Salt Spring Island

Central Composting Feasibility Study

FINAL REPORT

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by the

Salt Spring Island Agricultural Alliance

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Note: ***Central Composting Feasibility Study, Preliminary Research Report***, Dec 2009, forms part of this report and is available under separate cover.

EXECUTIVE SUMMARY

To facilitate the development by another organization or entrepreneurial entity, the Salt Spring Island Agricultural Alliance has undertaken a study to evaluate the need for and feasibility of a Central Composting Facility to meet requirements for commercial growers.

The preliminary research report produced in December 2009 included an overview of regulatory requirements, a review of regional composting facilities, the findings from Salt Spring market and feedstock surveys, and equipment and operational considerations.

The final report provides a preliminary financial and regulatory evaluation of the feasibility of a central composting facility on Salt Spring Island, and completes the work. For clarity, the composting of biosolids (sewage sludge) is not contemplated, and is the subject of an unrelated CRD project at the Burgoyne septage site.

A phased model was proposed as follows:

Phase I - Pilot Project	A 18-24 month pilot demonstration of the composting of General Organic Materials (GOM), consisting primarily of yardwaste, land clearing debris, spoiled produce, and animal manure.
Phase II - Permanent Facility	A permanent licensed facility composting Restricted Organic Materials (ROM), primarily cooked food scraps and GOM. Phase II could be located at the Phase I site, or at a different location.

Potential capital and operating scenarios for a generic pilot project were defined. A preliminary pro-forma statement was prepared for six scenarios, consisting of three different composting systems and two levels of feedstock.

Three good potential sites for the pilot project were identified from a number of possibilities. One site was selected for further analysis. A site-specific pro-forma statement with four scenarios (two systems and two levels of feedstock) was prepared.

Based on the Phase I analysis, potential capital and operating scenarios for Phase II were defined and a preliminary generic pro-forma statement prepared.

Regulatory and policy implications were reviewed, along with related funding opportunities, and a schedule prepared for implementation of the pilot project.

Findings

- Many different community interests and goals would be served by a central composting facility.
- The generic pilot project pro-forma analysis for GOM materials indicated that an annual operating subsidy of at least $6,500 would be required for an unlicensed central facility composting GOM. A distributed approach, whereby GOM feedstock is transported directly to farmers, would be more viable, although some amendments to the CRD composting bylaw would be required.
- The preferred model for the pilot project was a private landowner/operator with composting experience and a suitable site. Several landowners were contacted and evaluated. An appropriate candidate was identified.

- When the site-specific pilot project pro-forma analysis was prepared, the economic viability improved, suggesting lower subsidies (or in one higher volume scenario, no subsidy) would be needed for this particular site and operator. This will be helpful in minimizing costs and financial risks associated with the pilot project, but cannot necessarily be expected to continue on a permanent basis.

- A generic permanent licensed facility processing both GOM and ROM showed break-even potential as a result of higher volumes and tipping fee revenues. Very high volumes could potentially generate a surplus. However, this model was considered very preliminary with a number of regulatory and cost and revenue uncertainties.

- CRD agreed that regulatory changes could be made and that funding for organic waste diversion would be available to Salt Spring.

- More stringent outdoor burn restrictions would increase availability of carbon feedstock, and would also result in environmental and health benefits. Partnerships with CRD and the Fire Department to achieve this objective could be pursued.

Recommendations

1. Establish a body to oversee and support a central composting pilot project. This body could be a committee of the Agricultural Alliance or one of its member organizations, and could include CRD and Islands Trust representatives, and representation from the SSI Solid Waste Advisory Committee.

2. Develop a Landowner's Agreement for the preferred site and begin the regulatory approvals process.

3. Identify and secure key feedstock supply arrangements as well as commercial growers interested in composted product.

4. Identify and confirm investment/funding partners for the pilot project.

5. Set a target date of Fall 2010 for the launch of the pilot project, i.e. the opening of the site to feedstock materials.

6. Design reporting and equipment trials to facilitate a refined analysis of the viability of a permanent licensed facility.

7. Plan for the continuation of central composting on Salt Spring in some form after the pilot project, either as a GOM facility or as a licensed ROM facility.

INTRODUCTION

To facilitate the development by another organization or entrepreneurial entity, the Salt Spring Island Agricultural Alliance has undertaken a study to evaluate the need for and feasibility of a Central Composting Facility to meet requirements for commercial growers.

The preliminary research report produced in December 2009 as part of this study included an overview of regulatory requirements, a review of regional composting facilities and Salt Spring initiatives, equipment and facility options, market and feedstock surveys, reviewed haulers, potential sites and operators, and greenhouse gas implications.

This report completes the work. It includes business analyses and preliminary pro-forma statements for a pilot project composting General Organic Materials (GOM) and for a permanent licensed facility composting food scraps (Restricted Organic Materials, ROM). Three potential sites for the pilot project were assessed for suitability and one was selected for a more detailed pro-forma analysis. The next steps in taking the pilot project forward and a schedule are provided.

Background

The Salt Spring Island Agricultural Alliance was incorporated as a not-for-profit organization in November 2008 to oversee the implementation of the 'Plan To Farm' Salt Spring Island Area Farm Plan (AFP), completed in January 2008, and to represent Salt Spring agricultural interests on and off-island. Membership is restricted to organizations and current members are: Salt Spring Island Farmers' Institute, Island Natural Growers (the Gulf Islands Chapter of Canadian Organic Growers), Salt Springers for Safe Food, the Earth Festival Society (representing the Salt Spring Energy Strategy), and the Salt Spring Island Chamber of Commerce. Each member organization appoints a Director, with the two farm organizations appointing up to three directors each to ensure the Board always has a majority of grower representatives. The geographic scope is Salt Spring Island (SSI), which has an area of just under 20,000 ha and a population of about 10,000.

Salt Spring Island has a long tradition of agriculture, at one time supplying the vast majority of residents' food supply as well as exporting to nearby markets. Today, we supply less than 5% of our own food. Declining farm profits, rising land prices, infrastructure and input costs, and an ageing farmer population are all cited as reasons. A key step in restoring the long-term viability and security of Salt Spring Island's food supply was the initiation of an area farm planning process. Priority recommendations of the AFP included the establishment of key community facilities that support the expansion of agricultural activities.

One of the frequently cited challenges for commercial growers who wish to increase food production, is a chronic shortage of compost. A Central Composting Feasibility Study is the first step in establishing a central Salt Spring composting facility to create high quality compost suitable for commercial market gardeners from currently under utilized waste resources such as land-clearing, yard and landscaping waste, horse manure, and kitchen food scraps. This composting facility would invite community participation and would also help to address local air quality issues by providing an alternative to outdoor burning of leaves and other organic waste. Salt Spring market gardeners identified a need for locally-produced finished compost during the AFP consultations. This resulted in a recommendation in the Area Farm Plan to establish a community composting facility as a mechanism to support the expansion of agricultural activities.

The closure of the Hartland Landfill in 2012 to organic waste presents an added opportunity to capture organic waste currently leaving the island.

Community Interests

Although the primary motivation for the feasibility study was to benefit Salt Spring's commercial market gardeners and thus enhance the island's food producing capacity, it was found that several different community interests might be met by a central composting facility. These included the following groups and interests:

Group	*Interest*
Salt Spring Fire Department	seeks alternatives to outdoor burning because of fire hazard and monitoring concerns.
CRD	responsible for providing residents with food scrap disposal options when the Hartland Landfill is closed to organics in 2012.
Islands Trust	supports the Area Farm Plan and the Salt Spring Energy Strategy, and has an interest in limiting land use activities such as outdoor burning.
SSI Agricultural Alliance	oversees the implementation of the Salt Spring Area Farm Plan to increase agricultural production.
Salt Spring Energy Strategy	seeks climate change mitigation through reductions to GHG emissions associated with imported, conventional food, and reductions to black carbon (outdoor burning and diesel emissions).
Market gardeners	need access to good quality compost at reasonable cost.
Salt Spring businesses	pay a premium for food scrap disposal and would benefit from reduced transportation costs to a local facility.
Salt Spring waste haulers	would benefit from reduced time and fuel costs to transport food scraps to a local composting facility.
Salt Spring meat producers	are investigating the feasibility of a mobile abattoir, for which they need a facility to dispose of offal.
Salt Spring gardeners	would benefit from availability of good quality local compost.

From the above it can be seen that restrictions to outdoor burning, which can only be accomplished if an alternative disposal option is available, is a desired community objective. Apart from fire department concerns, outdoor burning is a source of fine particulate matter (PM 2.5) which is known to be a health hazard with no safe level of exposure. The Vancouver Island Health Authority actively supports education about outdoor burning for this reason.

Outdoor burning is also a source of black carbon, now recognized to be a powerful agent of climate change. Black carbon from various sources, primarily forest fires, is possibly responsible for as much as 21% of global warming.

Restrictions to outdoor burning are considered necessary to guarantee carbon feedstock for a central composting facility. Simultaneous information campaigns on central composting and outdoor burning would encourage landclearing and yardwaste diversion to the composting facility and enable eventual restrictions on outdoor burning.

Approach

In order to test the feasibility of a central composting facility on Salt Spring, a two phase approach was deemed appropriate:

Phase I - Pilot Project
A 18-24 month pilot project would be undertaken, involving the composting of General Organic Materials (GOM), consisting primarily of yardwaste, land clearing debris, and animal manure. The pilot project would provide information regarding availability of various types of feedstock, suitability of equipment and methods, level of community support, and costs. If the pilot was successful, it could be continued, or it could be expanded into Phase II.

Phase II - Permanent Facility
Depending on the results of the pilot project, the central composting facility could be modified to accept food scraps and could become a licensed in-vessel composting facility. Phase II could be located at the Phase I site, or at a different location.

Assumptions
For Phase I, infrastructure and capital costs would be kept to a minimum. The operation would use leased equipment where possible. One or more yardwaste receiving points could be established, possibly including a bin at the Rainbow Road recycling depot and/or a stockpile or bin at the Blackburn Road waste transfer station. Planet Zero has indicated willingness to participate in the pilot by providing yardwaste containers to customers, which when full would be delivered to the composting site. A contractor would be engaged to chip and haul the yardwaste to the central composting site, and/or haul and chip onsite, as appropriate. Arborists would be encouraged to supply chipped material. Farmers and others identified in the surveys would be contacted and arrangements made to receive animal manure and other GOM feedstock at the composting site.

A variant of this model would be to have the feedstock materials collected at a central location, possibly the Blackburn Road waste transfer station, and to have the windrows located on individual farms. Farmers would contract with the central composting facility to have a windrow constructed on their property. The composting process would then be undertaken and managed by the farmer, and the resulting compost would utilized on the farm.

Systems Considered

For the purposes of this analysis, the following approaches were initially considered for both the pilot project and a permanent facility:

- Centralized ‘Ag-Bag’ system
- Centralized covered windrow system
- Centralized in-vessel (shed) system
- Distributed (on-farm) windrow system

In order to compare and evaluate these options, new and used equipment cost estimates and lease rates were obtained, operator time estimates were developed for each type of process, and site characteristics were established to meet the regulatory requirements.

Composting Systems
Each composting system considered follows the same basic process of gathering and mixing materials, forming into suitable piles or windrows, monitoring temperature, and turning at intervals. In most cases, the compost will need to be screened when complete, with any oversized material returned to the process:

stage 1 involves the receiving and blending, grinding, mixing and initial rapid phase of composting of organic matter through the mesophyllic and thermophilic stages.

stage 2 involves curing after having completed the mesophyllic and thermophilic stages.

stabilized means organic matter that has completed the stage 2 process.

thermophilic stage is the biological decomposition of organic matter characterized by active bacteria which are favoured by a high temperature range of 45°C to 75°C; and is associated with a high rate of decomposition and stabilization.

mesophyllic stage is the biological decomposition of organic matter characterized by active bacteria which are favoured by a moderate temperature range of 20°C to 45°C; and is associated with a moderate rate of decomposition and stabilization.

The mixture of feedstock materials and the management of the composting process is both an art and a science. While there are preferred carbon to nitrogen (C:N) ratios and moisture content targets, because of variable feedstock streams an operator will need to experiment and use judgment. Good records should be maintained to minimize the learning curve and facilitate planning and adjustments to content and/or turning schedules. A skilled operator is considered essential to the production of top quality compost.

Temperature is monitored to ensure the compost reaches sufficient temperatures to kill pathogens and weed seeds, while not overheating and destroying the beneficial organisms responsible for the decomposition. Overheating can also cause reductions in the nutritive value of the compost itself.

Compost is turned either to reduce the temperature and prevent overheating, or when the desired temperature has been reached and begins to decline; this aerates the material and begins the heating process again. Aeration using pressurized air flow performs a similar function to turning, although without the benefit of the mixing of materials. When compost has completed the initial thermophillic and mesophyllic stage (stage 1), it is left to cure (stage 2) for several weeks to complete the composting process. It is then considered stable and may be screened and stockpiled for weeks or months, depending on operator and/or market preference.

Centralized covered windrow system

Windrows are actively managed with piles built and turned with farm equipment, such as a tractor with a bucket loader or a Bobcat. To comply with the CRD Composting Bylaw, stage 1 and 2 windrows must be built on an impermeable surface with leachate control; this can be a concrete pad, but more likely would be a think poly membrane covered with a layer of hog fuel. Leachate could be collected in the center of the membrane, or elsewhere and drained into a storage tank.

While not a regulatory requirement for the general organic materials in the Pilot Project, windrows should covered by tarps or plastic sheeting to avoid drying in summer and loss of nutrients in winter. Stage II windrows for a permanent facility handling restricted organic materials must be covered by an approved heavy duty breathable membrane.

Temperatures are generally monitored with long-pronged thermometers. Aeration and temperature control is achieved either by turning the windrow (the normal method for GOM), or with a blower and perforated pipe installed under the windrow before it is built. Larger operations may justify a tractor-pulled PTO-driven windrow turner, which produces a superior product and can eliminate the need for screening.

The main advantages of the windrow system are simplicity, availability of equipment which reduces initial capital costs, and compliance with CRD bylaw requirements for both general and, with some modification, restricted organic materials. Disadvantages include high labour requirements, and potential difficulty with odour and/or rodent control particularly for restricted organic materials.

Centralized 'Ag-Bag' system
The Pacific Forage Ag-Bag is an in-vessel composting system consisting of plastic tubes or PODs filled by a hydraulic ram from a feed hopper. The PODs are available in 5' and 10' diameters and come in 200' lengths, although they can be cut to any length to suite feedstock volume or site constraints. The 5' diameter bags would be most appropriate for the scale of facility considered for Salt Spring Island.

The POD includes air-vents that can be opened or closed and a flexible aeration pipe that can be attached to a timer-controlled fan. This enables temperature control similar to other in-vessel static aerated pile systems.

The advantages include weather protection and greater processing control compared to a static pile without aeration, flexibility and portability, odour control, leachate containment, and it meets the CRD bylaw requirements for both general and restricted organic materials. Some operators report that both stage 1 and stage 2 composting can be successfully completed within the POD without the need for turning, which would reduce labour and handling.

The disadvantages are cost of the equipment, the ongoing cost of the PODs, and the inability to reuse the PODs or aeration pipes.

Centralized in-vessel (shed or tunnel) system
In-vessel composting occurs in an enclosed sealed container or building, or in an approved membrane or bag system with temperature, air flow and odour control. Generally the air circulation is provided through floor vents that inject air under pressure, and exhaust is extracted through an in-ground bio-filter to eliminate odour. Temperature and moisture conditions are monitored with probes.

The system under consideration for a permanent facility would be multiple static piles, as described above, housed in a sealed site built wood frame building, but could include some form of mixing device, such as an overhead auger that runs on rails.

The advantages include reduced labour (for turning), greater control/monitoring capabilities, odour control, leachate containment, and it meets the CRD bylaw requirements for both general and restricted organic materials. The disadvantages are a high initial cost for design and construction, and less flexibility than covered or bagged windrows for handling changing volumes of material. These factors and the lack of portability make it inappropriate for the Pilot Project, but an option to consider for a permanent facility.

Distributed (on-farm) windrow system
This system is a departure from the centralized models, with the composting taking place on individual farms. Farmers would contract with the central composting facility operator to source and deliver feedstock, and have windrows constructed on their property. Existing on-farm feedstock would be added if available. All further management would be the responsibility of the farmers.

The advantages are simplicity and lower costs for the operator, utilization of the composting skills of farmers, efficient use of existing on-farm composting feedstock, a less costly compost supply for farmers, and significantly reduced capital and operating requirements for the project. The primary disadvantages include the need for each farm site to address any regulatory requirements that may apply to their situation, and the unavailability of compost for those growers without a suitable site for compost production.

This system would be appropriate, after CRD Composting Bylaw amendments, for either a Pilot

Project or a permanent facility for general organic materials, but could be challenging and expensive for farmers to meet requirements for regulated materials.

Business Models

As with any new venture, an important decision is the selection of a suitable business model to deliver the product or service, achieve the goals and reflect the organization's values. The term 'business model' can include the full business strategy, capital and infrastructure plans, organizational structure, operational processes and policies, etc.

For the purposes of this report the discussion will be brief, and limited to the type of entity that will be tasked with planning and operating the Pilot Project. The appropriate entity and business model to operate a permanent facility will be dependent on the results and experiences of the Pilot Project, and must be evaluated at that time.

The options considered for an operator for the Pilot Project include a private entrepreneur, a non-profit volunteer and/or staff based model, or a community co-op, each with their advantages and disadvantages.

Entity	*Advantages and disadvantages*
Private entrepreneur	will often bring capital and/or equipment, and will have business experience to assist in the planning and implementation of the project. Some may have compost-specific expertise, marketing experience and/or an appropriate location. An entrepreneur will generally only pursue an initiative if their analysis indicates it is financially feasible.
Non-profit model	may bring some or even all of the entrepreneurial skills, but is not likely to provide capital, equipment or a site. Volunteer recruitment and training is often a challenge and can not be assured consistently or in the long-term. A non-profit entity may have the advantage of its ability to secure government grants and/or fundraise in the community.
Community co-operative	is a hybrid between the entrepreneurial and non-profit models, bringing the advantages of each while diminishing some of the disadvantages. These models often work very well in some circumstances, but can be complicated and time consuming to initiate. As such, it is less appropriate for the Pilot Project, but should be considered if a permanent facility is pursued.

Until some of the more significant uncertainties are worked out, the preferred model for the Pilot Project would be a private operator who already has experience in composting of the scale and type envisioned. For the Pilot Project feasibility, we have assumed a private operator and accordingly used a conservative approach to costs. It further assumes no subsidy, either for capital or operationally, although as the reader will see, a subsidy may be required to ensure the viability of the project. Nor does a private entrepreneurial model preclude community involvement and any associated costs savings which may emerge and develop over time.

Constraints and Challenges

Our research and discussions with potential operators confirmed that it is very difficult to establish with confidence a number of the fundamental and critical assumptions required to evaluate feasibility before a pilot project is initiated. While many assumptions could be considered consistent across several approaches, the most important areas of variability are:

- Feedstock - very importantly, the amount, quality and type of feedstock available has tremendous implications with respect to storage and staging of supply, C:N ratios and required supplementation, time required for full composting, and shrinkage of feedstock (i.e. amount of saleable product produced).

- Equipment - each approach considered also introduces a number of variables with regard to equipment required, labour and management time and skills, regulatory implications and required site characteristics.

- Market - critical to the revenue side the equation, is the amount of demand and acceptable price point of the finished product for the primary target market (commercial growers).

- Site - each operation would be highly dependent on the specific site and the operator's involvement (e.g. equipment they could provide) and their conditions and requirements.

Due to the high levels of uncertainty with regards to many of the fundamental assumptions, the feasibility analysis focuses on the pilot project. The goal of the pilot project would be to refine and modify the assumptions required to properly evaluate the feasibility of a permanent facility with the experience gained in operating the pilot. Further details on the assumptions made for the feasibility analysis are provided on the following pages.

Systems Selected for Evaluation
Due to regulatory, capital cost and/or other constraints, some of the approaches identified above were abandoned and the analysis continued for the following options:

Pilot project approaches:
1) Centralized 'Ag-Bag' system
2) Centralized covered windrow system
3) Distributed (on-farm) windrow system

Permanent facility approaches:
1) Centralized 'Ag-Bag' system
2) Centralized in-vessel (shed) system

2. PILOT PROJECT (PHASE I)

Feedstock

The starting point for estimating the levels and types of feedstock available are the results of the feedstock survey undertaken in 2009. This indicated that an annual maximum of 1,935 yards of general organic materials (GOM) is currently available from commercial growers, restaurants, horse owners, utility arborists, and supermarkets.

However a significant amount of this supply is currently being made available to commercial growers for their individual composting efforts and for livestock feed. If the pilot project were to secure only the supply currently not being supplied to growers, the remaining feedstock available is estimated to be 480 yards annually.

Critical to the success of a composting process, is the carbon to nitrogen (C:N) ratio of the feedstock; a ratio below 20:1 will result in nitrogen to burning off and cause odours, and materials with a ratio above 40:1 will not heat and decompose in a timely manner. The target for optimum results is 30:1, which may result in the requirement to included additional carbon or nitrogen sources depending on the actual composition of the feedstock for each batch.

For the purposes of this analysis, two levels of available feedstock per year were considered:

- **Low: 480 yards** (470 available was somewhat nitrogen rich, so estimated 10 yards carbon required. While this adjustment is relatively minor, it is included in the analysis to draw attention to the concept and importance of targeting an appropriate C:N ratio.)

- **High: 1,935 yards** (stock available was close to target C:N)

One of the assumptions for a permanent facility is that additional sources of feedstock would become available once a community composting initiative was underway and marketed, and importantly when the Hartland landfill starts to prohibit the dumping of organic matter in 2012. This will introduce restricted organic material (ROM), which includes cooked food, meat and dairy and trigger higher regulatory requirements for the permanent facility than is required for the pilot project.

Even for the Pilot Project which would handle only general organic material (GOM), efforts would need to be undertaken to achieve feedstock supplies in the range of 1,935 yards per year without taking materials that are currently being provided to farmers. The most likely sources in the shorter term would be yard waste and chipping materials from homeowners and utility arborists which should become available with a community education and promotion initiative. This could, however, produce an excess of carbon materials, necessitating the sourcing of additional nitrogen rich materials to retain an appropriate C:N ratio.

Compost Volumes Produced

The composting process results in a large amount of shrinkage in materials volume. Depending on the type of feedstock, shrinkage rates can vary from about 40% to almost 75%. Most of the research we conducted indicated that a shrinkage rate of 65% can be expected if using a wide variety of input materials.

If the actual feedstock supply contains a higher proportion of yard waste, this shrinkage factor may be lower, however, in order to produce a conservative estimate of compost and revenue, we used 65% for the two different volume scenarios:

Table 1: Compost volumes

	Low	High
Feedstock volume (yards)	480	1,935
Conversion rate (shrinkage)	65%	65%
Compost volume (yards)	**168**	**677**

Regulatory Assumptions

The feasibility analysis assumed none of the pilot options would require a CRD composting or transfer station license, since the pilot will not process cooked food waste or other restricted materials, and because it can be designed in such a way that it can be exempted from the licensing requirements of these bylaws. It should be noted that the performance standards of the CRD composting bylaw (e.g., with respect to management of leachate and other “vectors”) still apply. The cost estimates include provisions to ensure compliance with the bylaw, but if performance standards are not met, a license application and associated costs could be required.

Any regulatory conditions for the on-farm distributed model would be the responsibility of the individual farmers. It is our understanding that an exemption from the CRD composting bylaw may be negotiate for on-farm composting, for the production of compost to be used on that farm.

However, all of the pilot options involving a centralized composting facility would require either rezoning or a temporary use permit (TUP). Until the feasibility of composting is confirmed, it would be prudent to secure land use approval by means of a TUP. The related application and planning costs of the TUP are included in the feasibility evaluation.

Table 2: Regulatory requirements

	Pilot Project			Permanent	
Option	**1**	**2**	**3**	**1**	**2**
Feedstock	GOM	GOM	GOM	ROM	ROM
Type	Ag-Bag	Covered Windrows	Covered Windrow	Ag-Bag	Tunnel
Composting location	Central	Central	Distributed	Central	Central
Regulatory requirements					
CRD 2736 (compost)	Class 1	Class 1	Exemption req’d	Class 2	Class 2
License	N	N	N	Y	Y
CRD 2810 (transfer)	N	N	N	N	N
LUB	TUP	TUP	TUP (unless ALR)	TUP	TUP (unless ALR)

Equipment Assumptions

While the focus is on the pilot project, the equipment and infrastructure requirements for both the pilot and the permanent facility are included below. The equipment identified is to prepare, move and store feedstock, build windrows (or load ag-bags), turn windrows, collect leachate, monitor temperature, handle the finished product, and oversee the process.

Table 3: Equipment required

	Pilot Project				**Permanent**	
Option	**1**	**2**	**3**		**1**	**2**
Feedstock	GOM	GOM	GOM		ROM	ROM
Type	Ag-Bag	Covered Windrows	Windrow		Ag-Bag	Shed
Composting location	Central	Central	Distributed		Central	Central
Chipper	Y	Y	Y		Y	Y
Feed mixer	Y	Y	Y		Y	Y
Bag feeder	Y	N	N		Y	N
Loading/turning tractor	Y	Y	Y		Y	Y
Impermeable pad /leachate collection	N	Y	Y		Y	Y
Watering system	Y	Y	N		Y	Y
Temperature sensors	Y	Y	Y		Y	Y
Screen	Y	Y	N		Y	Y
Tarp system	Y	Y	N		Y	Y
Bagging system	Y	Y	N		Y	Y
Sealed storage bins	N	N	N		Y	Y
In-vessel system	N	N	N		Y	Y
Aeration system	N	N	N		Y	Y
Odour control system	N	N	N		Y	Y
Computer	N	N	N		Y	Y
Power supply	N	N	N		Y	Y
Fencing, gates	N	N	N		Y	Y
Truck weigh scale	N	N	N		Y	Y
Tractor shed	Y	Y	Y		Y	Y
Office space	Y	Y	Y		Y	Y

For the pilot project, wherever possible it was assumed that the larger equipment would be leased. These costs are reflected in the operating expenses for each option. The only exception would be the purchase of a used tractor, which could be re-sold at the end of the pilot project if necessary. A number of other equipment purchases are assumed, which are summarized in the capital cost budget that follows.

Data sources included readily available data from equipment suppliers, and landowners and businesses who are currently undertaking composting-related activities, and discussions with local government officials. Where direct data from third party sources were not available, the study team constructed estimates based on conservative (i.e., worse case) assumptions.

Capital Costs

While the focus of the analysis is for the pilot project, it is assumed that many of the capital cost assumptions would hold for a permanent central facility as long as the site selected could accommodate larger feedstock volumes. Additional equipment associated with a permanent facility that could handle regulated organic matter (ROM) are indicated below with a cost of -0-.

It should be noted that we have not assumed that there is any capital funding available. But presumably an initiative such as a community central compost facility should have access to government, community and/or foundation funding, and this should be pursued. We have further assumed that the capital costs would be financed at 6% and amortized over 15 years, which may not be available from conventional sources but rather needs to be sought from alternative 'friendly' financing sources.

It is further assumed that the capital costs for a pilot project would be similar for all levels of feedstock contemplated, as the system should be designed to accommodate a range of volumes.

Table 4: Capital costs

	Pilot Project		
Option	**1**	**2**	**3**
	Ag-Bag Central	Covered Windrows Central	Windrow Distributed
Land and Site			
Land	0	0	0
Regulatory & planning	2,300	2,300	2,300
Site development	1,000	1,000	1,000
Promotion, education	3,000	3,000	3,000
Contingency	1,000	1,000	1,000
Total site cost	7,300	7,300	7,300
Equipment			
Loading/turning equipment	23,000	23,000	0
Containment equipment	6,500	6,500	6,500
Monitoring & Finishing	7,000	7,000	0
Buildings	4,000	4,000	4,000
Feedstock storage equipment	1,500	1,500	0
In-vessel (tunnel)	0	0	0
ROM addt'l costs	0	0	0
Contingency	3,000	3,000	3,000
Total Equipment	45,000	45,000	13,500
Total Cost / Funding Required	**52,300**	**52,300**	**20,800**
Debt service (6%, 15 yrs.)	5,271	5,271	2,096

Revenue Assumptions

One of the assumptions made in the initial stages of this project was that commercial organic production was limited, in part, by shortages in the availability of good quality compost for soil improvement. This was cited as an obstacle during the development of the Area Farm Plan.

The results of the market survey of commercial growers conducted in late 2009 indicated that there was a demand for good quality compost, but that only a small proportion (13%) were currently paying commercial rates ($55 to $75 per yard). The analysis of the survey results indicated potential demand from commercial producers to be approximately 154 yards/year (approximately 50% of the assumed low-level production or 12% of the high-level production).

This led us to question the assumption that commercial producers would purchase the majority of the compost produced in bulk quantities, particularly at commercial rates. Informal discussions with potential site operators (who are currently making and/or buying compost) and commercial growers seemed to confirm that growers would (and could) generally only afford to pay $25-$30 per yard for bulk compost; the economics of farming simply do not allow for larger expenditures on compost. Even organic growers often find that other crop amendments (such as liquid fish fertilizers and powdered minerals) are more feasible than purchasing compost, in spite of their preference for the benefits of compost.

Forecasting operating results with a bulk sales price of $25-$30/ yard was uneconomical, regardless of the volumes of feedstock considered (range of 480 to 1,935 yards per year). As a result, the decision was made to consider including a component of smaller-volume bagged compost for sale into the retail market, essentially subsidizing the cost of bulk compost for commercial growers. Bagged product retails for approximately $140-$200/yard; we used $100 per yard, assuming bags would be sold wholesale to a local retailer.

The compost sales price assumptions for both low and high levels of production are as follows:

Table 5: Compost sales price

	Low	High
Finished compost (yards)	168	677
% sold bulk	50%	50%
Yards sold bulk	84	339
Bulk price/yard	$25	$25
% sold bagged	50%	50%
Yards sold bagged	84	339
Wholesale price/yard	$100	$100

There is also the potential for some revenue in the form of 'tipping fees', which is the cost that some suppliers of feedstock currently incur to have their waste hauled off. This price does vary, but the tipping fee at Hartland Landfill is currently $100/ton, to which must be added transportation, including BC Ferries fees. Given the uncertainties with regard to the source and amount of feedstock available, we incorporated the assumption that only a portion of the feedstock would carry a tipping fee (25%). To ensure our revenue projections were conservative, we further assumed a tipping fee of $50/ton for a range of 30-121 tons per year.

Table 6: Tipping fees

	Low	High
Tipping fees/ton	$50	$50
Yards/ton (approx.)	4	4
Tons per year	120	484
% feedstock subjected	25%	25%
Tons subjected to tipping	30	121

Operating Expense Assumptions

Many operating expenses are assumed to be fixed, regardless of levels of feedstock or compost produced (e.g. land lease). Others are highly dependent upon the volume of materials (e.g. feedstock chipping and tractor time to turn piles). We found it difficult to estimate the time required to process the materials, and received wide ranges of time estimates from the two operators we interviewed. These operators are both currently producing large volumes of compost, but have different methods, types of feedstock and equipment, and their site conditions and set-ups vary considerably.

We have produced an estimate of management and equipment operation based on certain fixed activities, plus activities that vary based on volumes and systems used. We recognize that this resulting generic model will not fit every (or any) particular situation, but it should provide a 'big-picture' evaluation of the feasibility of implementing a pilot project. Actual results from the pilot project can then be used to refine and modify these assumptions to evaluate the feasibility of expanding or continuing the operation into a permanent facility.

Some of the assumptions for key expenses used in the operating pro-forma for the two levels (low and high) of production and the two main locations (central, distributed) are as follows:

Table 7: Assumptions for variable operating costs

	Central Facility		Distributed (on-farm)	
Variable Costs (feedstock levels)	**Low**	**High**	**Low**	**High**
Operator				
hours per week	12	20	4	8
hours per year	420	700	140	280
hourly rate	$30	$30	$30	$30
Annual cost	$12,600	$21,000	$4,200	$8,400
Chipper lease				
% all feedstock chipped	25%	25%	25%	25%
Yards chipped	120	484	120	484
hours per yard	0.05	0.05	0.05	0.05
hours per year	6.0	24.2	6.0	24.2
hourly rate w/operator	$100	$100	$100	$100
Annual cost	$600	$2,419	$600	$2,419
Hauling to site	$0	$0	$600	$2,419
Total	$600	$2,419	$1,200	$4,838

Table 8: Assumptions for fixed operating costs

Fixed Costs	
Feedstock receiver/sorter	
hours per week	8
hours per year (35 wks)	280
hourly rate	$25
Annual cost	$7,000
Ag-Bag system lease	
Monthly lease	$1,262
Annual lease	$15,140

Pilot Project Operating Pro-forma

The revenue and operating cost assumptions for each level of feedstock, as well as each system considered are summarized below for comparison. While the revenue figures for bulk compost sales to farmers is relatively small compared to retail bagged sales, this is largely due to sales price differential; half the compost is targeted to farmers, but at one quarter the price per yard.

As the reader can see, based on the assumptions contained in this report, the project is not feasible without some form of operating subsidy.

Table 9: Generic Pilot Project Operating Pro-Forma

	LOW Levels of feedstock			HIGH Levels of feedstock		
	1	**2**	**3**	**1**	**2**	**3**
REVENUE:	Ag-Bag	Covered Windrows	Distributed Windrow	Ag-Bag	Covered Windrows	Distributed Windrow
Compost Sales						
Bulk compost	2,100	2,100	4,200	8,466	8,466	16,931
Bagged compost	8,400	8,400	0	33,863	33,863	0
Total compost sales	10,500	10,500	4,200	42,328	42,328	16,931
Total Tipping Fees	1,500	1,500	1,500	6,047	6,047	6,047
Total Subsidy	0	0	0	0	0	0
Total Revenue	**12,000**	**12,000**	**5,700**	**48,375**	**48,375**	**22,978**
OPERATING EXPENSES:						
Land lease	3,600	3,600	0	3,600	3,600	0
Taxes	0	0	0	0	0	0
Insurance	1,500	1,500	500	1,500	1,500	500
Total land costs	5,100	5,100	500	5,100	5,100	500
Operator	12,600	12,600	4,200	21,000	21,000	8,400
Promotion, education	1,200	1,200	1,200	1,200	1,200	1,200
Testing, Analysis, Reporting	3,000	3,000	0	4,000	4,000	0
Storage (offset tipping)	0	0	0	0	0	0
Feedstock receive/sort	7,000	7,000	7,000	7,000	7,000	7,000
Chipper lease/chip delivery	600	600	1,200	2,419	2,419	4,838
Tractor lease	0	0	0	0	0	0
Ag-Bag & mixer lease	7,650	0	0	7,650	0	0
AG-Bag PODs	1,284	0	0	5,176	0	0
Bagging machine lease	7,200	7,200	0	7,200	7,200	0
Vessel (tunnel) lease	0	0	0	0	0	0
Equipment maintenance	2,000	2,000	0	2,000	2,000	0
Fuel	1,000	1,500	0	1,000	1,500	0
Total operations	43,534	35,100	13,600	58,645	46,319	21,438
Total Cost	**48,634**	**40,200**	**14,100**	**63,745**	**51,419**	**21,938**
Operating Surplus/Shortfall	**-36,634**	**-28,200**	**-8,400**	**-15,370**	**-3,044**	**1,041**
Debt Service	5,271	5,271	1,290	3,401	3,401	1,482
Net Cash Flow	**-41,905**	**-33,471**	**-9,690**	**-18,771**	**-6,445**	**-441**

Pilot Project Site Requirements

The following would be needed for Phase I, GOM:

1. **An appropriate site, minimum area 0.75 acre, maximum 2 acres, including:**
    - access driveway;
    - truck unloading, loading, and parking areas for feedstock delivery and wholesaling of finished compost;
    - area to store feedstock;
    - area for Stage 1 windrows;
    - area for Stage 2 windrows;
    - area to store finished compost;
    - areas to chip/grind/shred and mix feedstock, and screen finished compost;
    - impermeable surface (or equivalent) with leachate collection system under windrows;
    - water and power supply.

2. **Temporary structures and equipment:**
    - Plastic sheet covered with hog to function as impermeable membrane under windrows;
    - Tarps or breathable fabric covers for windrows, finished compost, and nitrogen-rich feedstock;
    - shed or tarp enclosure to house any equipment stored onsite, e.g. tractor;
    - watering system for the summer months to maintain moisture levels in the windrows and reduce dust;
    - temperature sensors to monitor the windrows;
    - optional aeration equipment, i.e. perforated pipe, blower and control system (not essential for GOM but recommended to improve quality of finished product);
    - trailer or small building to function as office, lunch room, etc.;

3. **Periodic access to the following equipment:**
    - chipper or stump grinder for woody feedstock not already chipped;
    - equipment to load, move and turn material, e.g. tractor with front end loader or bobcat;
    - a feedstock mixer, e.g. livestock feed mixer or compost mixer to mix materials before composting (not essential for GOM but recommended to ensure uniform product);
    - screen (e.g. rotary trammel screen) to screen the finished compost;
    - if an encapsulated system is trialed, lease of the bagging equipment and purchase of bags;
    - if volume warranted, a small or medium scale agricultural windrow turner

4. **Part-time operator:**
    - Part-time facility operator, estimated time 1.5 days per week;

5. **Off-site facilities and services:**
    - Chipper-hauler contractor(s) to chip and haul feedstock, including animal manure;
    - Optional yardwaste collection bins at recycling depot and/or waste transfer station;
    - Optional yardwaste collection service e.g. by Planet Zero.

6. **Phase I variant:**
    - central location to store feedstock materials, e.g. the Blackburn Road waste transfer station;
    - farmers to contract with facility operator for feedstock materials and windrow construction and management;
    - the items listed in 1. above would not be required, and some items in 2. would be the responsibility of the farmer(s).

Potential Pilot Project Sites

The market and feedstock survey conducted in 2009 identified a number of landowners who expressed potential interest in locating the Pilot Project on their property. Based on site access, size, zoning and other considerations, the four landowners that we felt would be the best candidates were contacted to further discuss the possibility of locating the composting and/or collection facilities on their property.

Of these four landowners one declined, two sites with existing operations were toured, and discussions took place with the owner of one suitable (vacant) site. Existing transfer station facilities were also considered, both for composting facilities and feedstock collection and storage.

The three landowners that continued to express interest were evaluated based on criteria established on previous page and summarized in the table below:

Table 10: EVALUATION OF POTENTIAL SITES FOR PILOT PROJECT

	Site 1	Site 2	Site 3
1. Site Characteristics:			
0.75 - 2 acres	Yes	Lower end of range	Yes
Access	Access off main road good.	Access off main road poor.	Access off main road good.
Loading, parking - feedstock delivery	Access to loading and composting areas good, size adequate.	Access to loading and composting areas tight, size limited.	Access to loading and composting areas good, size adequate.
Loading, parking - wholesaling compost	Good location on main road.	Inadequate, need off-site storage and sales.	Good location on secondary road.
Feedstock storage / transfer.	Good storage and transfer (no transfer station req'd).	Inadequate, need off-site storage / transfer.	Good storage and transfer (no transfer station req/d).
Stage 1 windrows	Good	Good	Good
Stage 2 windrows	Good	Limited	Good
Finished compost storage	Good	Limited, need off-site storage	Good
Chip and mix feedstock, screen finished compost	Good	Limited	Good
Impermeable surface with leachate collection	Leachate drain to holding pond in place.	Concrete pad and leachate collection.	None
Water and power supply.	On-site, at location.	On-site, at location.	On-site
2. Structures / Equipment:			
Covers for windrows, finished compost, and nitrogen-rich feedstock;	None in place.	Covered building (~25'x30') on concrete pad.	None in place
Enclosure for equipment	In place	Limited	None in place
Watering system	Nearby	In place	None in place
Temperature sensors	In place	In place	None in place
Office space	In place for owner/operator.	In place for owner/operator.	None in place

EVALUATION OF POTENTIAL SITES FOR PILOT PROJECT (cont.)			
	Site 1	Site 2	Site 3
3. Access to Equipment:			
Chipper or stump grinder	None in place. Has regular contracted chipper.	None in place	None in place
Equipment to load, move and turn material	Equipment available at favourable rates.	Equipment available at favourable rates, hours limited.	None in place
Feedstock mixer	None in place	None in place	None in place
Screen	None in place	Considering purchase	None in place
Small scale windrow turner	None in place	None in place	None in place
4. Operator:			
Part-time (1.5 days/wk).	Owner currently operating moderate sized composting process. Very experienced.	Owner currently operating moderate sized composting process. Very experienced.	None.
Compensation	Will oversee operations in exchange for portion of finished compost.	Will oversee operations in exchange for portion of finished compost.	Annual land lease.
Equipment	Will operate equipment at fraction of market hourly rate.	Will operate equipment at nominal cost, but can not increase current hours.	None.
Feedstock	Can supply 40-50 tons manure (mix cow, horse, chicken) + 40-50 tons wood chips annually.	May be able to supply limited amounts of horse manure.	None.
Interest Level	Very interested.	Very interested.	Receptive.

Site-Specific Pilot Project Feasibility

As summarized in the table above, each site has its advantages and disadvantages in terms of location, site size and characteristics, and availability of equipment and services. Reconsideration of these sites and further investigation is recommended if it is decided to proceed with a permanent facility.

As a result of this site assessment, it was clear that sites #1 and #2 were the most feasible options. In order to be able to make a specific site recommendation, a brief review of the potential capital and operating cost assumptions as they relate to specifically to sites #1 and 2 was undertaken to determine if there was potential to reduce the forecasted operating shortfall.

For the pilot project, site #1 was considered superior because of the forecasted operating cost savings, and the site location and characteristics, which include areas suitable for feedstock collection and product sales. Because there was willingness on the part of the landowner to provide machinery (with operator), and some administrative support and project oversight at favourable rates, this site has the most potential.

While care must be taken to monitor the pilot project so that true "commercial" costs can be estimated, this site will minimize the capital and operating cost, and associated financial risk of determining the feasibility of composting.

A site-specific operating pro-forma is presented on the following page, taking into consideration the features of the site and input from the land owner regarding how he would approach the project. This particular operator has indicated a willingness to operate the Pilot Project, provide that he is able to retain a portion of the compost, at least an equivalent amount to the amount he is producing now. Given his estimate of 40 tons of manure and 40 tons of woodchips, we estimate this would be approximately 208 yards per year. At $25/yard bulk, the value would be $5,200.

As indicated in the generic operating pro-forma on page 16, the operating shortfall on the two high-level, centralized options under consideration for the Pilot Project (Ag-bag and covered windrow) are $6,445 and $18,771 per year.

The distributed windrow model requires less subsidy, $9,690 for low volume levels and $441 for high volume. The savings result from lower operator costs. However this model involves farmer exemptions from the CRD Composting Bylaw which will take about a year to develop. Therefore this variation may be tested in the second year of the pilot project.

While the details of the site-specific forecast are very preliminary and the specifics have yet to be confirmed in detail with the landowner, an initial review does seem to indicate potential savings in many expense areas. Revenue forecasts are assumed to remain unchanged, and the potential savings are based on the high-level of production (minimum 1,935 yards per year of feedstock). This analysis does not include any distributed on-farm composting, but nor does the model preclude such arrangements that could be made between the operator and farmer(s).

Site-Specific Pilot Project –Operating Pro-forma Site #1

Again, it must be stressed that these are *very* preliminary estimates of potential savings, and remain to be discussed and negotiated with the potential operator. However, should an agreement be reached based on these general terms discussed during our site tour, at the higher levels of feedstock there may be potential for a break-even or small surplus in a Pilot Project located on site #1 as indicated below.

Table 11: Site-Specific operating pro-forma for Site #1

	LOW Levels		HIGH Levels	
	1	2	1	2
REVENUE:	Ag-Bag	Covered Windrows	Ag-Bag	Covered Windrows
Compost Sales				
Bulk compost	2,100	2,100	8,466	8,466
Bagged compost	8,400	8,400	33,863	33,863
Total compost sales	10,500	10,500	42,328	42,328
Total Tipping Fees	1,500	1,500	6,047	6,047
Total Subsidy	0	0	0	0
Total Revenue	**12,000**	**12,000**	**48,375**	**48,375**
OPERATING EXPENSES:				
Land lease	0	0	0	0
Taxes	0	0	0	0
Insurance	1,500	1,500	1,500	1,500
Total land costs	1,500	1,500	1,500	1,500
Operator	5,200	5,200	5,200	5,200
Storage (offset tipping)	0	0	0	0
Feedstock receive/sort	3,500	3,500	3,500	3,500
Chipper lease	600	600	2,419	2,419
tractor and operator	3,500	3,500	10,500	10,500
Ag-Bag & mixer lease	7,650	0	7,650	0
AG-Bag PODs	1,284		5,176	
Bagging machine lease	7,200	7,200	7,200	7,200
Vessel (shed) lease	0	0	0	0
Equipment maintenance	2,000	2,000	2,000	2,000
Fuel	1,000	1,500	1,000	1,500
Total operations	31,134	23,500	44,645	32,319
Total Cost	**33,434**	**25,000**	**46,145**	**33,819**
Operating Surplus/Shortfall	**-21,434**	**-13,000**	**2,230**	**14,556**
Debt service	2,555	2,555	2,555	2,555
Net Cash Flow	**-23,989**	**-15,555**	**-325**	**12,001**

3. PERMANENT FACILITY (PHASE II)

A feasibility evaluation of a permanent facility for the composting ROM materials is subject to great uncertainty regarding the regulatory and policy environment and the implications of CRD initiatives to divert food waste from the Hartland landfill and compost liquid wastes on Salt Spring. While a preliminary assessment of a permanent facility is included in this study, a more detailed analysis is clearly required, based on pilot project results and the outcome of CRD regulatory and other initiatives.

It is possible to influence such developments and encourage the CRD regarding other policy changes to improve the chances of success for on island composting. For example, such changes could include possible amendments to the composting bylaw to support small scale, distributed composting on farms as well as more stringent burning regulations to enhance supplies of carbon feedstock. For this reason, the Agricultural Alliance should work closely with the CRD and the SSI Solid Waste Advisory Committee to ensure a regulatory and policy framework to support a permanent composting facility on island.

The implications of the CRD's forthcoming Request for Proposals (RFP) for collection and processing of ROM materials, as well as the possible startup of a CRD liquid waste composting facilities on Salt Spring (which could compete for carbon feedstock) must be considered before any capital investment in a permanent facility is seriously considered. Finally, the possibility that competing private sector composting facilities may start up within the CRD as a result of the RFP should also be taken into account when considering the financial risks of such a facility on Salt Spring.

Equipment

The equipment and process for Phase II, an in-vessel licensed facility handling ROM (i.e. cooked food waste), would be much the same as Phase I except for the following additional requirements:

Phase II:

- sealed storage bins for cooked food waste and other high odour materials;
- equipment to mix the raw compost (optional for Phase I);
- (optional, depending on location) enclosed building for odour control during mixing;
- expandable in-vessel system for primary composting, e.g. proprietary fabric covers such as Gore Cover for windrows (this system sometimes housed in a lightweight structure such as a Coverall building), or encapsulated system such as the AgBag, OR a site-built tunnel system;
- system to aerate the piles, e.g. perforated pipe, blowers and a compressor to control temperature (optional for Phase I);
- odour control system, typically an in-ground site built biofilter, but commercial products also available;
- computer to run automated aeration control system;
- (depending on location) fencing and gate to prevent unauthorized access;
- (if a weight-based tipping fee is charged) truck weigh scale;

Fabric covers and bagged systems are considered in-vessel and could be relatively easily trialed during Phase I. For a permanent operation, purchase of used equipment might be more cost-effective than lease arrangements.

Capital Cost Assumptions

As mentioned previously, it is assumed that the majority of the capital cost assumptions would hold for a permanent central facility as long as the site selected could accommodate larger feedstock volumes.

The regulatory process is expected to be more onerous, and site development costs could be expected to be higher due to the nature of regulated organic matter (ROM). Additional equipment is required to handle ROM including equipment for the more odorous store feedstock material, aeration equipment, and more robust fencing and gates.

We have not assumed any capital subsidy. It is further assumed that the capital costs would be similar for all levels of feedstock contemplated, as the system should be designed to accommodate a range of volumes.

Table 12: Capital cost assumptions for permanent licensed facility

	High (1,935 yards)		**V. High (3,870 yards)**	
Option	**1**	**2**	**1**	**2**
	Ag-Bag	Tunnel	Ag-Bag	Tunnel
Land and Site				
Land	0	0	0	0
Regulatory & planning	16,000	16,000	16,000	16,000
Site development	6,000	6,000	6,000	6,000
Contingency	10,000	10,000	10,000	10,000
Total site cost	32,000	32,000	32,000	32,000
Equipment				
Loading/turning equipment	18,000	18,000	18,000	18,000
Containment equipment	6,500	6,500	13,000	13,000
Monitoring & Finishing	7,000	7,000	7,000	7,000
Buildings	4,000	4,000	4,000	4,000
Feedstock storage equipment	1,500	1,500	3,000	3,000
In-vessel (Ag-bag or tunnel)	40,000	50,000	40,000	75,000
ROM addt'l costs	11,000	11,000	22,000	22,000
Contingency	10,000	10,000	10,000	10,000
Total Equipment	98,000	108,000	117,000	152,000
Total capital cost	**130,000**	**140,000**	**149,000**	**184,000**
Debt service (6%, 15 yrs.)	13,102	14,110	15,017	18,545

Feedstock

A higher range of feedstock levels was assumed for the permanent facility than for the Pilot Project on the assumption that a permanent facility would not be feasible unless higher volumes of feedstock were available.

The assumed low range of feedstock available is 1,935 yards of material, a combination of general organic materials (GOM) and restricted organic material (ROM). The high end of the range is double that amount (3,870 yards) on the basis of availability from the diversion of organic waste from the Harland landfill beginning in 2012.

Potential sources for additional feedstock for the very high volume scenario include household organic waste (once the Hartland ban is in effect), increased yard waste and chipped materials as the public outreach campaign is implemented, and possibly some by-products from island food processors. If additional burn restrictions are implemented on Salt Spring, the supply of carbon materials available could be substantial.

While these volumes are difficult to estimate, one could reasonably assume that a large portion of the household organic waste currently being land-filled could be diverted to this project. The CRD advises that between 2003 and 2008, an average of 3,770 tonnes of refuse have been received from Salt Spring Island. In the 2004-2005 CRD waste stream analysis, it was found that approximately 30% was organic, and in a very small 2009-2010 waste composition analysis for Salt Spring, organics were 36%. Using 30% of the average amount of refuse, one could estimate 1,130 tonnes of organic waste will be diverted from the landfill annually. Using approximately 2.1 yards per tonne, this translates to approximately 2,375 yards per year. If half of this organic waste could be provided to a community compost facility (1,187 yards), the feedstock shortfall would be reduced to approximately 748 yards/year. While no efforts were made to identify specific sources, we felt that it was reasonable to expect that 748 yards per year could be obtained from a combination of yard waste and chipped material (particularly with burn restrictions).

Compost Volumes

Using the same conversion assumptions from the Pilot Project, the volume of compost produced under the two volume scenarios are as follows:

Table 13: Phase II compost volumes

	High	V. High
Feedstock volume	1,935	3,870
Conversion rate (shrinkage)	65%	65%
Compost volume (yards)	**677**	**1,355**

Revenue Assumptions

Revenue assumptions have remained unchanged from the Pilot Project (with the exception of volumes). The compost sales assumptions for both levels of production are as follows:

Table 14: Phase II compost sales

	High	V. High
Finished compost (yards)	677	1355
% sold bulk	50%	50%
Yards sold bulk	339	677
Bulk price/yard	$25	$25
% sold bagged	50%	50%
Yards sold bagged	339	677
Wholesale price/yard	$100	$100

'Tipping fee' revenue calculations differ from the Pilot Project, on the assumption that once organic materials are banned from Hartland land fill, the market price $100/ton would apply. As with the Pilot project, to ensure our revenue projections were conservative, we further assumed a that only 50% of the material would be subjected to tipping fees.

Table 15: Phase II tipping fee revenues

	High	V. High
Tipping fees/ton	$100	$100
Yards/ton (approx.)	4	4
Tons per year	484	968
% feedstock subjected	50%	50%
Tons subjected to tipping	242	484

Operating Expense Assumptions

As mentioned earlier, it is difficult to accurately estimate the time required for processing the materials, and until more data is obtained from the Pilot Project, we assume many of the operating expenses are similar to those of the Phase I high-volume centralized facility option.

Notable exceptions are higher insurance costs, costs associated with administration and reporting, higher land lease costs, equipment maintenance costs and higher debt service to accommodate the increased capital costs.

As with the Pilot Project, many operating expenses are assumed to be fixed, regardless of levels of feedstock or compost produced (e.g. land lease). Many of these costs, however, were assumed to be higher than those in the Pilot Project because of the practical and regulatory requirements associated with handling regulated organic material (ROM).

Table 16: Phase II variable cost estimates

	Central Facility	
Variable Costs (feedstock levels)	**High**	**V. High**
Operator		
hours per week	20	40
hours per year (35 wks)	700	1,400
hourly rate	$30	$30
Annual cost	$21,000	$42,000
Chipper lease		
% all feedstock chipped	25%	25%
Yards chipped	484	968
hours per yard	0.05	0.05
hours per year (35 wks)	24.2	48.4
hourly rate w/operator	$100	$100
Annual cost	$2,419	$4,838
Feedstock receiver/sorter		
hours per week	10	15
hours per year (35 wks)	350	525
hourly rate	$25	$25
Annual cost	$8,750	$13,125

Other expenses are highly dependent upon the volume of materials (e.g. feedstock chipping and tractor time to turn piles), and we estimated management and equipment operation times based on certain fixed activities, plus activities that vary based on volumes and systems used.

We stress that this resulting generic model is based on many assumptions that remain to be proven or modified based on the experiences of the Pilot Project; it will be very important that the Pilot Project include the type of reporting that will make extrapolation to a larger, more complex permanent project possible. Some of the assumptions for key expenses that varied directly with volumes and therefore differed significantly form the Pilot Project are included in Table 16 above.

Permanent Facility Operating Pro-forma

The revenue and operating cost assumptions for each level of feedstock are summarized below for comparison. Unlike the Pilot Project, the assumption is made that the Ag-Bag system would be purchased (not leased) or that an in-vessel system would be constructed (see capital cost pro-forma). This brings the operating expenses for both systems into line, and for the purpose of the operating pro-forma, both cost structures are considered equivalent.

Table 17: Phase II operating pro-forma

	High (1,935)		V. High (3,870)	
	1	2	1	2
REVENUE:	Ag-Bag	Shed	Ag-Bag	Shed
<u>Compost Sales</u>				
Bulk compost	8,466	8,466	16,931	16,931
Bagged compost	33,863	33,863	67,725	67,725
Other compost	0	0	0	0
Total compost sales	42,328	42,328	84,656	84,656
Total Tipping Fees	24,188	24,188	48,375	48,375
Total Subsidy	0	0	0	0
Total Revenue	**66,516**	**66,516**	**133,031**	**133,031**
OPERATING EXPENSES:				
Land lease	5,400	5,400	5,400	5,400
Taxes	0	0	0	0
Insurance	2,500	2,500	2,500	2,500
Total land costs	7,900	7,900	7,900	7,900
Operator	21,000	21,000	42,000	42,000
Administer Mgt. Plan	4,000	4,000	6,000	6,000
Feedstock receive/sort	7,000	7,000	8,750	8,750
Chipper lease	2,419	2,419	4,838	4,838
tractor lease	0	0	0	0
Ag-Bag & mixer lease	0	0	0	0
Ag-Bag PODs	5,176	0	10,352	0
Bagging machine lease	7,200	7,200	7,200	7,200
Vessel (shed) lease	0	0	0	0
Equipment maintenance	2,000	2,000	3,000	3,000
Fuel	1,000	1,000	2,000	2,000
Total operations	49,795	44,619	84,140	73,788
Total Cost	**57,695**	**52,519**	**92,040**	**81,688**
Operating Surplus/Shortfall	**8,821**	**13,997**	**40,992**	**51,344**
Total debt service	13,102	14,110	15,017	18,545
Net Cash Flow	**-4,281**	**-113**	**25,974**	**32,799**

4. REGULATORY AND POLICY FRAMEWORK

The regulatory and policy framework within the CRD can significantly affect the feasibility of commercial composting on SSI. The direct regulatory framework for composting in the CRD has been developed relatively recently. Due to input from commercial interests, the farming community and the public, the current CRD composting bylaw was revised significantly in the course of its development. CRD staff have consistently taken the view that further revisions to the regulatory framework are possible, taking into account further public input and experience with commercial composting operations. One example arising out of this study is the possibility of amendments to the CRD bylaw making it easier for farms to take a portion of feedstock from off-site locations for small scale composting of non-restricted materials. The process to change the bylaw would require public consultation, support from SSISWAC, the CRD Board and the Ministry of Environment, and would likely take up to 18 months.

In addition to possible changes to the existing regulatory framework, there are a number of other initiatives being undertaken by the CRD that could affect the feasibility of commercial composting on Salt Spring. The composting of liquid wastes at the Burgoyne Bay septage facility has been deferred until 2011, but could result in competition for composting feedstock, particularly for carbon sources. On the other hand, more restrictions and/or public education on burning by the CRD and/or the SSI Fire District could increase the supply of waste for composting on SSI. In addition, other strategies to reduce fuel loading and the chances of interface wildfires on SSI, much of which is in high to extreme risk areas, could also increase the supply of carbon feedstock for composting.

The higher regulatory standards that apply to restricted materials such as cooked food waste involve higher costs, and therefore a further cost impediment to a permanent facility. However, another CRD initiative to ban and divert household food waste from the Hartland landfill, expected by 2012, could improve the viability of composting, particularly of restricted materials. A CRD survey of bagged garbage delivered the Hartland landfill indicated that over 30% of the waste was comprised of food waste, suggesting that the banning of such materials from the landfill could greatly increase the feedstock available to a Salt Spring facility.

The CRD Board has agreed in principle to provide up to $2.5 million in funding over a 5 year period within the entire CRD area to support the diversion of household organics from Hartland. As with CRD funding for recycling, SSI would receive an equitable share of this organics diversion funding, which, on a per household or per capita basis could total approximately $70,000 over a 5 year period. This transition funding could support a number of possible initiatives, including public education, subsidizing composters for household use, and/or supporting collection and/or processing of organics. The CRD will be issuing tenders for collection and processing of household organics in early April of this year, with a response deadline in early May. Tenders for SSI will be considered separately, and will provide CRD with better estimates of the costs of diverting and processing organics.

The SSI Agricultural Alliance should remain involved in all of the above CRD regulatory and policy initiatives in order to influence outcomes that increase support for composting of household and other organics on SSI. In fact, composting should be viewed as just one element of an overall waste reduction and management strategy for SSI. For example, it could be argued that CRD should treat organics in a similar way as other recyclables, which are subsidized by solid waste tipping revenues at the Hartland landfill. The solid waste management system on SSI further encourages recycling since residents pay for waste disposal on a user fee basis. However, it may be possible to improve the local solid waste management system on SSI to provide even more support and encouragement for recycling and composting. It is recommended that the Agricultural Alliance work in close cooperation with the SSISWAC to explore such options.

5. NEXT STEPS

A window of opportunity exists in the form of a suitable site for a pilot project with an experienced and willing landowner/operator, plus a variety of supportive local government and community interests. It is important to seize this opportunity and promptly move forward with the development of the pilot project.

The first steps for the Salt Spring Agricultural Alliance are to share this report with all interested parties and establish a body to oversee and support the pilot project. This body could be a committee of the Agricultural Alliance or one of its member organizations, and should include CRD and Islands Trust representatives, and representation from the SSI Solid Waste Committee. Good communications with the proposed landowner/operator and the regulatory authorities are essential if the proposed launch timelines are to be met.

Table 18: Schedule for twenty-four month pilot project

	Task	*First 6 months 2010 Apr-Sep summer*	*Second 6 months 2010/11 Oct-Mar winter*	*Third 6 months 2011 Apr-Sep summer*	*Fourth 6 months 2011/12 Oct-Mar winter*	*Fifth 6 months 2012 Apr-Sep summer*
1	Establish and maintain body to oversee and support pilot project	x	x	x	x	x
	Refine project	x				
	Apply for TUP	x				
	Establish pilot project status with CRD	x				
	Secure funding to cover any losses	x				
	Secure funding for educational programs and other soft costs	x		x		
2	Site improvements, obtain equipment, set up		x			
	Launch, and ongoing information campaign		x	x	x	x
	Begin receiving and stockpiling yardwaste, ongoing		x	x	x	x
	When sufficient feedstock, chip and create windrows, cover with tarps, manage, monitor and test		x	x	x	x
	Adjust management practices for volume and quality		x	x	x	x
3	Spring clean-up campaign			x		x
	Market compost when volumes warrant			x	x	x
	Trial AgBag system, and/or other in-vessel method			x		
	Trial yardwaste pickup service			x		
4	Fall clean-up campaign				x	
	Continue trials, if appropriate				x	x
	Assess pilot project, refine Phase II parameters				x	x
	Plan for ongoing central composting, GOM or ROM, if viable				x	x
	Asses sites for Phase II, as appropriate				x	x
	Establish Phase II project status with CRD				x	x
	Secure appropriate levels of funding				x	x
	Apply for TUP for ongoing GOM and/or new ROM facility, as appropriate				x	x

As can be seen from Table 18, project planning and regulatory approvals are likely to take six to eight months, just enabling a project launch in time for the fall yard clean-up and burning season. The first winter is anticipated to be slow, with time to refine feedstock receiving and handling issues. It is suggested that the trialing of in-vessel systems not be attempted until the second six months of operation, after basic logistic and management protocols have been established and feedstock quantities are sufficiently large. The launch should be timed to coincide with yardwaste availability—spring, summer or fall. In-vessel trials should also begin during the summer season to benefit from increased feedstock availability and better weather. Delays in the pre-planning and approvals process could thus have a significant impact on the design of the pilot project. The final six month period provides leeway should regulatory delays or other unforeseen circumstances be encountered.