Organics Implementation Plan

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RESOURCE SYNERGY

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Executive Summary

San Juan County is a rural county, comprised of hundreds of islands in NW Washington. The county has limited formal infrastructure for recycling organic materials, which results in a substantial amount of compostable material being landfilled. Hauling this waste back to the mainland via ferry, and then trucking it to remote mega-landfills creates an environmental and financial burden on the county, residents, and businesses. At $350-$400/ton, San Juan County has the highest waste disposal cost in the State of Washington and approximately 7 times the national average.

In the winter of 2022/2023, San Juan, Orcas, and Lopez Island stakeholders such as organic waste generators (grocery stores, resorts, restaurants, schools, public entities, and haulers) were interviewed. From these conversations and subsequent research, recommendations for San Juan County and each of these three islands were prepared.

This report is compartmentalized such that each island's sections can be extracted and distributed to stakeholders on the respective islands. As such, some repetition exists within the section descriptions.

Inter-Island Vision & Considerations

Through extensive stakeholder conversations, there was a resounding common vision: To create an on-island closed-loop organics material cycle that turns food, yard, and other organic wastes into a nutrient-rich soil amendment that enhances farming and a localize food system. This includes creating financial incentives for all participating parties to ensure the long-term financial sustainability of the programs as well as controlling undesirable side effects like odors and vectors. In addition to compost, options for food waste prevention and animal feed were also explored, which provides the opportunity to up-level food waste.

When this vision is realized, it will position the San Juan Islands as a model for self-sufficiency and reduce the environmental and financial impacts of waste disposal.

San Juan County can encourage participation and reduce contamination by leveraging local ordinances and enforcing state and federal regulations. Additionally, a multitude of state and federal grant opportunities exist to fund the implementation of composting & organics management programs.

To ensure success, however, it is recommended that San Juan County invest in a comprehensive education and outreach program to local waste generators. This outreach program can include training, collection bins, and signage. Additionally, a waste characterization study is an important step in this process, as it determines the respective volume and composition of organic materials contained in the solid waste stream. It is recommended that San Juan County budget up to $340,000 over the next 5 years for implementation support, education, and outreach.

When siting composting facilities, San Juan County will need to comply with state requirements and obtain the appropriate permits, described in greater detail later in the document.

San Juan Island

San Juan Island has the opportunity to implement a composting system at the Sutton Road Transfer Station. Multiple composting technologies were explored, but the Green Mountain in-vessel system is recommended due to its ability to scale incrementally, its small footprint, and ability to control odors and vectors. The management of these systems can be outsourced to the contracted operator of the transfer station, currently Lautenbach Industries. Hauling can be provided by San Juan Sanitation and/or other private haulers. Once

produced, the compost can be wholesaled by Lautenbach to local retail outlets such as Cattle Point Rock & Topsoil. We estimate the capital cost of a composting system for Sutton Rd. to be approximately $950,000.

Orcas Island

Orcas Island can also implement a composting operation at the island's transfer station, currently operated by Orcas Recycling Services (ORS). It is recommended that the County and ORS consider starting with a Green Mountain in-vessel system as well before scaling to an aerated static pile system. Orcas Recycling Services has expressed interest in operating these systems as well as selling the finished product, both wholesale and retail. San Juan Sanitation and/or other private haulers can provide collection. We estimate the capital cost of a composting system for Orcas to be approximately $990,000.

Lopez Island

Of all the islands that we visited, Lopez has the most developed informal system for organics management. Many restaurants and grocers donate food scraps to local farmers and Midnight's and Sweetgrass farm produce and sell compost. As such, it is recommended that the County continue supporting vs. replacing these existing systems. Options include enhancing the use of LopezRocks.org as an organic materials exchange, creating a recognition system for local businesses, and developing a nightly rental toolkit.

Overview

About the San Juan Islands

San Juan County is a remote, rural county in western Washington comprised of hundreds of islands. While the county is home to only about 18,000 full-time residents, it welcomes over a million visitors each year. These residents, visitors, and the businesses that serve both have very limited or no options for recycling organic materials which results in a substantial amount of compostable material being landfilled. Hauling all this waste back to the mainland via ferry, and then trucking it to remote mega-landfills creates an environmental and financial burden on the county, residents, and businesses. At $350-$400/ton, San Juan County has the highest waste disposal cost in the State of Washington and approximately 7 times the national average (Statista, 2023). Globally, food waste left to rot in landfills is estimated to be 4.4 gigatons of CO2e into the atmosphere each year, representing 8% of anthropogenic greenhouse gas emissions (Hawkin, 2017). Rather than continuing this expensive and environmentally damaging practice, organic materials could remain on the islands, nourishing local soils and enhancing local farms. This would also reduce the need to haul compost to the Islands for local gardens and projects.

Project Overview

In the fall of 2022, San Juan County contracted Resource Synergy to craft an Organics Implementation Plan. The team traveled through the San Juan Islands twice, interviewing stakeholders and shepherding ideas.

These trips included:

A 5-day visit in November of 2022, including in-depth discovery meetings with 24 stakeholders, including:

San Juan (2 days)	Orcas (2 days)	Lopez (1 day)
• San Juan County Public Works • Town of Friday Harbor Public Works & Town Administrator • Lautenbach Recycling • Roche Harbor • Kings grocery store • San Juan Island School District • San Juan Island Brewing Co.	• San Juan Sanitation • Rain Shadow Consulting • Orcas Island School District • Rick Hughes • Orcas Co-op • Orcas Island Market • YMCA Camp Orkila • Rosario Resort • Wild Island Restaurant • Kathy Morris • Paul Andersson • Orcas Recycling Services	• Vortex Café • Blue Heron Bistro • Lopez Solid Waste Disposal District • Lopez Island School • Lopez Village Market • The Southend Market

A 2-day visit in January of 2023, included group forums on each island where preliminary ideas were shared and feedback gathered. Participants included:

San Juan (2 hours)	Orcas (2 hours)	Lopez (1 day)
• Katie Fleming • Kendra Smith • Troy Lautenbach • Carolyn Moulton • Sean Aylward • Calvin Den Hartog • Jesse Douglas-Seitz	• Katie Fleming • Madden Surbaugh • Wendy Thomas • Carson Sprenger • Paul Andersson • Kathy Morris • Calvin Den Hartog • Logan Luft	• Katie Fleming • Larissa Mansfield • David Bill • Cyndi Smith • Faith Van de Putte

Each trip included visits to each of the 3 major islands: Lopez, San Juan and Orcas.

The primary focus of this plan is on food and yard waste. However, additional feedstocks like manure and biosolids could be integrated into a common system in the future.

Vision

Through extensive Island-based stakeholder conversations, there is a resounding common vision: To create an on-island closed-loop organics material cycle that turns food, yard, and other organic wastes into a nutrient-rich soil amendment that enhances farming and a localized food system. Additional elements included creating financial incentives for all participating parties to ensure the long-term financial sustainability of the programs as well as controlling undesirable side effects like odors and vectors. In addition to compost, options for food waste prevention and animal feed were also explored, which provides the opportunity to up-level food waste through the EPA hierarchy pictured to the right.

If (or when) this vision is realized, it will position the San Juan Islands as a model for self-sufficiency and reduce the environmental and financial impacts of waste disposal.

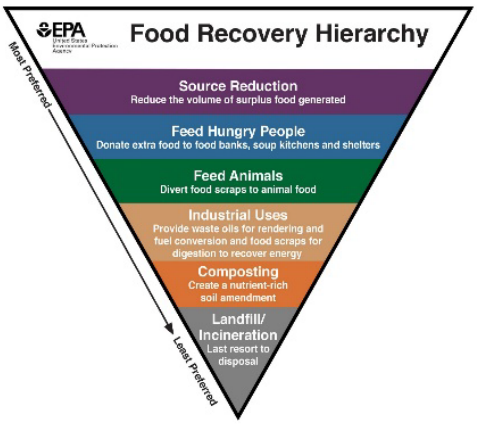


Image Source: (EPA Website, 2023)

Inter-Island Considerations

Policy Considerations

There are a wide variety of policies and funding opportunities at the federal, state, and local level that can be leveraged to advance San Juan County's organics diversion goals.

These include, but are not limited to:

Federal Grants

- The Bipartisan Infrastructure Law and Inflation Reduction Act provides substantial funding for solid waste infrastructure.
- The EPA's Solid Waste Infrastructure for Recycling (SWIFR) Grant to support projects that improve solid waste management and promote post-consumer materials management and recycling efforts. The Resource Synergy team and San Juan County collaborated to write a SWIFR grant proposal to seek funding for the execution of the recommendations in this implementation plan.

WA State Grants

- HB 1799 is mandating composting in municipalities with populations over 25,000 which will subsequently trickle down to smaller counties until the entire Washington State has composting infrastructure in place. San Juan County has roughly 18,000 residents but may still be eligible for funding from this bill.
- WA Climate Commitment Act which is a cap-and-invest bill to incentivize large polluters to reduce emissions through purchasing allowances to emit. The money generated from this will be placed into a pool that re-invests in green solutions that support climate mitigation, resilience, clean transportation, and reduction in environmental disparities.

Local Points of Leverage

The following are ways that San Juan County can encourage composting and support the financial sustainability of programs developed:

- Including organic diversion in San Juan County's long-range community planning efforts will increase visibility to key parties that are budgeting for future infrastructure needs.
- Incorporating composting facilities into the site development plans for transfer centers and drop box facilities.
- Implementing community ordinances like banning organic material from trash, once diversion infrastructure is available.
- Implementing a minimum tipping fee to prevent private and municipal haulers from negotiating disposal costs at a fraction of the cost paid by the general public.
- Incentivizing or subsidizing composting, even for a couple of years while volumes build to the point that the system can become financially self-sustaining.
- Implementing a burn ban or providing incentives to reduce burns on the San Juan Islands. If burning remains an option, it will compete for valuable woody feedstocks, at a fraction of the cost to residents and businesses. Note: an exception may need to be provided for on-site production of biochar.
- Setting tangible organics recycling goals and targets.

Food Waste Generator Outreach

To ensure that food waste diversion is maximized, and contamination is minimized, it is recommended that San Juan County provide an extensive outreach and education program to entities like schools, hospitals, grocery stores, restaurants, and resorts. This would include hands-on work with kitchen staff to implement an effective system to collect clean organic materials and minimize contamination. Other technical support would include proper dumpster placement at each site and right-sizing containers to create consistent capacity for organics collection.

To complement the consulting support to food waste generators, it is recommended that San Juan County provide a bin grant program, which would provide collection receptacles like buckets and carts at no charge to participating businesses.

Without such a program, organics dumpsters may be underutilized, or worse, become simply a second trash dumpster. Composting is incredibly sensitive to contamination and even moderate amounts of such can unravel a program.

Best Practice:

Resource Synergy has discovered that inserting a 5-gallon bucket into a "Slim Jim" trash can is particularly successful. Food waste can be placed in the bucket, while trash is still disposed in the Slim Jim.

Waste Characterization

It is recommended that San Juan County consider performing (or contracting) a waste characterization before investments of infrastructure are made. Depending on the available budget, multiple sorts could be conducted to account for seasonal variability, or a single sort could be performed for a one-time snapshot to provide directional guidance. Either approach would provide valuable insight. While the primary target materials for this waste characterization would be the organic categories of food and yard waste, including other materials like targeted recyclables (paper, metals, etc.) could maximize the value of such a sort, for minimal extra cost. The waste characterization will determine the percentage of the total waste stream that is compostable, which when paired with MSW (trash) tonnage records, can be used for proper sizing of infrastructure. It also determines the density of the waste stream, which will help guide hauler pricing. These waste audits can be sampled from commercial and residential routes to gather a wide range of data.

Image: Resource Synergy conducting a waste characterization at Snoqualmie Casino.

Permitting Requirements

As of the time of this report, composting sites may be able to operate without a dedicated Solid Waste Permit, and with minimal state oversight/regulation, if one of the following 5 scenarios applies:

(1) if the material includes all organic feedstocks (such as food waste, yard debris, manure, and wood waste etc.) no more than 25 cubic yards of material on-site at any one time. There is no reporting or testing requirements.

(2) if the material includes all organic feedstocks (such as food waste, yard debris, manure, and wood waste etc.) greater than 25 but no more than 250 cubic yards of material on-site at one time. Cannot exceed 1,000 cubic yards of feedstock in a calendar year. This requires submitting a notification of intent to operate as conditionally exempt facility to the Department of Ecology and the local health department. Facilities that distribute the compost offsite must manage the operation to reduce pathogens, conduct compost analysis, and submit annual reports to the Department of Ecology and the local health department.

(3) if the material is just yard debris, crop residues, manure, bedding/bulking agents. Greater than 25 but no more than 500 cubic yards of material on-site at one time. Cannot exceed 2,500 cubic yards processed in a calendar year. This requires submitting a notification of intent to operate as conditionally exempt facility to the Department of Ecology and the local health department. Facilities that distribute the compost offsite must manage the operation to reduce pathogens, conduct compost analysis, and submit annual reports to the Department of Ecology and the local health department.

(4) if the material is only agricultural wastes, yard debris, bulking agents. Must be greater than 25 but no more than 1,000 cubic yards of agricultural wastes and bulking agents on-farm at one time. Up to 50% of organic materials on-farm can be imported yard debris. This is only allowed for agricultural farms. Facilities that distribute the compost offsite must manage the operation to reduce pathogens, conduct compost analysis, and submit annual reports to the Department of Ecology and the local health department.

(5) if only agricultural wastes, manure and bedding from zoos, bulking agents. Must be greater than 25 cubic yards when only agricultural wastes, manure and bedding from zoos, and bulking agents are processed on-farm. This is only allowed for agricultural farms and zoos. Facilities that distribute the compost offsite must manage the operation to reduce pathogens, conduct compost analysis, and submit annual reports to the Department of Ecology and the local health department.

Failure to meet any of the requirements for each exemption will result in retraction of the exemption. (Washington State Legislature, 2023)

Operating as an exempt facility, at least for a period of time, should allow facilities to start operating sooner, and with less capital investment. Operating as an exempt facility will also reduce the administrative burden. Once facilities surpass the limits above permitting, monitoring, and reporting will be required. For the most recent information related to permitting and monitoring, please reference the following websites:

Washington State Department of Ecology: https://ecology.wa.gov/Waste-Toxics/Reducing-recycling-waste/Waste-reduction-programs/Organic-materials/Managing-organics-compost

Washington State Administrative Code 173-350-220: https://apps.leg.wa.gov/wac/default.aspx?cite=173-350-220

Inter-Island Cost Estimates

The following are estimates for the level of support needed to create a robust food waste diversion program. While actual expenditures will obviously be dictated by the budget available, it's important that San Juan County budget sufficiently for these activities, as compost it notoriously intolerant of contamination and the program

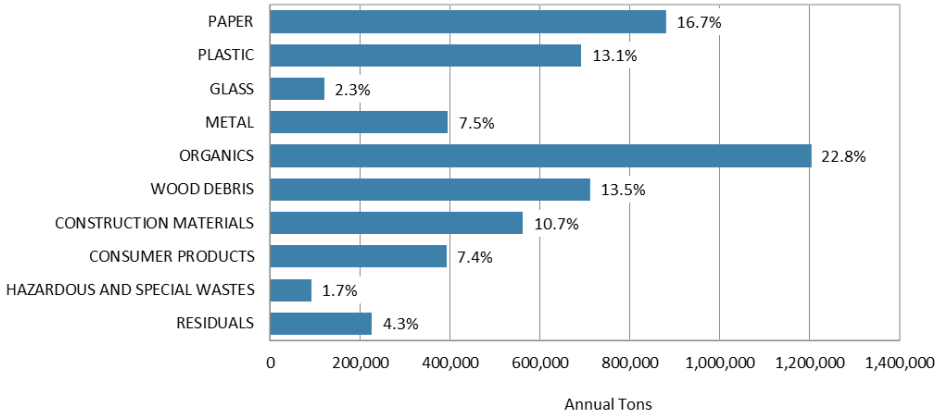
will inevitably fail without proper outreach and implementation support. The costs in the first three years cover the start-up operations and training of businesses, institutions, and individuals.

Support type	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Community Outreach	$85,000	$75,000	$65,000	$10,000	$10,000	**$245,000**
Implementation Support	$35,000	$25,000	$25,000	$10,000		**$95,000**
Total	**$120,000**	**$100,000**	**$90,000**	**$20,000**	**$10,000**	**$340,000**

San Juan Island

Feedstock

The 2020/21 Washington Statewide Waste Characterization, commissioned by the WA State Department of Ecology, estimates that approximately 22.8% of the weight of this MSW (trash) is organic material. One important caveat is that no samples were collected from San Juan County for the statewide report, so this data may differ from actual percentages generated in the San Juan Islands. A San Juan waste characterization study would provide more targeted data (as discussed previously). However, assuming the 22.8% organics number is represented in the 6,863 tons of MSW processed by the San Juan Island Transfer Station in 2021, it would suggest that 1,578 tons of compostable material was disposed in the trash in 2021.



Waste streams by category, 2020/21 Washington Statewide Waste Characterization Study.

Key Stats (2021):

6,863 tons of trash processed through the SJI Transfer Center

22.8% of trash was organic material, statewide.

1,578 tons of organics disposed in the trash of San Juan Island (assumed)

EPA Estimates:

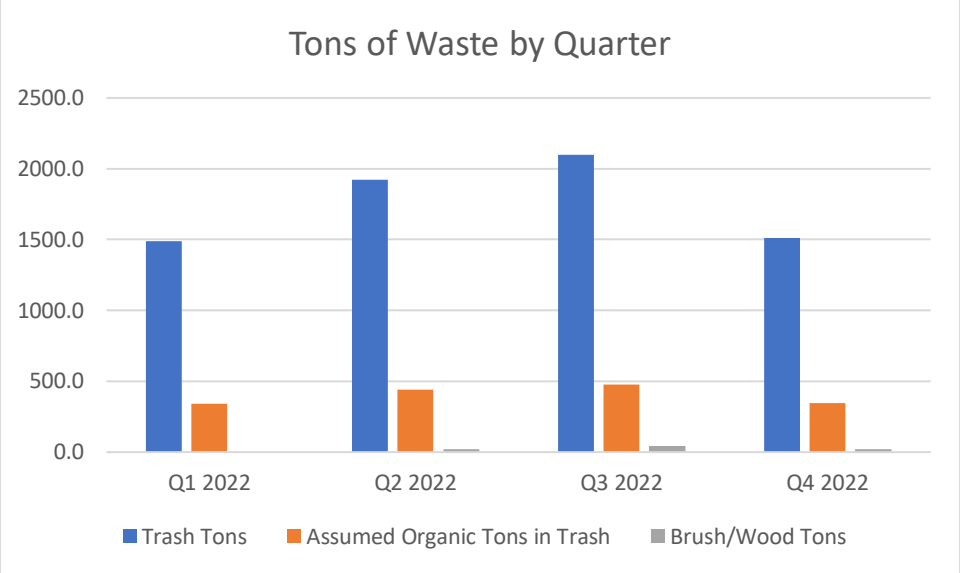
- Food waste to weigh 463 lbs./cu yd
- Yard waste 250 lbs./ yd

This material, however, is not generated at a steady rate throughout the year. Because the San Juan Islands are a summer tourist destination, Q2 (April 1st- June 30th) and Q3 waste volumes are roughly 1/3 higher than Q4 and Q1. It is expected that monthly variations in Q2 & Q3 are even more dramatic, and that MSW could fluctuate between 425 tons and 750 tons per month (based on Orcas Islands monthly trailer stats). The seasonality of yard waste and food waste could compound these fluctuations, suggesting that July's volume of compostable material could be as much as twice that of April.

The San Juan Transfer Station also currently collects wood and brush from self-haulers. This material, collectively, represented 86.22 tons in 2022.

Tons of Waste Processed by San Juan Transfer Station in 2021

Quarter	Trash Tons	Assumed Organic Tons in Trash	Brush/Wood Tons
Q1 2022	1489.1	339.5	0
Q2 2022	1923.7	438.6	22.7
Q3 2022	2099.8	478.8	43.44
Q4 2022	1510.0	344.3	19.88
Total	**7022.6**	**1601.1**	**86.0**



Beyond food and yard waste, other sources of compostable material are currently generated, but not represented in San Juan's transfer center tonnage. These include:

- Roadkill disposed of by the:
  - Town of Friday Harbor at/near the transfer station
  - County near Roche Harbor
- Biosolids (sewage sludge) generated at the:
  - Friday Harbor Wastewater Treatment Facility
  - Roche Harbor Water System (3 dry tons a year)
- Manure generated by equestrian facilities farms such as
  - Blue Horse Ranch
  - Sweetwater Farm
- Land clearing and brush generated from San Juan County road projects – estimated at 33 cubic yards – 66 cubic yards
- Town of Friday Harbor yard waste – 12-25 tons of yard debris/yr.

Priority Waste Generators

Restaurants

There are approximately 37 restaurants on San Juan Island. Examples include:

- Haley's Sports Bar & Grill
- The Bait Shop
- Bakery San Juan
- Duck Soup Restaurant
- San Juan Island Brewing Co.
- Friday's Crabhouse
- JP's Restaurant

Restaurants present a solid source of food waste feedstock, however there are many variables. As compared to resorts or grocery stores, restaurants typically generate less food waste individually, but they are more numerous and dispersed. This can cause hauling challenges. This dispersed nature also means that the program relies on the success of many crews of staff in an industry that's known for high turnover and limited engagement. Some keys for success are included to the right.

Best Practices: Restaurant

1) Start with the kitchen, only move to guest participation after the kitchen program is dialed.
2) Closely monitor for contamination.
3) Track metrics, communicate to staff.
4) Utilize bin colors and signage.
5) Make it easy for staff to participate.
6) Consider durable food service ware vs. compostable.

Restaurant Profile: San Juan Brewing

Sample Financials: Summer Service

Current Service Levels

2, 2-yard trash, 3x/wk. – $2,580.00

Total monthly trash cost: $2,580.00

Proposed Service Levels

1, 2-yard trash, 3x/wk. – $1,290.00

1, 1.5-yard trash, 3x/wk. –$967.50

1, 1-yard org, 1x/wk. – $172

Total monthly cost: $2,429.50

Result: $150.50 savings

San Juan Island Brewing Co. is a local brewery located in Friday Harbor on San Juan Island. The brewery opened its doors in 2017 and has relied on local contractors and staff since its inception. This has resulted in a great community of regulars who frequent the brewery, and it is a nice local spot for tourists to drop by.
The brewery has recently seen an increase in tourism and subsequently an increase in business volume. This has been welcomed, but has also produced unexpected waste challenges. At the time visited (Nov 2022), the

building had two 2-yard garbage dumpsters, one 2-yard recycling dumpster, and one 1-yard recycling dumpster. The brewery is serviced three times a week (M, W, F) and their recycling is serviced twice a week. However, the dumpsters are only serviced if they're completely full. San Juan Sanitation has insisted on a second recycling dumpster over the summer because of volume. Trash collections are provided over the weekend in the summertime but not in the wintertime. The brewery has freight days on Monday and Thursday when most of the supplies come in. Cardboard (OCC) is currently placed in the comingled recycling dumpster, however, if a baler were installed, it would significantly reduce the volume of recyclables and potentially eliminate an entire dumpster.

The brewery generates food waste, both from the kitchen (back of house) and dining room (front of house). Additionally, they produce a large volume of spent grains from the brewing process. The grains are hauled for free every week by Stillwater Farms. We recommend that the brewery continue to divert these grains to animal feed because it is a higher and better use (per the EPA Food Waste Hierarchy) than composting. However, diverting the restaurant's food waste to composting is a great opportunity. Ultimately, the best way to handle food waste is not to generate it in the first place. Food waste prevention is considered superior to all other forms of management because it avoids not only the downstream environmental and financial impacts of food waste, but also the upstream/midstream impacts of producing, transporting, and preparing foods. The "Leanpath" food waste prevention system may be considered.

Grocery Stores

A total of 4 grocery stores serve San Juan Island:

- Kings Market
- Friday Harbor Market Place
- San Juan Food Co-Op
- Roche Harbor Company Store

Grocery stores represent large single-source generators for food waste and as such, are typically targeted as early participants in new food waste diversion programs. Grocery stores serviced by a roll-off compactor like Kings Market, the Market Place, and Company Store represent a unique opportunity to deliver significant savings from weight reduction. Savings generation in dumpster-serviced properties (like the Co-Op) is still possible, but less significant. Fresh Produce, Meat and Deli departments are great places to start when implementing programs within grocery stores because packaging is limited. Training in these departments is still important because twist ties, stickers, and plastic wrap can introduce damaging contaminants to compost. Only after programs are dialed in within these departments it is recommended to expand the program to packaged food products. De-packaging expired meats, dairy and grain products is an essential function, but often dreaded by grocery staff. As such, it is recommended that programs are only expanded to these departments after early wins are experienced, and if staff engagement is high.

Grocery Profile: Kings Market

Image: (Visit San Juans, 2023)

Kings is one of the main grocery stores on San Juan Island, located in the Town of Friday Harbor. Kings currently has a trash compactor that's serviced once a week during the summer season and is serviced every-other-week (EOW) in the wintertime. This service reduction starts on September 1st and continues through late spring. Staff have noticed unauthorized dumping into the compactor. Kings bales cardboard (OCC) and collects plastic film, both of which their grocery distributor picks up and provides a credit. However, this credit often only offsets the cost of the haul.

Sample Financials: Summer Service

Current Service Levels

1 trash compactor, 1x/wk

Haul fees: 2 hauls/wk x $214.50

Tonnage fees: 15.13 tons x $78.08/ton

Total monthly cost: $3,026.02

Proposed Service Levels

1 trash compactor, 1x/wk

Haul fees: 2 hauls/wk x $214.50

Tonnage fees: 7.65 tons x $78.08/ton

1, 1-yard org, 1x/wk - $172

Total monthly cost: $2,614.01

Result: $412.01/month savings

Kings plans to remodel their garbage/recycling area in the next year, so timing is opportune to implement new service levels and dumpsters. Currently, all the food waste that is pulled from the shelves goes into the trash. The Kings team believes that the salad bar station produces the most food waste because they provide fresh salad every day. From the salad bar and chicken bar alone, Kings produces three 23-gallon cans of (mostly) organic material each day. In the produce department, Kings generates 12-15 banana boxes of waste every week. A local pig farmer occasionally comes by to the store and picks up 4-5 boxes/week. Bread and pastry products come frozen and then are sold regularly. The team doesn't believe that this area produces a large amount of food waste. The Kings team believes that the prepared fruit, salads, and other items sell regularly and don't produce a lot of food waste. The deli counter produces one 55-gallon brute a day that consists of fish and meat scraps. There is discussion about implementing whole animal utilization at this part of the store, which represents a great waste prevention opportunity. Another idea presented by the Kings team is to donate the fat produced at the deli to local soap and/or candle makers. A potential contact is Pelindaba Lavender Farm, where fat would be donated and then soap could be sold in the Kings store to promote a closed-loop system. All waste is processed through the backroom, then it is transported out to the garbage area in the parking lot. Kings is very concerned about food waste attracting rodents, so any containers utilized would need to be at least, if not more, secure and sanitary than existing containers.

Resorts

Resorts represent large single-source generators that may have the opportunity to implement programs quickly. However, the transient nature of guests makes it difficult to expand programs from back-of-house to front-of-

house. Guests are often familiar with whatever composting program their own community has implemented (if at all), and are not familiar with the local nuances of which materials are collected and which are not.

Resort Profile: Roche Harbor

Image: (Scenic Washington, 2023)

Roche Harbor is a resort community located on San Juan Island's northwest side. The area of Roche Harbor produces about 250 tons of waste a year. 75% of that is generated in the three months of summer. They utilize a trash compactor that is serviced by San Juan Sanitation (SJS) and a second compactor that is currently not used. Roche also has their own small truck that services approximately 40 residential/rental houses in the area. The smaller truck has a 6-yard body that can carry 1.5-2 tons, but it has experienced problems with the electronics and the Roche team is unsure how much longer it will last. Roche has considered selling this truck and contracting San Juan Sanitation to service the whole area.

Sample Financials: Summer Financials

Current Service Levels

1 trash compactor, 2x/wk – $9,203.67

Haul fees: 2 hauls/wk x $168.00

Tonnage fees: 51.57 tons x $179/ton

Total monthly cost: $9,203.67

Proposed Service Levels

1 trash compactor, 2x/wk

Haul fees: 2 hauls/wk x $168.00

Tonnage fees: 25.78 tons x $179/ton

2, 2-yard org, 1x/wk - $344.00

Total monthly cost: $6,403.42

Result: $2,800.25/month savings.

Roche has a high need for biosolids composting. They operate their own wastewater treatment facility and produce about 3 tons of dried biosolids every two months. Currently they land-apply biosolids every 5-6 years, however biosolids could be removed more frequently if a convenient system were available. They anticipate generating 35 dry tons over 20 years. Their current cost of disposal through land application was approximately $1,000-1,250/ton. They are interested in alternatives to this land application process. If an on-island (or on-site) option were available, Roche could compost 5-10 dry tons/year, resulting in a steady flow of nutrient-rich material. Roche has an immediate use for compost on grounds around the resort. Roche currently buys about 10 yards of compost a year from Cattle Point Topsoil, but they could use more.

The Lime Kiln Café (fast casual dining) and McMillin's Dining Room (fine dining) generate food waste. The Café would use compostable to-go packaging if they had access to composting. They currently utilize durable plates with basket liners, but don't have durable cups or silverware because of staffing concerns. It is recommended that durables are expanded as much as possible with the implementation of a composting program. If 100% replacement of disposables is not possible, 100% compostable packaging is recommended. Any non-compostable packaging represents an opportunity for contamination.

School(s)

Schools represent not just an opportunity for waste prevention and diversion on-site, but also an opportunity to train the community. Across cultures, the "trickle up effect" is one of the most effective mechanisms to implement behavior change within a community. If kids are trained to separate food waste at school, they will bring this knowledge and expectation home to their families, thereby impacting residential participation as well.

School Profile: Friday Harbor Middle and High School

Image: (San Juan Update, 2023)

Sample Financials:

Current Service Levels

2, 2-yard trash, 3x/wk - $2,580

Total monthly cost: $2,580.00

Proposed Service Levels

1, 2-yard trash, 3x/wk - $1,290

1, 1.5-yard trash, 3x/wk - $967.50

1, 1-yard orgs, 1x/wk - $172

Total monthly cost: $2,429.50

Result: $150.50 savings

The elementary, middle, and high school have a total of 1,000 students. The kitchen inside the high school makes ~250 breakfast meals and ~350-500 lunch meals a day. These meals are all prepped and cooked at the high school and then some are taken to the elementary and middle school. The high school has a zero-hour program where students help prep and cook meals. The students use small bins at each prep station, and this same process could be utilized to collect food scraps. The kitchen has six trash brutes and one recycling brute on wheels to move around the kitchen area. The cafeteria has one recycling bin, one bin for milk, and a few garbage cans.

The elementary school has one trash and one recycling dumpster. Waste is picked up on Monday, Wednesday, and Friday. There is one dumpster for cardboard that's picked up twice a week, and two other recycling dumpsters. These are all serviced by the Town of Friday Harbor.

The school kitchen used to send food scraps to a local pig farmer, but this ceased during the pandemic and has not resumed. The elementary school has a garden run by volunteers, which utilizes some compost. There is currently no food donation system. Leftover meals used to be donated to teachers, but exact volumes and the current status of that system are uncertain.

The high school produces a large volume of compostable grab and go packaging that travels off campus during lunch hour.

It is recommended that the schools implement food waste collection for composting first, then explore donation and prevention opportunities thereafter. This will ensure that diversion volume is maximized, and implementation time is minimized. Like restaurants, it's important that schools implement programs back-of-house first before expanding to dining halls. Some communities implement food waste diversion programs first in the elementary schools, then roll practices to middle schools and high schools as those students progress

through the grades. Due to the single point of preparation, and student involvement in the kitchen, justification exists to implement the food waste diversion program first in the San Juan High School kitchen, followed by elementary, middle, and high school dining halls, in that order. It'll be important not to rush this implementation, leaving time between each segment for practices to solidify.

Landscaping Companies

Landscaping companies are a great source for woody debris and grass clippings, valuable feedstocks for a composting operation. Because they typically have their own hauling capabilities, implementing diversion strategies with landscaping companies can be as simple as encouraging them to dump in the desired area at the transfer station. However, most existing landscaping contractors already have an outlet for their material, likely at a lower price than a self-sustaining compost operation would charge. Therefore, ensuring that a critical mass of companies utilize County facilities presents a challenge. No-dumping ordinances, burn bans, and similar local ordinances can encourage landscapers to dispose of their material at the County transfer center vs. other sites.

Landscaping Profile: Mike Carlson Enterprises, Inc

Mike Carlson Enterprises offers various excavation, hauling, and landscaping services on San Juan Island. They also make and sell compost. It was discovered that Mike Carlson accepts brush and landscaping debris drop-off, charging $10 for a small load (pickup truck size) and $20 for a large load (overhanging pickup truck or trailer). They only accept material that's less than 2" in diameter. They also sell compost for the following rates:

- $70/yd if picked up, or
- $91/yard delivered in a 5yd truck
- $81/yard in a 12-yard truck.

Because they already process their own material, Mike Carlson Enterprises represents a competitor for a county-operated facility, however, they are not currently processing food waste.

Public Entities

Public entities are also a great source of woody debris and grass clippings, though unlike landscapers, inter-local agreements or internal policies can established to ensure that a majority of targeted materials are disposed at intended facilities.

Public Entity Profile: San Juan County Public Works

San Juan County Public Works generates a large volume of wood waste material through tree removal operations. They manage overhead limbs, broken limbs, and tree thinning. When these materials are collected, they are chipped and blown onto the shoulder of the road area. However, San Juan County Public Works is currently not chipping wood material because it takes longer and is more labor intensive. Larger material is set on fire during appropriate times. Instead of burning wood waste material, the County would need a tub grinder to chip and sell material as hog fuel.

There are large piles of wood waste generated around three times a year, and the main issue is finding space to store material. Wood waste from the County also goes to Mike Carlson, MEM, Lawsons, and/or Egg Lake Quarry.

From conversations it was identified that the County has a need for someone to take dirt from excavation projects. This is sandy, loamy high-quality topsoil for which they haven't found an outlet. When dealing with finished compost, the County is open to blowing compost instead of hydroseed for landscaping projects.

Residential Single and Multi-Family

Residential waste generators are by far the most distributed points of generation. Collectively, they represent a measurable volume of organic waste, but the number of participants relative to the volume of waste makes it difficult to increase volume while also managing contamination. Yard waste is seasonal, leading to large volume swings for collection routes and minimal food waste per collection site.

Because the Town of Friday Harbor has already implemented residential yard waste collection, it is recommended that the municipality focuses on expanding that program to weekly collection in summer and bi-weekly in the winter. It is recommended that food waste collection is only introduced once:

1) Yard waste opportunities are maximized
2) Collection frequency is increased
3) Contamination within yard waste bins is at acceptable levels
4) Food waste collection is implemented in all commercial sectors

As each new change to residential service is made (either service frequency or accepted materials), it is recommended that a residential "cart tagging" program is conducted by affixing an informational flyer on the handle of each residential cart on collection day. This method has proved to be far more successful than mailers or bill inserts.

Residential Profile: Town of Friday Harbor Yard Waste Collection

The Town of Friday Harbor currently collects residential yard waste, which is hauled to Mike Carlson Enterprises. Residents are not charged extra for yard waste pickup, as it's included in the monthly trash bill costs. The Town of Friday Harbor hauls roughly 12-25 tons of yard debris a year and they're charged $35 a ton for disposal at Mike Carlson's. Mike Carlson's chips much of the material and sells it as mulch, however some is sold as compost. Customers include contractors and/or individuals.

The Town of Friday Harbor Public Works has some, but not substantial, use for compost. They've estimated annual volume of compost to be 120 yards, and suggested uses include utilizing compost for tree wells and construction. However, these uses may be limited because little area exists for new construction within the town.

Hauling & Collection

Organics hauling presents multiple challenges compared to trash and recycling hauling. It is recommended that organics hauling services are phased in by sector, in the following order:

1. Grocery stores
2. Large foodservice venues (resorts, hospital, schools)
3. Restaurants
4. Other commercial
5. Residential

This progression would allow volumes to scale quickly, while contamination is controlled. Also, the most savings will be experienced by the entities that currently have trash hauled in roll-off compactors, including Kings, Market Place, PeaceHealth and Roche Harbor. Including these as early adopters will likely encourage them to become long-term participants due to the financial benefit.

An alternative/complement could be conducting a "pilot project" by selecting one participating entity from each sector.

Commercial

It is recommended that commercial customers be given the option of two types of collection containers: 1 cubic yard dumpsters and 65-gallon carts. Both containers balance the competing priorities of large enough to provide service efficiency, but still small enough to maintain a manageable weight. Based on multiple conversations with San Juan Sanitation (SJS), dumpsters are more cost-effective for their trucks to service, so commercial customers should be encouraged to utilize dumpsters wherever possible.

1 Cubic Yard Dumpster

The costs associated with purchasing containers are roughly $85 per cart, and $907 per 1yd dumpster (when shipped in a full load of 42). These containers also require assembly.

During site visits, observations indicated that trash/recycling container colors varied between islands and between commercial and residential collection. This may cause confusion, especially when a third waste stream is introduced. It is recommended that San Juan County collaborate with the Town of Friday Harbor and San Juan Sanitation to align commercial and residential dumpsters/bins to the industry standards of:

- Blue = recycling
- Brown/black = trash
- Green = yard + food waste


96 Gallon Cart

It is recommended that commercial hauling be conducted by private haulers like San Juan Sanitation, and that services are priced slightly less than current trash rates, such as:

- $12.80/pick-up for 65-gal tote (currently $16 equivalent for trash)
- $40 for 1 yd ($50 for trash in the Town of Friday Harbor)

Note: In such a scenario, the Town of Friday Harbor would benefit, as commercial customers are charged by volume, but the Town pays a disposal fee by tonnage. Removing the food waste from foodservice dumpsters is expected to dramatically reduce the weight of waste while only having a nominal impact on volume. This benefit could offset the minimum tipping fee recommendation discussed in "Policy Considerations" above.

Residential

As discussed above, it is recommended that the Town of Friday Harbor first focus on maximizing the yard waste collection opportunity, then expand to food waste once certain conditions are met. Residential organics collection outside the Town of Friday Harbor, Roche Harbor, and select dense HOAs would be impractical due to low route-density and alternative options available to rural residents. To ensure that food waste composting is

available to such residents, if they are motivated to participate, Lautenbach may consider placing a food waste collection bin next to the yard waste dumpster at the Sutton Road Transfer Center. In more dense neighborhoods, Homeowners Associations (HOAs) could provide a single dumpster to be shared by neighbors. This would create a central location to generate enough food waste material and support neighborhood engagement. To reduce contamination, the county could provide education and engagement through a community leader. It is recommended that such a pilot project be considered in tandem with the commercial roll-out.

Processing

It is recommended that San Juan County establish a composting system at the Sutton Road transfer station due to its convenient location, shared staffing opportunities, and experience with waste operations.

Phased Approach

San Juan County can pursue a metered progression for phasing in composting at Sutton Road. Commercial composting is a capital-heavy process with significant efficiencies of scale. San Juan Island presents the challenge of insufficient volume to achieve such efficiencies, coupled with existing vector issues and close neighbors. Multiple systems were explored to overcome these hurdles and the recommendations are below.

Phase 1: Off-island processing

Organics would be collected in a roll off dumpster positioned at the transfer station Z wall, then hauled to Skagit Soils. Finished compost would be back-hauled and sold on San Juan Island. This scenario would be capital light, but the operating costs would be significant. Hauling alone is estimated at $1400 per round trip. Coupled with the $40 tipping fee at Skagit Soils, Lautenbach estimates that a tipping fee of $210+/ton would be required to support this scenario. That fee is significantly higher than either the Town of Friday Harbor or San Juan Sanitation are currently paying for Trash (MSW) disposal, so for organics diversion to be financially viable in this scenario, the county would likely need to subsidize tipping fees. As such, it is recommended that this scenario only be considered as a temporary solution to support a pilot project and/or as a stop-gap measure while on-island processing is in development. The method could also be utilized to provide surge capacity for peak summer months. Hauling costs could be controlled by utilizing tandem trailers and embedding some of the return-haul costs in the price of compost.

Lautenbach anticipates some operational complexities as well. It is unknown whether it would be possible for San Juan Sanitation to dump the wet & messy food waste from their packer truck directly into the roll-off bin. An open-top bin containing food waste may further attract ravens, an existing issue at the site. Also, lightening the MSW load wouldn't necessarily deliver much savings as options for compaction are limited so trailers may be under-utilized.

Phase 2: In-vessel system

An Intermodal in-vessel system, would provide a great opportunity to process material on-site while controlling vectors and odors. This is an in-vessel, active composting system that processes roughly 1 ton per day, contained in a 40 ft shipping container. The system accepts all organics material, including ground yard debris and food waste, as long as the "green-to-browns ratio" is maintained. The in-vessel system allows for continuous loading, shortening the time that untreated material remains outside, which is anticipated to control vectors. In-vessel processing time is 21 days, after which the material would be removed and piled to "cure". The total cost for one in-vessel system is $180,000 including the installation and training costs. The in-vessel system would require a pad, or at least footings, to be poured.

According to Green Mountain, the in-vessel processing time could be shortened to as little as 15 days, by 1) meticulous adherence to protocol and input "recipe" by the operators and/or 2) addition of biochar as an accelerant. By doing so, the use of the asset could be maximized while still remaining under the "permit exempt" threshold described below.

Phase 3: Scaling

As the in-vessel system is modular, it may be scaled by adding additional units. This presents a cost-effective solution for scaling volume, as units would only need to be added when volume materializes. In-vessel system units could then be decommissioned, or hold-time could be increased, in the winter to scale back volume. To handle the summer surge, we estimate that a system would need to be capable of handing the equivalent of 2,000 tons per year. This would require as many as 5 in-vessel systems, bringing it to capital parity with an Aerated Static Pile system. However, by strategically managing the in-vessel system units, San Juan County may be able to avoid/delay the purchase of at least two of these units. Options include:

- Shortening the in-vessel time to 15 days & enhancing curing stage with turned-piles
- Adding 5% biochar (by volume) to the feedstock
- Utilizing only the minimum required carbon blend, creating a secondary turned-pile system for surplus yard waste

If, after the first in-vessel system is implemented, the operators determine that scaling to multiple in-vessel systems is undesirable for any reason (maintenance, labor, cost, etc…), San Juan County may consider siting an Aerated Static Pile system on the county's property immediately west of the existing transfer station. The first in-vessel system can always be sold to another municipality or even Roche Harbor, for biosolids processing.

Grinding & Screening

Material must be processed before and after composting. Prior to adding to the system, bulky woody debris needs to be ground to a consistent size. After the composting process, material must be screened to extract contamination and wood chunks that have not completely composted. This process produces a fine and rich compost end product, however the equipment required can add significant capital costs. The following are some suggestions for managing such costs.

Grinder

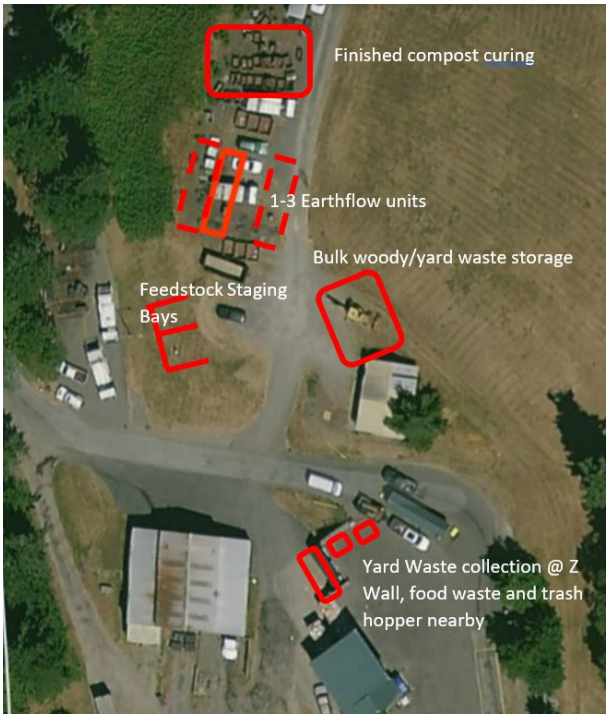
A quality horizontal grinder can cost $500,000 or more if purchased new. These units are also maintenance heavy and require skilled labor to operate. As such, it is recommended that San Juan County consider subcontracting grinding for a couple of years. San Juan Island Excavating has previously ground material for Orcas Recycling Services. Rates are estimated to be $400-$500/hour (depending on grinder size). Once the material throughput makes contract grinding cost prohibitive, it is recommended that the County consider purchasing a used grinder (estimated at $275,000). Once a grinder is purchased, it could be shared between San Juan and Orcas Island Operations. This equipment could also be utilized for roadside vegetation projects and land clearing/thinning.

Screener

Many screeners can also cost $250,000 or more. However, most of the units would be excessively large for the amount of material that a San Juan composting operation would generate. As such, it is recommended the County consider an MDS Mini drum screener, produced by CZ Screen. Such a unit would cost approximately $44,000 shipped to Friday Harbor. At such a price, a dedicated unit may be justified for both San Juan and Orcas Islands, reducing transportation logistics. However, these units are highly portable, so they could be shared if necessary.

Site Design

Stakeholders expressed a desire/opportunity to develop the San Juan County property immediately to the west of the existing transfer station to help consolidate Town operations and manage the traffic flow and queuing. This would be necessary to ensure the use of the Town storage space for a composting operation which could provide sufficient space for 1-3 in-vessel systems and the corresponding support infrastructure. Siting operations within the existing transfer station footprint would significantly reduce upfront capital and time-to-implementation. The following diagram represents a conceptual layout of such a design:



Sample Capital Budget

The following budget is provided for San Juan Island. It assumes that material will be stockpiled for no more than 1 month, necessitating a 2,000 cubic yard per year equivalent capacity, roughly 66-100% greater than the actual annual material produced. This "oversizing" should accommodate peak summer season volume. Capital costs may be mitigated by hauling some of the peak summer surge off-island for processing, introducing a less capital intensive process like turned piles for yard waste and pushing in-vessel system units to the maximum capacity (as previously discussed). It is assumed that the county would provide the hauler (likely San Juan Sanitation) some financial support to purchase organics dumpsters and carts.

Equipment	Year 1	Year 2	Year 3	Year 4	Year 5	Total
CZ Screen	$44,000					**$44,000**
Earthflow	$180,000	$180,000	$180,000			**$540,000**
Carts/Dumpsters	$21,550	$17,200				**$38,750**
Grinder purchase (1/2 cost of shared unit)			$137,500			**$137,500**
Engineering		$25,000				**$25,000**
Site Prep		$50,000				**$50,000**
Eco block walls		$4,500				**$4,500**
Pad Pour	$55,000		55,000			**$110,000**
San Juan Total	**$300,550**	**$276,700**	**$372,500**	**$0**	**$0**	**$949,750**

Tipping Fees

Self-Haulers are currently charged a total of $392.88 per ton ($332.67/ton + 18.1% tax) to dispose of trash (MSW) at the Sutton Road Transfer Center. After Orcas Island, this is the second highest tipping fee in the state and more than 7 times the national average. However, haulers have negotiated rates much lower than this amount. At the time visited, The Town of Friday Harbor was paying $134.80/ton to tip MSW and San Juan Sanitation was paying $179/ton. These discounted rates hinder the viability of organics collection because the density of food and yard waste equates to higher total tipping fees for haulers, even at similar rates per ton. As such, it is recommended that the County consider setting a minimum tipping fee for all transfer stations. For instance, mandating a tipping fee of no less than $225/ton for MSW and $100/ton for organics would allow haulers to receive a $25 benefit from tipping organics, even if the combined food/yard waste was twice as heavy. The Town of Friday Harbor will be benefiting from lighter MSW loads and San Juan Sanitation should be able to pass-through tipping fees savings to customers, per the Washington State Utilities and Transportation Commission (UTC).

It is estimated that tipping fees of $100 per ton could generate approximately $100,000-$120,000 per year in revenue once the system is fully scaled. Many other composters in Washington State (mainland) charge $45 - $55/ton in tipping fees, however the high MSW tipping fees, inflated operational cost, and lack of alternatives on San Juan Island could justify a two-fold premium.

Sample Operating Budget (Annual)

The following operating budget is provided. Because the facility will likely be operated by a contractor vs. San Juan County, the return-on-investment to San Juan County would be some amount less than that listed below (depends on agreement negotiated). To improve financials for the county, upfront capital costs may be shared, or a lease/use fee may be charged to the operator.

Volume Assumptions	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Average Input Tons/day	1	2	3	3.2	3.5	
Days/yr operation	365	365	365	365	365	
Tons Capacity	365	730	1095	1168	1277.5	
Tons Procesed	365	730	1095	1168	1277.5	**4,636**
Revenue/Cost	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Revenue						
Tipping Fee/Ton	$100	$103	$106	$109	$113	
Annual Tipping Fee Revenue	$36,500	$75,190	$116,169	$127,631	$143,784	**$499,273**
Finished Yds/Ton	2.00	2.00	2.00	2.00	2.00	
Sales price/yd	$ 55	$ 57	$ 58	$ 60	$ 62	
Annual Product Sales	$ 40,150	$ 82,709	$ 127,785	$ 140,394	$ 158,162	**$ 549,200**
Total Revenue	**$ 76,650**	**$ 157,899**	**$ 243,954**	**$ 268,024**	**$ 301,946**	**$ 1,048,473**
Direct Operating Costs						
Labor cost/hour (loaded)	$40	$41	$42	$44	$45	
Labor hours/day	3	4	5	5.5	6	
Labor days/yr	312	312	312	312	312	
Total Labor	**$37,440**	**$51,418**	**$66,200**	**$75,005**	**$84,278**	**$314,341**
Fuel cost/gal	$5.50	$5.50	$5.50	$5.50	$5.50	
Fuel gal/day	1	2	3	3.2	3.5	
Fuel days/yr	330	330	330	330	330	
Total Fuel Cost	**$1,815**	**$3,630**	**$5,445**	**$5,808**	**$6,353**	**$23,051**
Contract Grinding	**$4,000**	**$8,000**	**$12,000**	**$12,800**	**$14,000**	
Electricity cost/kWh (blended)	$0.10	$0.10	$0.10	$0.10	$0.10	
kWh/day	24	48	72	76.8	84	
Electricity days/yr	365	365	365	365	365	
Total Fuel Cost	**$876**	**$1,752**	**$2,628**	**$2,628**	**$2,628**	**$10,512**
Biochar cost/yd	$100.00	$100.00	$100.00	$100.00	$100.00	
Biochard yd/ton	4.00	4.00	4.00	4.00	4.00	
Mix ratio	0%	5%	5%	5%	5%	
Biochar yards needed	0.00	146.00	219.00	233.60	255.50	**854**
Total biochar costs	**$0**	**$14,600**	**$21,900**	**$23,360**	**$25,550**	**$85,410**
Total costs	**$44,131**	**$79,400**	**$108,173**	**$119,601**	**$132,809**	**$433,313**
Operating Profit	**$32,519**	**$78,499**	**$135,781**	**$148,423**	**$169,137**	**$615,160**

Compost Sales Outlets

Compost is currently sold on San Juan Island, both in bulk and bagged forms. As with most markets, bulk material is priced much lower on a per-cubic-yard basis, as consumers are paying for convenience with bagged product.

Bulk

Cattle Point Rock & Topsoil currently sells compost in bulk, which they import from Cedar Grove in Everett, WA. Cattle Point sends a 42-yard dump truck off-island twice a day to retrieve rock or soil materials. They currently sell mulch for $69/yard, compost for $75/yard, and topsoil for $80/yard. They would consider buying local if the quality is deemed to be as good, or better, than the product that they're currently purchasing.

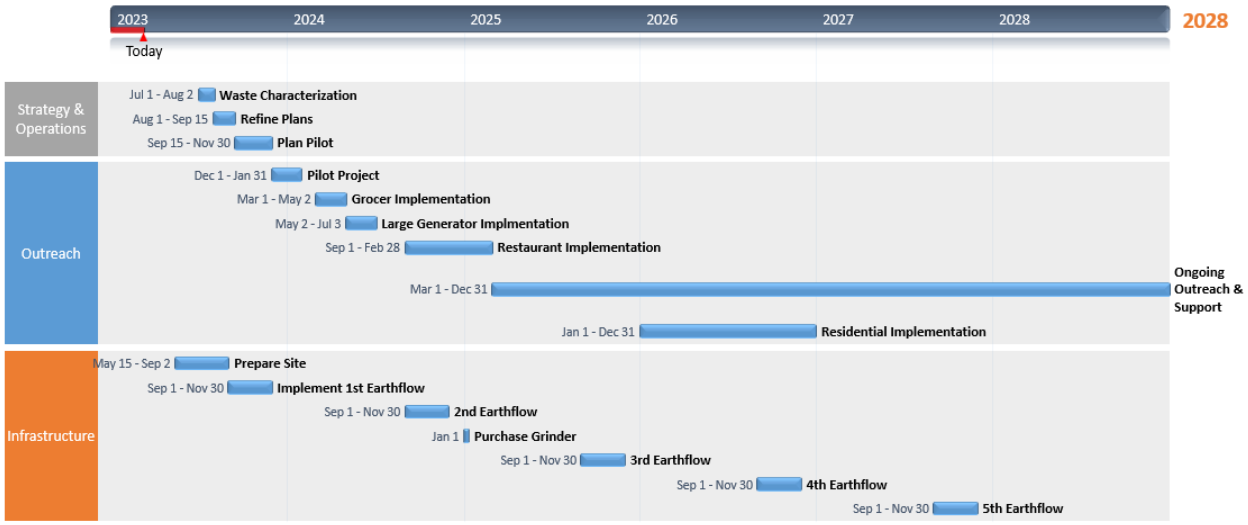
Bagged

Bagged compost is sold at multiple retailers at dramatically differing prices. The following are a couple of examples:

- Browne's Home Center - $15.99 per 1 cubic foot bag
- Ace Hardware - $8.99 per 1.5 cubic foot bag
- The Marketplace - $5.99 per 1 cubic feet bag

Sample Timeline

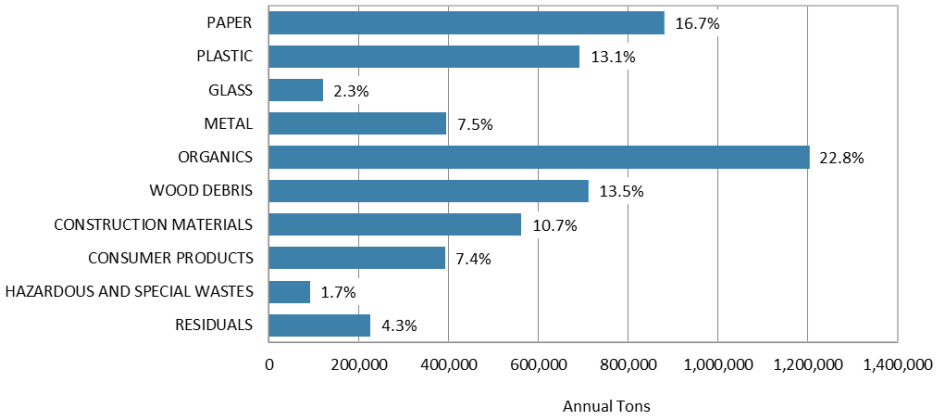
The following timeline is provided for directional guidance only. Availability of capital, stakeholder engagement and other variables will inevitability dictate the actual implementation timeline.



Orcas Island

Feedstock

The 2020/21 Washington Statewide Waste Characterization, commissioned by the WA State Department of Ecology estimates that approximately 22.8% of the weight of this MSW (trash) is organic material. One important caveat is that no samples were collected from San Juan County for the statewide report, so this data may differ from actual percentages generated on Orcas Island. An Orcas Island waste characterization study would provide more targeted data (as discussed previously). However, assuming the 22.8% organics number is represented in the 4,748 tons of MSW processed by The Orcas Transfer Station in 2021, it would suggest that 1,082 tons of compostable material was disposed in the trash in 2021. It is important to note that Orcas MSW numbers include Lopez and Shaw Island's MSW hauled by San Juan Sanitation. Shaw generates approximately 2.9 tons a year.



Waste streams by category, 2020/21 Washington Statewide Waste Characterization Study.

Key Stats (2021):

4,748 tons of trash processed through The Orcas Transfer Station

22.8% of trash was organic material, statewide.

1,082 tons of organics disposed in the trash on Orcas Island (assumed)

EPA Estimates:

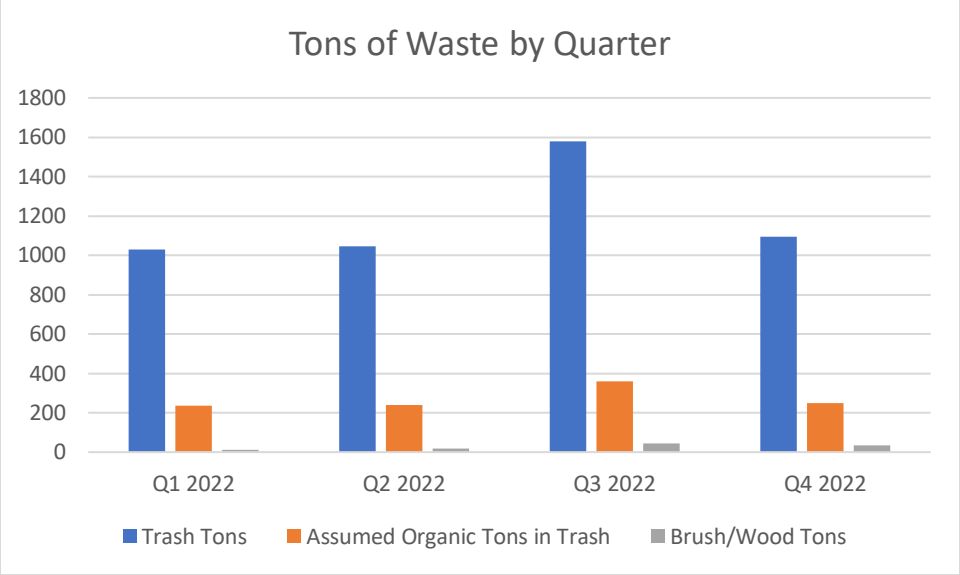
- Food waste to weigh 463 lbs./cu yd
- Yard waste 250 lbs./ yd

This material, however, is not generated at a steady rate throughout the year. Because the San Juan Islands are a summer tourist destination, Q2 (April 1st- June 30th) and Q3 waste volumes are roughly 1/3 higher than Q4 and Q1. It is suspected that monthly variations are even more dramatic, and that MSW could fluctuate between 425 tons and 750 tons per month (based on Orcas Islands monthly trailer stats). The seasonality of yard waste and food waste could compound these fluctuations, suggesting that July's volume of compostable material could be as much as twice that of April.

The Orcas Transfer Station currently collects wood and brush from self-haulers. This material, collectively, represented 109 tons in 2021.

Tons of Waste Processed by The Orcas Transfer Station in 2021

Quarter	Trash Tons	Assumed Organic Tons in Trash	Brush/Wood Tons
Q1 2022	1031.04	235.08	13.01
Q2 2022	1045.21	238.31	17.83
Q3 2022	1579.15	360.05	43.42
Q4 2022	1093.34	249.28	34.96
Total	**4748.74**	**1082.72**	**109.22**



Beyond the material currently processed through The Orcas Transfer Station, other sources of compostable material are currently generated, including:

Roadkill disposed near the transfer station.

- Biosolids (sewage sludge) generated at the:
  - Eastsound Sewer District
  - WA Water Service (near Rosario)
- Manure generated by equestrian facilities farms such as:
  - Turtlehead Farm
  - Orcas Island Trail Rides
  - Hatcheries
- Land clearing and brush generated from San Juan County Road projects

Priority Waste Generators

Restaurants

Restaurants present a great solid source of food waste feedstock, however there are many variables. As compared to resorts or grocery stores, restaurants generally generate less food waste individually, but they are more dispersed. This can cause hauling challenges. This dispersed nature also means that the program relies on the success of many crews of staff in an industry that's known for high turn-over and limited engagement. Some keys for success are included to the right.

There are approximately 38 restaurants on Orcas Island, examples include:

- Wild Island Restaurant
- White Horse Pub
- Doe Bay Cafe
- The Madrona Bar and Grill
- Mijitas
- Island Hoppin' Brewery

Best Practices: Restaurant

1) Start with the kitchen, only move to guest participation after the kitchen program is dialed.
2) Closely monitor for contamination.
3) Track metrics, communicate to staff.
4) Utilize bin colors and signage.
5) Make it easy for staff to participate.
6) Consider durable food service ware vs. compostable.

Restaurant Profile: Wild Island Restaurant

Sample Financials: Fall Financials

Current Service Levels

1, 2-yard trash, 1x/wk - $286.72

Total monthly cost: $286.72

Proposed Service Levels

1, 1.5-yard trash, 1x/wk - $232.24

1, 1-yard orgs, 1x/wk - $172

Total monthly cost: $404.24

Result: $117.52/mo. expense

Wild Island Restaurant is located right outside the heart of Eastsound on Orcas Island. The restaurant and juice bar aims to provide local, simple, and high-quality organic food to energize and nourish customers. They offer pressed juice, smoothies, rice bowls, bagels, and a variety of dessert treats to be enjoyed by residents and visitors.

Wild Island Restaurant generates 2-5 buckets of food scraps a day. This consists of rinds from their juice machine, and veggie/fruit scraps from preparing food. Food scraps are placed in buckets in the kitchen where they're picked up every day by community member, Kathy Morris, to be taken to West Beach Farm and fed to pigs. All post-consumer scraps are thrown away into the trash. Wild Island also provides compostable to-go

packaging like cups, straws, utensils, and containers. This invites possibilities to commercially compost these products.

Grocery Stores

Grocery stores represent large single-source generators for food waste and as such, are typically targeted as early participants in new food waste diversion programs. Grocery Stores serviced by a roll-off compactor like Orcas Island Market represent a unique opportunity to deliver significant savings from weight reduction. Savings generation in dumpster-serviced properties is still possible, but less significant. Fresh Produce, Meat and Deli departments are great places to start when implementing programs within grocery stores because packaging is limited. Training in these departments is still important because twist ties, stickers, and plastic wrap can introduce damaging contaminates to compost. Only after programs are dialed in these departments do we recommend expanding the program to packaged food products. De-packaging expired meats, dairy and grain products is an essential function, but often dreaded by grocery staff. As such, we suggest using caution when expanding programs to these categories; and to do so only after early wins are experienced, and if staff engagement is high.

A total of 3 grocery stores serve Orcas Island:

- Orcas Island Market
- Orcas Village Store
- Orcas Food Co-Op

Grocery Profile: Orcas Island Market

Orcas Island Market is the primary grocery store on Orcas Island. It is a family-owned business that has proudly served the community since 1897 when it was passed down from father, Dale Linnes, to brothers Jason and Jacob Linnes. The store provides a full-serve Deli & Bakery, meat department, and a produce department. The store and its staff are devoted to connecting the community and treating all its customers like neighbors.

Sample Financials: Summer Financials

Current Service Levels

1 trash compactor, 1x/wk

Haul fees: 4 hauls x $126.00

Tonnage fees: 10.77 tons x $260/ton

Total monthly cost: $3,765.05

Proposed Service Levels

1 trash compactor, 1x/wk

Haul fees: 4 hauls x $126.00

Tonnage fees: 5.39 tons x $260/ton

1, 1-yard orgs, 1x/wk - $172

Total monthly cost: $2,077.40

Result: $1,687.65/month savings

The store currently has a pig program that is partnered with local farmers to pick up excess produce. Orcas Island Market has red bins that fill up daily with organic material. These bins are placed at the back of the market for pig farmers to pick up and feed to their livestock. Some farmers take the whole bins and return them the next day empty, others dump the contents inside and leave the bins on-site. The store also has a diversion program through Safeway, where food waste goes to a distribution center in Auburn, WA to be turned into methane and/or fuel. This material mostly consists of produce. If a composting program is in place, the market would prefer totes, but are flexible to any changes.

Grocery Profile: Orcas Food Co-op

Sample Financials: Summer Financials

Current Service Levels

1, 2-yd trash, 1x/wk - $266.72

Total monthly cost: $266.72

Proposed Service Levels

1, 1.5-yard trash, 1x/wk - $232.24

1, 1-yard orgs, 1x/wk - $172

Total monthly cost: $404.24

Result: $137.52 expense

Orcas Food Co-op is the only cooperative on Orcas Island. It's an independent, democratic organization owned, operated, and financed by its members with the purpose of increasing local food production and enhancing the community food network. The Co-op sells high quality local and organic household goods at a feasible cost for all shoppers. (site: https://orcasfood.coop/about/)

The Co-op strongly supports sustainability initiatives, including zero waste practices. Before the produce is donated, produce is sold at a discount price depending on how long it's been sitting on the shelves. They also have an employee discount bin for employees to take unsold food that is approaching an expiration date. The Co-op generates roughly one bin a day for this program. The Orcas Food Co-op donates food waste to a local food bank or coordinates pickups with community member, Kathy Morris, at West Beach Farm. Kathy comes every day to pick up generated food scraps. The Co-op has one trash and one recycling dumpster. They're serviced once a week, but in the summertime they're serviced twice a week.

Landscaping Companies

Landscaping companies are a great source for woody debris and grass clippings, valuable feedstocks for a composting operation. Because they typically have their own hauling capabilities, implementing diversion strategies with landscaping companies can be as simple as encouraging them to dump in the desired area at the transfer station. However, most existing landscaping contractors already have an outlet for their material, likely at a lower price than a self-sustaining compost operation would charge. Therefore, ensuring that a critical mass of companies utilize County facilities present a challenge. No-dumping ordinances, burn bans, and similar local ordinances can encourage landscapers to dispose of their material at the County transfer center vs. other sites.

Landscaping Profile: Rain Shadow Consulting

Rain Shadow specializes in tree removal, tree care, fire safety thinning, and tree risk assessments for greater San Juan County. One of their many service offerings is visiting sites to pick up wood waste from customers and to bring the material back on site to process. They primarily sell mulch that can be delivered to customers. Rain Shadow prefers picking up feedstock material versus a public drop-off because it's easier to manage and oversee. However, they do have partnerships with landscapers that drop off homogenous material. In 2022, Rain Shadow sold roughly 950 yards of mulch material. They also sell mixed chips.

Rain Shadow's equipment includes:

- A portable sawmill
- A horizontal grinder where they run stringy wood material to make a wood mulch
- An 18'' drum chipper
- One tractor with a 1-yard bucket
- A truck with a dump bed and claw

Rain Shadow would like to have long-term contracts with Orcas Recycling Services, the Town of Friday Harbor or San Juan County, to give them stability to invest in new equipment and drive business innovations. They could be interested in distributing and/or reselling compost, as they have good relationships with landscapers on Orcas.

Resorts

Resorts represent large single-source generators that may have the opportunity to implement programs quickly. However, the transient nature of guests makes it difficult to expand programs from back-of-house to front-of-house. Guests are often familiar with whatever composting program their own community has implemented (if at all), and are not familiar with the local nuances of which materials are collected and which are not.

Resort Profile: Rosario Resort & Spa

Rosario Resort sits on 40 acres of land, in addition to 40 more acres undergoing landscaping projects, on the eastern side of Orcas Island. The resort is listed on the National Register of Historic Places and welcomes tourists and residents alike to enjoy the beautiful scenery and nature. It has 69 rooms for guests and 90 beds for employees in the peak summer months. During the wintertime, the resort is open Wednesday-Sunday.

Sample Financials:

Current Service Levels

1, trash compactor, EOW

Haul fees: 2 hauls x $147

Tonnage fees: 10.82 tons x $260

Total monthly cost: $3,107.20

Proposed Service Levels

1, trash compactor, EOW

Haul fees: 2 hauls x $147

Tonnage fees: 5.41 tons x $260

1 yd org, 1x/wk - $172

Total monthly cost: $1,872.60

Result: $1,234.60/month savings

The nature of this business results in the generation of organic waste that's currently disposed of in the resort's trash. The resort has been searching for avenues to efficiently dispose of or recycle organic waste. In the summertime there are two restaurants: the summertime grill and the main house restaurant. Rosario will soon have a third restaurant in the beach house closer to the marina. The main house restaurant is table service where staff bus dishes and then scrape plates back into the kitchen. This is an opportunity for post-consumer scraps to be composted. Currently the main house kitchen disposes of two full 45 or 55-gallon bags a day out to the trash. To implement composting, the kitchen staff will need rolling "brutes" and multiple five-gallon buckets for prep station food scraps.

Rosario also produces yard waste through thinning and landscaping projects. There is a "boneyard" on-site where the yard waste is stored. This consists of large branches, stumps, and logs that could be composted. However, most of the stumps and logs are re-utilized for firewood at the beach area of the resort.

Rosario has an on-site sewage treatment system that was sold off in 2008 to WA Water Service. Sewage goes to the center of the resort to then be pumped up to the pond areas to be treated.

Rosario has a compactor for trash that is serviced one to two times a week and three recycling dumpsters. They are charged by weight which opens the opportunity to save money by diverting heavy food waste out of that stream.

School(s)

Schools represent not just an opportunity for waste prevention and diversion on-site, but also an opportunity to train the community. Across cultures, the "trickle up effect" is one of the most effective mechanisms to implement behavior change within a community. If kids are trained to separate food waste at school, they will bring this knowledge and expectation home to their families, thereby impacting residential participation as well.

School Profile: Orcas Island Elementary, Middle, and High School

The Orcas School District has approximately 400 students between the elementary, middle, and high school on their full campus. The kitchen serves 270 meals for breakfast and 240 meals for lunch, including a mid-morning break. Food waste is produced at staff prep stations and at the post-consumer level from students. One of the leading waste generator areas is the salad bar due to changing out wilted and/or spoiled food with fresh produce. This waste is currently going into the trash.

Sample Financials:

Current Service Levels

1, 2-yard trash, 1x/wk - $286.72

Total monthly trash cost: $286.72

Proposed Service Levels

1, 1.5-yard trash, 1x/wk - $232.24

1, 1-yard orgs, 1x/wk - $172

Total monthly cost: $404.24

Result: $117.52 expense

The school district isn't currently working with farmers to take food scraps because the food served to students isn't organic, and some farmers prefer organic food scraps to feed livestock. The school district could compost meat and dairy products but would need frequent pickup, so it doesn't sit around and create odors. The dumpster area has limited space and the lack of a loading dock ramp would make the use of totes nearly impossible. A one-yard dumpster would be the preferred container, however, placement and configuration will be tricky. The kitchen/cafeteria currently has one trash and one recycling dumpster. Trash is serviced on Mondays and Thursdays in the morning. Recycling is serviced on Tuesdays. They're charged per pickup and not by weight, resulting in minimal savings. The school district has a garden that could potentially use compost.

Camp Profile: YMCA Camp Orkila

Camp Orkila is a destination camp that serves over 10,000 youth a year through summer overnight camps, family weekend camps, and day camps for locals. YMCA's Camp Orkila is the first established permanent camping home of the YMCA of Greater Seattle and was established in 1906. The camp works to strengthen community and uplift the growing potential of youth campers by fostering healthy living and social responsibility.

Sample Financials: Summer Financials

Current Service Levels

1, 2-yd trash, 1x/wk - $286.72

1, 1.5 trash, 1x/wk - $232.24

1, 1.5-yard trash, EOW - $108.02

Total monthly trash cost: $626.98

Proposed Service Levels

1, 1.5-yd trash, 1x/wk - $232.24

1, 1.5 trash, 1x/wk - $232.24

1, 1.5-yard trash, EOW - $108.02

1, 1-yard orgs, 1x/wk - $172

Total monthly cost: $744.50

Result: $117.52 expense but would experience significant savings with reducing overage charges

The camp has a full capacity of 1000 beds, where 700-800 are filled seven days a week in the summertime. They have two dining rooms for campers where they're served family style to promote only taking how much food each person wants to eat. While this gives youth more independent decision making, it is a large generator of waste when there are leftovers. These leftovers are thrown away in the trash where it generates roughly 450 lbs (1 yard) of food waste. Orkila plans to install a pulper and has considered on-site composting. This pulper can process 100 lbs/hour (maybe 200-300). This will reduce volume of food waste and be net neutral on water usage.

Camp Orkila used to have dumpsters that were serviced six days a week. This became difficult to service so most of the cans are now serviced outside the kitchen area in a central location. This cut their trash service bill in half. They now have three two-yard recycling dumpsters and four two-yard trash dumpsters. In the summertime these are picked up three times a week. Camp Orkila also has two 30 yard roll off containers used for garbage. One is used for personal garbage while the other is used for peak summer season.

Camp Orkila struggles with continuous over-weight fees. The overage charges are based on the sound of how hard the truck is working to lift each can.

Steve Miller at Camp Orkila is supportive of an organics collection system. If the county were not to move forward with a commercial composting program, he would like to build an on-site composting area at the camp, as they have the resources and funding to make this happen. The camp will use finished compost to spread on their fields and landscaping areas.

Public Entities

While our Orcas stakeholder outreach did not include any public entities, we infer that material could be generated from the town of Eastsound, Moran State Park, Orcas Ferry Dock, and Deer Harbor.

Hauling & Collection

Organics hauling presents multiple challenges compared to trash and recycling hauling. As such, it is recommended that organics hauling services are phased in by sector, in the following order:

1. Grocery stores
2. Large foodservice venues (resorts, hospital, schools)
3. Restaurants
4. Other commercial
5. Residential

This progression would allow volumes to scale quickly, while contamination is controlled. Also, the most savings will be experienced by the entities that currently have trash hauled in roll-off compactors, including Orcas Village Market and Rosario Resort. Camp Orkila will also likely experience savings due to the elimination of their overweight fees. Including these as early adopters will likely encourage them to become long-term participants due to the financial benefit.

An alternative/complement could be conducting a “pilot project” by selecting one participating entity from each sector.

Commercial

Provide commercial customers with the option of two types of collection containers is recommended: 1 cubic yard dumpsters and 65-gallon carts. Both containers balance the competing priorities of large enough to provide service efficiency, but still small enough to maintain a manageable weight. Based on multiple conversations with San Juan Sanitation (SJS), dumpsters are more cost-effective for their trucks to service, so commercial customers should be encouraged to utilize dumpsters wherever possible.

The costs associated with purchasing containers are roughly $85 per cart, and $907 per 1yd dumpster (when shipped in a full load of 42). These containers also require assembly.

1 Cubic Yard Dumpster

During visits, observations indicated that trash/recycling container colors varied between islands and between commercial and residential collection. This may cause confusion, especially when a third waste stream is introduced. It is recommended that San Juan County collaborate with San Juan Sanitation to align commercial and residential dumpsters/bins to the industry standards of:

- Blue = recycling
- Brown/black = trash
- Green = yard + food waste

96 Gallon Cart

It is recommended that commercial hauling be conducted by private haulers, like San Juan Sanitation (SJS), and that services are priced slightly less than current trash rates. Orcas commercial trash collection fees are lower than the Town of Friday Harbor, likely due to Washington State Utilities and Transportation Commission (UTC) control. Pricing organics lower than these trash fees will squeeze the margins of organics collection. Prices could be as follows:

- $10/pick-up for 65-gal tote (currently $12.25 equivalent for trash)
- $30 for 1 yd ($38.31 trash)

It was initially speculated that trash margins would increase for SJS once the heavy organic material was removed from bins. Through conversations with SJS and the UTC, it was discovered that any decrease in disposal charges (tipping fees) would result in downward price pressure, eliminating the benefit of lighter trash. The county can preemptively combat this dynamic by creating a minimum tipping fee for trash disposal that's higher than what SJS is currently paying (they should be able to pass costs through to customers), or the county can provide a subsidy to organics hauling. The prices above may not be viable for SJS without some assistance.

Residential

As discussed above, it is recommended that San Juan Sanitation first focus on maximizing yard waste collection opportunities, then expand to food waste once certain conditions are met. Residential organics collection outside Eastsound and select dense HOAs would be impractical due to low route-density and alternative options available to rural residents. To ensure that food waste composting is available to such residents, if they are motivated to participate, ORS may consider placing a food waste collection bin next to the yard waste dumpster at the transfer center. In more dense neighborhoods, Homeowners Associations (HOAs) could provide a single dumpster to be shared by neighbors. This would create a central location to generate enough food waste material and support neighborhood engagement. To reduce contamination, the county could provide education and engagement through a community leader. It is recommended that such a pilot project be considered in tandem with the commercial roll-out.

Processing

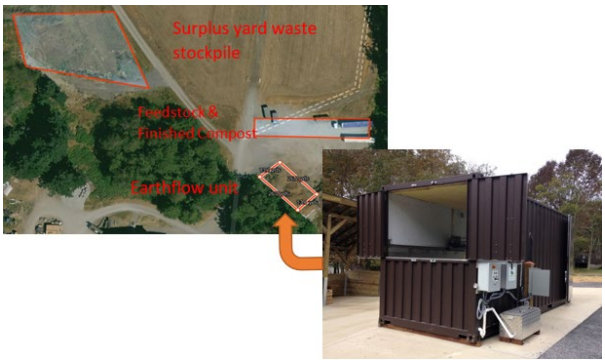
Orcas Recycling Services can establish a composting system at the transfer station due to its convenient location, shared staffing opportunities, and experience with waste operations.

Phased Approach

San Juan County could pursue a metered progression for phasing in composting. Commercial composting is a capital-heavy process with significant efficiencies of scale. Orcas Island presents the challenge of insufficient

volume to achieve such efficiencies. Multiple systems have been explored to overcome these hurdles and the settled on the recommendations below were settled upon.

Phase 1: In-vessel system



An in-vessel system, would provide a great opportunity to process material on-site while controlling vectors and odors. This is an in-vessel, active composting system that processes roughly 1 ton per day, contained in a 40 ft shipping container. The system accepts all organics material, including ground yard debris and food waste, as long as the "green-to-browns ratio" is maintained. The in-vessel system allows for continuous loading, shortening the time that untreated material remains outside, which is anticipated to control vectors. In vessel processing time is 21 days, after which the material would be removed and piled to "cure". The total cost for one in-vessel system is $180,000 including the installation and training costs. The in-vessel system would require a pad, or at least footings, to be poured.

According to Green Mountain, the in-vessel processing time could be shortened to as little as 15 days, by 1) meticulous adherence to protocol and input "recipe" by the operators and/or 2) addition of biochar as an accelerant. By doing so, we could maximize the use of the asset while remaining under the "permit exempt threshold described below.

Phase 3: Scaling

Image: (Horses for Clean Water, 2023)

If the compost volume generation eventually warrants, ORS is well positioned for an Aerated Static Pile composting system. Once volume surpasses what the in-vessel system can process, a concrete pad could be poured, and 6 bunkers could be built utilizing Ecology Blocks (less expensive and more durable than poured walls).

To handle the summer surge, it is estimated that a system would need to be capable of handing the equivalent of 2,000 tons per year. Aeration systems (probes, fans, pipes and the corresponding computer software) range from $125,000 to $390,000. Further refinement of design specifications and a formal procurement process would be necessary before an ASP system could be purchased. If an ASP system is implemented, the in-vessel system unit may be transferred to Lopez, or sold to a resort or other municipality.

Grinding & Screening

Material must be processed before and after composting. Prior to adding to the system, bulky woody debris need to be ground to a consistent size. After the composting process, material must be screened to extract contamination and wood chunks that have not completely composted. This process produces a fine and rich compost end product, however the equipment required can add significant capital costs. The following are some suggestions for managing such costs.

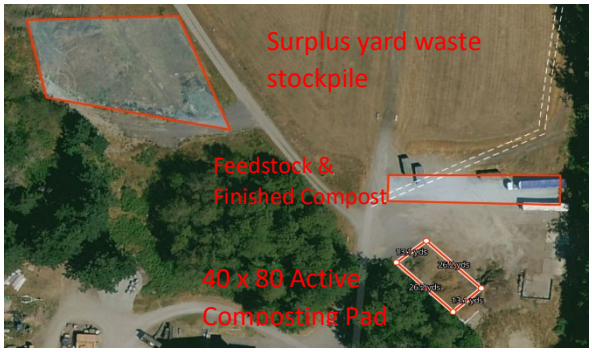
Grinder

A quality horizontal grinder can cost $500,000 or more if purchased new. These units are also maintenance heavy and require skilled labor to operate. As such, it is recommended that San Juan County consider subcontracting grinding for a couple of years. San Juan Island Excavating has previously ground material for Orcas Recycling Services. Rates are estimated to be $400-$500/hour (depending on grinder size). Once the material throughput makes contract grinding cost prohibitive, the County could consider purchasing a used grinder (estimated at $275,000). Once a grinder is purchased, it could be shared between San Juan and Orcas Island Operations. This equipment could also be utilized for roadside vegetation projects and land clearing/thinning.

Screener

Many screeners can also cost $250,000 or more. However, most of the units would be excessively large for the amount of material that the Orcas Island composting operation would generate. An MDS Mini drum screener, produced by CZ Screen costs approximately $44,000 shipped to Orcas Island. At such a price, a dedicated unit maybe justified for both San Juan and Orcas Islands, reducing transportation logistics. However, these units are highly portable, so they could be shared if necessary.

Site Design



The diagram to the right represents one option for layout. During Phase 1, an in-vessel system unit may be placed in the location of the “active composting pad”, or the location indicated for finished compost & feedstock. Multiple locations were considered for the active composting pad, but the location pictured proved to be superior due to runoff processing through existing stormwater treatment, geotechnical stability, and proximity to points of generation. Feedstock and finished compost storage should be located as close to this pad as possible, however, the location pictured would require the relocation of vehicles and trailers that currently reside here. Ample space for surplus material storage exists on the NW side of the county’s property, however stability of the hillside behind, and inconsistencies in the ground below such location prevented it from being a viable option for active composting.

Sample Capital Budget

The following budget is provided for directional guidance. It assumes that material will be stockpiled for no more than 1 month, necessitating a 2,000 cubic yard per year equivalent capacity, roughly twice the actual annual material produced. This “oversizing” should accommodate peak summer season volume. Capital costs may be mitigated by hauling some of the peak summer surge off-island for processing, introducing a less capital-intensive process like turned piles for yard waste. It is also assumed that the county would provide the hauler (likely San Juan Sanitation) some financial support to purchase organics dumpsters and carts.

Item	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Earthflow & sale there-of	$180,000		-$90,000			**$90,000**
CZ Screen	$44,000					**$44,000**
Carts/Dumpsters	$21,550	$17,200				**$38,750**
Contract Grinding						**$0**
Site Prep	$200,000					**$200,000**
Grinder purchase (1/2 cost of shared unit)			$137,500			**$137,500**
Engineering		$65,000				**$65,000**
ASP System		$280,000				**$280,000**
Eco block walls		$9,450				**$9,450**
Pad Pour		$125,000				**$125,000**
Shed Roof		$50,000				**$50,000**
Orcas Total	**$445,550**	**$546,650**	**$47,500**	**$0**	**$0**	**$989,700**

Tipping Fees

Self-Haulers are currently charged a total of $472.40 per ton ($400/ton + 18.1% tax) to dispose of trash (MSW) at the Orcas Island Transfer Station. This is the highest tipping fee in the state and more than 7 times the national average. However, haulers have negotiated rates much lower than this amount. At the time of our visit, San Juan Sanitation was paying $280/ton. These discounted rates hinder the viability of organics collection because the density of food and yard waste equates to higher total tipping fees for haulers, even at similar rates per ton. San Juan Sanitation should be able to pass-through tipping fee savings to customers, per the Washington State Utilities and Transportation Commission (UTC).

Tipping fees of $100 per ton could generate approximately $100,000-$120,000 per year in revenue once the system is fully scaled. Many other composters in Washington State (mainland) charge $45 - $55/ton in tipping fees, however the high MSW tipping fees, inflated operational cost, and lack of alternatives on Orcas Island could justify a two-fold premium.

Sample Operating Budget (Annual)

The following operating budget is provided. Because the facility will likely be operating by a contractor vs. San Juan County, the return-on-investment to San Juan County would be some amount less than that listed below (depends on agreement negotiated). To improve financials for the county, upfront capital costs may be shared, or a lease/use fee may be charged to the operator.

Volume	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Average Input Tons/day	1	1	3	3	3	
Days/yr operation	365	365	365	365	365	
Tons Capacity	365	365	2000	2000	2000	
Tons Procesed	365	365	1000	1000	1000	**3,730**

Revenue/Cost	Year 1	Year 2	Year 3	Year 4	Year 5	Total
Revenue						
Tipping Fee/Ton	$100	$103	$106	$109	$113	
Annual Tipping Fee Revenue	$36,500	$37,595	$106,090	$109,273	$112,551	**$402,009**
Finished Yds/Ton	2.00	2.00	2.00	2.00	2.00	
Sales price/yd	55	57	58	60	62	
Annual Product Sales	40,150	41,355	116,699	120,200	123,806	**442,209**
Total Revenue	**76,650**	**78,950**	**222,789**	**229,473**	**236,357**	**844,218**
Direct Operating Costs						
Labor cost/hour (loaded)	$40	$41	$42	$44	$45	
Labor hours/day	3	3	5	5.5	6	
Labor days/yr	312	312	312	312	312	
Total Labor	**$37,440**	**$38,563**	**$66,200**	**$75,005**	**$84,278**	**$301,486**
Fuel cost/gal	$5.50	$5.50	$5.50	$5.50	$5.50	
Fuel gal/day	1	1	3	3.2	3.5	
Fuel days/yr	330	330	330	330	330	
Total Fuel Cost	**$1,815**	**$1,815**	**$5,445**	**$5,808**	**$6,353**	**$21,236**
Contract Grinding	**$4,000**	**$4,000**	**$12,000**	**$12,000**	**$12,000**	
Electricity cost/kWh (blended)	$0.10	$0.10	$0.10	$0.10	$0.10	
kWh/day	24	24	35	35	35	
Electricity days/yr	365	365	365	365	365	
Total Fuel Cost	**$876**	**$876**	**$1,278**	**$1,278**	**$1,278**	**$5,585**
Biochar cost/yd	$100.00	$100.00	$100.00	$100.00	$100.00	
Biochard yd/ton	4.00	4.00	4.00	4.00	4.00	
Mix ratio	0%	5%	5%	5%	5%	
Biochar yards needed	0.00	73.00	200.00	200.00	200.00	**673**
Total biochar costs	**$0**	**$7,300**	**$20,000**	**$20,000**	**$20,000**	**$67,300**
Total costs	**$44,131**	**$52,554**	**$104,923**	**$114,090**	**$123,908**	**$395,606**
Operating Profit	**$32,519**	**$26,395**	**$117,866**	**$115,382**	**$112,449**	**$448,612**

Compost Sales Outlets

Compost is currently sold on Orcas Island in both bulk and bagged form. As with most markets, bulk material is priced much lower on a per-cubic-yard basis, as consumers are paying for convenience with bagged product.

Bulk

San Juan Sanitation currently sells compost in bulk. San Juan Sanitation back-hauls compost from Skagit Soils (near Burlington) and mulch from Sunland (near Anacortes) when they haul wood and yard debris to the mainland. They currently sell mulch for $81/yard, vegetable compost for $69/yard, a three-way soil blend for $86/yard, an enhanced soil blend for $86/yard, and medium fir bark for $64/yard. They donate 4 yards a year to the school district. They would consider buying local if the quality is deemed to be as good, or better, than the product that they're currently purchasing. San Juan Sanitation would be interested in selling local compost if it were deemed a premium product (i.e. blended with biochar). They believe that there's a market for such a premium product with high-end landscapers. ORS would like to be the primary seller of bulk compost, with the potential to expand into bagged compost. They are open to wholesaling compost to other entities.

Bagged

Bagged compost is sold at multiple retailers at dramatically differing prices. The following are a couple of examples:

- Ace Hardware
  - $3.99 per 1 cubic foot bag of manure - $107.73/yd. eq.
  - $5.99 per 1 cubic foot bag of organic blend compost - $161.73/yd equivalent

The premium fetched for bagged compost opens an opportunity for ORS to cover its bagging costs and/or it creates an opportunity for an entrepreneur to purchase compost in bulk, then bag and sell at a premium.

Idea: Bucket Exchange

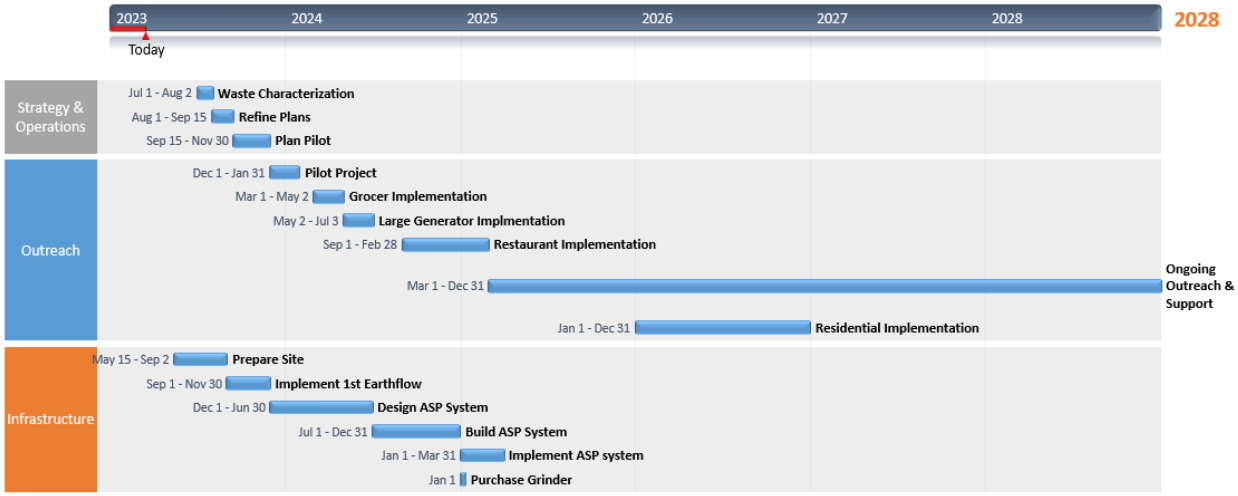
Image: (Fertile Gound Compost, 2023)

Compost could be packaged in 5-gallon buckets vs. plastic bags. Buyers would pay the retailer a deposit equivalent to the price of the bucket when they purchased the compost, then would be credited that value if/when they returned the bucket. If they chose to keep the bucket, the retailer would keep the deposit. Empty buckets would be returned for refilling. This system would:

- Reduce plastic bag waste
- Differentiate product from others sold at garden centers
- Further justify the premium charged for Orcas compost
- Reduce the cost of bags
- Encourage return traffic to retailers, likely increasing impulse buys

Sample Timeline – Orcas

The following timeline is provided for directional guidance only. Availability of capital, stakeholder engagement and other variables will inevitability dictate the actual implementation timeline.

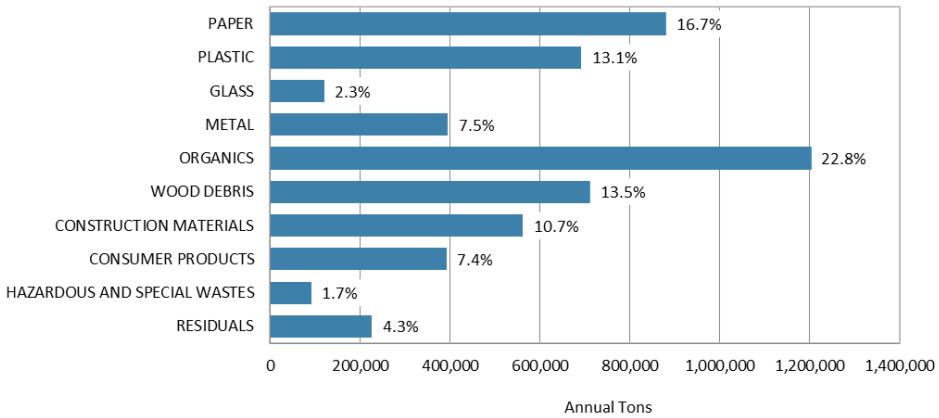


Lopez Island

Of the three islands visited, Lopez has, by far, the most comprehensive informal system for organics management. Many restaurants and grocery stores have already partnered with local farmers, and Midnight's Farm and Sweet Grass Farm are already producing and selling compost. As such, a very different approach for Lopez exists than Orcas and San Juan; one that supports and enhances the informal system already developed rather than replacing it with competing infrastructure.

Feedstock

The 2020/21 Washington Statewide Waste Characterization, commissioned by the WA State Department of Ecology estimates that approximately 22.8% of the weight of this MSW (trash) is organic material. One important caveat is that no samples were collected from San Juan County for the statewide report, so this data may differ from actual percentages generated in Lopez Island. A Lopez Island waste characterization study would provide more targeted data (as discussed previously). However, assuming the 22.8% organics number is represented in the 809.14 tons of MSW processed by Lopez Solid Waste Transfer Station in 2021, it would suggest that 184.48 tons of compostable material was disposed in the trash in 2021.



Waste streams by category, 2020/21 Washington Statewide Waste Characterization Study.

Key Stats (2021):

809.14 tons of trash processed through the Lopez Solid Waste District drop-box facility

22.8% of trash was organic material, statewide.

184.48 tons of organics disposed in the trash Lopez Island (assumed)

EPA Estimates:

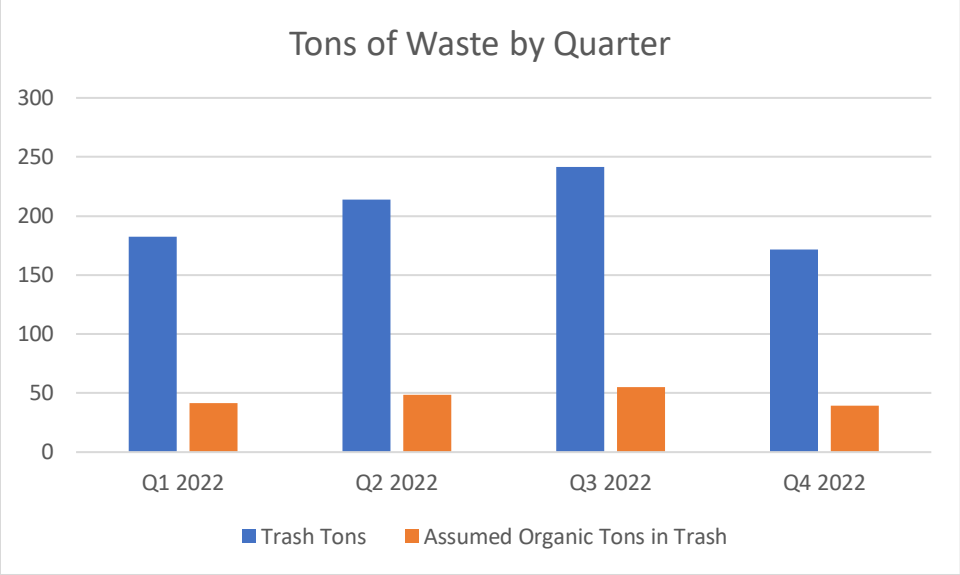
- Food waste to weigh 463 lbs./cu yd
- Yard waste 250 lbs./ yd

This material, however, is not generated at a steady rate throughout the year. Because the San Juan Islands are a summer tourist destination, Q2 (April 1st- June 30th) and Q3 waste volumes are roughly 1/3 higher than Q4 and Q1. We suspect that monthly variations are even more dramatic, however, and that MSW could fluctuate between 65 tons and 85 tons per month. The seasonality of yard waste and food waste could compound these fluctuations, suggesting that July's volume of compostable material could be as much as twice that of April.

The Lopez Solid Waste Disposal District doesn't currently accept wood waste or yard debris.

Tons of Waste Processed by the Lopez Island Dropbox Facility in 2021

Quarter	Trash Tons	Assumed Organic Tons in Trash
Q1 2022	182.22	41.55
Q2 2022	213.75	48.74
Q3 2022	241.44	55.05
Q4 2022	171.84	39.18
Total	**809.25**	**184.52**



Beyond the Lopez Island Transfer Station, there are other sources of compostable material currently generated, including:

- Roadkill
- Biosolids (sewage sludge) generated at the: Fisherman Bay Wastewater Treatment plant
- Manure generated by equestrian facilities farms such as
- Land clearing and brush generated from San Juan County road projects

Priority Waste Generators

Restaurants

There are approximately 14 restaurants on Lopez Island, examples include:

- Vortex Café
- Blue Heron Bistro
- Poutine Your Mouth
- Setsuni Noodles

- Brewvado Taproom
- A Pizza Pie
- Holly B's Bakery

Restaurants present a great source of food waste feedstock, however there are many variables. As compared to resorts or grocery stores, restaurants generally generate less food waste individually, but they are more numerous and dispersed. This can cause hauling challenges. This dispersed nature also means that the program relies on the success of many crews of staff in an industry that's known for high turn-over and limited engagement. Some keys for success are included to the right.

Best Practices: Restaurant

7) Start with the kitchen, only move to guest participation after the kitchen program is dialed.
8) Closely monitor for contamination.
9) Track metrics, communicate to staff.
10) Utilize bin colors and signage.
11) Make it easy for staff to participate.
12) Consider durable food service ware vs. compostable.

Restaurant Profile: Vortex Café

Image Source: (Lopez Island Directory, 2023)

Vortex Café is an organic café and juice bar located in Lopez Village. Vortex Café prides itself on serving local produce and nourishing meals to all its customers. Their menu consists of smoothies, juices, soups, salads, wraps, and more.

Vortex Café exemplifies a closed loop food system through its partnership with local farmers. Every day, owner and chef, Jean Perry, collects all food scraps (pre and post-consumer) in 5-gallon buckets and places them in an enclosed area outside. These are then picked up by either local pig or chicken farmers, depending on the season of harvest. Unfortunately, they don't come every day, so sometimes large amounts of food are sitting outside. However, vectors haven't been an issue at Vortex.

Restaurant Profile: Blue Heron Bistro

The Blue Heron Bistro is a brick-and-mortar restaurant in the heart of Lopez Village that is dedicated to creating a family-friendly dining space that builds the local food economy and connects community. The bistro values building relationships through food while providing the freshest ingredients that accommodate the seasons. The Blue Heron Bistro has a full bar, serves brunch, hosts special events, and does catering services.

The restaurant has one recycling and one trash dumpster that's consistently full. The location generates roughly three to five 5-gallon buckets of food scraps a day in the tourist off season. Like Vortex Café, these food scraps are pre-consumer, post-consumer, meat, and dairy picked up every day by local pig farmers. One of their largest needs is the ability to compost commercially compostable to-go containers, cups, and utensils. Owners Jennifer Buckallew and Ted Warner also own two Lopez Island food trucks, Poutine Your Mouth and APIZZAPIE. The pizza truck generates a large volume of pizza boxes that could be composted.

Grocery Stores

Grocery stores represent large single-source generators for food waste and as such, are typically targeted as early participants in new food waste diversion programs. Grocery Stores serviced by a roll-off compactor represent a unique opportunity to deliver significant savings from weight reduction. Savings generation in dumpster-serviced properties is still possible, but less significant. Fresh Produce, Meat and Deli departments are great places to start when implementing programs within grocery stores because packaging is limited. Training in these departments is still important because twist ties, stickers, and plastic wrap can introduce damaging contaminates to compost. Only after programs are dialed in these departments is it recommended to expand the program to packaged food products. De-packaging expired meats, dairy and grain products is an essential function, but often dreaded by grocery staff. As such, we suggest using caution when expanding programs to these categories; and only implementing after early wins are experienced, and if staff engagement is high.

A total of 3 grocery stores serve Lopez Island:

- Lopez Village Market
- Blossom Grocery
- Southend General Store & Restaurant

Grocery Profile: Lopez Village Market

The Lopez Village Market is one of the primary grocery stores on Lopez Island. It is a family owned and operated full-service grocery store that provides a diverse selection of high-quality products. The Lopez Village Market takes pride in its convenience and customer service.

The Lopez Village Market seems proactive about reducing food waste. The store claims to not generate much waste, as they commit significant focus to selling products while they're still fresh. Any surplus food from the hot bar is re-packaged and sold at a discount, any leftover deli meat is ground and sold as dog food, and they sell surplus chicken and fish as crab bait. Their main source of waste comes from their produce department. The market produces about 1-5 bins a day depending on the season where they're collected and picked up by three different local pig farmers. Because they have such a proactive system, the administrators at the market don't see a need for compost collection.

Grocery Profile: Southend Market & Café

Image Source: (Loopnet, 2023)

The Southend Market & Café is located on the south side of Lopez Island, providing organic and conventional food items for residents and visitors. Beyond food, Southend has a wide variety of wine, beer, and local art. The location also has a café that serves tasty sandwiches, burgers, and kid-friendly meals.

The Southend Market generates some organic material from the store's produce section and restaurant. A chicken farmer picks up buckets of produce during the summertime, but is less consistent in the off season. The market has an on-site backyard compost but needs to be revamped with proper staff training. As of January 24th, 2023, the current owner, Lori Honeywells, has sold the Southend Market and Café to a local couple.

Landscaping Companies

Landscaping companies are a great source for woody debris and grass clippings, valuable feedstocks for a composting operation. Because they typically have their own hauling capabilities, implementing diversion strategies with landscaping companies can be as simple as encouraging them to dump in the desired area at the transfer station. However, most existing landscaping contractors already have an outlet for their material, likely at a lower price than a self-sustaining compost operation would charge.Therefore, ensuring that a critical mass of companies utilize County facilities presents a challenge. No-dumping ordinances, burn bans, and similar local ordinances can encourage landscapers to dispose of their material at the County transfer center vs. other sites.

School(s)

Schools represent not just an opportunity for waste prevention and diversion on-site, but also an opportunity to train the community. Across cultures, the "trickle up effect" is one of the most effective mechanisms to implement behavior change within a community. If kids are trained to separate food waste at school, they will bring this knowledge and expectation home to their families, thereby impacting residential participation as well.

School Profile: Lopez Island Elementary, Middle, and High School

The Lopez Island School District offers students a variety of unique programs and services to foster success. The school partners with volunteers and the Lopez community to collaborate on new learning opportunities for students. The district is nationally recognized for its farm-to-garden curriculum. The elementary, middle, and high school has a total of 220-240 students and 40-50 staff employees. The kitchen serves 150-170 meals a day. Roughly 30 of those meals are breakfast and 140 are lunch. All school meals are made from scratch and the school raises much of the produce served from the school garden program. These operations generate five 10-gallon buckets of pre-consumer scraps a day and

approximately five 7-gallon buckets of post-consumer scraps a day. Currently the school has partnered with a local pig farmer that comes by on Tuesdays and Fridays to pick up food scraps. However, this is subject to sudden or abrupt cancelations because the farmer can't always come by the school. The kitchen staff would like compost service of some kind to create consistency and stability. The school also generates grass clippings that are currently piled on a hillside near the athletic field. These nitrogen-rich unturned piles could be a source of methane emissions, which a more intentional composting operation would solve.

Public Entities

While our Lopez stakeholder outreach did not include any public entities, we infer that material could be generated from the Lopez Village, Spencer Spit State Park, Odlin County Park, and Lopez Ferry Dock.

Hauling & Collection

The Lopez Island community is passionate about reducing food waste and supporting local agriculture. Local businesses improvised and sought out solutions to divert food scraps to local farmers. Because Lopez Island has created a robust system to collect food scraps for animal consumption, there is no immediate need for organics collection service on the island. Lopez Island generates the smallest amount of MSW and organic material, and based on the costs provided by San Juan Sanitation, it would be financially infeasible to service and organics collection route on Lopez. If grant funds were available for equipment and infrastructure, Lopez Solid Waste District may consider purchasing a small collection truck, known as a satellite truck to service select organics generators.

Image: (Perkins Mfg., 2023)

Processing

San Juan County should support waste prevention efforts on Lopez Island and then if a surplus in-vessel system becomes available, consider repurposing it at the Lopez Solid Waste Disposal District drop box facility due to its convenient location, shared staffing opportunities, and experience with waste operations.

Phased Approach

San Juan County could pursue a metered progression for phasing in organics diversion on Lopez Island. Commercial composting is a capital-heavy process with significant efficiencies of scale. Lopez Island presents the challenge of insufficient volume to achieve such efficiencies. Multiple avenues were explored, with the recommendations below.

Idea 1: Materials Exchange

Locals on Lopez Island use the site, "LopezRocks.org", as a central location to announce events, promote local business deals, and overall connect the community. We recommend maximizing the existing tool and creating a subpage for locals to exchange feedstock and finished compost. This way when one farmer harvests their livestock, another farmer can step in to collect a business's food scraps and minimize collection gaps.

LOPEZROCKS
A Community Website by Lopez Island

Idea 2: Promoting Businesses

There are already many local businesses such as restaurants, grocery stores, and cafes that have a local farmer collect food scraps. Not all places have utilized local farmers, so working with the Lopez Chamber of Commerce to create a sticker, logo, or sign advertising they divert food waste material to a local farmer could help. This could promote all the great work Lopez is already doing and encourage other businesses to join those efforts. Andrea with the Lopez Chamber of Commerce has expressed interest in this and could promote it via her newsletter.

Idea 3: Nightly Rental Toolkit

Multiple stakeholders speculated that a significant amount of organic materials, specifically food waste, comes from visitors during the summer months. Locals on the island are already making strides to reduce food waste by feeding animals, but there is still an opportunity to reduce material going into the trash by engaging with visitors. To do this, creating and implementing a nightly toolkit for vacation rentals could be beneficial. This would include a compost bin in rental home kitchens, educational flyers on what can be composted, and other helpful instructions and/or information visitors should know about. This could then be taken to the island's trash drop box or somewhere else to be properly composted. Specifics of such a program would need careful consideration and planning.

Site Design

After pursuing waste preventative measures on Lopez Island, an in-vessel system may be supported. This will create an opportunity for Lopez to compost at a convenient location with waste management experience. Wilson Engineering is leading the site planning for the expansion of the transfer station, with suggestions integrated below.

San Juan County owns the property of the Lopez transfer station, but Lopez Solid Waste Disposal District uses the land and its buildings. The site has three phase power and an excavator on wheels. The Lopez transfer station is planning to re-design the existing site once Lopez Public Works moves. With this re-design, mitigating noise and working with the neighbors is important. Currently they're not experiencing any vector issues. The transfer station doesn't have a scale but would like to because they're seeing an increase in dumping from contractors. 10% of their customer base would benefit from a scale house.

The composting area should be on a flat surface to better navigate trucks. An in-vessel system could go on the east side of the southend building. Based on Wilson Engineering's Lopez Island Solid Waste Master Plan, they recommend the south east corner to be paved with new asphalt, a sound wall, and include seven bunker walls.

Tipping Fees

The Lopez Island transfer station has a drop box for trash. They have three trash dumpsters, with two of them available for dumping. Once the trash drop boxes are full, they're sent to Skagit County Transfer Station via Lopez's own trucks. The transfer station has various charges for customers. They charge $5-$10 for a 32-gallon can. 11% of their customers fall under this billing. Other charges include $0.32/gallon for garbage and $2.34 cubic feet for garbage. San Juan Sanitation takes Lopez Island's commercial trash to the Orcas Island transfer station.

There is potential space for a 30-40 yard clean green waste drop box near the trash drop boxes, which if discounted rates were charged for clean-green material, could be transported to Midnight's Farm or another on-island yard waste composting facility. This would provide residents a convenient one-stop-stop for waste disposal.

Compost Sales Outlets

Compost is currently sold on Lopez Island, primarily in bulk form. As with most markets, bulk material is priced much lower on a per-cubic-yard basis, as consumers are paying for convenience with bagged product.

Bulk

Sweet Grass Farm raises pure-bred Wagyu cattle where they turn animal bedding to make compost. They make approximately 500 – 1000 tons a year and currently sell compost at $80/yard, with the option to deliver.

Midnight's Farm is the first Department of Ecology approved composting facility in San Juan County located on Lopez Island. They produce compost out of yard debris feedstock and sell various compost sizes. Midnight's Farm holds only an agricultural composting permit, so they are unable to accept food waste. Their 7/8" compost is sold at $73.64/yard with tax, and their 1 ¼" compost is sold at $59.57/yard with tax. They deliver for $60/load.

Conclusion

At $350-$400/ton, San Juan County has the highest waste disposal cost in the State of Washington and approximately 7 times the national average. (statista.com). Much of the food waste currently ends up in the trash, only to be hauled off-island to a remote mega-landfill hundreds of miles away. Rather than continuing this expensive and environmentally damaging practice, organic materials could remain on the islands, nourishing local soils and enhancing local farms. This would also reduce the need to haul compost to the Islands for local gardens and projects.

The goal of this Organics Recycling Implementation Plan is to ensure that Orcas, San Juan, and Lopez Islands can each process the organic materials generated on their respective islands. This includes a multi-phase approach with separate considerations for each island, as well as consistent countywide program elements. Factors considered in the planning process included: efficiency, pricing, impact on the public (noise and smell), environmental concerns, staffing, return on investment, and ease of implementation.

Extensive research and stakeholder operational needs were considered for the best fit composting infrastructure options for each island. This includes the implementation of a full-scale aerated static pile (ASP) system and in-vessel mobile composting systems. However, the ASP system requires significant time and capital investment for design and engineering. Because of this, it is recommended San Juan and Orcas Island pursue smaller systems like the Green Mountain Earth Flow Intermodal (EFI) and scale up to a full compost system as organics recycling continues to expand to serve Island needs. The EFI is a fully automated and enclosed steel vessel that limits pest and odor issues. These systems allow for full control of the composting process and generate high-quality compost. Additionally, modular in-vessel systems are more cost-effective than a standard system due to the speed of composting, a smaller footprint, and minimized labor required for operation. This allows the County to immediately foster collection and end-market sales while building throughput. For Lopez Island, it is recommended stakeholders continue to divert food waste to feed animals and then consider using either San Juan or Orcas Island's Earth Flow system towards the end of its lifespan.

Once the project begins, there will be a need to further educate the residents and visitors, informing them that the program exists and how it works so that they will participate. Procedures will also need to be established with businesses and other waste generators to determine specifics for pickups. Without proper community education and outreach, participation will be limited, and contamination will be rampant.
After three visits, dozens of stakeholder meetings, and multiple site tours across three islands, it is evident that residents, business owners, and public workers want to bring commercial composting to the San Juan Islands. There is immeasurable support to make this plan a reality and collaborate with all stakeholders involved to make it feasible. This Organics Recycling Implementation Plan can be used as a guide for San Juan County to bring commercial composting to fruition.

Appendix 1: WAC 173-350-220 (Washington State Legislature, 2023)

Composting facilities.

(1) **Composting facilities - Applicability.**

(a) These standards apply to all facilities that treat solid waste by composting.

(b) These standards do not apply to:

(i) Methods of managing organic materials that are excluded from the solid waste handling standards in WAC **173-350-020**;

(ii) Composting used as a treatment for contaminated soil or contaminated dredged material regulated under WAC **173-350-320** or **173-350-490**;

(iii) Anaerobic digesters regulated under WAC **173-350-250**, or treatment of other liquid or solid wastes in digesters regulated under WAC **173-350-330**;

(iv) Composting of bovine and equine carcasses for producers subject to RCW **70.95.306**. Producers that fail to meet the conditions of RCW **70.95.306** will be required to obtain a solid waste handling permit from the jurisdictional health department and must comply with all other conditions of this chapter; and

(v) Composting biosolids when managed under chapter **173-308** WAC, Biosolids management.

(2) **Composting facilities – Permit exemptions.** In accordance with RCW **70.95.305**, conditionally exempt facilities composting materials and volumes in Table 220-A must meet the conditions listed in Table 220-A, and (a) through (e) of this subsection to be conditionally exempt from solid waste handling permitting. Feedstocks not listed in Table 220-A must be approved by the department and jurisdictional health department. For the purposes of this subsection, "material on-site at any one time" includes feedstocks, active composting, curing piles, and composted materials. An owner or operator that does not comply with the terms and conditions of Table 220-A and (a) of this subsection is required to obtain a permit from the jurisdictional health department and must comply with all other applicable requirements of this chapter. Violations of the terms and conditions of Table 220-A and (a) of this subsection may be subject to the enforcement provisions of RCW **70.95.315**.

Table 220-A

Terms and Conditions for Solid Waste Permit Exemptions

	Organic Materials	**Volume**	**Specific Requirements for Activity or Operation**
(1)	All organic feedstocks	No more than 5,000 gallons or 25 cubic yards of material on-site at any one time.	No notification, reporting or testing requirements.
(2)	All organic feedstocks	Greater than 25 but no more than 250 cubic yards of material on-site at any one time, not to exceed	(a) Thirty days prior to operation, facilities must submit a notification of intent to operate as a conditionally exempt facility to the

		1,000 cubic yards in a calendar year.	jurisdictional health department and the department. Notice of intent must be submitted on a form provided by the department; (b) Facilities that distribute composted material off-site must meet the following conditions: (i) Manage the operation to reduce pathogens to meet limits set by Table 220-B; (ii) Conduct compost analysis according to the requirements of Table 220-B. Compost testing frequency is based on volume of compost produced annually as required by subsection (4)(a)(x)(B) of this section; and (iii) Submit annual reports and results of composted material analysis to the department and the jurisdictional health department by April 1st of each calendar year. Annual reports must be submitted on forms provided by the department.
(3)	Yard debris Crop residues Manure and bedding Bulking agents	Greater than 25 but no more than 500 cubic yards of material on-site at any one time, not to exceed 2,500 cubic yards processed in a calendar year.	(a) Thirty days prior to operation, facilities must submit a notification of intent to operate as a conditionally exempt facility to the jurisdictional health department and the department. Notice of intent must be submitted on a form provided by the department. (b) Facilities that distribute composted materials off-site must meet the following conditions: (i) Manage the operation to reduce pathogens to meet limits set by Table 220-B; (ii) Conduct compost analysis according to the requirements of Table 220-B. Compost testing frequency is based on volume of compost produced annually as required by subsection (4)(a)(x)(B) of this section; and (iii) Submit annual reports and results of composted material analysis to the department and the jurisdictional health department by April 1st of each calendar year. Annual reports must be submitted on forms provided by the department.
(4)	Agricultural wastes Yard debris Bulking agents	Greater than 25 but no more than 1,000 cubic yards of agricultural wastes and bulking agents on-farm at any one time, and up to 50% of organic materials on-farm can be yard debris.	Agricultural farms managing more than 25 cubic yards of imported yard debris on-site at any one time or composting only agricultural wastes but that distribute off-site must meet the following conditions: (a) Thirty days prior to operation, facilities must submit a notification of intent to operate as a conditionally exempt facility to the

			jurisdictional health department and the department. Notification must be submitted on a form provided by the department; (b) If agricultural farm is only managing agricultural waste and not distributing composted material off farm, then notification in (4)(a) of this table is not required; (c) Facilities that distribute composted material off-site must meet the following conditions: (i) Manage operation to reduce pathogens to meet limits set by Table 220-B of this section; (ii) Conduct compost analysis according to the requirements of Table 220-B. Compost testing frequency is based on volume of compost produced annually as required by subsection (4)(a)(x)(B) of this section; and (iii) Submit annual reports and results of composted material analysis to the department and the jurisdictional health department by April 1st of each calendar year. Annual reports must be submitted on forms provided by the department.
(5)	Agricultural wastes Manure and bedding from zoos Bulking agents	Greater than 25 cubic yards with no upper limits when only agricultural wastes, manure and bedding from zoos, and bulking agents are processed on-farm, or on-site for zoos.	Agricultural farms that distribute composted material off-farm, or off-site for zoos, must meet the following conditions: (a) Thirty days prior to operation, facilities must submit a notification of intent to operate as a conditionally exempt facility to the jurisdictional health department and the department. Notification must be submitted on a form provided by the department; (b) For composting at a dairy, composting must occur as part of an updated dairy nutrient management plan as required by chapter **90.64** RCW, Dairy Nutrient Management Act; (c) For composting at a farm other than a dairy, composting must occur as part of an updated farm management plan written in conjunction with a conservation district, a qualified engineer, or other agricultural professional able to certify that the plan meets applicable conservation practice standards in the USDA *Washington Field Office Technical Guide*, Code 317, produced by the Natural Resources Conservation Service; (d) Facilities that distribute composted material off-site must meet the following conditions: (i) Manage the operation to reduce pathogens to meet limits set by Table 220-B of this section;

			(ii) Conduct compost analysis according to the requirements of Table 220-B. Compost testing frequency is based on volume of compost produced annually as required by subsection (4)(a)(x)(B) of this section; and (iii) Submit annual reports and results of composted material analysis to the department and the jurisdictional health department by April 1st of each calendar year. Annual reports must be submitted on forms provided by the department.

(a) Comply with the performance standards of WAC **173-350-040**;

(b) Manage the operation to prevent the migration of agricultural pests identified by local horticultural pest and disease control boards, as applicable;

(c) Control nuisance odors to prevent migration beyond property boundaries;

(d) Manage the operation to prevent attraction of flies, rodents, and other vectors; and

(e) Allow the department or the jurisdictional health department to inspect the site at reasonable times.

(3) **Composting facilities - Permit requirements - Location.** There are no specific location standards for composting facilities subject to this chapter; however, composting facilities must meet the performance standards of WAC **173-350-040**.

Note: When considering compost facility location, please review the U.S. Department of Transportation Federal Aviation Advisory Circular. No. 150/5200-33B 2007.

(4) **Composting facilities - Permit requirements - Design.** Composting facilities must be designed and constructed to meet the requirements of this subsection.

(a) Composting facilities must be designed and constructed such that:

(i) The facility can be operated to meet the performance standards of WAC **173-350-040**; and

(ii) The facility can be operated to promote controlled, aerobic decomposition. This requirement is intended to ensure that compost facility designers take into account porosity, nutrient balance, pile oxygen, pile moisture, pile temperature, and retention time of composting when designing a facility. It is not intended to mandate forced aeration or any other specific composting technology.

(b) The owner or operator of a composting facility must prepare and provide to the jurisdictional health department engineering reports, engineering plans, and engineering specifications that address the design standards of this subsection. The engineering documents must be prepared by a professional engineer registered in the state of Washington, and must include:

(i) An engineering report that presents the design basis and calculations for the engineered features of the facility including, but not limited to: Pad, impoundments, stormwater management features, leachate management features, and aeration and emission control features as required by the permitting air authority where applicable. The engineering report must demonstrate that the proposed design will meet the performance standards of this chapter;

(ii) Scale drawings of the facility including the location and size of feedstock and composted material storage areas, compost processing areas, fixed equipment, buildings, stormwater management features where applicable, access roads, traffic patterns, and other constructed areas and buildings integral to facility operation;

(iii) Design specifications for the engineered features of the facility including, but not limited to, pads, stormwater management features, leachate management features, and aeration and emission management features as required by a permitting air authority where applicable; and

(iv) A construction quality assurance plan that describes monitoring, testing, and documentation procedures that will be performed during construction of the facility to ensure the facility is constructed in accordance with the approved design.

(c) When operations require public access, all-weather roads must be provided from the highway or roads to and within the compost facility and must be designed and maintained to prevent traffic congestion, traffic hazards, dust, and noise pollution.

(d) Compost facilities must manage stormwater and leachate to meet the standards of this section and of any and all federal, state, and local water and air quality permits.

(e) Composting facilities must minimize the production of leachate and runoff by designing stormwater management features such as run-on prevention systems, which may include covered areas (roofs), diversion swales, ditches, or other features designed to divert stormwater from areas of feedstock preparation, active composting, and curing.

(i) Composting facilities must manage any leachate generated at the facility by providing leachate management features. The leachate management features include, but are not limited to, leachate collection, conveyance, and storage structures, or treatment systems. Leachate must be collected from areas of feedstock storage and preparation, active composting, and curing, and be conveyed to a leachate storage structure or treatment system. Any discharges to ground that result in contaminants migrating to groundwater require a waste discharge permit under chapter **90.48** RCW, Water pollution control, prior to discharge. Discharges to ground that result in degradation of groundwater quality are prohibited under chapter **90.48** RCW, Water pollution control. Any discharge to sanitary sewer requires additional permitting by the local delegated authority or department;

(ii) Stormwater and leachate collection and conveyance structures must be designed based on the volume of water resulting from a twenty-five-year storm event;

(iii) Leachate storage structures such as ponds or tanks must be of adequate capacity to store the normal maximum volume of leachate generated by the facility. The normal maximum volume will be established based on the following conditions:

(A) Facility design;

(B) Normal climatic precipitation and evaporation data for the location of the facility;

(C) Monthly leachate reuse or removal; and

(D) A factor of safety to accommodate variability of actual conditions from normal conditions.

(iv) Leachate holding ponds and tanks must be designed according to the following:

(A) Leachate ponds at registered dairies must meet Natural Resources Conservation Service standards for a waste storage facility in the 2001 (revised June 2011) *Washington Field Office Technical Guide* (Code 313).

(B) Leachate ponds at composting facilities other than registered dairies must be designed to meet the following requirements:

(I) Have a liner consisting of a minimum 30-mil thickness geomembrane on a subgrade that provides sufficient bearing capacity to support the liner and the contents of the pond. A liner constructed with a high density polyethylene geomembrane must be at least 60-mil thick to allow for proper welding. The jurisdictional health department may approve the use of an alternative liner design if the owner or operator can demonstrate during the permitting process that the proposed design will prevent migration of solid waste constituents or leachate into the ground or surface waters at least as effectively as the liners described in this subsection;

(II) Have dikes and slopes designed to maintain their structural integrity under conditions of a leaking liner and capable of withstanding erosion from wave action, overfilling, or precipitation;

(III) Have freeboard (distance between the liquid level and the top of the pond) equal to or greater than eighteen inches to avoid overtopping from wave action, overfilling, or precipitation. The jurisdictional health department may reduce the freeboard requirement if other engineering controls are in place that prevent overtopping. These engineering controls must be specified during the permitting process; and

(IV) Leachate ponds that have the potential to impound more than ten-acre feet (three million two hundred fifty-nine thousand gallons) of liquid measured from the top of the dike and which would be released by a failure of the containment dike must be reviewed and approved by the dam safety section of the department.

(C) Tanks used to store leachate must meet design standards in WAC **173-350-330** (4)(b).

(f) Incoming feedstocks, active composting, and curing materials must be placed on pads that prevent contamination of soil or groundwater underlying or adjacent to the pads. Pads must meet the following requirements:

(i) All pads must be curbed or graded in a manner to prevent ponding, to control run-on and runoff, and to separately collect and convey all stormwater and leachate to separate storage or holding systems. Stormwater that is combined with leachate must be managed as leachate in accordance with this section;

(ii) All pads must be constructed on subgrades that provide sufficient bearing capacity to support the weight of the pad, the materials placed on them, and the equipment used in handling the materials;

(iii) The entire surface area of the pad must be designed to maintain its structural and hydraulic integrity against loads resulting from any machinery used for feedstock and compost handling activities, and from surface wear or damage caused by feedstock and compost handling, or by active composting at the facility;

(iv) The pad may be constructed of materials such as concrete (with sealed joints), asphaltic concrete, or soil cement that prevents subsurface soil and groundwater contamination; and

(v) The jurisdictional health department may allow pads for compost facilities to be designed and constructed with materials other than those listed in (f)(iv) of this subsection, provided the applicant demonstrates in the engineering report to the jurisdictional health department's and the department's satisfaction that the alternative pad provides sufficient protection to meet the performance standards of this section and of WAC **173-350-040**.

(5) **Composting facilities - Permit requirements – Documentation.** Within thirty days of completing construction, the owner or operator of a composting facility must provide copies of the construction record drawings for engineered features at the facility and a report documenting facility construction, including the results of observations and testing carried out as part of the construction quality assurance plan, to the jurisdictional health department and the department. Facilities must not begin operating until the jurisdictional health department has determined that the construction was completed in accordance with the approved engineering report, plans, and specifications and has approved the construction documentation in writing. The jurisdictional health department has thirty days after receiving complete construction records to provide its determination.

(6) **Composting facilities – Permit requirements – Operating.** The owner or operator of a composting facility must:

(a) Operate the facility to:

(i) Control air contaminants such as dust and nuisance odors to prevent other contaminants from migrating beyond property boundaries in accordance with WAC **173-350-040**(3);

(ii) Prevent the attraction of vectors;

(iii) Prevent the migration of agricultural pests identified by local pest and disease control boards, as applicable;

(iv) Ensure access to the facility is restricted when the facility is closed;

(v) Ensure that only feedstocks identified in the approved plan of operation are accepted at the facility;

(vi) Ensure the facility operates under the supervision and control of a properly trained individual(s) during all hours of operation:

(A) Facility supervisors responsible for daily operation must receive training, or be able to document prior training, in the basics of composting within the first year of supervising the facility. Training must consist of classroom and hands-on course work and conclude with a certificate of completion that must be kept on-site at all times. Appropriate compost training can be obtained through organizations such as the Washington organic recycling council, the Solid Waste Association of North America, the U.S. Composting Council, or other training as approved by the jurisdictional health department; and

(B) Ensure facility employees are trained in appropriate facility operations, maintenance procedures, and safety and emergency procedures according to individual job duties and according to an approved plan

of operation. A trained supervisor may provide appropriate training to employees responsible for daily operations.

(vii) Implement and document pathogen reduction activities. Documentation must include compost pile temperatures representative of the composting materials, and notation of turnings as appropriate, based on the composting method used. Pathogen reduction activities must at a minimum include the following:

(A) In vessel composting - The temperature of the active compost pile must be maintained at fifty-five degrees Celsius (one hundred thirty-one degrees Fahrenheit) or higher for three consecutive days (seventy-two hours); or

(B) Aerated static pile must have a cover such as a synthetic material or a layer of finished compost to ensure that pathogen reduction temperatures are reached and vectors are controlled. The temperature of the active compost pile must be maintained at fifty-five degrees Celsius (one hundred thirty-one degrees Fahrenheit) or higher for three consecutive days (seventy-two hours); or

(C) Windrow composting - The temperature of the active compost pile must be maintained at fifty-five degrees Celsius (one hundred thirty-one degrees Fahrenheit) or higher for fifteen days or longer. During the period when the compost is maintained at fifty-five degrees Celsius (one hundred thirty-one degrees Fahrenheit) or higher, there must be a minimum of five turnings of the windrow; or

(D) An alternative method of composting that can be demonstrated by the owner or operator to achieve an equivalent reduction of human pathogens.

(viii) Monitor the composting process according to the plan of operation submitted during the permitting process. Monitoring must include inspection of incoming loads of feedstocks and pathogen reduction requirements of (a)(vii) of this subsection;

(ix) Collect composted material samples for analysis that are representative of the pile. Use a sampling method such as described in the U.S. Composting Council 2002 Test Methods for the Examination of Composting and Compost, Method 02.01-A through E; and

(x) Analyze composted material for metals and other testing parameters listed in Table 220-B.

(A) The jurisdictional health department may require additional tests for metals and contaminants;

(B) Testing frequency is based on amount of composted material produced. A representative sample of composted material must be tested for every 5,000 cubic yards produced, or every three hundred sixty-five days, whichever is more frequent. The jurisdictional health department may modify the frequency of testing based on historical data for a particular facility;

(C) Composted material meeting the conditions of subsection (6)(a)(x) and (g) of this section can be stored off of a pad.

Table 220-B

Testing Parameters

Metals and other testing parameters	Limit (mg/kg dry weight), unless otherwise specified
Arsenic	≤ 20 ppm
Cadmium	≤ 10 ppm
Copper	≤ 750 ppm
Lead	≤ 150 ppm
Mercury	≤ 8 ppm
Molybdenum	≤ 9 ppm
Nickel	≤ 210 ppm
Selenium	≤ 18 ppm
Zinc	≤ 1400 ppm
Physical contaminants1	≤ 1 percent by weight total, not to exceed .25 percent film plastic by weight
Sharps	0
pH	5 - 10 (range)
Biological stability2	Moderately unstable to very stable
Fecal coliform3	< 1,000 Most Probable Number per gram of total solids (dry weight)
OR	
Salmonella	< 3 Most Probable Number per 4 grams of total solids (dry weight)

1 A label or information sheet must be provided with compost that exceeds .1 percent by weight of film plastic. See WAC 173-350-220 (6)(f)(iii)(D)(I).

2 Tests for biological stability must be done as outlined in the United States Composting Council Test Methods for the Examination of Composting and Compost unless otherwise approved by the jurisdictional health department.

3	Test for either fecal coliform or salmonella.

Note: Biosolids composters regulated under this chapter must communicate with the jurisdictional health department to determine if different testing parameters and testing frequencies are required.

(b) Inspect the facility to prevent malfunctions and deterioration, operator errors and discharges that may cause or lead to the release of waste to the environment or a threat to human health. Inspections must be conducted at least weekly, unless an alternate schedule is approved by the jurisdictional health department as part of the permitting process.

(c) For compost facilities with leachate holding ponds, conduct regular liner inspections at least once every five years, unless an alternate schedule is approved by the jurisdictional health department as part of the permitting process. The frequency of inspections must be specified in the operations plan and must be based on the type of liner, expected service life of the material, and the site-specific service conditions:

(i) Inspect the liner for degradation and ruptures of the liner material and for failure of any seams or joints in the liner material. If the maximum wetted extent of the liner geomembrane cannot be directly inspected visually, then the liner must be tested for leaks by electrical leak detection survey methods. If leaks, degradation, or ruptures of the liner material are detected, the liner must be repaired; and

(ii) The jurisdictional health department must be given sufficient notice and have the opportunity to be present during liner inspections. An inspection record must be kept at the facility or other convenient location if permanent office facilities are not on-site, for at least five years from the date of inspection. Inspection records must be available to the jurisdictional health department upon request.

(d) Maintain operating records of the following:

(i) Daily temperatures representative of compost piles;

(ii) Additional process monitoring data as prescribed in the plan of operation;

(iii) Results of analyses for composted materials as required in (a)(x) of this subsection and Table 220-B; and

(iv) Facility inspection reports must be maintained in the operating record. Significant deviations from the plan of operation must be noted in the operating record. Records must be kept for a minimum of five years and must be available upon request by the jurisdictional health department.

(e) Prepare and submit an annual report to the jurisdictional health department and the department by April 1st of each calendar year on forms provided by the department. The annual report must detail the facility's activities during the previous calendar year and must include the following information:

(i) Name and address of the facility;

(ii) Calendar year covered by the report;

(iii) Annual quantity and type of feedstocks received and compost produced, in cubic yards or tons;

(iv) Annual quantity of composted material sold or distributed, in cubic yards or tons;

(v) Annual summary of laboratory analysis of composted material; and

(vi) Any additional information required by the jurisdictional health department as a condition of the permit.

(f) Develop, keep, and follow a plan of operation approved as part of the permitting process. The plan of operation must convey to site personnel the concept of operation intended by the designer. The plan of operation must be kept on-site and be available for inspection at the request of the jurisdictional health department. If necessary, the plan must be modified with the approval, or at the direction of the jurisdictional health department. Each plan of operation must include the following:

(i) List of feedstocks to be composted, including a general description of the source of feedstocks. Feedstocks must be approved by the department or jurisdictional health department;

(ii) A plan to control air contaminants such as dust and nuisance odors to prevent contaminants from migrating beyond property boundaries in accordance with WAC **173-350-040**(3), including:

(A) A description of how staff will document and respond to nuisance odor complaints should they arise. The plan must include date and time of complaints, weather conditions, and operations at the facility at the time of the complaint, and a summary of actions taken;

(B) A description of facility and operational features to prevent nuisance odors beyond the facility's property boundary, as determined by the jurisdictional health department, the department, or the air authority. The description must address the receiving, composting, curing, and storage areas of the facility;

(C) A description of facility maintenance activities that encompass nuisance odor prevention and control, such as acquiring critical odor control backup equipment in the event of a breakdown, a schedule for purging aeration lines and changing biofilter media as appropriate, and a schedule for cleaning leachate ponds or leachate storage tanks as appropriate; and

(D) A description of how feedstocks with high moisture or the potential for high odors will be managed to reduce nuisance odors upon receipt, and through the composting process.

(iii) A description of how wastes and organic materials including incoming feedstocks, composting, curing, and composted materials are to be handled on-site during the facility's active life, including:

(A) Maximum site capacity in cubic yards for all materials on-site at any one time. The jurisdictional health department may require cumulative capacity for materials or separate capacities for incoming feedstocks, composting, curing, and composted materials, or any combination;

(B) Processing capacity in tons or cubic yards of solid waste feedstocks processed in a given amount of time. The jurisdictional health department may require monthly or annual processing capacity;

(C) Procedures and criteria for ensuring that only the feedstocks described will be accepted. This includes a plan for rejecting feedstocks contaminated with greater than five percent physical contaminants by volume, or a plan to accept and separate contaminated loads from noncontaminated loads, and reduce physical contaminants to an acceptable level prior to composting;

(D) Procedure to reduce physical contaminants in composted material to meet testing parameters in Table 220-B. Grinding to reduce the size of physical contaminants does not meet the requirements of this section;

(I) Compost facilities must provide a label or information sheet to purchasers of compost that exceeds .1 percent film plastic by weight but does not exceed .25 percent film plastic by weight. The label or information sheet must include the statement in subsection (4)(f)(iii)(D)(II) of this section, or equivalent language approved by jurisdictional health department or the department.

(II) "This compost does not meet Department of Ecology standards for film plastic content for unrestricted use. This compost may only be used in locations where a means of removing or containing the film plastic on-site is put in place promptly after use. Acceptable controls include removal from the site, incorporation, planting, covering with soil or another media, or containment in a compost sock or similar device. This product may not be used adjacent to regulated waters of the state (e.g., wetlands, streams, lakes) or in environmentally sensitive areas."

(E) Procedures for handling unacceptable wastes;

(F) A discussion on types and amounts of feedstocks including basic calculations showing that the facility will be able to achieve an acceptable mix of materials for efficient decomposition;

(G) Material flow plan describing general procedures to manage all materials on-site from incoming feedstock to composted material;

(H) A description of equipment, including equipment to add water to compost as necessary;

(I) Compost process monitoring plan, including compost mix (carbon to nitrogen ratio), temperature, moisture, and porosity;

(J) Pathogen reduction plan;

(K) Representative sampling and analysis plan for the composted material such as described in the 2002 U.S. Composting Council Test Methods for the Examination of Composting and Compost Method 02.01-A through E;

(L) Leachate management plan, including monthly precipitation and evaporation data, and if applicable, monthly leachate reuse or removal; and

(M) Stormwater management plan.

(iv) A description of how equipment, structures, and other systems are to be inspected and maintained, including the frequency of inspections and inspection logs;

(v) A description of how facility staff will receive appropriate training in the operation of the facility, including how they will be trained to identify nuisance odors and how to correct them;

(vi) A community relations plan describing how the owner or operator will document and manage complaints;

(vii) Safety, fire, and emergency plans;

(viii) Forms for recordkeeping of daily volumes or weights of incoming feedstocks by type, outgoing composted material, and process monitoring results; and

(ix) Other details to demonstrate that the facility will be operated in accordance with this subsection and as required by the jurisdictional health department.

(g) Manage composted material piles that have met the testing parameters in Table 220-B in the following manner:

(i) Comply with the performance standards of WAC **173-350-040**;

(ii) Minimize and control runoff from composted material piles through the use of covers, diversion swales, berms, ditches, or other features designed to prevent runoff and divert stormwater from compost material; and

(iii) Minimize odor by maintaining porosity of composted material piles and managing moisture levels in composted material piles, not to exceed sixty percent moisture.

(7) **Composting facilities - Permit requirements - Groundwater monitoring.** There are no specific groundwater monitoring requirements for composting facilities subject to this chapter; however, composting facilities must meet the performance standards of WAC **173-350-040**.

(8) **Composting facilities - Permit requirements - Closure.** The owner or operator of a composting facility must:

(a) Notify the jurisdictional health department sixty days in advance of closure. At closure, the facility owner or operator is financially responsible for the removal of all solid waste, including but not limited to, raw or partially composted feedstocks, composted material and leachate from the facility. The materials must be sent to another facility that complies with the applicable regulations for handling the waste; and

(b) Develop, keep, and follow a closure plan approved by the jurisdictional health department as part of the permitting process. At a minimum, the closure plan must include methods of removing solid waste, leachate, and other organic materials from the facility. For planning purposes, assume that the facility is at full, permitted site capacity at the time of closure.

(9) **Composting facilities - Permit requirements - Financial assurance.** There are no specific financial assurance requirements for composting facilities subject to this chapter; however, composting facilities must meet the performance standards of WAC **173-350-040**.

(10) **Composting facilities - Permit application contents.** The owner or operator of a composting facility must obtain a solid waste permit from the jurisdictional health department. All applications for permits must be submitted in accordance with the procedures established in WAC **173-350-710**. In addition to the requirements of WAC **173-350-710** and **173-350-715**, each application for a permit must contain:

(a) Engineering reports, plans, and specifications that address the design standards of subsections (4) and (5) of this section;

(b) A plan of operation meeting the requirements of subsection (6) of this section; and

(c) A closure plan meeting the requirements of subsection (8) of this section.

(11) **Composting facilities - Designation of composted materials.** When used on-site or distributed off-site, composted materials meeting the testing parameters of Table 220-B are no longer subject to this chapter. Composted materials that do not meet these requirements are solid waste and subject to management under chapter **70.95** RCW, Solid waste management—Reduction and recycling.

[Statutory Authority: Chapter **70.95** RCW, and RCW **70.95.060**, **70.95.215**, **70.95.218**, **70.95.260**(6), **70.95.300**, **70.95.305**, **70.95.310**, **70.95.440**. WSR 18-17-008 (Order 13-08), § 173-350-220, filed 8/1/18, effective 9/1/18. Statutory Authority: RCW **70.95.020**(3), **70.95.060**(1), **70.95.260**(6), **70.95.305**, **70.95.330**. WSR 13-08-016 (Order 10-06), § 173-350-220, filed 3/25/13, effective 4/25/13. Statutory Authority: Chapter **70.95** RCW. WSR 03-03-043 (Order 99-24), § 173-350-220, filed 1/10/03, effective 2/10/03.]

Appendix 3: Feedback Meeting with Dawn Marie, Department of Ecology

February 14th, 2023

- Smaller operations still may need permitting
    - Dependent on feedstock, where they're located, and volume
- Existing facilities on the islands
- What size, tech, scalability will be in the county's best interest
    - Grant dollars have flexibility but need a structure on how to use that funding fully
    - Need biggest "bang for buck"
- The county's location makes it unique
    - Community of ambitious people but these recommendations need to have return benefits that pencil out
    - Need it to be economically feasible
- Current recommendations: ability to operate on a small footprint could be very expensive and have high upfront costs
- Want to make sure the county can afford organics implementation
- Not in favor of high tech – it brings on its own challenges with those who are new to the composting field
    - Wants to start simple and small but have a long term plan to scale up existing infrastructure/systems
        - Break it down into phases with measurable actions
    - Hard to train all those involved (from organics generators to disposal and collection)
        - Lots of signage + education
        - Master yard debris collection and scale up to pre-consumer scraps, then go to post-consumer
            - Start with the most forgiving material to build confidence and learn lessons
            - Don't want to fail with using public money
    - It's a big commitment – don't want to jump and not have proper support
- Include acknowledgement of vector issues (ravens, rats, raccoons, odors)
    - Provide solutions and how to mitigate these vector issues
- What does the county wants?
    - Doesn't want to ship food waste off island but could be an interim solution
- Doesn't believe there's money/funds for a larger system
    - Wants county to narrow in on what they want to accomplish
    - Go beyond just doing "the right thing"
- Account for post-consumer residential food waste and yard debris
    - Need to limit what can be collected
    - No food soiled paper products
- Need to properly account for contamination prevention
    - Need to account for labor to maintain systems and contamination
- Drop in places on both islands – only pre-consumer food
    - Mix yard debris (have a grinder/chipper)
        - Have a consistent stream

    - Start with locations where people can be trained to maximize capacity while minimizing contamination (get a clean stream)
        - Start with one island then work to another island
    - Ready once a week for food waste and cover it with yard debris on a plemouth bed
        - Leave it then turn it on a schedule (low-tech solution)
        - Low turn system accommodates a glut of food waste
    - Livestock manure brings larger volume of compostable material
        - Not sure what SJC reps/stakeholders feel about this
- Exempt facilities
    - Five of them: backyard/pea patch composting for private and communal use. All organics feedstock (food waste) that only allows 1,000 cubic yards of feedstock. Can't have more than 250 cubic yards of material on site. (3) yard debris proper, manure, bedding/bulking agents
        - No standards for concrete pad for curing compost
        - Supposed to have an aerobic process that's protective of env
            - Fail = retract exemption
    - Have to prove not transporting solid waste to be exempt

Appendix 4: Composting Technologies

Green Mountain Earth Flow – 40 Ft

GREEN MOUNTAIN TECHNOLOGIES
COMMERCIAL COMPOSTING SOLUTIONS

Date: November 23, 2022

To: Erik Makinson, Resource Synergy

From: Van Calvez, Composting Systems Engineer, Green Mountain

Technologies Subject: Quote for Intermodal Earth Flow Composting Systems

Hi Erik, Thanks for requesting a quote for two sizes of the Intermodal Earth Flow™ steel vessel composting system. Please let me know if you have any questions.

The following information specifies pricing for recommended and optional features.

System Pricing and Recommended Features:	**EF-20-IM**	**EF-40-IM**
Overall Approx Vessel Footprint	20' L x 8' W	40' L x 8' W
Approx Internal Dimensions of Compost Mass	19' x 7 x 4'	19' x 7 x 4'
Processing Capacity (@ 21 day retention, total feedstocks)	1,000 lbs/day	2,200 lbs/day
Total Capacity (cubic yards)	20 yd3	40 yd3
Earth Flow Composting System	$ 108,350	$ 158,420
Manual Temperature Measurement Ports (@$290 ea)	$ 290	$ 870
Moisture Addition System	$ 895	$ 895
Standard Spare Parts Package (Small Parts)	$ 1,800	$ 1,800
Replacement Bolt-On Auger Flighting (3 sections per set)	$ 1,795	$ 1,795
Piping for Pile-Based Biofilter	$ 990	$ 1,990
Ballpark Freight/System– to be Quoted at Time of Order	$ 6,000	$ 8,000
Installation and Training/System (including travel expenses)	$ 6,000	$ 6,000
Subtotal per System:	$ 126,120	$ 179,770
Additional Options		
Tote Tipper (for dumping 64 gallon toters into vessel)	$ 14,200	$ 14,200
Automated Compost Temp Measurement/Datalogging	$ 9,995	$ 9,995
Custom Painting of Vessel Exterior	$ 1,995	$ 3,995
220V Single Phase Power Upcharge	$ 895	$ 895
Abrasion-Resistant Flighting Upcharge (per flight)	$ 500	$ 500

Notes:

- All prices in USD.
- These costs do not include applicable taxes.

- These costs do not include infrastructure costs such as electrical service/breaker panel, foundation, materials handling equipment, biofilter enclosure or media, grinding or screening technologies.
- Maintenance costs (including labor & materials) are estimated to be 4% of capital costs/year.
- Expected daily power requirements are approximately 12-14 kWh per day for the 20' system and 18-20 kWh/day for the 40' system.
- Lead-time: 6 months from receipt of down payment to order shipment
- This pricing is valid for 30 days from the date above.

GREEN MOUNTAIN TECHNOLOGIES
COMMERCIAL COMPOSTING SOLUTIONS

Intermodal Earth Flow (EF-40-IM) - Price & Specifications

Base Price: $158,420

Key Features

- Earth Flow Auger Retrofitted into a High Cube 40' Intermodal Container
- In-Floor Positive Aeration System
- Stainless Steel Carriage and Travel Car
- Compost Contact Surfaces Lined with Stainless Steel
- Heavy Duty Vessel Floor
- Wall Insulation Standard
- Polycarbonate Load Doors with Viewport Standard

Vessel Specification

Total Vessel Compost Capacity (cubic yards)	40 yd^3
System Weight – Empty	6.25 tons
External Dimensions of Intermodal Container	40'L x 8'W x 9' -6"D (High Cube) Approximate
Dimensions for Compost Mass	39'L x 7'W x 4'D
Daily Input Capacity @ 21 days retention	1.1 tons/day*
Daily Input Capacity @ 14 days retention	1.5 tons/day*
Daily Input Capacity @ 10 days retention	2.0 tons/day*
Daily Input Capacity @ 7 days retention	2.6 tons/day*

Mixing System

Mixing Auger	14" 304 stainless steel, 3/8" thick flighting
Gear Motor	7.5hp, 3 ph (208/230/460V – 60 Hz)
Auger Gearbox	Helical bevel, synthetic lube
Carriage & Rail Gear Motors	Fractional hp Helical Bevel
Control Panel	Programmable PLC in NEMA 4x panel
Power Requirements	30A 3 phase 208V or 40A 1 phase 220V

Options Available

Replacement Bolt-On Auger Flighting (one set)	$ 1,795 (3 pieces per set)
Abrasion Resistant Lower Auger Flighting Upgrade	$ 1,100 per piece
Spare Parts Hardware Package (parts list available)	$ 1,895
Manual Temperature Measurement Ports (per port)	$ 290
Tote Loader with Hydraulic Package	$ 14,200
Bear-Proof Load Doors	$ 4,995

Custom Painting for Vessel Exterior	$ 3,995
Moisture Addition System	$ 895
Piping for Pile Based Biofilter	$ 1,990
Single Phase Power Connection	$ 895

Commissioning (Prices to be determined at time of quoting)

On-Site GMT employee for install/training	$ 9,000-14,000
Welding Services	$ 2,500
Domestic Shipping**	$ 7,500

GREEN MOUNTAIN TECHNOLOGIES
COMMERCIAL COMPOSTING SOLUTIONS

Intermodal Earth Flow (EF-20-IM) - Price & Specifications

Base Price: $108,350

Key Features

- Earth Flow Auger Retrofitted into a High Cube 20' Intermodal Container
- In-Floor Positive Aeration System
- Stainless Steel Carriage and Travel Car
- Compost Contact Surfaces Lined with Stainless Steel
- Heavy Duty Vessel Floor
- Wall Insulation Standard
- Polycarbonate Load Doors with Viewport Standard

Vessel Specification

Total Vessel Compost Capacity (cubic yards)	20 yd^3
System Weight – Empty	3.4 tons
External Dimensions of Intermodal Container	19'-10"L x 8'W x 9'-6"D (High Cube) Approximate
Dimensions for Compost Mass	19'L x 7'W x 4'D
Daily Input Capacity @ 21 days retention	0.5 tons/day*
Daily Input Capacity @ 14 days retention	0.7 tons/day*
Daily Input Capacity @ 10 days retention	1.0 tons/day*
Daily Input Capacity @ 7 days retention	1.3 tons/day*

Mixing System

Mixing Auger	14" 304 stainless steel, 3/8" thick flighting
Gear Motor	5hp, 3 ph (208/230/460V – 60 Hz)
Auger Gearbox	Helical bevel, synthetic lube
Carriage & Rail Gear Motors	Fractional hp Helical Bevel
Control Panel	Programmable PLC in NEMA 4x panel
Power Requirements	30A 3 phase 208V or 40A 1 phase 220V

Options Available

Replacement Bolt-On Auger Flighting (one set)	$ 1,795 (3 pieces per set) Abrasion
Resistant Lower Auger Flighting Upgrade	$ 1,100 per piece
Spare Parts Hardware Package (parts list available)	$ 1,895 Manual
Temperature Measurement Ports (per port)	$ 290
Tote Loader with Hydraulic Package	$ 14,200
Bear-Proof Load Doors	$ 4,995
Custom Painting for Vessel Exterior	$ 1,995
Moisture Addition System	$ 895
Piping for Pile Based Biofilter	$ 990
Single Phase Power Connection	$ 895

Commissioning (Prices to be determined at time of quoting)

On-Site GMT employee for install/training	$ 9,000-14,000
Welding Services	$ 2,500
Domestic Shipping**	$ 5,500

Note: standard color of shipping container varies but is typically beige, gray or tan.

* Assumes aggregate bulk density of 850 lbs/yard for all feedstocks. Assumes continuous flow and some reduction of volume in the vessel.

-Price includes a standard one year only parts warranty. It does not include labor. It does not include repair/replacement of wear items that require periodic replacement.

Engineered Compost Systems (ECS)

Aerated Static Pile System

ECS engineered COMPOST systems

BUDGETARY ESTIMATE

Client: Paul Andersson
Facility: Orcas Island
By: Baraka Poulin, Steve Diddy
Date: 1/12/2022
Basis: Aerated static pile compost system featuring high air flow aeration.

		Option 1
Sizing	(US units)	Primary
Throughput	TPY	2,000
Throughput (365 d/yr)	TPD	5
Density	lb/CY	815
Aeration Type		Positive
Aeration Floor Type		B/G Sparger
Pile Arrangement		Bunker
Retention Time	days	25
Independent Aeration Zones	#	6
Fan Groups	#	1
Zone Width	ft	10
Zone Length	ft	28
Pile Depth	ft	7.0
Cover Depth	ft	1.0
Time to Fill Zone	days	4.6
Total System Mix Volume	CY	360
Mechanical		
Aeration Rate - Peak	CFM/CY	5.0
Fan Power - Installed (total)	HP	5
Fan Energy (Annual)	kWh/yr	14,000
Process Area		
Paved Area (Process, Mechanical + Apron)	ft^2	3,800

Cost Estimate		
Total ECS Scope of Work ($USD)		$ 240,000
$/ TPY Capacity (ECS Scope of Supply)		$ 120

*throughput in US tons

ECS SCOPE OF V

Client: Paul Andersson
Facility: Orcas Island
Facilitated By: Baraka Poulin, Steve Diddy
Date: 1/12/2022
Aerated static pile compost system featuring high air flow aeration.

Aeration System (Above Grade)	Description	By
Fans	Per ECS Spec, Standard Efficiency	ECS
Aeration Ducting	Per ECS Spec	ECS
Aeration Floor System	Per ECS Spec	ECS
HDPE Components		
Embedded Stainless Steel Components		
Surface Stainless Steel Components		
Drainage Line: Zones to Sump		
Drainage Line: Sump to Re-use System		
Control System		
CompTroller Hardware & Software		
Fan Drives		
Process Sensors		
Temp Probe Holders		
Electrical		
Control Skid		
Other		
System Engineering		
Startup		
Freight		
Warranty		

Duct Supports		
Zone Damper Assemblies	Dampers per ECS Spec, Sealed, Electric Actuators	ECS
Irrigation - Distribution	Control Valve, Hose Laterals and Sprinklers	ECS
Irrigation - Water Supply	Standard Pipe & Fittings	OTHERS
Electrical	Wiring and Conduit	OTHERS
Duct & Fan Condensate Drains	Standard Pipe & Fittings	OTHERS

OTHERS=Design and Supply by other team members

Note: ECS deliverables exclude: a lead role in obtaining permits, any professional engineering services required for permits or constructing the facility, construction management, any phase of construction or equipment installation, any equipment not specifically called out above, any local taxes or fees.

ECS engineered COMPOST systems

BUDGETARY ESTIMATE

Client: San Jaun County
Facility: WA
By: Baraka Poulin
Date: 12/12/2022

Basis: Aerated static pile compost system featuring high air flow aeration and automated controls.

		Option 1	Option 2:
Sizing	(US units)	Primary	Primary
Throughput	TPY	2,000	2,000
Throughput (365 d/yr)	TPD	5	5
Density	lb/CY	815	815
Aeration Type		Reversing	Negative
Aeration Floor Type		Trench	Trench
Pile Arrangement		Bunker	Bunker
Retention Time	days	20	20
Independent Aeration Zones	#	5	5
Fan Groups	#	1	1
Zone Width	ft	12	12
Zone Length	ft	25	25
Pile Depth	ft	6.5	6.5
Cover Depth	ft	1.0	1.0
Time to Fill Zone	days	4.5	4.5
Total System Mix Volume	CY	300	300

Mechanical			
Aeration Rate - Peak	CFM/CY	5.0	5.0
Fan Power - Installed (total)	HP	5	5
Fan Power - Installed (total)	kW	4	4
Fan Energy (Annual)	kWh/yr	19,000	17,000

Process Area			
Biofilter Area	ft^2	176	267
Paved Area (Process, Mechanical + Apron)	ft^2	3,600	3,600
Site Area: Paved Area + Storage + Roads	ft^2	9,700	10,700
Site Area: Paved Area + Storage + Roads	acres	0.2	0.2

Cost Estimate			
Total ECS Scope of Work ($USD)		**$ 390,000**	**$ 340,000**

*throughput in US tons

www.compostsystems.com

Reverse Aerated Static Pile System with Automated Controls

ECS SCOPE OF WORK

Client: San Jaun County
Facility: WA
By: Baraka Poulin
Date: 12/12/2022
Basis: Aerated static pile compost system featuring high air flow aeration and automated controls.

Aeration System (Above Grade)	Description	By
Fans	Per ECS Spec, Standard Efficiency	ECS
Aeration Ducting	Per ECS Spec	ECS
Duct Hangers and Supports	Per ECS Spec	ECS
Zone Damper Assemblies	Dampers per ECS Spec, Sealed, Electric Actuators	ECS
Makeup Air Inlet Damper	Per ECS Spec, Electric Actuators	ECS
Irrigation - Control	Control Valves, Integration to CompTroller	ECS
Irrigation - Water Supply+Distribution	Pipe & Fittings, Distribution Hoses, Sprinklers	OTHERS
Electrical	Wiring and Conduit	OTHERS
Duct & Fan Condensate Drains	Standard Pipe & Fittings,	OTHERS

Aeration Floor System	Description	By
HDPE Components	Fabricated and Standard HDPE Pipe & Fittings	ECS
Embedded Stainless Steel Components	Trench Boots, hardware, SS304	ECS
Surface Stainless Steel Components	Trench Covers, Cover Clamps, SS304	ECS

Drainage Line: Zones to Sump	Standard Pipe & Fittings, Level Maintained Sump	OTHERS
Drainage Line: Sump to Re-use System	Standard Pipe & Fittings	OTHERS

Control System	Description	By
CompTroller Hardware & Software	Web-based, distributed, ruggedized	ECS
Fan Drives	Variable frequency drives, filters	ECS
Process Sensors	Temperature, pressure	ECS
Temp Probe Holders	Mild Steel	ECS
Electrical	Wiring and Conduit	OTHERS
Control Skid	Per ECS Spec	ECS

Biofilter System	Description	By
Air Temperature & Pressure Sensors	Integrated with ECS Control System	ECS
Biofilter Media Temperature Probes	Integrated with ECS Control System	ECS
HDPE Pipe	Pipe-on-Grade, Drilled with End Caps	ECS
Biofilter Plenum	SS304, per ECS Spec	ECS
Biofilter media Irrigation System	All mechanical components (installed by others)	ECS
Biofilter Media (i.e. wood chips)	Shredded wood per ECS spec	OTHERS
Biofilter Duct Supports	Painted Steel, duct saddles	OTHERS
Biofilter Drain	Drain to Sump	OTHERS
Media Containment Blocks & Curbs	as needed	OTHERS

Other	Description	By
System Engineering	Technical Submittal, CASP system installation drawings, construction support	ECS
Startup	ECS on site commissioning, operator training and unlimited 1 year remote support	ECS
Freight	Includes freight allowance FOB site	ECS
Warranty	1yr equipment warranty	ECS
Professional Servies	Permitting, Civil/Structural Design, Construction Management	OTHERS
Concrete work	Design, Reinforcement, Supply, Installation	OTHERS
Installation	All ECS supplied equipment	OTHERS
Surface Water Management	Leachate + Stormwater Storage and Distribution, Design and Supply	OTHERS

OTHERS=Design and Supply by other team members

Note: ECS deliverables exclude: a lead role in obtaining permits, any professional engineering services required for permits or constructing the facility, construction management, any phase of construction or equipment installation, any equipment not specifically called out above, any local taxes or fees.

engineered COMPOST systems

BUDGETARY ESTIMATE

Client: San Juan County
Facility: WA
By: Baraka Poulin, Steve Diddy
Date: 12/12/2022
Basis: Aerated static pile compost system featuring high air flow aeration.

Sizing	(US units)	Primary
Throughput	TPY	2,000
Throughput (365 d/yr)	TPD	5
Density	lb/CY	815
Aeration Type		Positive
Aeration Floor Type		B/G Sparger
Pile Arrangement		Bunker
Retention Time	days	22
Independent Aeration Zones	#	5
Fan Groups	#	1
Zone Width	ft	12
Zone Length	ft	25
Pile Depth	ft	6.5
Cover Depth	ft	1.0
Time to Fill Zone	days	4.5
Total System Mix Volume	CY	300

Mechanical		
Aeration Rate - Peak	CFM/CY	5.0
Fan Power - Installed (total)	HP	3

Process Area		
Paved Area (Process, Mechanical + Apron)	ft^2	3,600

Cost Estimate		
Total ECS Scope of Work ($USD)		**$ 220,000**

*throughput in US tons

ECS SCOPE OF WORK

Client: San Juan County
Facility: WA
By: Baraka Poulin, Steve Diddy
Date: 12/12/2022
Basis: Aerated static pile compost system featuring high air flow aeration.

Aeration System (Above Grade)	Description	By
Fans	Per ECS Spec, Standard Efficiency	ECS
Aeration Ducting	Per ECS Spec	ECS
Duct Supports	Per ECS Spec	ECS
Zone Damper Assemblies	Dampers per ECS Spec, Sealed, Electric Actuators	ECS
Irrigation - Distribution	Control Valve, Hose Laterals and Sprinklers	ECS
Irrigation - Water Supply	Standard Pipe & Fittings	OTHERS
Electrical	Wiring and Conduit	OTHERS
Duct & Fan Condensate Drains	Standard Pipe & Fittings	OTHERS

Aeration Floor System	Description	By
HDPE Components	Fabricated and Standard HDPE Pipe & Fittings	ECS
Embedded Stainless Steel Components	Trench Boots, hardware, SS304	ECS
Surface Stainless Steel Components	Trench Covers, Cover Clamps, SS304	ECS
Drainage Line: Zones to Sump	Standard Pipe & Fittings	OTHERS
Drainage Line: Sump to Re-use System	Standard Pipe & Fittings	OTHERS

Control System	Description	By
CompTroller Hardware & Software	Web-based, distributed, ruggedized	ECS
Fan Drives	Variable frequency drives, filters	ECS
Process Sensors	Temperature, pressure	ECS
Temp Probe Holders	Mild Steel	ECS
Electrical	Wiring and Conduit	OTHERS
Control Skid	Per ECS Spec	ECS

Other	Description	By
System Engineering	Technical Submittal, CASP system installation drawings, construction support	ECS
Startup	ECS on site commissioning, operator training and unlimited 1 year remote support	ECS
Freight	Includes freight allowance FOB site	ECS
Warranty	1yr equipment warranty	ECS

OTHERS=Design and Supply by other team members

Note: ECS deliverables exclude: a lead role in obtaining permits, any professional engineering services required for permits or constructing the facility, construction management, any phase of construction or equipment installation, any equipment not specifically called out above, any local taxes or fees.

Technical Memo

Attention: Katie Fleming **Date:** February 14, 2023

From: Brian Fuchs
Brett Hoyt

Purpose: San Juan County Compost Project

SG Mobile® System with GORE® Cover Support Information

Project Description: Sustainable Generation and GORE® Cover is providing system sizing, preliminary layout and budgetary information for processing of Source Separated organics (SSO) organic waste. For discussion purposes only.

Enclosed we will provide concepts for developing a compost facility based on experience from similar design concepts, similar feed stocks and similar climate conditions.

We are using our standard 3 Phase 8-week (56 days) process to achieve regulatory compliant stabilized high- quality compost. While achieving a high level of environmental controls for protection of air (odors and VOC emissions) and water (separation of leachate from storm water) quality.

Note: Our scope of supply is centered on the composting portion of the project for supply of equipment and services for the SG Mobile® System using GORE® Cover technology. All other critical components, scale, office buildings, receiving area (open or covered), biofilter and adjacent processing equipment and materials handling outside the composting pad to be supplied by other. We are happy to share our experience from relevant reference facilities.

Key Assumptions:

- **2,000 ton per annum SSO (source separated organics for food organics and green organics)**
- **SG Mobile® System with GORE® Cover**
- **Power supply (clean power, solar, generator….)**

Mass Balance Calculations and Assumptions

Assumptions	Project Information	
Feed Stocks (Organics)	SSO, Bulking Materials and Screened Over's	
Total Throughput Volume / Year	ton	Cubic Yards @ 925lbs/y³
Design Capacity Required	2,000	4,324
Design Capacity Proposed	2,494	5,393
Total Compost Pad Footprint	~ 0.35 acres including driving space and pipe pulling space	
Treatment Time	3 Phase Process – 56 Days**	
Phase 1 Active Composting	28 Days with GORE® Cover	
Phase 2 Maturation Composting	14 Days with GORE® Cover	
Phase 3 Finishing Composting	14 Days with GORE® Cover (Optional) or with no cover	

*Mixed adjusted

Process Time	8	weeks	Active	Curing	Finishing
			Phase 1	Phase 2	Phase 3
Days per Week Operation	5				
# of Heaps	4		2	1	1
Heap Length	50	ft			
Heap Width	22	ft			
Heap Height	10	ft			
Actual Mix*	925	lbs/y3		0.46	US ton/y3
Volume per heap	207	y3			
Volume on pad (if pad full)	830	y3			
Total Throughput Volume					
per year	5393	y3			
per week	104	y3			
per day	21	y3			
Tons per heap	96	US ton			
Tons per pad (if pad full)	384	US ton			
Total Throughput Tons	Actual mix*				
per year	2494	US ton			
per week	48	US ton			
per day	10	US ton			
*Actual Mix is mixed input material entering Phase 1; inclusive of screened overs and added process water to adjust moisture					

SG Mobile® System with GORE® Cover – examples of installations

BigReUseNYC in New York City, NY using SG Mobile® System with GORE® Cover

Republic Services in Chula Vista, CA using SG Mobile® System with GORE® Cover

***Demo Project using** SG Mobile® System with GORE® Cover*

-

SG Mobile® System with GORE® Cover

The **SG Mobile® System** solution **Budgetary Pricing**:

GORE® Cover System	Configuration	Pricing ($USD)
SG Mobile® System	4 SG Mobile with 3 GORE® Cover	
	50ft Length x 22ft Width x 10ft Height	
	SG Mobile® System	Included
SG SmartStart™	Installation Guide, Pre-Design Support / Construction Support/ Installation Supervision	
Service Package	Commissioning, Start Up Services & Operating Training Module, Ongoing Technical Support	Included
	Total	$ 425,000.00

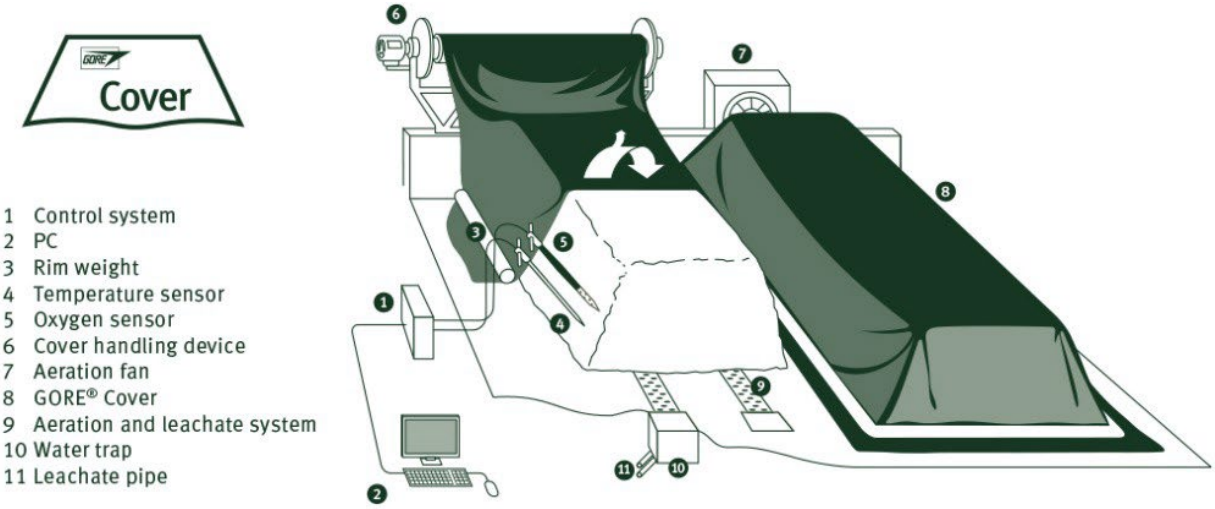
*Engineering Design, Construction not part SG scope of supply – supplied by other.

- Prices include estimated Duty and Shipping delivered to project site.
- All other Taxes not included
- Tariffs not included, if any
- State and Local Sales Tax payable by Buyer
- Subject to Terms and Conditions in the formal Quotation

For budgetary purposes only, pricing and configuration are subject to change. Upon agreed equipment configuration and determined scope of work for services, a formal quote will be developed. All information in this **budgetary quotation shall be kept confidential and shall not be shared with third parties without the express written approval of Sustainable Generation**.

The SG Bunker®, Heap®, Mobile® System using GORE® COVER include:

Equipment and Service Supply Package



SG Mobile® System Equipment Supply Package

(a) **GORE® Cover**
(b) **SG Compost Control** system inclusive of software, programing, and hardware
- Server, PC, Laptop or Mobile Device
- Modes of Operation
  - Interval Mode
  - O2 Mode
  - Manual Mode
  - Safety Mode

(c) **Temperature Probes**
(d) **Oxygen Probes**
(e) **Blower**
(f) **Aeration System** consisting of:
- SG Heap®/ SG Bunker® System using in ground Polymer Concrete Trench
- SG Mobile® System using HDPE Pipe on grade

(g) Water Trap
(h) **Leachate Collection Pipe**
(i) Perimeter Weight Sealing System or Side Wall Fastening System
(j) **Winding Machine** type for deployment and retracting the GORE ® Cover.

SG Scope of Supply of Services

The SG Service (SG SmartStart™ Service Package) includes a high level of interaction between the owners, engineering consultants and the construction company. It is very important that the installation of the GORE® Cover technology and Operating Manual be followed to insure a successful installation and sustainable operation.

Installation Guide: According to Final Agreement

- Drawings, Component Specification, Detail, and Installation Guidelines

Operations Manual: According to Final Agreement

- SG Mobile® System using GORE® Cover technology
- Cover Winder Machine

Permitting Support Services: According to Final Agreement

- Support permitting process with technical information

System Design Guidance / Support: As part of the Installation Guide Package

- Preliminary Layout and Drawings as defined in the bid document
- Layout Drawings to handed over to the Buyer's Engineer for design and construction

Construction Guidance / Support: According to Final Agreement

- Pre-Construction Meeting
- Installation Services/ Guidance
    - Aeration Trench Installation Support
    - Electronics Installation Support
- Portable Winding Machine Installation/Testing/Commissioning
- Compost Process Commissioning, Start Up and First Heap Construction
- Performance Test

Training for Site Management and Operators: According to Final Agreement

- Classroom and On-site training
    - Training 1 - at reference site or on-site (up to 3 days)
        - Site Reference Visits (optional)
    - Training 2 – during system check and start-up (up to 3 days)
    - Training 3 – 12 weeks after commissioning (up to 3 days)

Mobile® System San Diego, CA USA

Mobile Power Winding Machine

Typical Facility and Process Flow including all pertinent steps (see diagram)

The overall design includes identifying the optimum layout for the facility and the best usage of available area. It is recommended that the layout of the compost pad be optimized taking into consideration:

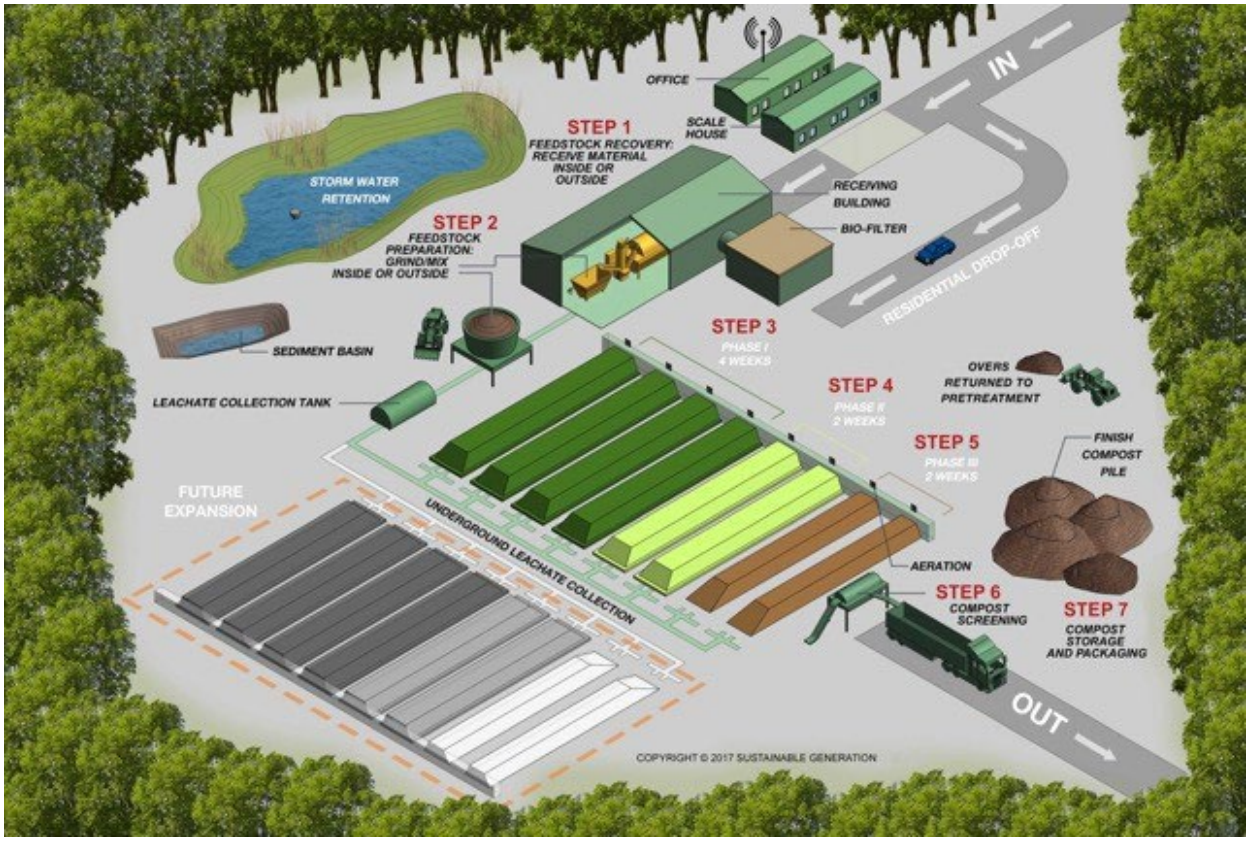
- Practicality for the front-end loader to move between the heaps and to and from the pre-treatment to the compost pad and the screening/ storage area.
- Process water and storm water management.
- Likelihood of expanding the capacity of the facility.

Mix Recipe - Pre-treatment

Feedstock must be adequately prepared for composting in the GORE® Cover system. To be properly prepared, the feedstock must be mixed in the right ratio to obtain:

- A beginning carbon to nitrogen ratio (C: N) of approximately 25-35:1.
- A beginning moisture content of approximately 55-65%
- Adequate structure material to optimize the mixed material porosity, sized to approximately 80mm or 3 inch minus shredded green/leaf/yard waste or wood chips.

Typical Compost Facility Layout and Process Flow Diagram



Step 1: Receiving Area / Tipping Building: (supplied by other)

The feedstock material will be received outdoors or inside a Tipping Building where it will be inspected for quality control. The feedstock materials will be mixed to create mix recipe.

Step 2: Mixing / Grinding Equipment: (supplied by other)

See Typical Compost Facility Layout and Process Flow Diagram (previous page)

Step 3: Phase 1: Active / High-Rate Composting – 21 to 28 Days*

The composting process begins with a front-end loader moving the material from the mixing area to a heap in the Phase I section to begin the active composting period. Once a heap is built, it is covered, the temperature and oxygen probes are installed and the software is turned on, which then controls the rate of aeration.

Step 4: Phase 2: Maturation / Curing – 14 to 21 Days*

After Phase I, the GORE® Cover is removed from the heap and the compost is moved by front- end loader to a heap in the Phase II area. Once a heap is built, it is covered, the temperature and oxygen probes are installed and the software is turned on, which then controls the rate of aeration.

Step 5: Phase 3: Finishing/ Curing – 14 Days** (optional)

After Phase II, the compost is moved by front- end loader to a heap in the Phase III area. Once a heap is built, covered or uncovered, only the temperature probe is installed and the software is turned on, which then controls the rate of aeration.

Step 6: Screening Equipment (supplied by other)

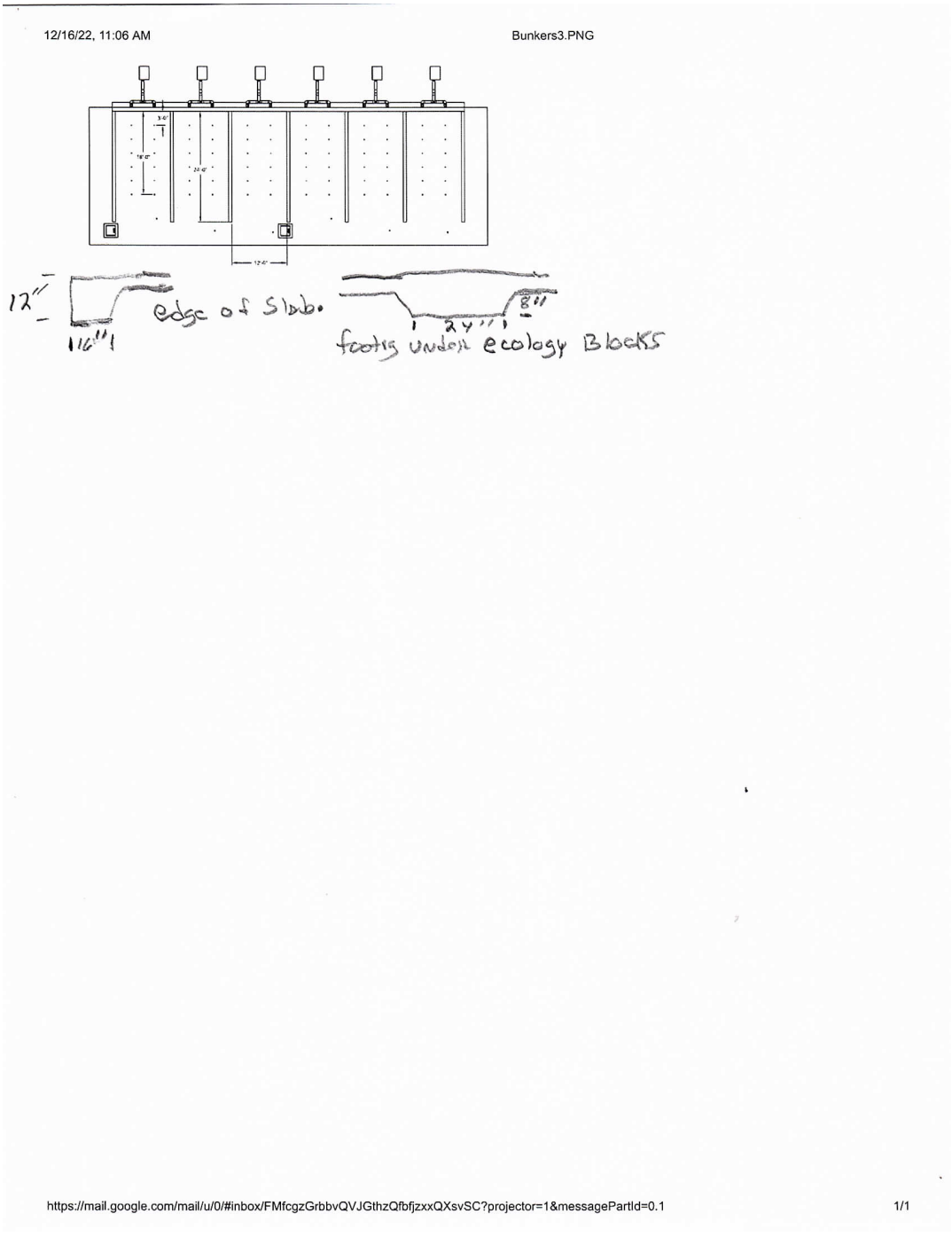
Step 7: Storage: (supplied by other)
Finished compost material can then be screened upon leaving Phase III of the process. Typically, the screened material can be sold directly or placed into storage for additional curing/aging.

*** Phase 1 Active, Phase 2 Maturation / Curing treatment times are flexible depending on the quality of product being produced and the market that the finished compost is being applied.**

**** Phase 3 Finishing / Curing treatment is optional and generally used for temperature and moisture management prior to screening and storage. Phases can also be covered.**

Appendix 6: Construction and Prep

Custer Concrete



SINCE 1977
CUSTER CONCRETE & CONST., INC.
8982 Delta Line Rd.
CUSTER, WA 98240
office: **360-366-3293**
cell: **360-201-0421**
email: **ronhunter1952@gmail.com**

JOB ESTIMATE

Phone

Date 2 -13 - 2023

Job Name / Location Composting Site

TO: Delaney Carr

Revised with Addition

Orcas Island,WA. 98245

JOB DESCRIPTION:

40' x 80' Slab with Thicken Edges & Footings Under Walls

back wall would be 80' x12"x 8'

Includes- set-up, forms, rebar, concrete, pump trucks, & all labor

Not included-permits, grading, fill, excavation, back fill or ecology blocks

Needed on sit before start - power, port-a-pottie, & water.

Change orders will be $100.00 per hour per man plus materials

Bid is good for 60 days

40' x 80' Slab with footings $150.000.00

126 Ecology Blocks (2'x2'x6') with Shipping & Unloading to Orcas Island site would be around $50,000.00

THIS ESTIMATE IS FOR COMPLETING THE JOB AS DESCRIBED ABOVE. IT IS BASED ON OUR EVALUATION AND DOES NOT INCLUDE MATERIAL PRICE INCREASES OR ADDITIONAL LABOR AND MATERIALS WHICH MAY BE REQUIRED SHOULD UNFORESEEN PROBLEMS OR ADVERSE WEATHER CONDITIONS ARISE AFTER THE WORK HAS STARTED.

ESTIMATED JOB COST

ESTIMATED BY Bart Parker 360-815-3560

Appendix 7: Equipment

CZ Screen

GRINDER CRUSHER SCREEN
1772 Corn Rd, Smyrna, GA 30080
770-433-2670 East | 770-433-2669 Fax
971-344-0001 West | sales@grindercrusherscreen.com

SALES CONTRACT AND SECURITY AGREEMENT

CUSTOMER NO. _____ DATE _____

INVOICE TO: _____

SHIP TO: _____

Phone no. _____

salesman	shipping date	p.o. no.	f.o.b.	via

by your signature, below, you warrant that you are authorized to enter into this agreement	AMOUNT
☐ NEW (LIMITED PARTS WARRANTY, SEE REVERSE SIDE FOR TERMS) ☐ USED (SOLD AS IS, NO WARRANTY) — SUB TOTAL	
Less trade in Make Type Model Serial No. — Allowance on: — Purchaser certifies that the equipment traded is free and clear of all liens and encumbrances	
SUB TOTAL	
State tax % = $ Local tax % = $ — TOTAL TAX	
Other charges - describe: — Customer is responsible for all taxes — Customer responsible for freight? ☐ YES ☐ NO	
BALANCE DUE — A finance charge of 2% monthly (24% annual percentage rate) may be charge to accounts over 30 days — TOTAL	

terms and conditions (see also reverse side or page 2)

insurance agent	name	address	phone

note THIS CONTRACT IS NOT EFFECTIVE UNTIL SIGNED AND DELIVERED BY ALL PARTIES	purchaser (company) X
accepted by GRINDERCRUSHERSCREEN - SELLER	by (name and title) XX
by (name and title)	by (name and title)
phone 770-433-2670	☐ individual ☐ partnership ☐ corporation

by signing this agreement, you acknowledge that you have received, read, understand and agree to the terms and conditions on the reverse side or page 2 of this agreement.

Rotochopper Grinder

Rotochopper, Inc. | 217 West Street; PO Box 295 | St. Martin, MN 56376 | P: 320-548-3586 | F: 320-548-3372

For:
Erik Makinson
Resource Synergy
1821 W 5th Ave Suite 105
Spokane, WA 99201

☑ Ship To Same As Billing

QUOTATION BB:	40354
Quoted by	CJ Cox
On	12/7/2022
Estimated shipping date	To be determined
Terms	20% deposit, 80% prior to shipment
FOB	St. Martin, MN

~ 175MT TROMMEL - SN# 219

Cat C3.6 (135hp) Tier 4 engine
10' Tracks
42" Heavy-Duty Belt Feeder
17' long x 5' diameter drum with 1/2" screen
24" Fines Collection Conveyor
40" Variable Angle Oversize Conveyor
7 yd3 Hopper Capacity
Hydraulic Drum Angle Adjustment
Delivery

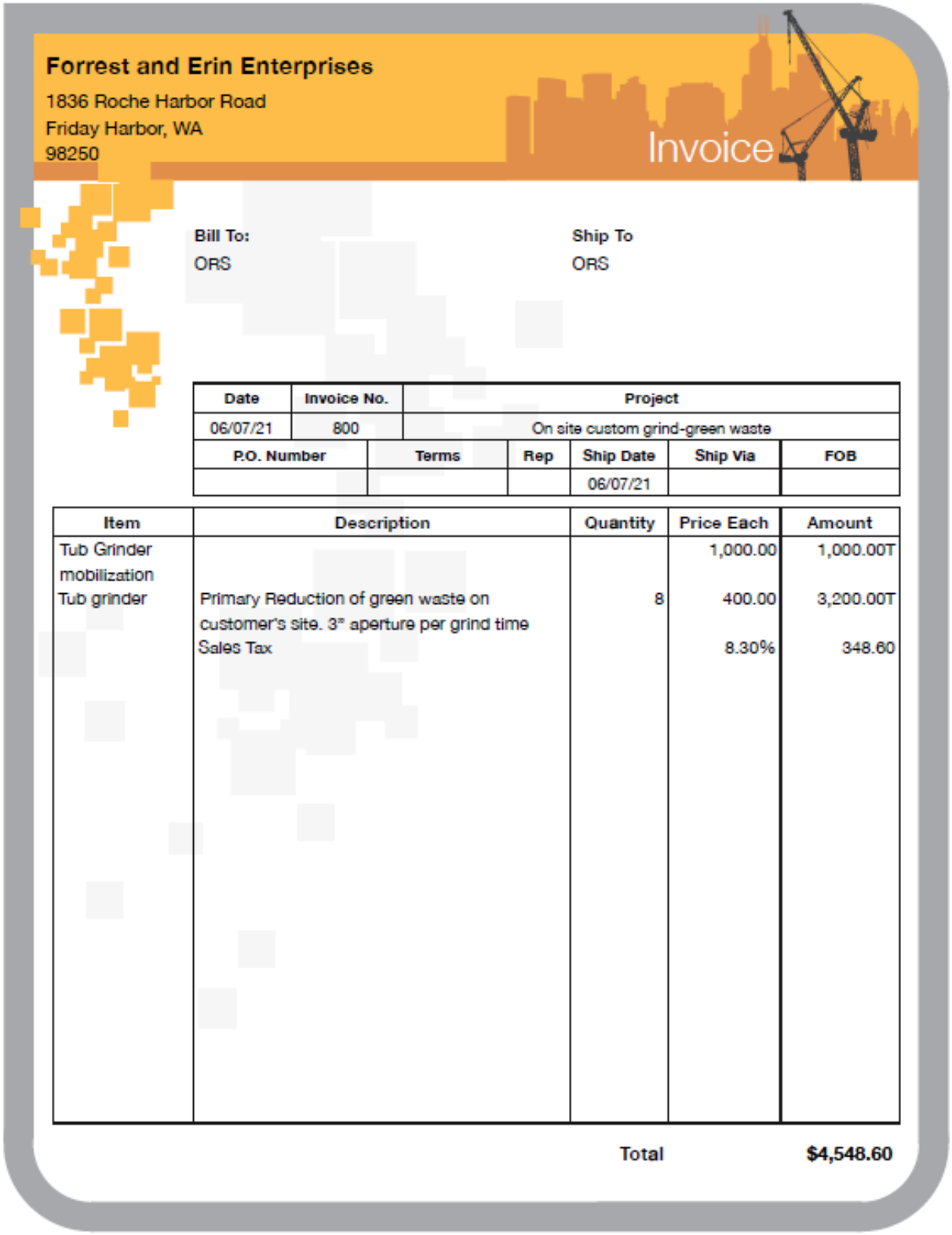
Subtotal **$335,314.00**

Total $335,314.00

Notes:

- This quotation is valid for 30 days from the date above. All taxes, levies, duties, or other governmental fees are the responsibility of the buyer.
- Unless otherwise noted, all prices are shown in US dollars ($).
- Fuel surcharge may apply.
- Rotochopper Standard Terms and Conditions are incorporated herein by reference; they can be reviewed at https://www.rotochopper.com/rotochopper-standard-terms-conditions-3/

Contract Grinding



Forrest and Erin Enterprises
1836 Roche Harbor Road
Friday Harbor, WA
98250

Invoice

Bill To:
ORS

Ship To
ORS

Date	Invoice No.	Project
06/07/21	800	On site custom grind-green waste

P.O. Number	Terms	Rep	Ship Date	Ship Via	FOB
			06/07/21		

Item	Description	Quantity	Price Each	Amount
Tub Grinder mobilization			1,000.00	1,000.00T
Tub grinder	Primary Reduction of green waste on customer's site. 3" aperture per grind time	8	400.00	3,200.00T
	Sales Tax		8.30%	348.60
		Total		$4,548.60

Green Roll Out Carts

Toter®

1661 Frontera Rd, Del Rio, TX, 78840
PHONE: 800-424-0422 FAX: 833-930-1124
WQ-10257763

Sell To:

Contact Name	Delaney Carr	Ship To Name	San Juan Sanitation
Bill To Name	Resource Synergy	Ship To	279 Gravel Pit Rd Eastsound, WA 98245 USA
Bill To	1821 W 6th Ave STE 105 SPOKANE, WA 99201 USA		
Email	delaney@resource-synergy.com		
Phone	(509) 796-3749		
Mobile	(509) 688-0113		

Quote Information

Salesperson	Tina Rainwater	Created Date	12/28/2022
Salesperson Email	trainwater@wastequip.com	Expiration Date	1/12/2023
		Quote Number	WQ-10257763 Please Reference Quote Number on all Purchase Orders

Product	Product Description	Selected Option	Quantity	Sales Price	Total Price
Plastics - ACC64	Model ACC64 --Caster Cart - 64 gallon, Standard Lid --Dimensions: 31.75 l x 24.25 w x 44.375 h --Load Rating: 224 lbs/101.6 kg --CU FT: 19.77 --Ship Wt: 35 lbs	---Body Color - (925) Waste Green ---Lid Color - (925) Waste Green ---Wheels - 10in Sunburst ---Customer Serial Number Hot Stamped on Front of Cart Body in White ---2/3 Assembled with Lid (down), Stop Bar and Axle Factory Installed ---Warranty – 12 Yrs Cart Body, All other components 10 Yrs	100.00	$143.45	$14,345.00

Payment Terms	Net 30 Days if credit has been established	Subtotal	$14,345.00
Shipping Terms	FOB Origin	Shipping	$2,823.75
		Tax	$2,381.27
		Grand Total	$19,550.02

Additional Information

Additional Terms

Our Quote is a good faith estimate, based on our understanding of your needs. Subject to our acceptance, your Order is an offer to purchase our Products and services in accordance with the Wastequip Terms & Conditions of Sale ("WQ T&C") located at: https://www.wastequip.com/terms-conditions-of-sale, as of the date set forth in Section 1(b) of the WQ T&C, which are made a part of this Quote. These WQ T&Cs may be updated from time to time and are available by hard copy upon request.

Additional Information

Pricing is based on your anticipated Order prior to the expiration of this Quote, including product specifications, quantities and timing, accepted delivery within 45 days of Order acceptance by Toter. Any differences to your Order may result in different pricing, freight or other costs. Due to volatility in petrochemical, steel and related Product material markets, actual prices and freight, are subject to change. We reserve the right, by providing notice to you at any time before beginning Product manufacturing, to increase the price of the Product(s) to reflect any increase in the cost to us which is due to any factor beyond our control (such as, without limitation, any increase in the costs of labor, materials, or other costs of manufacture or supply). Unless otherwise stated, materials and container sizes indicated on sales literature, invoices,