Composting Investigation Report

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Land Forest People wishes to thank Lower Nicola Indian Band for the opportunity to be of service. We acknowledge the contributions made to this project by:

- The staff of Lower Nicola Indian Band
- Lorna Shuter, Shulus Community Garden
- Seabird Island Band
- Cook's Ferry Indian Band
- The First Nations Land Management Resource Centre

Executive Summary

This report is a product of the second phase of LNIB solid waste management planning that began in early 2019. At that time the initial investigation into their system identified the lack of community-wide composting as one factor contributing to their program being more costly and less environmentally responsible than desirable. This report is an attempt to lay out the necessary considerations that LNIB should address in order to implement a community-scale composting system.

Although they do not apply to LNIB land, we offer that provincial regulations can provide excellent guidance on best practices in the development of a compost facility. We also looked to two other First Nations in British Columbia with composting initiatives at opposite ends of the scale in order to learn from their experiences. Both provide lessons that LNIB can incorporate into their planning.

The Shulus Community Garden is a natural ally and partner to the LNIB Infrastructure Department in this initiative. They have experience and expertise in different composting methods, can provide some of the necessary source material (the "brown" material), and can incorporate a new composting system into existing outreach strategies. With respect to funding sources, the garden may potentially access certain grants in addition to the federal infrastructure funding that is available to the LNIB administration.

We offer three main areas for consideration when planning a composting program for LNIB:

- The goals for the composting program, and inclusion of the economic development;
- The type of infrastructure and size of operations that make sense, both initially and in consideration of future expansion; and
- Regional context, including what other local authorities offer their residents, and what expertise and support is available locally to LNIB.

Finally, we offer eight recommendations to LNIB to develop a community composting program that we believe has the greatest chance of success. They are:

1. Start small, engage the willing, and lead by example.
2. Install multiple composting sites in population centres and where the users of the end product are located.
3. Determine the necessary compost infrastructure and site design.
4. Remove barriers to participating, and use incentives where possible.
5. Establish the nature of the partnership between LNIB Infrastructure department and the Shulus Community Garden.
6. Make use of locally available resources.
7. Engage, educate, and support community members to compost.
8. Decide whether to evaluate the business opportunity.

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1.0 BACKGROUND

In 2019 the Lower Nicola Indian Band (LNIB) received support from the First Nations Land Management Resource Centre (FNLMRC) to undertake a comprehensive study of solid waste management on LNIB land. The goal of the project was to improve the existing solid waste system to better meet the needs of the community and the environmental and financial goals of LNIB. In November, 2019 LNIB received additional funding from FNLMRC to build on the various recommendations that came out of the initial project in 2019 towards further advancing LNIB's solid waste management program.

There were four stated goals of the initial 2019 project:

- Reduce the volume of solid waste produced by the community;
- Divert as much material as possible from the residual waste stream;
- Eliminate inappropriate waste disposal on LNIB lands; and
- Reduce the financial burden of solid waste management on LNIB.

The initial 2019 project delivered three documents to LNIB – the *Issues Characterization Report*, the *Solid Waste Management Plan* (SWMP), and the *Solid Waste Community Education Report*. These various documents describe resources available to LNIB and detail a number of recommendations for environmental and financial improvements that LNIB could make to the current system.

The SWMP identified the lack of community composting as one factor that contributes to LNIB's solid waste system as being less efficient and more costly than necessary. With no community-wide composting system, the large majority of organic kitchen waste is assumed to end up in the residual waste stream, likely contributing approximately 30% of LNIB's total disposal costs for that stream. Instituting a system that captures household compostable organic waste could help LNIB make progress on two of their goals for improving their solid waste management system: reduce volume and reduce costs. With respect to composting, the SWMP recommends that LNIB leverage local resources in the short-term to support community members to implement closed-loop home composting, and, in the long-term, evaluate the range of potential opportunities to institute a composting facility in the community in partnership with the Shulus Community Garden.

This report attempts to lay out a roadmap for achieving the long-term recommendation to implement a community-scale composting program at LNIB. We begin by reviewing the legislative context for compostable organic waste generally in BC, both on- and off-reserve. We then survey some best practices in designing and operating community-scale composting facilities. We detail the experience of two other First Nations in BC who have instituted community-wide composting operations, but at different scales. Finally, we lay out some considerations for LNIB and our recommendations to successfully implement a composting program at LNIB.

2.0 LEGISLATIVE CONTEXT

2.1 FEDERAL AND PROVINCIAL LEGISLATION

Ordinarily, composting on Indian Reserves is governed by the *Indian Act*, specifically by the *Waste Disposal Regulations*. In that context, a First Nation wishing to institute a composting waste management program requires a permit from the federal government. It also requires details about any related infrastructure needs in their *First Nation Infrastructure Investment Plan*, to be eligible for funding by the First Nation Waste Management Initiative, a subset of the First Nation Infrastructure Fund.

Outside of Indian Reserves, composting is regulated in British Columbia by the provincial *Environmental Management Act* and the *Organic Matter Recycling Regulation*.

2.2 LNIB LEGISLATION

As a signatory to the *Framework Agreement on First Nation Land Management*, LNIB has opted out of those sections of the *Indian Act* that govern land management on Indian Reserves. LNIB brought their *Land Code* into force in 2016, and have since made efforts to pass additional legislation. The following acts are either in force or under development at the time of writing:

- The *Lower Nicola Indian Band Zoning By-law, 1994* (to be repealed and replaced by the *Land Use and Zoning Law* which is under development)*;*
- The *Lower Nicola Indian Band Property Assessment Law, 2009;*
- The *Lower Nicola Indian Band Property Taxation Law Amending Law, 2009;*
- The *Subdivision, Development and Servicing Law* (under development);
- The *Land Use and Zoning Law* (under development);
- The *Enforcement Law* (under development);
- The *Allotment and Custom Interests Law* (under development);
- The *Environmental Management Law* (under development); and
- The *Business Licence Law* (under development).

As an operational First Nation under *Land Code*, neither the provincial *Environmental Management Act*, nor the *Indian Act* govern LNIB with respect to land management. Therefore, the LNIB *Environmental Management Law*, which is currently under development, rightfully governs and regulates composting on LNIB land. The LNIB *Environmental Management Policy and Procedures* works in conjunction with their laws to guide their staff to implement and administer the solid waste management program.

At the time of writing, LNIB's *Environmental Management Law* and *Environmental Management Plan* were under development. While still in draft form, the two documents contain provisions with respect to composting.

Part 5 of the *Environmental Management Law* states, in part:

16. A Person must not dispose of any material as Residual Waste destined for landfill or incineration that may be segregated for composting or recycling.

17. Anyone disposing of Waste must comply with the Lower Nicola Indian Band Environmental Management Plan and Environmental operating procedures and utilize composting, recycling, and waste disposal facilities provided by Lower Nicola Indian Band or available locally.

18. Materials that must be [composted] or recycled include:

    …

    b. organic garden Waste;

    c. organic kitchen Waste and uncooked food;

    …

The *Environmental Management Plan* cites soil improvement, food security, and program cost minimization as reasons to maximize composting as a component of waste diversion. Further, it states that it is LNIB policy to:

- Support personal household composting.
- Take advantage of subsidized composting bins and free resources and other support offered by the Thompson-Nicola Regional District (TNRD).
- Consider the implementation of a community-wide composting facility on LNIB lands.
- Support and encourage all offices, businesses, and households to segregate compostable materials from their garbage stream and either undertake their own composting or contribute their material to a community member.
- Encourage community and individual home gardens wherever possible to allow for the membership to grow, prepare, and store quality and wholesome food.
- Have an ongoing public communication program that will encourage all offices, businesses, and households to participate in composting.

Upon their adoption by Chief and Council, the LNIB *Environmental Management Law* and *Environmental Management Plan* will provide the legislative and policy basis for composting on LNIB land.

3.0 COMPOSTING BEST PRACTICES

While a compost facility on LNIB land would be exempt from complying with the provincial regulations governing compost facilities elsewhere in the province, LNIB should consider looking to those enactments for guidance on best practices in their planning.

In 2016 the BC Ministry of Environment released a 9-page Information Note entitled *Summary of General Composting Best Management Practices* (the Summary). Its purpose is to summarize the information found in a more comprehensive guideline entitled *Compost Facility Requirements Guideline: How to Comply with Part 5 of the Organic Matter Recycling Regulation*, which was developed to assist proponents in complying with the Organic Matter Recycling Regulations under the *Environmental Management Act*.

Note that these guidelines are relevant to both large- and small-scale facilities. The Summary outlines the following as best practices in composting facilities and operations in BC:

3.1 FACILITY DESIGN

Good design is a major factor in a successful facility and operation, and is seen as the single most important factor in minimizing or controlling other considerations such as odours, leachate, and noise. Compost facility construction plans, specifications, and operational plans should be completed by qualified professionals, regardless of the facility's capacity.

3.2 SITING

Location has a great influence on a facility's success, and should be decided with community input. Factors that are important to consider when siting a composting facility this includes:

- Composting method you will employ, and the equipment and site requirements associated with that method.
- Topography's effect on site drainage, facility visibility, and odour movement.
- The proximity to and potential impacts on nearby residents and land users.
- The use of buffer areas to avoid or mitigate environmental impacts.
- Disease vectors such as insects and rodents.
- The use of fire buffers in addition to a facility fire protection plan
- The effect of weather conditions on leachate generation and odour movement.
- Locate facilities away from wetlands and flood plains due to the higher potential for environmental impacts.
- Any necessary facility infrastructure and utilities.
- Space requirements for storing raw materials and finished product, curing, and odour and leachate control measures (berms, sediment ponds, etc.).
- Ease of access to vehicular traffic, and minimal traffic increases in residential areas.
- Minimal travel distances for users.
- Zoning compliance.

3.3 LEACHATE

The best leachate management strategies are to reduce and re-use leachate as much as possible. Treating leachate should be a last resort, only after maximizing efforts to reduce and re-use. Key factors in controlling leachate include:

- The use of impervious surfaces, covers and a collection system.
- The use of buffers between the site and surface or groundwater.
- The influence of site layout on leachate generation.
- Use of pile shape to influence water retention or shedding.
- Use of slope to prevent run-off and leachate.
- The site's grade and its effect on leachate flow.
- The use of gutters as a means of collection in open compost systems.
- The use of in-vessel channels or containers in closed compost systems.
- Run-off management, including soil treatment, filter strips, recirculation, or sediment traps.
- The use of leachate treatment methods as decided by a qualified professional.

3.4 ODOURS

Compost facilities that are well-built and operate well should not produce offensive odours. Every composting facility operator should have an odour source control strategy, and should document all odour complaints. Odours typically arise due to sub-optimal processing conditions. Key factors related to minimizing odour include:

- Proper degradation, aeration, temperature, moisture content, and pH levels.
- Optimal mix of microorganisms.
- Good housekeeping, dust control, and the use of visual buffers.
- Keeping feedstock, or raw material, dry and composted as soon as possible.
- The use of open versus closed composting systems.

3.5 COMPOSTING PROCESSES

You must consider the composting processes you will employ. Different methods range both in their operator requirements, and the need for related equipment. Generally speaking, the more passive the process, the longer it takes to complete the full composting process.

3.6 OTHER CONSIDERATIONS

Other factors that are important to consider and plan for when designing, constructing, and operating a successful compost facility include:

- Proper carbon to nitrogen ratio (C:N)[1] in feedstock and any necessary additives or bulking agents.
- Proper mixing of raw materials and any necessary related equipment.
- Proper aeration and any necessary related equipment.

[1] Recommended C:N ratio is 25-30:1. Kitchen scraps are a high source of nitrogen.

- Proper temperature maintenance and any necessary related equipment.
- Curing time.
- Screening for foreign matter and oversize material and any necessary related equipment.

3.7 CARBON:NITROGEN RATIO

While not extensively covered in the Summary, it is important to note the carbon and nitrogen requirements of successful composting. Decomposition slows when the C:N ratio is too high (excess carbon); a C:N ratio that is too low (excess nitrogen) produces foul odours.

The amount of carbon in compostable material greatly depends on the amount of water present. Carbon-rich materials, such as leaves or hay, are often referred to as brown material because they are quite dry. Nitrogen-rich materials, such as kitchen scraps, coffee grounds and grass clippings, are often referred to as green material as they are usually fresh and quite moist.

Maintaining the ideal 25-30:1 C:N ratio requires relative volumes of brown and green anywhere from two parts brown to one part green, to approximately equal amounts of brown and green, to one part brown to two parts green. These amounts depend on several factors:

- The C:N ratios of the source materials. Brown material in particular varies based on the size of particles; “bulkier” materials have more air space and therefore require more volume. Smaller volumes will be required where the material has been shredded.
- The temperature of the compost pile and the rate of decomposition. Decomposition happens quickly in high temperature piles, and slowly in low temperature piles.
- The method of composting. Batch piles do well with a 2-to-1 ratio of green to brown, while a 1-to-1 ratio works well for add-as-you-go piles. In the batch pile method, compostable materials are stockpiled until they can be mixed together at one time, which results in a quicker, hotter decomposition. Add-as-you-go piles are arguably more convenient, but take longer to decompose fully as they do so at a lower temperature.

4.0 THE SHULUS COMMUNITY GARDEN

The Shulus Community Garden is a natural and willing partner to the LNIB Infrastructure department on a community-wide composting initiative, as the two entities have a mutual interest in successfully implementing such a program. Partnering with the garden also brings the possibility of accessing funding sources, such as grants, for which the LNIB government would not be eligible.

The Shulus Garden has been growing food on LNIB land since 1998. The Shulus Farms, a subsidiary of the LNIB Development Corporation owns the plot of land on which the garden is situated. Workers and volunteer gardeners transformed the garden from rocky, sandy ground that was once unsuited to growing cattle forage into a productive, successful garden plot. Building up the soil with compost has been a significant contributing factor in that transformation.

The garden enjoys a great deal of support from the community and its local partners and stakeholders, such as TNRD, the City of Merritt, and LNIB itself. The garden has always been a community resource, and is a partner in various educational programs with the LNIB school and employment and skills training initiatives with the band. A community-wide compost system brings new potential to expand these programs.

Management of the garden is overseen by Lorna Shuter. Her passion for growing food and background in horticulture and business are great assets to the community. Lorna has an extensive network of people across the province involved in horticulture and in particular the movement to grow food locally. Her experience, enthusiasm, and connections are a great asset to the community composting initiative.

The garden receives an annual operating budget from LNIB, plus occasional grant money. Past grants allowed the garden to construct various demonstration piles to highlight different compost methods, develop a medicine garden, and support members in growing and preserving food. The garden has an active outreach strategy and uses several tactics to encourage LNIB members to make use of the garden, if not to grow their own food, then at least to stimulate more interest in locally grown food. Those initiatives include:

- A rent-a-plot program for individuals and groups;
- Various workshops related to gardening and growing food;
- Participating in different programs for existing groups, such as the LNIB school and Elders group;
- Active in the establishment of the Nicola Valley Farmer's Market;
- LNIB food voucher program that can be exchanged for Shulus Garden produce; and
- A regular section in LNIB newsletter.

The garden currently does some composting, and has a great deal of expertise, and some infrastructure in place. They are likely able to supply the necessary amount of brown material, such as dry grass clippings or hay, that a community-scale kitchen scrap composting program would require. It is important to note that while the garden does not necessarily have the ability to manage a composting program within current staffing levels, however staff is available to assist during the months of October to February while Shulus garden overwinters.

The garden has always been challenged by a lack of community participation, an obstacle which a community composting program may also face, and has experience in different strategies to engage community members.

5.0 EXAMPLES OF OTHER COMPOSTING OPERATIONS ON FIRST NATION LAND

As part of our research, we looked at two different First Nations in BC who implemented community-wide composting operations, at different scales. The programs at Cook's Ferry Indian Band (CFIB) and Seabird Island Band (SIB) represent two approaches to composting at opposite ends of the scale: CFIB instituted a program that only serves their own small community, while SIB instituted a program to serve both their own community and the wider community in the Fraser Valley (and therefore the Band's economic development interests). There are aspects of both programs that we can learn from and apply to the circumstances at LNIB.

For context, LNIB and SIB have similar populations (in the range of 600 – 700 residents), that are approximately 10 times that of CFIB.

Originally, we were going to visit both Nations to speak to their staff and see their operations in person. That plan was disrupted through the winter of 2019-2020, first due to weather, then operational issues, and then finally due to the COVID-19 pandemic. Those visits may be rescheduled for the future.

5.1 SEABIRD ISLAND BAND

The SIB compost operations, including its commercial operation, were implemented through their community waste management plans, just as LNIB recently started to undertake. Initial composting efforts were focused within the community: increase composting participation; build a mid-scale compost facility for community use; and outreach education and engagement with members. While those initial community-focused efforts were rolled out SIB explored the business opportunity, and extensive business planning was completed approximately four years after the initial waste management study was done.

What follows is a summary of the timeline for SIB's composting program:

2009:

- SIB completed a study entitled *Managing Our Waste: A strategy for solid waste management on Seabird Island*. This plan set the vision and a number of goals for SIB's solid waste, one of which was to reuse, recycle, and compost more.
- One of the key opportunities identified for action was to divert compostable organics from the residual stream.
- The Waste Management Working Group determined that hands-on compost outreach programs and an on-site compost facility development should be explored.

2010-2011 fiscal year:

- Initiatives in this period focused on two areas:
    1. The compost outreach program, in which:
        - Two demonstration piles were built and maintained by SIB staff,
        - 25 backyard compost kits were delivered to community members, accompanied by hands-on training and follow up home visits, and

        - Four elementary classroom worm bins and one high school science mid-scale worm bin were established, supplemented by presentation and educational curricula.
    2. Development of an onsite compost facility, through which:
        - Three staff members from three SIB facilities attended a compost certification course, and
        - SIB staff, with professional support from Transport Compost Systems, located in Abbotsford, constructed a mid-scale onsite composting facility.

- SIB also brought in a compost consultant to collaborate with staff and community members to implement the organics management program.

2011-2012 fiscal year:

- During this period, organics management was one of four priority waste management initiatives. The four organics management initiative activities were to:
    1. Maintain the organics outreach programs;
    2. Develop a collection program for food scraps, and operationalize the onsite compost facility to continue to divert organics from the residual waste stream;
    3. Train Public Works staff; and
    4. Allocate a .5 FTE from existing staff time to launch the program.
- The other three priority initiatives were: adopt policies and plans; allocate staff support; and use expertise of engineering consultants. All of these actions indirectly supported the organics management program.
- Continued research into the feasibility of a commercial composting operation was also identified as a priority for focus in the next period.

2012-2013 fiscal year:

- A comprehensive 52-page business plan for the Seabird Island Eco-Station was completed. The premise was to build on the existing community compost facility to become a commercial operation. Important elements of the plan to note include:
    - Potential suppliers of compostable organic matter included the SIB community as well as large suppliers, like local hotels, restaurants, and two Regional Districts.
    - Potential customers for the final product included home gardeners, municipalities, and golf courses.
    - The facility was designed to compost up to 3,600 metric tonnes of organic material annually and made up of one 40x100 ft compost finishing compound, one 50x100ft compost processing compound and two additional structures for storage and public drop-off.
    - The detailed operational plan addressed all elements of composting best practices listed in section 3.0 of this report, plus additional elements such as staff and visitor safety, and closure and maintenance plans.
- It should be noted that the composting industry in the Fraser Valley has changed, and certain conditions that factored into SIB's business model do not necessarily exist now, nor may they apply to the Nicola Valley.

2013 – present

- The Seabird Island Eco-Depot officially opened in April, 2013 with the ability to process 4,000 tonnes of material annually from the SIB community and local municipalities. The goal was to eventually process 80,000 tonnes as a commercial operation.

Post-2013

- At this time, it is unclear whether SIB was able to make progress on their goal of processing up to 80,000 tonnes of compost as a commercial operation.
- We know that at the time of writing, commercial composting at SIB was not operational. Due to our inability to engage with SIB as much as we would have liked, we do not know the reasons for shifting away from commercial operations. The facility currently functions only as a community facility.

5.2 COOK'S FERRY INDIAN BAND

Lorna Shuter visited CFIB in December, 2019 to tour their compost operations. The CFIB Compost System is a small operation serving the community of fewer than 100 people at Spence's Bridge. CFIB have been composting since 2017, and the final product is made available to community members.

Funding in the amount of $5,000 was provided for the project through the federal Lands and Economic Development Services Program (LEDSP). At that time, the program was administered by Indigenous and Northern Affairs Canada (INAC), but has since been moved to the newly created Indigenous Services Canada (ISC). The fund is available to Framework Agreement signatory nations.

The purpose of the CFIB operation is to protect their land and reduce the volume of waste going to the landfill. They do not run a commercial operation. Members are asked to collect their household compostable waste and deposit it directly into the community composters. CFIB does not offer household pickup.

CFIB uses six compost tumblers that were purchased in 2017 through Wayfair Canada at a cost of $800 each. A local representative based in Kamloops helped facilitate, and staff were trained on the set up and use of the equipment. Figure 1 below shows one of the tumblers in use.

Figure 1 – Compost Tumbler in Use at CFIB

The compost tumblers must be anchored to the ground. One tumbler was cemented to the ground but the collecting leachate underneath was found to be problematic. The remaining tumblers are anchored into the earth, which CFIB finds more manageable.

CFIB keep their composters outside for easy access, and are exposed to the elements. They recommend that LNIB take certain steps with respect to placement and protection if LNIB were to install similar equipment. They suggest:

- Placing the composters under a roof in order to protect them from rain and snow;
- Locating the composters near a source of electricity so that heaters may be used to keep the compost material from freezing in winter; and
- Ensuring there is access to a water source, as the compost material needs to be moistened periodically.

CFIB finds that using pine pellets helps to absorb smells and excess moisture, and prevents excess leachate. As a brown material, the pellets are a good choice for the tumblers because they are compact in size. One drawback however is that they must be purchased.

6.0 CONSIDERATIONS FOR COMPOSTING ON LNIB LAND

In this section we discuss some of the factors that will help LNIB to determine what type of composting operation makes sense for the community.

6.1 GOAL OF A COMPOSTING PROGRAM

LNIB's original goals for waste management as stated in 2019 were to reduce the amount of residual waste and lower the costs of disposal, not to investigate a commercial opportunity. For that reason, it makes sense for LNIB to focus its attention on designing a program that serves the community's needs with respect to managing their own solid waste first. Should LNIB wish to investigate the potential for a commercial operation, it should undertake a careful consideration of the business opportunity only after a community compost system is successfully implemented.

With respect to reducing the financial cost of waste management, LNIB can expect to save up to 30% of their net tipping fees by eliminating compostable material from the residual waste stream. In addition, LNIB can expect to see a parallel reduction in operational costs associated with collection and disposal. While difficult to enumerate, savings may be realized by:

- adjusting the collection schedule from weekly to biweekly; and
- a reduced need for human resources, fuel, insurance and other operational costs.

6.2 TYPE OF INFRASTRUCTURE AND SCALE OF OPERATIONS

In addition to the best practices summarized in section 3.0, the type of facility and scale of operation that would suit LNIB's purposes depends on a number of factors, including:

- Cost and available budget;
- Number of participants and volume of waste produced;
- Accessibility and ease of access by users;
- One central facility or distributed facilities;
- Type of material produced (*e.g.* primarily kitchen scraps in residential areas *vs.* primarily garden waste in other areas);
- Composting method (e.g. add as you go, batch piles, *etc.*);
- Whether a shelter will be constructed to protect and/or insulate the infrastructure;
- Availability of water and power;
- Ability to expand as more community members participate in composting; and
- Potential need to incorporate initial infrastructure into a commercial operation in the future.

We estimate that if every household were to divert all of their organic kitchen scraps to the compost stream, LNIB residents could collectively produce up to 2.5 cubic yards of compostable material per week. This breaks down to approximately 2 gallons per household, or 0.75 gallons per person, per week. A 100-gal compost tumbler will accommodate approximately 20 gal per week using the add as you go

method. Using one 100-gal tumbler for every ten households is a reasonable guideline, and is in line with CFIB's experience.

6.3 REGIONAL CONTEXT

The TNRD is an excellent resource for composting. Support is given to local communities in their waste management through the provision of different types of backyard composters at cost, and in-person workshops and demonstrations.

Despite being the two largest population centres in the region, neither Merritt nor Kamloops offer collection service for compostable kitchen scrap as part of their solid waste services, though both encourage residents to do backyard composting.

Interestingly, in the absence of compost collection by the city, one Kamloops resident started a backyard composting business. Information regarding her operation, Go Forth Composting Services, can be found online at www.facebook.com/goforthcompostservices/ and in a recent newspaper article at https://infotel.ca/newsitem/one-woman-is-taking-on-composting-for-more-than-90000-kamloops-residents/it70160.

Of particular relevance to the potential for a commercial operation, the City of Merritt runs a commercial composting operation, though not from kitchen scraps. Source materials are coffee grounds, wood chips, hog fuel, and organic matter recovered from wastewater treatment and manures. The resulting four compost end products are available for purchase and are priced at $25 to $30 per yard.

7.0 RECOMMENDATIONS

As in the 2019 *Solid Waste Management Plan*, our recommendations are meant to drive behavioural change as well as operational change. A new composting program must be taken up and championed by LNIB community members, as its success hinges on their participation.

Note that we make these recommendations on the premise that LNIB will pursue composting as a community service, not as a commercial venture. In particular, the recommendation to install multiple compost sites is designed to maximize the benefits of a community operation rather than a commercial one. We would not necessarily advise this approach if a commercial composting operation is a probable or expected outcome of LNIB's solid waste planning.

Ideally, initial investments in infrastructure should be made in consideration of the end goal, whether that is multiple community facilities, or one large commercial facility.

Recommendation #1	**Start small, engage the willing, and lead by example.**

Given existing funding and resource realities, we recommend LNIB build a program from the "bottom up" rather than "top down". This approach is designed to focus effort where there is the greatest chance of success, and therefore gain momentum by building on feelings of excitement and ownership. This is an important element when participants are asked to do some of the work (i.e. there is no home pickup). Imposing a full-scale, community-wide, comprehensive program should only be undertaken with sufficient resources to properly support such an approach.

The SIB experience provides a good model for this. We recommend LNIB begin by canvassing the community to identify eager participants and early adopters, who are given home collection bins and other supports. LNIB must also lead by example by putting collection bins in public places, such as community and administration buildings. These will have to be emptied and managed by facilities staff.

This recommendation would be different if LNIB was to secure sufficient funding and other resources to implement a larger scale program that includes the necessary infrastructure, collection bins for every household and community or administration building coupled with home pickup service, and a robust communication and outreach program.

Recommendation #2	**Install multiple composting sites in population centres and where the users of the end product are located.**

Reducing barriers to composting is key to the success of any program. In the absence of home pickup, we recommend placing composting facilities close to users in order to make participation as easy as possible. This means placing collection sites both in population centres as well as in locations where users of the end product are located. Where possible, we recommend identifying "community champions" at each site who may be willing to assist their neighbors with participating, or answer questions. Relative sizes of population centres is based on the 2015 LNIB Community Profile.

We recommend considering the following locations:

Area	Location	Comments
Shulus neighborhood	Shulus Community Garden	Third largest population centre and location of the community garden.
Rocky Pines neighborhood	TBD. If possible, site in conjunction with a new garden.	Largest population centre. We understand there is interest in a new community garden in this area, and that initial discussions have taken place with the LNIB Infrastructure department, and that soil may be available from a new running path that is planned at the school. If a community garden is not established here, then a location near the community centre may make sense.
Springs neighborhood	TBD	Second largest population centre, more research required to determine possible location.
Zoht IR 4	TBD	Not a large population centre, but several farmers who were participating in garden club meetings are located here.
Joeyaska IR 2	TBD	As with Zoht, this is not a significant population centre, but there are a number of avid gardeners located here.

Recommendation #3	**Determine the most suitable compost infrastructure and site design.**

At this stage, we cannot determine the size and type of composing infrastructure to install at each site. It should be made subject to more discussion between the staff from the community garden and Infrastructure department, along with a qualified professional, as required. Sections 3.0 and 6.2 provide more guidance on some considerations that may inform this decision.

CFIB is an excellent resource for LNIB to hear some of the pros and cons of using tumblers.

Recommendation #4	**Remove barriers to participation, and use incentives where possible.**

A system that is as easy and convenient as possible for users is key. Every effort should be made to incentivize users and reduce the barriers to participation. Drop-off locations should be convenient, as should the placement of collection bins in public buildings. If at all possible, LNIB should consider implementing home pickup service. This may become more feasible in conjunction with curbside residual waste pickup, if it is implemented in the future.

Consider using home composting bins for giveaways and extending existing programs, such as food vouchers, to include compost.

This is an exercise that should not be undertaken only in the beginning of the program. Every so often, evaluate the program's effectiveness and brainstorm new and creative ways to reduce barriers and incentivize users.

Recommendation #5	**Establish the nature of the partnership between LNIB Infrastructure department and the Shulus Community Garden.**

It is clear that a partnership between the community garden and LNIB administration is a natural fit for a composting program. However, the nature of the relationship should be clarified, including roles and responsibilities, staffing, and funding structure.

Determine if a composting program can be managed within existing staffing levels and structures, or if a new position must be created. Ongoing duties will include community education and outreach, managing composting sites, sourcing and hauling brown material, and building and maintaining relationships with stakeholders such as the TNRD. Training for staff is important. Contact the Solid Waste Association of America's Pacific Chapter BC and Yukon (swanabc.org) for upcoming events. Net Zero Waste and Transform Compost Systems, both located in Abbotsford, are two companies that occasionally participate in training events.

Depending on the arrangement, the garden can seek grant funding, while the LNIB government can apply for ISC infrastructure funding.

Recommendation #6	**Make use of locally available resources.**

There is a great deal of support and experience available locally that LNIB may tap into. The TNRD, CFIB, and University of the Fraser Valley have all offered their support to LNIB in their composting efforts. The TNRD has a number of different home composting bins available at cost, and offers hands-on education and support on their use. CFIB has offered to visit LNIB to share their expertise and experience. UFV has offered to host LNIB on a tour of their compost facility, as has SIB. Both should be considered once travel and personal contact can be undertaken safely.

Recommendation #7	**Engage, educate, and support community members to compost.**

Starting a composting program is as much about changing behaviours and habits as it is about installing infrastructure and executing operations. Community outreach must be done continuously, not just at the outset of a new program. Messaging must be frequent and consistent, almost to the point of being background noise. In this way, participation in composting becomes normalized and expected within the community. Coupled with composting collection bins in public places, frequent and consistent messaging reinforces the concept that composting our organic waste is the common practice at LNIB.

Education and support are also critical. While composing is simple, it can feel daunting for some people to begin. Providing home collection bins and hands-on support on how to use them will go a long way in helping community members overcome the initial hurdle to engage in the practice at home.

As part of this project, a *Community Education and Engagement Plan* and other resources will be delivered to LNIB.

Recommendation #8	**Decide whether to evaluate the business opportunity.**

LNIB recently undertook their solid waste planning efforts with the goals of improving environmental outcomes and reducing costs. It was not about identifying business opportunities. However, should LNIB wish to revisit these goals, it will be necessary to undertake a robust and comprehensive business planning process.

While we recognize that the conditions of the Fraser Valley are not necessarily applicable to the Nicola Valley, it would be useful to hear more about SIB's experience with a commercial compost venture. Given recent events, we were unable to have discussions with SIB about the reasons for their pivot away from a commercial operation, though LNIB may be able to re-engage SIB in the future.

The LNIB Economic Development department should be brought into any future discussions regarding the potential for a commercial composting operation.

8.0 SOURCES

https://www2.gov.bc.ca/gov/content/environment/waste-management/food-and-organic-waste/regulations-guidelines

https://www.sac-isc.gc.ca/eng/1491490781609/1533647730166

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https://www.planetnatural.com/composting-101/making/c-n-ratio/

www.homecompostingmadeeasy.com/

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