and technical services	$92,500	attached	☐ Attached
Other personal services		attached	☐ Attached
Meetings	$4,500	attached	☐ Attached
Communications	$700	attached	☐ Attached
Training delivery and trainee costs	$8,280	attached	☐ Attached
Work experience initiatives	$15,600	attached	☐ Attached
Economic infrastructure			☐ Attached
Salaries and wages	$18,000	attached	☐ Attached
Travel	$38,400	attached	☐ Attached
Overhead	$28,328	attached	☐ Attached
Minor machinery and equipment	$164,000	attached	☐ Attached
Capital (equity)			☐ Attached
Other	$23,300	Attached	☐ Attached
Total Eligible Costs	**$393,608**		
*Attach copies and estimates to application			

4. Project Financing			
Financing	**$**	**Is funding approved?**	**Status and nature of funding approval***
First Nation		☐ Approved	
Partner		☐ Approved	
Debt		☐ Approved	
INAC	$393,608	☐ Approved	
Other Federal / Provincial		☐ Approved	
Other		☐ Approved	
Total Financing	**$393,608**		

5. Cash flow for the project							
April		July		October	$60,000	January	$70,000
May		August		November	$60,000	February	$70,000

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June		September		December	$60,000	March	$73,608
Q1 Total		**Q2 Total**		**Q3 Total**	**$180,000**	**Q4 Total**	**$213,608**
*Attach letters proving status of funding to application							

6. Project Management

Who	Project role	Activities	Supporting documents attached?*
Bruce Duggan	Project Lead	Responsible for all aspects of project execution.	☐ Attached
Joe Antsanen	Client's Representative	Authority to determine if project requirements are fulfilled.	☐ Attached

*Attach supporting documents such as resumes to application

7. Community Benefits and Other Benefits

Describe the expected benefits (or end results) that this project hopes to achieve in the short, medium and long-term.*	Provide examples of how these benefits will be measured (if applicable).
Short term: • Increase community awareness of waste and recycling options. • Increase community awareness of how waste and recycling activities can have a positive impact on environmental health (land, water, air) and human health. • Integrate school environmental education with in-community activities.	
Medium term: • Increased recycling, including organics. • Waste reduction. • Sustainable funding for waste management.	- Tonnes recycled per year. - Increased varieties of recycling (paper, plastics, metal, oil, batteries, tires, eWaste). - Revenues and expenses from waste match.
Long term: • Zero annual increase in landfill waste. • Mitigation of legacy landfill sites (if needed).	- Zero unmanaged waste in community.

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8. Land and Environmental

Please complete the following if the project will physically alter land (i.e. construction).

Will this project be located on First Nation reserve land?	Identify location (Reserve name or project location):
(•) Yes ( ) No	

Describe the land tenure required by the project.

(•) Ownership ( ) License
( ) Permit ( ) Certificate of posession
( ) Lease ( ) Other

Provide information on the status or next steps for acquiring land tenure. (e.g. land designation, draft lease or permit, etc)

Will the project be subject to a federal environmental assessment by the Canadian Environmental Assessment Agency, Canadian Nuclear Safety Commission or National Energy Board? If not, does AANDC's Environmental Review Process apply?

( ) Yes (•) No

Provide other significant and relevant information not provided elsewhere.

Describe key regulations and approval requirements that affect the development or operation of the project, describe that status of securing approvals, and outline measures that will address key regulations and approval requirements.

D APPLICANT APPROVALS

Name/Title	Signature
Chief Joe Antsanen, Chief	
Date	**BCR required attached**
August 30, 2017	☐ Attached

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Cost Breakdown

Professional and technical services		
Boke Consulting: Bruce Duggan - project lead		$15,000
KGS - consultation on legacy waste site monitoring & remediation		$10,000
DLF Consulting - consultation on recycling initiatives		$5,000
David Lane Consulting - consultation on waste project planning		$5,000
Curt Hull Consulting - consultation on community engagement		$7,500
Soil & leachate sampling & testing		$50,000
	Professional and technical services subtotal:	$92,500
Meetings		
2 community meetings @ $1000 /meeting		$2,000
5 community team meetings @ $500 /meeting		$2,500
	Meetings subtotal:	$4,500
Communications		
teleconferencing		$700
	Communications subtotal:	$700
Training delivery and trainee costs		
6 trainees for 80 hours each @ $15/hour		$7,200
6 trainees 10 lunches each @ $18/lunch		$1,080
	Training delivery and trainee costs subtotal:	*$8,280*
Work experience initiatives		
4 work experience participants for 30 days each @ $130/day		$15,600
	Work experience initiatives subtotal:	*$15,600*
Salaries and wages		
2 employees for 60 days @ $150/day		$18,000
	Salaries and wages subtotal:	*$18,000*
Travel		
16 flights @ $2,400/flight		$38,400
	Travel subtotal:	*$38,400*
Overhead		
5% of equipment expenses		$8,200
10% of non-equipment expenses		$20,128
	Overhead subtotal:	*$28,328*
Minor machinery and equipment		
a) Trailers for transporting recycling materials		$24,000
b) Collection boxes & signage		$9,000
c) Paper shredder		$6,000
d) Closed-vessel composting system		$35,000
e) Recycling depot		$60,000
shipping container		$8,000
shipping (2 shipments)		$22,000
	Minor machinery and equipment subtotal:	*$164,000*
Other		
In-community accommodation: 60 days @ $180/day		$10,800
In-community meals: 60 days @ $125/day		$7,500
Materials printing		$5,000
	Other subtotal:	*$23,300*
	Total:	**$393,608**

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4.2. Award Notification Letter

Indigenous and Northern Affairs Canada / Affaires autochtones et du Nord Canada

200-365 Hargrave St.
Winnipeg, MB
R3B 3A3

File # 5040-4
CIDM:

Oct. 5, 2017
Chief Joe Antsanen
Northlands Dënesųłine First Nation
P.O. Box 120, Lac Brochet
R0B 2E0

Dear Chief Antsanen

The Department is pleased to advise that your funding proposal titled, "***Northlands Dënesųłine First Nation Waste Management Planning Phase 1***" has been approved for a maximum contribution of $393,608 under the First Nations Solid Waste Management Initiative.

The Northlands Dënesųłine First Nation will use these funds to undertake the project activities described in your proposal dated Aug. 25, 2017. The terms and conditions for this project are attached for your information.

The Department will prepare a funding arrangement reflecting this contribution. All eligible costs related to this project should follow the timelines set out in Section 3; Disbursement of Funds.

Should you have any questions or require additional information, please contact Daniel Benoit at 204-983-4886.

Yours truly,

Emmanuel Atiomo
Manager, Environmental Planning & Management
Lands and Economic Directorate
Manitoba Region

Encl.: Terms and Conditions

Cc: Senior Environmental Officer, Daniel Benoit

Canada

4.3. Household Hazardous Waste (HHW) Items

These are items that are marked with one or more of the HHW symbols.

Figure 76: HHW Symbols

Some of the items that should be brought to Household Hazardous Waste (HHW) roundups or to the Transfer Station are listed below:

- Abrasive cleansers
- Acetone
- All spray (aerosol) cans, including:
  - paints
  - hair sprays
  - air fresheners
- All-purpose cleaners
- Ammonia
- Ant and wasp spray
- Auto body filler
- Barbeque starters
- Bleach
- Brake and transmission fluid
- Butane refills
- Car waxes and polishes
- Carbon tetrachloride
- Contact cement
- Degreasers
- Disinfectants
- Drain cleaners
- Fabric softeners
- Floor wax strippers
- Fungicides
- Furniture polishes and waxes
- Glass cleaners
- Glues
- Hair coloring and hair perm solutions
- Insecticides
- Laundry stain removers
- Laundry starch
- Lighter fluid
- Lighters
- Liquid cleansers
- Lye
- Mildew removers

- Muriatic acid
- Nail polish and remover
- Oven cleaners
- Paint thinners and strippers
- Photographic chemicals
- Propane gas cylinders
- Rubbing alcohol
- Rug and upholstery cleaners
- Rust removers
- Septic tank degreaser
- Shoe, silver and brass polishes
- Spot removers
- Toilet cleaners
- Tub and tile cleaners
- Turpentine, varnish and lacquers
- Weed killers
- Wood preservative

4.4. Transfer Station Examples

Although the proposed Transfer Station for Northlands Dënesųłiné is called a "Transfer Station", as mentioned above, it actually functions as a Reception, Sorting, Storage and Transfer Station. This combined approach was developed because:

1. The population being served is considerably smaller than that served by many other Stations, making the combining of functions into a single facility appropriate.

2. Some of the Transfer Station Examples examined combine some of these functions in various ways.

This report treats the Transfer Station Examples examined as "lessons learned", to be applied to our project. Lessons can also be learned from other recycling locations in Manitoba, which can be found on the "Find Your Eco-Depot" map on the Government of Manitoba's Sustainable Development webpage[47].

4.4.1. **ALTONA**

Altona's facility deals only with recyclables, which are collected separately from non-recyclables in the community. It is used to receive materials, to sort, store and transfer recyclables out.

It is a very good example of how recyclables can be separated into the various recycling streams (each one often associated with a particular PRO or a place that will pay for the recyclable material). More information can be found on the Altona municipal website[48].

The Altona facility has a conveyor system from lifting material from ground level and depositing it on a raised separator system—when the recyclables are distributed on a moving belt (almost like an assembly line in reverse).

[47] http://www.gov.mb.ca/sd/wastewise/ecodepot.html?id=b4472af2470049d2861f14b55bfc0e85

[48] https://altona.ca/residents/community-and-social-services/recycling/

Figure 77: Conveyor and Raised Separation System at Altona Facility

A number of people are employed to separate selected recyclables[49] from the rest of the recyclables. They stand next to the conveyor and pull these specified recyclables off the conveyor. Depending on the item, they either put them into cardboard barrels behind them, or drop the materials into a chute, which deposits them into a pile below. Materials in the pile are then gathered together, baled, and shipped out for further processing.

Figure 78: Baler at Altona Facility

Perhaps the primary lesson learned from the Altona facility is that recycling does not need to be a dirty or smelly process. With reasonable care, the facility can be a pleasant, tidy place to work.

[49] These are typically recyclables for which the facility can get money.

4.4.2. BRANDON EASTVIEW LANDFILL SITE

A tour of the City of Brandon Eastview Landfill Site[50] was also very helpful.

This facility is large and does only a modest amount of recyclables sorting—separating out mainly paper and cardboard. It functions primarily as a storage and transfer station, baling comingled recyclables and shipping them out for further processing elsewhere.

Like the Altona recyclables facility, it has a raised recycling system.

Figure 79: Conveyor and Raised Separation Table at Brandon Facility

Although not as tidy as the Altona facility, the Brandon facility still achieves a significant amount of diversion. A single bale of crushed pop cans, for instance, can weigh more than a tonne.

[50] https://www.google.ca/maps/place/Eastview+Landfill+Site/@49.8381387,-99.8946482,17z/data=!3m1!4b1!4m5!3m4!1s0x52e79133e238f58b:0x66ade4fdbc530eb6!8m2!3d49.83813
53!4d-99.8924542

Figure 80: Bale of Crushed Pop Cans at Brandon Facility

A number of lessons can be learned from the Brandon facility that are particularly useful for Northlands Dënesųłiné.

4.4.2.1. Brandon Lesson 1 – Waste Oil Storage

The Brandon facility stores waste oil for later recycling or use to generate heat in waste-oil furnaces.

Figure 81: Waste Oil at Brandon Facility

The Brandon facility makes it clear that storage does not have to be complex, and can be safely done outdoors, if pallets and appropriate storage containers are used.

4.4.2.2. Brandon Lesson 2 - Loading

We can copy the process of loading palleted recyclables into semi-trailers.

Figure 82: Loading from the Transfer Station to a Semi-Trailer.

In Brandon, they use a forklift. In Northlands Dënesųłiné, the Compact-Track Loader or the Pallet Jack will be used. A key piece of equipment in this photo—that is easy to overlook—is the ramp. This will be particularly necessary in Northlands Dënesųłiné, as the height of the trailer will vary depending on the depth of the snow on the road beside the Transfer Station. As part of building the Platform for the Transfer Station, a small, adjustable Bridge will need to be built. When a trailer is backed up to the Platform, the Bridge will need to be put down to connect the Platform with the Trailer.

4.4.2.3. Brandon Lesson 3 – Value of Roll-On-Roll-Off Systems

The Roll-On-Roll-Off system can be versatile—and can be used as part of education and awareness-raising.

Figure 83: Roll-On-Roll-Off Truck, with Recycling Bin, in Brandon

This truck and recycling bin are notable for a number of reasons:

- School children were involved in painting the bin, increasing their awareness of recycling, and building a sense of connection between them and the recycling initiatives in their community. This effect will probably be stronger in Northlands Dënesųłiné, as the students who paint the bins will pass by them every day.[51]
- Lids on the bins can be useful for keeping out rain and snow.
- A bin system can be adapted for various volumes. This is a relatively large bin, on a fairly large truck. Smaller bins and a trailer (rather than a truck) are proposed for Northlands Dënesųłiné. If, at some point in the future, the volume of material being transported warrants a truck being purchased, the bins can still be used.

[51] The bin looks like it has multiple compartments. This isn't the case. It is a single bin.

4.4.3. RURAL MUNICIPALITY OF LOUISE

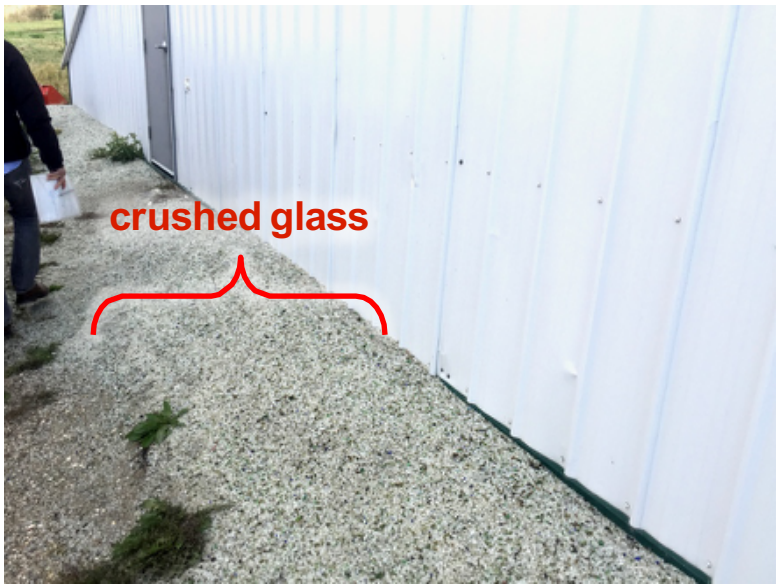
The RM of Louise (Pilot Mound) has an Integrated Waste Management Facility. This is one of the best waste and recycling management systems in Manitoba, for a number of reasons:

1. This facility deals with waste and recycling activities in:
    - one facility
    - managed by one department
    - with an integrated budget.
    - This integration does two crucial things:
        - It ensures cost savings
        - It greatly reduces the amount of material that ends up in the landfill
2. The sorting station is on the same level as the building floor.
    - This reduces capital costs.
3. Transfer facilities can be simple
    - See “Transfer Facility Between Ground & Semi-Trailers”, below.
    - Although this looks simple, to be durable, it needs to be carefully designed and constructed. Note, for example:
        - A strong, well-built wood barrier, with posts sunk securely into the ground.
        - Sufficient, compacted gravel at both levels, and on the sloped roadway between them.
        - A culvert to drain away the water that would otherwise accumulate in the low area.
        - A level area nearby for shipping containers. Northlands Dënesųłiné would need a second area nearby for semi-trailers to be lined up.
        - The lack of any garbage or other materials stored nearby.
4. The final material left after waste diversion is shredded before it goes in the landfill.
    - This ensures that the material is easy to compact and cover. It also ensures that nothing that could be diverted makes it into the landfill.
5. Innovative recycling ideas are encouraged
    - For example, the facility has a small crusher that grinds up glass bottles. The material it produces (glass pieces approximately ¼” in size) is laid around the building in a strip about 1 yard wide. Rodents will not walk on this material because the sharp edges of the glass cuts their feet, resulting in an effective, no-cost rodent control system. (See “Crushed Glass Beside Building”, below.)

6. The facility has an integrated leachate lagoon.
    - Leachate from the landfill—and water run-off from spraying down the floor of the building—are captured in a small, lined lagoon, where it can safely evaporate.

Figure 84: Transfer Facility Between Ground & Semi-Trailers in Louise

Figure 85: Crushed Glass Beside Building in Louise



Because the Northlands Dënesųłiné community's population is about 1/2 that of the area served by the Louise facility, these lessons all need to be scaled down. But they are all valuable pointers for Northlands Dënesųłiné.

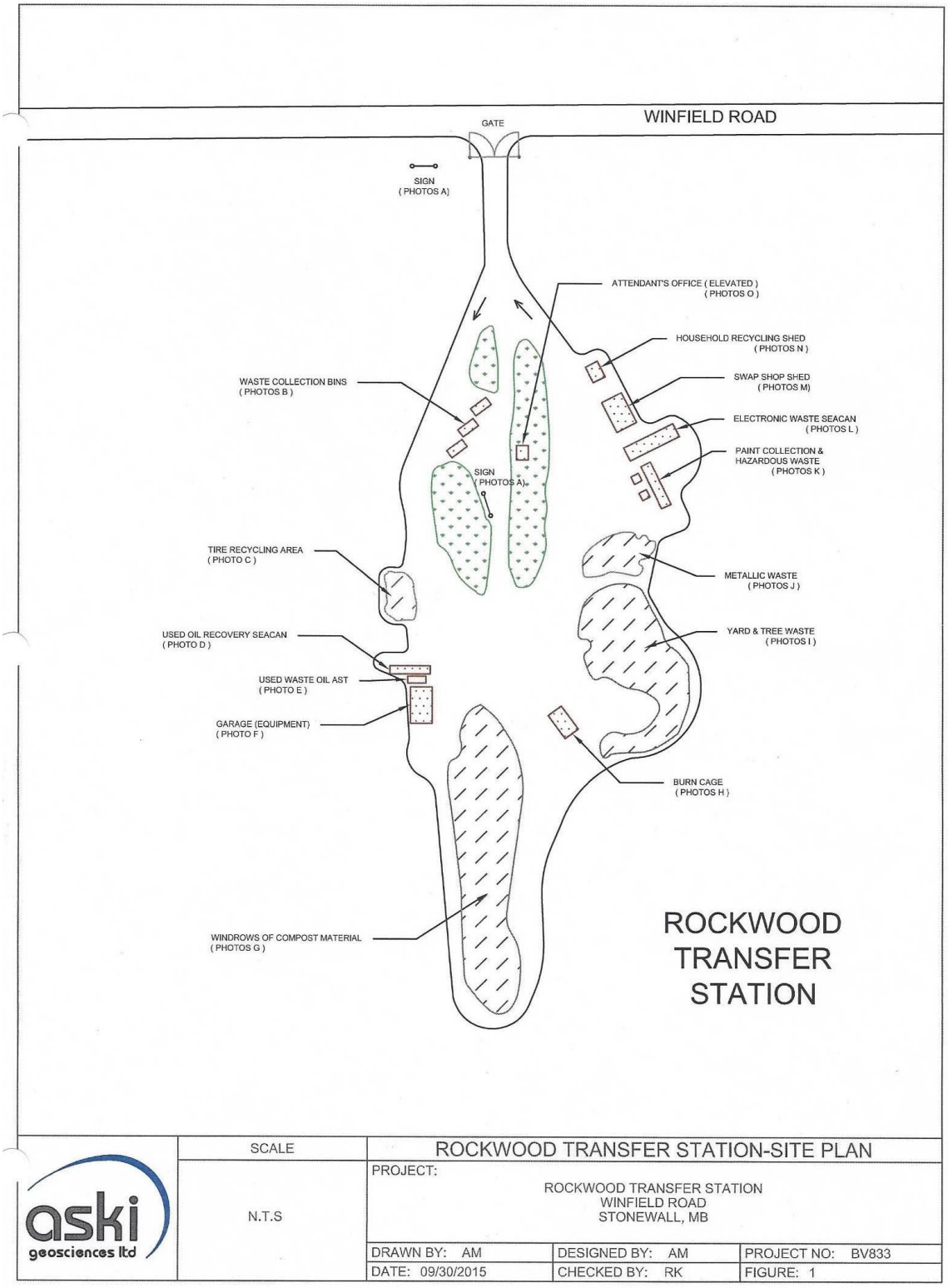
4.4.4. **THOMPSON**

Thompson has two locations that deal with recyclables—the Thompson Recycling Centre[51] and the City of Thompson's Waste Diversion Program at their Waste Disposal Grounds[52].

The Thompson Recycling Centre accepts rechargeable batteries, household recyclables ("Blue Box Materials"), waste oil and antifreeze. The Waste Disposal Grounds accept eWaste, appliances, metals, tires, and car batteries.

Perhaps the most important lesson learned from the Thompson facilities is the handling of compost. Although they accept only a limited range of compostables from the public (grass clippings and leaves), their facility demonstrates the necessity of including composting as part of a wholistic approach to waste and recycling.

4.5. Rockwood Transfer Station



4.6. Relevant Links & Literature on Waste & Recycling

4.6.1. **INTRODUCTION**

Northern and remote Canadian communities face unique challenges when it comes to waste management. The populations of these communities are generally small, with limited labour pools and resources. Also challenging is the distance to recycling facilities and the minimal options for transport. Given these factors, there are really only three the options for waste in these communities:

1. landfilled on-site,
2. sent south to a larger city or town, or
3. broken down by composting and/or incineration.

As concerns about climate change have grown, so too has the conversation about waste and waste management. The Federal and Provincial governments are just beginning to look more closely at waste practices in northern communities and to set up funding programs and guidelines to assist in building their capacity for waste management.

The consensus among waste management practitioners and government entities (see, in particular, *Gov't of Canada, Solid Waste Mgmt)*. seems to be that the best approach to waste management in northern first nations is to establish a transfer station or a Municipal Solid Waste (MSW) facility in the community that becomes a staging area for waste diversion, rather than a final resting point.

A transfer station is a facility where some—or all—of a community's solid wastes are received from local, short-haul collection vehicles, and where they may or may not be sorted, before being loaded onto long-haul vehicles for transfer to a disposal facility in a larger urban centre or town. In terms of economics, Indigenous Services Canada (ISC, formerly Indigenous and Northern Affairs Canada) has calculated that transfer haul becomes more economical than direct-haul when the round-trip distance to the end-point waste facility exceeds 50 km *[source: Gov't of Canada, Transfer Stations]*. As a result, the three key questions for northern and remote communities become:

1. What are the best practices for managing the various waste streams at a transfer station?
2. Which materials will be accepted at that transfer station?
3. What activities will occur at that transfer station?

This Appendix will seek to provide answers to the above for a northern, remote context.

An MSW facility—including ones which function as transfer stations—typically include the following:

- a dedicated area for processing and storing wastes that have been sorted (*i.e.*: hazardous and special waste, electronic waste, organic waste, recyclables)
- an area for residual waste disposal or transfer, and
- associated infrastructure such as heavy equipment, shelter for staff, signage and fencing *[source: Gov't of Canada, Solid Waste Mgmt]*.

The level of staffing at an MSW facility will depend on the activities of the facility. However, it is widely agreed that even at the smallest of facilities, staff are required on at least an intermittent basis to ensure the site is being kept clean and that wastes are being disposed of properly *[source: Gov't of British Columbia, Guidelines for Transfer Stations]*.

MSW facilities must also decide whether or not to charge tipping fees for wastes delivered to the facility. Tipping fees could be applicable to all residents, or the community could decide to apply fees only to certain generators, such as businesses. Churchill for example, charges tipping fees only to commercial producers and on appliances ($10) and derelict vehicles ($50) *[source: Town of Churchill]*.

The transition from being a community that does not charge for waste disposal to one that does may result in some challenges, including an increase in illegal dumping. This is especially a concern in remote communities where land is easily accessible to would-be dumpers. To help combat this, one community implemented a bylaw that prohibits waste disposal in non-designated areas. They enforced this bylaw by searching through any illegally dumped waste for a personal identifier and then posting a notice in the 'lost-and-found' section of the local paper asking the 'dumpee' to come claim it at their public works building *[source: Gov't of Canada, Solid Waste Mgmt]*.

Depending on population and sprawl, a community may also decide to implement curbside pick-up for some types of waste. According to Stewardship Ontario, curbside pick-up only makes economic sense if the cost of doing so is less than $50 per household, per year *[source: KPMG]*. Once it has been decided that a MSW facility will be opened, a community will need to look at the types of wastes that will be accepted and how they will be managed.

4.6.2. PREVENTION AND REDUCTION OF NEW WASTE

The first step in waste management is preventing and reducing waste at the source.

Minimizing waste generated at the source makes both environmental and economic sense, especially where southern recycling markets are far away. The key component of this particular step (and in the introduction of any new waste management practices) is public education. In their *What We Heard* document, the Northwest Territories (NT) government outlined how even when communities put resources into community clean-ups or waste management programs, without proper community outreach and education, the results of these endeavours would be undone within weeks.

To improve awareness while also reducing waste, the Northwest Territories launched a Single-Use Retail Bag Program whereby consumers were charged $.25 for each plastic bag they needed at the grocery store. This served to reduce the number of plastic bags in NT landfills by 73% in six years while also making consumers more mindful of their role in waste management *[source: Gov't of Northwest Territories]*.

4.6.3. ORGANIC WASTE

Organics (such as leaf and yard waste, food waste and soiled paper products) typically make up 1/4 to 1/3 of landfilled materials and as such, an organics program provides a great opportunity to significantly increase waste diversion *[sources: Gov't of Canada, Solid Waste Mgmt; Giroux Environmental Consulting]*.

Rapati researched several northern communities that have had success implementing a centralized composting system.

- In Mount Lorne, Yukon (pop. 800) for example, the community built an in-vessel composting tumbler using recycled materials. Residents pay a $20 membership fee to get access to the composter as well as rights to a share of the finished compost.
- Dawson City, Yukon (pop. 1,300) on the other hand, has three collection dumpsters situated around town. They are picked up and emptied by the town's waste collector and are brought to the landfill where the landfill operator turns them weekly through the summer months using a backhoe.
- A commonly cited challenge was a lack of community buy-in. To combat this, Gustuvus, Alaska offered one bucket of finished compost for every 11L of food waste that was brought in. While this was not sustainable, it generated early interest in the program and got people excited about using the new system.
- Iqaluit, Nunavut (pop. 7,800), used some of the compost on projects intended to enhance civic pride, such as growing flowers and local plants and vegetables. They found that this helped to cultivate a sense of community and gave residents an opportunity to feel like they were 'giving back'.

Rapati's review looked at the challenges that each composting program experienced and how they overcame them. One key takeaway was that upkeep can be a challenge when the program is solely run by volunteers. It suggested that that there should be a staff person whose job includes or is dedicated to taking care of the composting program.

Manitoba has an incentive program for municipalities who set up a composting facility. Facilities that enter into an agreement with Manitoba Sustainable Development are eligible for incentive payments of $10 per tonne for facilities that process more than 2,500 tonnes a year and $25 per tonne with a maximum of $25,000 annually for those processing 2,500 tonnes or less. Communities must agree to obtain Compost Facility Operator Certification within two years, meet national standards for composting as well as provide reports annually or bi-annually *[source: Gov't of Manitoba, Manitoba Composts Program]*.

Small communities in the Northwest Territories have also had success diverting organic waste with backyard composting and vermicomposting. NT has put out a user-friendly guide called *Composting North of 60* to help and encourage their residents to set-up a composting system in their homes.

With regards to compost, it is also important to note that while most paper products are recyclable, some communities are just too far away from a recycling mill for recycling to be economically worthwhile. This is the case in the Northwest Territories and some northern and remote areas of the provinces. As an alternative diversion method, paper is accepted in many composting programs (*e.g.* Nova Scotia, and PEI) as paper (cellulose) materials provide a good carbon source.

4.6.4. RESIDUAL WASTE

Residual waste is the non-hazardous household waste that cannot be recycled or composted. Due to its mixed nature and its relatively high volume, it is the costliest part of the waste stream to be managed *[source: Gov't of Canada, Solid Waste Mgmt]*.

The Government of Canada recommends the disposal of waste in a landfill cell at the community MSW Facility as the most feasible way for northern and remote communities to manage residual waste *[source: Gov't of Canada, Solid Waste Mgmt]*. They cite various reasons why incineration may not be a practical residual waste disposal solution including:

- that a second disposal system, such as a landfill, is required to dispose of the ash and non-combustible portion of residual waste; and
- that acceptable waste incinerators are expensive and require highly trained operators and extensive maintenance and monitoring.

Some places, such as Sweden, incinerate their residual waste using waste-to-energy technology. The Northwest Territories explored this option but decided to focus their strategy on reducing and diverting waste instead. They found that the costs and benefits of energy recovery technology—for example, financial costs, maintenance challenges, composition of air emissions and energy output—vary greatly *[source: Gov't of Northwest Territories]*.

4.6.5. RECYCLABLES

When considering which types of recyclables to begin with, it is recommended that communities focus on those materials that are covered by product stewardship and extended producer responsibility programs *[source: Gov't of Canada, Solid Waste Mgmt]*.

Manitoba has 12 Producer Responsibility Organizations (PROs) that have been established to enhance material recycling. One of the most challenging parts of establishing a recycling program in a remote northern community is the high cost of transporting recyclables to market *[source: Gov't of Canada, Solid Waste Mgmt]*. For this reason (among many others), it will be key for our province's northern communities to leverage the services of our PROs. *(See the information, below, on working with PROs).*

It is also a best practice for new recycling programs to making arrangements with a regional recycling centre to receive their materials. In northern Manitoba, this could be Flin Flon, Thompson, or The Pas *[source: Green Action Centre]*. These regional facilities may also be able to donate or lend equipment to improve recycling. For example, the Thompson facility has donated can crushers to northern communities to help them increase the amount that can be shipped in a single box *[source: Green Action Centre]*.

Northern waste management often requires a collaborative effort. In 2015 for example, a group of Manitoba PROs joined together for the Winter Road Pilot Project to help address the build-up of waste items in St. Theresa Point First Nation. Multi-Material Stewardship (MMSM), Canadian Battery Association (CBA), Product Care Association (PCA), Switch the Stat (through Heating, Refrigeration and Air Conditioning Institute of Canada), Electronics Product Recycling Association (EPRA), Manitoba Association for Resource Recovery Corp. (MARRC), and Tire Stewardship Manitoba (TSM) teamed up to coordinate the removal of the built-up waste with inbound and outbound transporters. They also provided supplies such as pallets and tote bags to help the community better collect and store waste in the future *[source: Multi-Material Stewardship Manitoba]*.

4.6.6. END OF LIFE VEHICLES

The depollution of End-of-Life Vehicles (ELVs) should be considered a high priority for any recycling program as there are significant human health and environmental risks associated with the waste *[source: Gov't of Canada, Solid Waste Mgmt]*.

As previously mentioned, trained personnel will need to remove the battery, fuel, and refrigerants found in a vehicle. *Scout Environmental* argues that communities may be able to make their ELV management program more financially feasible by removing additional vehicle parts in the decomissioning process. Catalytic converters, aluminum wheels, lead wheel weights, rotors, and wire harnesses can be sold or recycled separately and can often earn a higher price than scrap steel. Once decommissioned, communities may wish salvage vehicle parts for reuse by community members. After that, the ELVs can be shipped to a scrap metal facility for processing. The revenue received from the scrap facility will not pay for the full cost of decommissioning and shipping vehicles, but it will pay for a portion of those costs.

The community of St. Theresa Point purchased a car crusher in 2013. In the summer, vehicles are collected from the community and crushed. In the winter they are loaded onto flat bed and ice road trucks and backhauled to a scrap metal facility. The crushers can also take care of old ovens, fridges, washers, and dryers. The money made from the sale of the scrap metal goes back into the St. Theresa Point recycling project and helps pay the wages of the seven employees who work in the MSW facility.

4.6.7. BULKY WASTE AND WHITE GOODS

The depollution of white goods should be considered a high priority. A trained technician will need to remove refrigerants from appliances. Other bulky waste includes mattresses, furniture, and fibreglass tanks.

4.6.8. CONSTRUCTION, RENOVATION, AND DEMOLITION WASTE

One approach to reducing the quantity of Construction, Renovation and Demolition (CRD) waste destined for disposal within the community is to require contractors to sort the materials on the job site, and in some cases, arrange for the backhaul of materials for recycling or disposal as part of their contract *[sources: Gov't of Canada, Solid Waste Mgmt; Gov't of Manitoba, CRD]*.

4.6.9. REUSABLE ITEMS

It is a best practice to leave space at or adjacent to the MSW facility where household and other reusable or salvageable resources can be dropped off, organized, inventoried and stored for other community members to browse *[source: Gov't of Canada, Solid Waste Mgmt]*. Churchill for example, hosts two curbside giveaway weekends each year which are immediately followed by a Community Clean-up Week. During Clean-Up Week, bulky items can be flagged and left out for collection by the town. They are in the process of opening a REUSE area at their transfer station, but in the meantime encourage their residents to use the online swap and shop, a Facebook group that anyone in the community is able to join and post on *[source: Town of Churchill]*.

4.6.10. WORKING WITH THE PROS

What follows is a summary of how northern and remote communities can recycle and divert various types of waste and how the services of Product Recycling Organizations (PROs) can be used.

4.6.10.1. Household Recycling

MMSM provides up to 80% funding for a municipality's household recycling program and municipalities north of the 53rd parallel may be eligible for additional Northern Assistance to offset higher costs of shipping materials. Churchill, Manitoba provides curbside pick-up for their household recycling and residual waste. They do not recycle their cardboard however, due to the significant volume being recycled as well as the cost to ship it south. Instead, the town is authorized to burn cardboard and clean wood at their licensed burn cell. Residents are asked to separate and stack cardboard curbside on recycling day *[source: Town of Churchill]*. Cardboard can also be used as the base for raised beds in gardens, where it will help retain moisture and improve the soil.

4.6.10.2. Beverage Containers

Recycle Everywhere will provide municipalities with free indoor and outdoor public bins, posters to promote the program to residents, as well as guidance on how to implement a successful program. Once the Recycle Everywhere bins are full, you can empty and transport the materials to your recycling site or transfer station. The beverage containers collected from the Recycle Everywhere bins can be combined with those collected from residents' homes. It is recommended that you do not sort the containers into cans, glass and plastic as it is often most cost-effective for a community to ship co-mingled (mixed) recyclable materials to a recovery facility to be sorted there *[source: Green Action Centre]*.

4.6.10.3. Tires

Tire Stewardship Manitoba provides free scrap tire collection to all registered generators. As long as they follow TSM's scrap tire storage and collection guidelines, Municipalities and First Nations will also receive a fifty-cent per tire storage incentive for accepting and storing scrap tires at their MSW.

4.6.10.4. Electronic Products

EPRA provides support to communities based on how they choose to collect e-waste. If collecting waste at an MSW facility, EPRA will pay for the e-materials based on their weight but will not provide funding for transport. If collected at an MSW site, e-waste will need to be stored in a covered and locked area. EPRA will help communities to determine an appropriate and cost-effective collection/shipping container for their needs. If the community opts to host a collection event instead, EPRA will pay the transportation costs from the community to a regional processing facility but will not pay for the materials.

4.6.10.5. Special and Hazardous Wastes

Special and hazardous wastes are typically dropped off by the public at an MSW facility and stored until enough material accumulates to warrant it being transported to a licensed disposal facility (Indigenous and Northern Affairs Canada).

Regional collaboration can play an important role in successfully removing hazardous and special waste from communities. For example, communities can collectively hire technicians to depollute End-of-Life Vehicles (ELVs) and appliances with ozone-depleting substances.

In other instances, PROs may require a certain amount of waste to be collected prior to paying to have it removed. Communities can collaborate regionally to inventory and ship out these wastes together (Environment andClimate Change Canada). The Northwest Territories are exploring the idea of having regional mobile shredders, crushers, balers or other equipment that could reduce the volume of recyclables and waste including tires, ELVs, and large appliances *[source: Gov't of Northwest Territories]*.

4.6.10.6. Household Hazardous Waste

PCA assists communities with diverting paint, solvents, pesticides, and flammable liquids from the landfill. If a community is approved to collect household hazardous waste at their MSW facility, Product Care will provide all supplies including approved containers to segregate and package Household Hazardous Wastes, a spill kit, portable eye wash, signage, labels, and promotional/educational material. They will also provide training and collect full containers at no charge *[source: Green Action Centre]*.

4.6.10.7. Used Oil and Antifreeze

The Manitoba Association for Resource Recovery Corp. (MARRC) will share in the cost of setting up and operating a recycling depot for used oil and antifreeze. They will fund 50% of the capital investment to a maximum of $4,000 (total estimated cost for a 2,000 litre tank and used sea container is $8,000), provide operating support to a maximum of $2,000 for items such as insurance, advertising and supplies, cover the costs of required training, and provide a 10% return on the community's initial capital investment each year for 10 years to a maximum of $400 per year *[source: Green Action Centre]*. The Island Lake Working Group of Communities (St. Theresa Point, Wasagamack, Garden Hill, and Red Sucker Lake) were recently granted approvals to begin collecting used oil and antifreeze products.

A growing number of First Nations communities in Manitoba (including St. Theresa Point, Lac Brochet, Tadoule Lake, and Brochet) have opted to burn waste oil rather than haul it to a different facility for disposal. A waste oil burner can serve as a heater for a local building, reducing energy costs. This solution also provides a safer alternative to the risks and liabilities of hauling *[source: Brown]*.

MAARC is giving each community financial support of $7,500 plus $2,000 annually in operating funds for their burning unit. For communities interested in purchasing a Used Oil Burning Unit, Manitoba's Used Oil & Antifreeze Recycling Program will support the capital investment to a maximum of ($15,000 x 50%) $7,500. They will also pay $0.08 per litre on the throughput volume of the used oil annually *[source: MAARC]*.

4.6.10.8. Lead Acid Batteries (LABs)

The CBA provides funding for the transportation of batteries from a community to the closest recycling location. Your transfer station will need to be equipped with wooden pallets and cardboard boxes and the CBA provide rolls of shrink wrap, Transportation of Dangerous Goods (TDG) labels and TDG/ Hazardous Waste Manifests at no cost *[source: Green Action Centre]*.

4.6.10.9. Household Batteries and Cell Phones

If a community would like to set up a household battery and cell phone recycling program, Call2Recycle will provide postage-paid collection containers at no cost with a prepaid return shipping waybill. Communities may choose to host a collection event, where everyone saves their batteries for an annual or twice-yearly drop-off. Or, they may place the boxes in a central community space *[source: Green Action Centre]*.

4.6.11. ANNOTATED SOURCES

Brown, Thomas. *Energy Logic*. https://www.energylogic.com

A.J. Chandler and Associates Ltd. *Technical Document for Batch Waste Incineration: Executive Summary and Overview of the Six-Step Process for Batch Waste Incineration.* January 2010. http://publications.gc.ca/collections/collection_2010/ec/En14-17-2-2010-eng.pdf

Prepared for the Government of Canada.

This document acknowledges that incineration may be an appropriate and cost-effective waste management option for remote communities. It discusses how to select appropriate incineration technologies to meet specific waste management needs as well as the operational requirements that batch incinerators must meet to ensure adherence to Canada-wide standards for dioxins/furans and mercury.

Chesni Advisory Group. *Business Plan to Establish a Waste Management & Recycling Project in St. Theresa Point First Nation.* St. Theresa Point First Nation. December 7, 2014.

Not available online.

City of Iqaluit, Nunavut. *City Landfill Accepting End-Of-Life Vehicles*.July 28, 2015. http://www.city.iqaluit.nu.ca/news/end-life-vehicles-disposal-fees-various-sizes-are-available-city-iqaluit.

City of Whitehorse. *Solid Waste Action Plan.*August 2013. http://whitehorse.ca/departments/environmental-sustainability/waste-diversion/additional-information/solid-waste-action-plan-swapand http://whitehorse.ca/home/showdocument?id=3476

This document is interesting, in part because, while it outlines a comprehensive plan for a wide variety of waste streams, it omits derelict vehicles.

Earthbound Environmental. *A Study Into Economic Opportunities Utilizing Waste Materials In Thompson, Wabowden, and Norway House.* 2000. http://bokeconsulting.com/wp-content/uploads/2017/05/Earthbound-Thompson-Waste-Economic-Opportunities-2000.pdf.

_____. *A Waste Diversion Strategy for the Town of Gillam.*2000. http://bokeconsulting.com/wp-content/uploads/2017/05/Earthbound-Gillam-Waste-Diversion-Strategy-2001.pdf.

_____. *Scrap Metal Recycling in Remote Northern Communities: A Pilot Project Implementation Plan.*2003. http://bokeconsulting.com/wp-content/uploads/2017/05/Earthbound-Remote-Northern-Metal-Recycling-2003.pdf.

Ecology North. *Managing Hazardous Waste in your Community*. Video. http://ecologynorth.ca/our-work/waste-reduction-and-composting/managing-hazardous-waste-community/

Ecology North is an organization in the Northwest Territories that promotes the appreciation and protection of the natural environment. They have produced a video going over best practices in setting up a hazardous waste management plan in a Northern Community.

The video explains how best to set up a transfer station or MSW facility to accept, store, and transport hazardous waste and suggest hosting collection events once or twice per year to make it easy and top-of-mind for residents to drop off said waste.

The video also provides a helpful list of considerations to make when deciding which hazardous materials to accept at a transfer station. This list is applicable also to most other wastes a community may be looking to collect and manage:

- Can this be managed within the community?
- How do we manage this hazardous waste from residents?
- Can we manage this waste from businesses and government?

- How will it be safely collected? (does it require a special container?)
- Where will it be collected and how much space will we need?
- Whose role will it be to label identify, segregate and record the waste?
- How much will be collected before it is prepared for shipment?
- Will the material be transported out by road or barge?
- What signs and directions will show people what to do?

ELVS, Alaska. *End of Life Vehicle Solutions*.http://elvsolutions.org/?page_id=404.

Unfortunately, focused only on mercury switches.

Fisher, Ron and Megan Hooge. "Is it time for our industry to clean up the messes in our own backyard?" *Automotive Retailer.* April 13, 2015. http://www.automotiveretailer.ca/paving-the-way-for-the-future/.

Federation of Canadian Municipalities. *Getting to 50% and Beyond: Waste Diversion Success Stories from Canadian Municipalities*. 2009. https://fcm.ca/Documents/tools/GMF/Getting_to_50_percent_en.pdf

The Federation of Canadian Municipalities have compiled success stories of various communities who have reached waste diversion rates of nearly 50% or greater. They are sharing these stories in the hopes that municipalities who are just beginning to implement a waste management system can learn from their strategies.

Though an informative document, none of the municipalities profiled were similar to those we would be working with and did not address any of the challenges that a remote, northern community would face in terms of weather, access, population etc. Though interesting to read, this document does not prove too helpful for our purposes.

Giroux Environmental Consulting. *State of Waste Management in Canada*.2014. https://www.ccme.ca/files/Resources/waste/wst_mgmt/State_Waste_Mgmt_in_Canada%20April%202015%20revised.pdf

Government of British Columbia. *A Guide to Solid Waste Management Planning.* Ministry of Environment.September 2016. https://www2.gov.bc.ca/assets/gov/environment/waste-management/garbage/swmp.pdf

_____. *Guidelines for Establishing Transfer Stations for Municipal Solid Waste.* Ministry of Environment. https://www2.gov.bc.ca/assets/gov/environment/waste-management/garbage/guidelinesestablishingtransferstationsmunicipalsolidwaste.pdf

_____. *Waste Management.* Ministry of Environment, Lands, and Parks.2018. https://www2.gov.bc.ca/gov/content/environment/waste-management

The British Columbia guidelines provide a helpful overview of the various considerations a municipality would need to make when establishing a transfer station during implementation of their solid waste management plan. The guidelines cover such areas as zoning and location, design, operations, and costing models.

For our purposes, these documents most valuable in providing general best practices in terms of storage (how long, in what types of containers) and collection.

The Guidelines also provide an analysis of the various types of transfer stations (green box, dedicated truck, roll-off container, hydraulically tippable containers, direct dump, compaction) which may be important when looking at developing waste management systems for specific communities.

Government of Canada. *Design Guidance for Small-Scale Transfer Stations (Draft)*. Indigenous and Northern Affairs Canada.Updated December 18, 2017.

This guide provides advice to a First Nation on how to prepare a project proposal for a small (less than 50 tonnes/day) on-reserve transfer station. It looks at how to determine whether or not a transfer station is needed and identifies and discusses the various considerations one must make when planning and designing a transfer station in a First Nations context.

Indigenous and Northern Affairs Canada (INAC) asserts that a transfer station is essential for effective waste management on any rural or remote reserve that is not near (within 50 km) to an off-reserve disposal facility (pg 7).

This document will prove especially useful when developing waste management project proposals for specific communities.

_____. *Indian Reserve Waste Disposal Regulations*. Minister of Justice.C.R.C., c. 960.Current to September 26, 2018. https://laws-lois.justice.gc.ca/eng/regulations/C.R.C.,_c._960/index.html

Prior to establishing any new MSW or waste disposal site on a reserve, these regulations should be reviewed and adhered to. To summarize, the Indian Reserve Waste Disposal Regulations state that no person should operate a waste disposal site on a reserve, use reserve land for waste storage, or disposal or burn waste without a permit.

Failure to comply with these regulations may result in closure of the waste disposal/storage site, fine or imprisonment.

_____. *Mine Site Reclamation Guidelines for the Northwest Territories.* Indian and Northern Affairs Canada.January 2007. http://www.inuvwb.ca/Downloads/Mine_Site_Reclamation_2007.pdf.

Section 2.9 "Buildings & Equipment" is particularly relevant to northern communities. This section covers "ore processing/concentrator plant, head frame, maintenance shops, offices, warehouses, fuel tanks, fuel tank farms, assay and analytical labs, process reagent and explosive storage, boiler houses, power generation plants, and camp facilities. Equipment may include:

- all surface and underground mobile equipment,
- shaft installations,
- distribution piping, and
- conveyors."

A significant portion of the non-vehicle metal waste in northern communities is like the material listed in this section of this document.

_____. *Solid Waste Management for Northern and Remote Communities: Planning and Technical Guidance Document*. Environment and Climate Change Canada.March, 2017. https://www.canada.ca/en/environment-climate-change/services/managing-reducing-waste/municipal-solid/environment/northern-remote-communities.html

Environment and Climate Change Canada's (ECCC's) technical guide provides best practices in planning, design, and operations for Municipal Solid Waste facilities (MSWs) in northern and remote regions. This document is particularly useful for our purposes as it is location-specific, pragmatic, and builds on a traditional respect for nature, viewing waste not as a source of pollution, but as a resource (pg.4).

ECCC's guidelines are unique in that they take a risk-based approach to waste management, prioritizing MSW activities based on the waste stream's impact on human health and the environment. They advocate for a model of continuous improvement, implementing the high risk activities first and moving through the medium- and lower-risk items as resources become available.

_____. *Study of the Extent of Abandoned and Derelict Vessels in Canada.* Transport Canada. November 2012. http://avicc.ca/wp-content/uploads/2013/12/TransportCanada_Report_AbandonedDerelictVesselReport_Feb202013.pdf.

_____. *Technical Document on Municipal Solid Waste Organics Processing*. Environment Canada.2013. https://www.ec.gc.ca/gdd-mw/3E8CF6C7-F214-4BA2-A1A3-163978EE9D6E/13-047-ID-458-PDF_accessible_ANG_R2-reduced%20size.pdf

This document is meant to be a resource to Canadian municipalities who are engaging with consulting firms and technology providers to assess potential options for organic waste processing. It takes into account the Canadian context (in terms of weather, markets and end-users) and provides an overview and advantages/disadvantages of various composting methods.

In addition, this document will be useful in planning for a centralized compost system at a MSW facility as it provides considerations for facility siting and design.

Finally, it provides an overview of the Canadian Council of Ministers of the Environment's (CCME's) regulations for quality standards for compost in Canada.

_____. *Technical Guide for Developing a Solid Waste Management Plan*. Indigenous and Northern Affairs Canada. October 2017.

For a proposed community solid waste management project (such as constructing or expanding a solid waste transfer station or a landfill) to be considered for funding by INAC, project proponents must first complete a community solid waste management plan per the guidelines provided in this document.

Should ISC funding be pursued, this document will be an integral resource.

_____. *Transportation of Dangerous Goods Act, 1992*. Current to August 19, 2018. https://www.tc.gc.ca/eng/tdg/act-amendedact-69.htm

The Transportation of Dangerous Goods Act sets out the general requirements that must be met when handling or transporting dangerous goods. This act applies to many of the wastes at which we are looking, including e-waste, lead acid batteries, hazardous waste, bulky/white waste etc.

_____. *Transportation of Dangerous Goods Regulations*.Current to August 19, 2018. https://www.tc.gc.ca/eng/tdg/clear-menu-497.htm

The Transportation of Dangerous Goods Regulations provides specific details on how to transport the goods that you may come across in your day-to-day operations.

Government of Manitoba. *Construction, Renovation and Demolition Waste Management Guideline: Technical Update*. Green Building Program Manitoba.July 11, 2017. https://www.gov.mb.ca/finance/greenbuilding/pubs/2017-07-11_constructionrenovationdemolition.pdf

While I have not been able to find many tangible examples of how construction, renovation, and demolition (CRD) waste is being managed in northern remote communities, Green Building Program Manitoba provides guidelines for developing your CRD waste management plan. They also detail the materials that are most commonly recyclable or salvageable and what the uses (or reuses) of these products usually are.

Though they make mention of the difficulties some rural and remote areas may have in diverting CRD waste from landfills, they do not provide any insights on how these difficulties may be managed.

_____. *The Manitoba Composts Program*. Sustainable Development. n.d. https://www.gov.mb.ca/sd/wastewise/compost/program.html

_____. *Standards for Landfills in Manitoba*. Manitoba Sustainable Development.2016. https://www.gov.mb.ca/sd/envprograms/swm/pdf/standards_for_landfills.pdf

This authoritative document outlines the minimum standards for siting, design, operation, monitoring, planning, and closure of new or existing landfills in Manitoba. This document governs all landfills in Manitoba, including those operated by First Nations, unless it is operated on reserve land, in which case the Government of Canada document *Indian Reserve Waste Disposal Regulations* applies.

_____. *Standards for Transfer Stations in Manitoba*. Manitoba Sustainable Development.2016. https://www.gov.mb.ca/sd/envprograms/swm/pdf/standard_for_transfer_stationts.pdf

This authoritative document outlines the minimum standards for siting, design, operation, monitoring, planning, and closure of new or existing transfer stations in Manitoba. It does not take into account how waste management practices could or should vary based on a community's location within the province. In spite of that, this document should be reviewed during planning to ensure minimum standards are met.

_____. *Waste Management Facilities Regulation.* The Environment Act.Feb. 23, 2016. https://web2.gov.mb.ca/laws/regs/current/_pdf-regs.php?reg=37/2016

The Waste Management Facilities Regulation section of the provincial Environment Act should be reviewed prior to implementing a new or making operational change to a waste management facility.

The Regulation covers the licenses and permits required to operate a waste management facility, the operating requirements of various types of MSWs (transfer stations, material recovery facilities, landfills etc.) as well as requirements for closure of a waste management facility.

While the majority of these regulations have been re-stated in other sources, the Environment Act should be considered the definitive reference for minimum standards.

Government of Northwest Territories. *Composting North of 60: A Guide to Home Composting in the Northwest Territories*.https://www.iti.gov.nt.ca/sites/iti/files/composting%2520booklet.pdf

_____. *Developing a Waste Resource Management Strategy: Discussion Paper*. November 2017. https://www.enr.gov.nt.ca/sites/enr/files/resources/final_pdf_env_wrrp_discussion_paper_for_development_of_waste_resource_management_strategy_november_2017.pdf

_____. *Developing a Waste Resource Management Strategy: What We Heard Fall 2017/Winter 2018 Engagement*. June 2018. https://www.enr.gov.nt.ca/sites/enr/files/resources/what_we_heard.pdf\

The Northwest Territories' (NT's) Waste Resource Management Strategy is founded in four guiding principles and has four primary goals.

The founding principles are:

- protection of the environment
- economic development and financial liability
- environmental stewardship
- collaborative approaches

The goals are:

- to prevent and reduce waste generated at the source
- to divert waste disposed in landfills
- to improve waste management facilities and practices
- to lead by example ("Green the Government")

For each goal, they have suggested a handful of actions that may work in its favour.

It is important to note that this strategy is fairly broad (few best practices are discussed) and has yet to be enacted.

A follow-up paper, entitled *What We Heard*, was published in June 2018. It summarized community feedback on the discussion paper and the goals and actions therein.

This document is interesting for our purposes in that it provides insight into the types of waste management initiatives that may resonate with a northern community.

While the documents do not get too much at what northern communities are *actually doing* in pursuit of waste management, they demonstrate that we (Manitoba and NT) share some of the same challenges in this area.

A large focus for the NT will be on developing new extended producer responsibility programs to build on their existing two. For Manitoba, the focus for our northern communities will be on leveraging the 12 provincial programs that already exist.

The implementation of the NT's strategy will be interesting for Manitobans to observe.

Government of Nunavut. *End-of-Life Vehicle Hazardous Materials Recovery Program Manual: Manual for the Preparation and Disposal of End-of-Life Vehicles in Nunavut.* January 2011. http://www.gov.nu.ca/sites/default/files/final_-_elv_program_manual_-_jan_10_2011_0%20%281%29.pdf.

Prepared by Dillon Consulting Limited, Dennis Heinrichs, P.Eng., Project Manager.

Green Action Centre. *Starting a Recycling Program: A Toolkit for Manitoba First Nations and Northern Communities*. April 2017. http://greenactioncentre.ca/wp-content/uploads/2017/07/Cover-Intro-ToC.pdf

The Green Action Centre provides an easy-to-follow guide on how communities in Northern Manitoba can leverage 8 of the 12 recycling programs run by provincial Producer Responsibility Organizations (PROs).

The services provided by each PRO are provided, as is application information and key contacts for both the PRO and other important suppliers and service providers.

This is a well-organized document with many useful graphs and charts. In particular, the chart outlining best practices in storage, location, and transport of each type of recycling will be helpful.

Hamlet of Paulatuk, NT. *Solid Waste Facility Operation and Maintenance Manual.* July 2015. http://doczz.fr/doc/3081725/solid-waste-facility---inuvialuit-water-board.

Prepared by Jennifer Spencer of Dillon Consulting.

Hamlet of Ulukhaktok, NT. *Solid Waste Facility Operation and Maintenance Manual.* December 2015. http://www.inuvwb.ca/Downloads/Public%20Registry%20pdf%20files/2015-12-23%20Solid%20Waste%20O&M%20Manual%20-%20Draft.pdf.

Prepared by Dillon Consulting Limited, Jennifer Spencer, Project Manager.

Journal of the Northern Territories Water & Waste Association. http://ntwwa.com/journal.asp.

Useful as an ongoing resource.

KBL Environmental. *Waste Management Plan: F-68 Well Site Remediation, Satellite Bay, Prince Patrick Island, NT*. Inuvialuit Water Board. February, 2016 & February 2017. http://www.inuvwb.ca/Downloads/Public%20Registry%20pdf%20files/2017-04-13%20Updated%20WasteMgmtPlan.pdf

Particularly relevant in that it addresses waste materials beyond vehicles, including "old fuels, batteries, scrap metal…oily rags, and impacted water".

KPMG. *Blue Box Program Enhancement and Best Practices Assessment Project*. Waste Diversion Ontario. 2007. http://www.stewardshipontario.ca/wp-content/uploads/2013/03/KPMG_final_report_vol1.pdf

Machum, Eric. "Abandoned and Derelict Ships: Where do we go from here?" *The Canadian Maritime Law Association.* http://www.cmla.org/papers/Abandoned_Vessels.pdf.

A type of scrap metal that may be present in some communities but is not often considered in waste or recycling planning.

Mackenzie Valley Land and Water Board. *Operation and Maintenance Plan Templates for Municipal Water Licences: Solid Waste Facility.* November 10, 2015. https://glwb.com/sites/default/files/documents/Operation%20and%20Maintenance%20Plan%20Templates%20-%20Solid%20Waste%20Facility%20%28SWF%29%20-%20Apr%2020_17.pdf

A useful template for developing a solid waste management plan that can include much of the materials to be managed in First Nations and northern communities.

MARRC (Manitoba Association for Resource Recovery Corporation). *MARRC 2017 Annual Report*. http://usedoilrecycling.com/en/mb/sites/default/files/MARRC%20ANNUAL%20REPORT%202017%20COMPLETE%20FINAL%20April%2020%202018.pdf

Mason, Solomon. *Report: Scrap Metal Recycling Project Two (2) Year Action Plan April 2014 to March 2016.* St. Theresa Point First Nation. April 7, 2014.

Not available online.

Mason, Solomon, and Pinter & Associates. *Waste Stream Study, St. Theresa Point First Nation.* March 28, 2011.

Not available online.

Multi-Material Stewardship Manitoba. *2015 Annual Report*.2015. http://stewardshipmanitoba.org/wp-content/uploads/2013/10/MMSM-Annual-Report-for-2015-1.pdf

Oteng-Ababio, Martin. "Missing links in solid waste management in the Greater Accra Metropolitan Area in Ghana." *GeoJournal* (2011): 551-560. https://www.researchgate.net/publication/291047014_Missing_links_in_solid_waste_management_practices_in_the_Greater_Accra_Metropolitan_Area_GAMA

Oyegunle, Ahmed Oyeleye. *Solid Waste Management Practices in Two Northern Manitoba First Nations Communities: Community Perspectives on the Issues and Solutions.* Thesis Paper. 2016. https://umanitoba.ca/institutes/natural_resources/pdf/theses/Oyegunle,%20Ahmed.MNRM%202016.pdf

Oyegunle examines existing waste management practices in two Northern Manitoban First Nations—Garden Hill and Wasagamack. He provides a summary of the potential environmental and human health impacts that poor waste disposal practices may have on a community.

Based on this research and his experiences in Garden Hill and Wasagamack, he concludes with recommendations on how to improve waste management in northern first nations.

The most useful section of this report for our purposes is the recommendations portion. The recommendations, however, were fairly general and did not provide the specific best practices that I had hoped for.

Oyegunle recommends the following actions as a starting point for Garden Hill and Wasagamack:

- replace existing garbage dumps with sanitary landfills
- initiate community clean-up programs and closure of open dumps
- train community experts on waste to ensure environmental protection
- introduce a waste collection system
- build transfer stations
- embrace community environmental education and awareness to enhance community participation and capacity building
- enact band by-laws on solid waste disposal
- conduct a waste audit and develop a waste reduction plan
- understand the roles of the communities and the concept of shared responsibilities
- collaborate to develop a regional waste management approach

- develop a waste management option and compute financial implications

Oyegunle gives a fulsome explanation of the challenges faced by northern Manitoban communities when it comes to waste management and argues in favour of better support and action from the provincial producer responsibility organizations (pg 142).

Rapati, Kim. *Feasibility of Centralized Composting in Hay River, Northwest Territories, Canada*. March 2014. http://www.ecologynorth.ca/wp-content/uploads/2014/09/Hay-River-Composting-Study-of-Options-March-2014.pdf

Prepared by Ecology North for the Town Hay River, Environment Canada, and other interested parties.

Kim Rapati of Ecology North completed a feasibility study on composting in Hay River, a small community in the Northwest Territories (pop. 3,528). Rapati investigated three scenarios:

1. Composting of Poultry Manure and Paper Waste
2. Composting of Source-Separated Organics and Paper Waste
3. Composting of Source-Separated Organics, Paper and Aged Chicken Manure

The study outlined the importance and logistics of diverting paper from the regular household recycling stream for compost as well as best practices in compost facility location and design.

The study concluded that centralized composting in Hay River should be pursued and that the first step would be to place organics collection bins at major producers in town, such as schools, restaurants, and grocery stores.

_____. *Review of Centralized Composting Projects in Small- to Medium-sized Northern Communitie*s. 2013. http://ecologynorth.ca/wp-content/uploads/2016/02/HRCompost-AppendicesLitReviewMarch-2014.pdf

Prepared by Ecology North for Environment Canada.

Rapati completed a review of 11 centralized composting initiatives in northern communities, from Alaska to Greenland. The communities ranged in size from 380 people (Makkovik, Labrador) to ~20,000 (Whitehorse and Yellowknife). In these communities, five types of composting were used: aerated static piles, in-vessel, turned pile, pallet heap (hand-turned) and open windrow.

Operators of each program were interviewed and offer their recommendations and lessons learned. Rapati concludes by offering best practices in operations, technologies and techniques, economics, and leadership and partnerships.

This is a very useful document for any northern community considering implementing a compost program.

Scout Environmental. *Protecting the Land: A Practical Guide to ELV Recycling in the North*. August 2014. https://tundratakeback.ca/wp-content/uploads/2018/06/Protecting-the-Land-A-Practical-Guide-to-ELV-Recycling-in-the-North.pdf

Prepared for Tundra Take-Back.

Scout Environmental (SE, formerly Summerhill Impact) provides a thorough but easy-to-follow and practical overview of End-of-Life Vehicle (ELV) Recycling in a northern setting. It goes over guidelines for choosing a site to de-pollute and store ELVs and is divided into Beginner (de-pollute), Intermediate (de-pollute, flatten or crush) and Advanced (de-pollute, flatten or crush, transport for recycling) steps for ELV management. For each 'level' it provides the various jobs or roles that will need to be filled to ensure success as well as the best equipment and tools to use.

Practitioners will also find useful, for space planning purposes, the chart providing approximate measurements for vehicles depending on how they have been crushed.

Appendix A contains a list of shipping companies that operate in Canada's north, which may be useful when exploring options for backhauling. Finally, SE provides step-by-step instructions for hoisting and de-polluting an ELV.

Overall, this is an excellent overview document on ELV Recycling.

Town of Churchill. *Waste Management.* http://www.churchill.ca/main.aspx?parentCode=A8C7E6CB-184B-4CAE-96D4-562BD4A96707

Tundra Take-Back. *Successful Recycling and Hazardous Waste Management in Northern and Remote Canada*.2015. http://scoutenvironmental.com/images/uploads/mainimages/TTB-Report-2015Mar30.pdf

Van Dusen, John. "Gov't of Nunavut looking to charge $1,000+ to ship a vehicle North." *CBC News.* October 12, 2016. Http://www.cbc.ca/news/canada/north/nunavut-considers-charging-vehicle-import-fee-1.3801501

Washington State. *Demonstration Project: Solid Waste Management and Recycling.* Department of Labor and Industry.November 2004. http://www.lni.wa.gov/safety/SprainsStrains/demofnl/solidwasterecycling.pdf

The Washington State Department of Labor and Industry provide an overview of the different types of processes and vehicles involved with refuse collection, collection of recyclable material (non-organic), and the sorting of recyclable materials at a material recovery facility.

This document provides an ergonomic assessment of the different waste management processes and recommendations for worker wellness. It may not be appropriate for our purposes.

Wordsworth, Anne. "Improving the Management of End-of-life Vehicles in Canada." *Canadian Environmental Law Association.* April 2011. http://www.cela.ca/sites/cela.ca/files/784.ELV%20April%202011.pdf

Yukon River Inter-Tribal Watershed Council. *Backhaul: A "How To" Guide.* 2016. https://docs.wixstatic.com/ugd/dcbdaf_286fdf14a215417d9301c996864cbcc3.pdf