BURNS McDONNELL

DEPARTMENT OF AGRICULTURE AND NATURAL RESOURCES

South Dakota

Food Waste Composting Feasibility Study

Project No. 186537

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List of Abbreviations

Abbreviation	Term/Phrase/Name
ARSD	Administrative Rules of South Dakota
ASP	Aerated Static Pile (composting method)
BPI	Biodegradable Products Institute
BMP	Best Management Practices
CY	Cubic yards
DANR	Department of Agriculture and Natural Resources
EC	Electrical Conductivity
EPA	Environmental Protection Agency (U.S.)
FTE	Full-time equivalent
FY	Fiscal year
MPN	Most probable number (microbial measurement method)
MSW	Municipal solid waste
O and M	Operation and maintenance
PCB	Polychlorinated Biphenyls
SDCL	South Dakota Codified Law
SF	Square feet
SOP	Standard operating procedures
STA	Seal of Testing Assurance (U.S. Composting Council program)
TPY	Tons per year
USDA	United States Department of Agriculture

Executive Summary

The South Dakota Department of Agriculture and Natural Resources (DANR) retained Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to evaluate the feasibility of food waste composting in South Dakota and identify practical pathways for implementation. The Food Waste Composting Feasibility Study (Study) evaluated food waste generation, collection, and transportation models; household storage needs; composting technologies; landfill and facility readiness; market opportunities for finished compost; siting and regulatory considerations; and a pilot composting program.

The Study found that food waste composting can be feasible in South Dakota when programs are sized to local conditions and implemented in phases. Practical early opportunities exist at communities and permitted landfill facilities that already manage yard waste, have available space, and can use existing staff and equipment for pilot or startup operations. Over time, larger systems may be appropriate where feedstock volumes, route density, staffing, processing capacity, and end markets support a broader investment.

The following table summarizes the key findings and planning implications.

Topic	Key Finding	Planning Implication
Food Waste Volume Assessment	Statewide food waste generation is estimated at about 236,000 tons per year. A 10 percent initial-capture scenario represents approximately 23,600 tons per year.	Use the tonnage estimates as a screening tool, not as final design values. Communities should confirm local volumes before investing in equipment, pads, or long-term processing capacity.
Technology and Method Evaluation	Windrow, aerated static pile (ASP), and in-vessel composting can all work under South Dakota conditions. Windrow systems rely on routine turning for aeration, while ASP systems use blowers and perforated piping to provide aeration with less turning.	Match technology to scale, site conditions, odor sensitivity, staff capacity, and available carbon material. In-vessel systems are good for sites where space, winter operation, or odor control justify the higher cost. Windrow and ASP systems are good choices for landfill-based operations, especially where yard waste composting infrastructure already exists.
Food Waste Collection and Transportation	Drop-off programs are the lowest-cost entry point and can help communities test participation, contamination, and logistics. Curbside collection is more convenient and may increase participation, but it requires greater investment in vehicles, carts, staffing, and route planning.	Begin with drop-off sites or small pilots in smaller and rural communities. Consider curbside service where route density, participation, and existing collection systems can support the cost.

Topic	Key Finding	Planning Implication
Storage Containers and Household Readiness	Convenient containers, compatible liners, and clear labels help households separate food waste while reducing odors, pests, and contamination. Container needs vary by collection model, household type, and storage duration.	Match containers to the program design. Use countertop bins and carts for curbside collection, sealed buckets for drop-off programs, and consistent visual labels to support participation and proper sorting.
Landfill and Solid Waste Facility Engagement	Surveyed landfill and solid waste facilities showed interest in food waste composting, especially where yard waste composting programs are already operating. Common concerns included contamination, permitting, odor, staffing, equipment, and cost.	Target early implementation at permitted landfills with existing yard waste operations. Provide permit guidance, operator support, and modest startup funding to reduce barriers.
Education, Investment, and Technical Assistance	Communities and facilities need coordinated support to launch food waste composting, including outreach materials, operator training, startup funding, monitoring tools, site improvements, product testing, permit guidance, and operating procedures.	Pair consistent statewide education materials with targeted technical assistance and startup funding for equipment, pads, monitoring, testing, and permit support. This support can reduce barriers and improve early program performance.
Pilot Composting Program	The Brookings Pilot Composting Program (Brookings pilot) showed that a small drop-off food waste program can launch using existing municipal staff, equipment, and yard waste composting infrastructure. Early participation was strong, contamination was low, and no odor complaints were reported.	Use the Brookings pilot as a model for additional small-scale pilots. Future pilots should consider seasonal timing, pile size, and co-composting with active yard waste windrows to improve process performance.
Compost Market Analysis and Expansion Opportunities	South Dakota has an existing compost market, but demand is uneven and often influenced by free or low-cost municipal yard waste compost. The strongest near-term markets include landscaping, nurseries, local government applications, residents, and community gardens.	Build buyer confidence through product testing, clear specifications, reliable distribution, and demonstration projects. Public procurement can help create predictable demand.

Topic	Key Finding	Planning Implication
Siting Criteria and Regulatory Review	Existing solid waste regulations include tonnage based facility categories in ARSD 74:27:08:02, and DANR has developed permit requirements for food waste composting facilities. Additional guidance may help communities understand how these requirements apply to pilots or existing yard waste composting sites adding source separated food waste.	Develop implementation guidance for communities considering food waste composting. Guidance could explain how existing solid waste facility categories and DANR's food waste composting permit requirements apply to pilot projects, existing yard waste composting sites, and permanent food waste composting operations.

Implementation Themes

Several themes emerged across the volume assessment, technology review, collection analysis, facility survey, market analysis, regulatory review, and the Brookings pilot (Section 8.0). These themes can help guide how South Dakota communities move from interest to implementation.

- **Build from existing infrastructure.** Existing yard waste composting sites, landfill campuses, public works yards, and municipal collection systems provide a practical foundation for early food waste programs.
- **Start small and scale deliberately.** Small pilots and drop-off programs allow communities to test participation, contamination, staffing, routing, and processing before committing to larger curbside or regional systems.
- **Match technology to the site.** Windrow composting offers the lowest capital cost where land and equipment are available, while ASP can improve odor control and reduce turning needs. In-vessel systems can be useful for constrained or institutional sites, but costs may limit broad municipal use.
- **Invest early in contamination prevention.** Clear signage, container labeling, resident education, load checks, and staff training should be part of the program design rather than added after problems occur.
- **Make finished compost quality visible.** Testing, product specifications, and clear end-use guidance can help buyers understand where compost can be used and support stronger, long-term markets.
- **Provide practical guidance.** Communities need straightforward permit pathways, operating templates, example site layouts, and access to technical support during startup and early operations.

The Brookings pilot provided a practical example of how food waste composting can begin at a manageable scale using existing municipal resources. The program used public drop-off sites, outreach materials, compostable bags, existing staff, and an existing yard waste composting operation. Early results showed strong participation, low contamination, minimal operational disruption, and positive community response.

The Brookings pilot also identified practical implementation considerations for future programs, including convenient drop-off locations, clear sorting guidance, access to compostable bags or other approved collection methods, and straightforward operating procedures for receiving, mixing, monitoring, and managing food waste with yard waste. These lessons helped inform the phased implementation pathway and next steps summarized below.

The phased implementation pathway illustrated above provides a practical framework for how communities can move from small pilot efforts to broader regional composting systems over time.

Implementation Phase	Primary Focus	Next Steps
Near term, 0 to 12 months	Pilots, guidance, and outreach	Continue evaluating the Brookings pilot. Support additional pilots at permitted landfill or municipal sites that already manage yard waste. Distribute standard accepted materials lists, container labels, drop-off signage, and outreach templates. Provide direct technical assistance on feedstock mix, contamination control, site operations, temperature monitoring, and basic recordkeeping.

Implementation Phase	Primary Focus	Next Steps
Mid-term, 1 to 3 years	Program expansion, operator support, and market development	Expand drop-off programs and test curbside collection where route density and participation can support the cost. Refine operating standards based on pilot results. Develop compost quality guidance, including recommended testing parameters and product specifications. Build partnerships with local governments, landscapers, nurseries, agricultural users, institutions, conservation districts, and extension partners.
Long term, 3 to 5 plus years	Regional infrastructure and regulatory alignment	Evaluate scaled or tiered permitting approaches for food waste composting. Develop regional composting capacity where sufficient feedstock volumes exist. Support shared services across communities where individual communities lack scale. Strengthen compost markets through consistent product quality, delivery options, public procurement, and recurring private sector demand.

The phased next steps outlined above provide a practical path for moving from pilot programs to broader implementation. In the near term, efforts should focus on existing yard waste composting sites, standard outreach materials, operator training, permit guidance, and targeted startup support. As programs mature, communities can expand drop-off or route-based collection, refine compost quality practices, and build stronger end-use markets. Larger investments, including dedicated collection routes or regional processing infrastructure, should follow only where participation, feedstock supply, operator capacity, and market demand support the cost.

Using existing landfill and yard waste infrastructure as the starting point allows South Dakota communities to test programs at a manageable scale, build operational confidence, and make future investment decisions based on local data. This phased approach offers a practical path for expanding food waste composting statewide while reducing the risk of overbuilding systems before communities are ready to operate and sustain them.

1.0 Introduction

The South Dakota Department of Agriculture and Natural Resources (DANR) retained Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell) to conduct a Food Waste Composting Feasibility Study (Study). This section describes the Study's purpose, outlines the project approach, and provides a guide to the Study.

1.1 Purpose

The purpose of this Study was to evaluate the feasibility of food waste composting in the State of South Dakota (State) and provide a roadmap for practical and scalable implementation. The Study assessed food waste volumes generated across the State, identified suitable composting technologies, evaluated collection and transportation strategies, and examined market opportunities for finished compost. The Study also addressed siting and regulatory considerations and facility and landfill engagement to understand the factors that influence participation in food waste composting.

A key component of the Study was the development of a pilot composting program with an interested permitted landfill facility. The pilot evaluated collection and composting methods on a small scale, provided lessons learned for future implementation, and informed potential permit amendments for ongoing food waste composting operations. Findings from the pilot are intended to help DANR develop statewide recommendations and practical guidance for future food waste composting operations.

1.2 Project Approach

The Study approach included data analysis, stakeholder engagement, facility surveys, and a technology evaluation. The components and objectives of the Study include the following:

- **Food waste volume assessment**. Quantified volumes across community, institutional, and regional scales.
- **Composting technologies**. Evaluated in-vessel, aerated static pile (ASP), and windrow systems, including costs, space requirements, and adaptability of each technology.
- **Collection and transportation strategies**. Identified scalable approaches for urban, suburban, and rural communities, as well as institutional and commercial generators.
- **Storage containers and household readiness**. Recommended user-friendly and cost-effective options to support participation.
- **Landfill and facility engagement**. Assessed interest and barriers for permitted facilities in accepting food waste.
- **Education, investment, and technical assistance**. Identified the outreach, training, funding, monitoring, permitting, and operating support needed to launch and sustain food waste composting programs.

- **Compost market analysis and expansion opportunities**. Evaluated demand for finished compost and opportunities for market expansion.
- **Siting criteria and regulatory review**. Developed siting criteria and reviewed regulations to support future composting facility development.
- **Composting pilot program**. Partnered with an existing permitted facility to evaluate composting methods and collection strategies under current permit conditions.

1.3 Study Overview

The Study is organized into 11 sections. **Table 1-1** presents an overview of the Study.

Table 1-1: Study Overview

Section	Title	Description
ES	Executive Summary	Summarizes key findings and recommendations.
1.0	Introduction	Describes the purpose, project approach, and guide to the Study.
2.0	Food Waste Volume Assessment	Quantifies food waste volumes and defines system thresholds by scale.
3.0	Technology and Method Evaluation	Evaluates in-vessel, ASP, and windrow composting methods.
4.0	Food Waste Collection and Transportation	Recommends collection methods and transportation strategies by community type.
5.0	Storage Containers and Household Readiness	Provides guidance on household and commercial storage options.
6.0	Landfill and Facility Engagement	Identifies factors influencing facility willingness to accept food waste.
7.0	Education, Investment, and Technical Assistance	Identifies gaps and future needs to support successful programs.
8.0	Pilot Composting Program	Develops and evaluates a pilot food waste composting program.
9.0	Compost Market Analysis and Expansion Opportunities	Reviews current and expansion market opportunities for compost.
10.0	Siting Criteria and Regulatory Review	Defines siting criteria and reviews regulatory considerations.
11.0	Next Steps	Consolidates all findings and provides short-, mid- and long-term priorities.

2.0 Food Waste Volume Assessment

To determine the feasibility of food waste composting systems across the State, Burns & McDonnell assessed the minimum tonnage thresholds required to support viable composting operations at three distinct scales: community-scale, mid-scale, and large-scale, as defined later in this section. Tonnage recommendations were influenced by seasonal variability in feedstock availability, co-composting potential with other organics (e.g., yard waste), staffing models, and transportation efficiency.

Understanding the scale of food waste generation across different landfills within their associated wastesheds was essential, as composting facilities require a consistent, sufficient supply of organic materials to operate efficiently and produce a high-quality product. If the volume is too low, facilities may struggle to cover operating costs or maintain proper composting conditions. Higher volumes create opportunities for economies of scale, technology investment, and market development for finished compost.

A recent solid waste characterization study conducted for the City of Sioux Falls in July 2023 (HDR, Inc., 2023) reported that food waste comprised 13.6 percent of the disposed waste stream. Food waste tons per year (TPY) disposed at each landfill in the State was estimated by applying this percentage to each landfill's permitted tons per year, and the resulting values were compared against the estimated population in each landfill's wasteshed for context. Permitted annual tonnage provides a consistent planning proxy across facilities, but it represents permitted capacity that may be higher than actual annual disposed tonnage. Volumes should be refined during implementation planning using landfill-scale data, hauler reports, and, where available, local waste characterization results. A 10 percent capture scenario was used as a planning benchmark to illustrate potential initial diversion under early adoption conditions. It is not intended as a performance target. Actual capture rates may be lower or higher depending on program design, convenience, outreach, contamination controls, generator participation, and collection access. **Table 2-1** summarizes each landfill's estimated wasteshed population, DANR permitted TPY, estimated food waste generation, and projected food waste capture under the 10 percent planning scenario. Actual capture can increase over time with targeted outreach, convenient service design, and phased program expansion.

Table 2-1: Estimated Food Waste Tonnages and Capture Potential by Wasteshed

Landfill	Estimated Population of Wasteshed [1]	Permitted TPY [2]	Food Waste TPY [3]	10% Capture TPY
Custer/Fall River	16,689	24,999	3,400	340
Northwest Regional	10,461	24,999	3,400	340
Roberts County	10,283	24,999	3,400	340
Southern Missouri	9,343	24,999	3,400	340
Walworth County	5,270	24,999	3,400	340
Mitchell	35,560	149,999	20,400	2,040
Bell Fourche	16,746	149,999	20,400	2,040
Brookings	45,000	149,999	20,400	2,040
Brown County	37,495	149,999	20,400	2,040
Pierre	40,000	149,999	20,400	2,040
Tri-County	23,000	149,999	20,400	2,040
Vermillion	40,000	149,999	20,400	2,040
Watertown	35,000	149,999	20,400	2,040
Rapid City	125,482	200,000	27,200	2,720
Sioux Falls	306,035	>200,000	28,560	2,856
Totals	**756,364**	**1,724,987**	**235,960**	**23,596**

[1] U.S. Census Bureau QuickFacts: Fall River County, South Dakota

[2] South Dakota Waste Management Program - Permitted Municipal Solid Waste Landfills

[3] City of Sioux Falls in July 2023 (HDR, Inc., 2023) reported food waste is 13.6 percent of the disposed waste stream

Based on this screening level analysis, South Dakota generates an estimated 236,000 tons of food waste per year across permitted landfill wastesheds, with an initial capture potential of about 23,600 tons per year under a 10 percent diversion scenario. The largest wastesheds, including Sioux Falls and Rapid City, offer the strongest near-term opportunities to support higher-throughput systems due to generator density and collection efficiency. Mid-sized wastesheds such as Brookings, Pierre, Watertown, Mitchell, and Brown County could support mid-scale systems or shared regional approaches if collection access, contamination controls, and processing capacity are aligned between landfills. Smaller wastesheds align with community-scale models that can start with modest volumes and expand over time as participation grows and additional generators are added.

This guidance is provided to help South Dakota communities assess whether local conditions, such as population density, generator type, and collection options, support a particular composting system scale and subsequently select an appropriately sized and cost-effective approach.

Community-, mid-, and large-scale composting system sizes were determined using county data listed in **Table 2-1**. The wastesheds were divided into three categories based on similar quantities of waste generation. For each category, minimum food waste volumes were estimated to justify capital investment, maintain efficient processing, and produce consistent, high-quality compost. Food waste volumes required for each system size, typical use cases, and implementation considerations were summarized. These thresholds were informed by research on operational programs across the Midwest. This volume-based

screening provides a practical way to match each wasteshed to the right-sized composting system and identify a phased path for expansion based on local generator types, collection options, and available co-composting materials. **Table 2-2** provides composting system tonnage guidance.

Table 2-2: Composting System Tonnage Guidance Table

Composting System Scale	Estimated Minimum Tons per Year Needed	Typical Use Case	Notes and Examples
Community-Scale	<500	Small towns, farms, tribal communities, schools	Often volunteer-based, low-tech (bins, piles, windrows). Typically performs well with co-composting of yard waste. Bucket Ruckus of Steven's Point, WI uses outdoor compost piles to compost approximately 64 tons/year.
Mid-Scale	500 to 2,000	Municipal programs, correctional facilities, universities and cities	High-tech or low-tech, they may require mechanization (loaders). Sun Prairie, WI uses an in-vessel aerobic drum with household collection. Polk County, Minnesota has two small windrows composting 600 to 1,000 tons/year.
Large-Scale	>2,000	Urban centers, large cities, regional collection hubs, shared system	Large space requirement, high maintenance, mechanization (loaders, turners, screens, aeration). SET Compost in Rosemount, Minnesota, composts >25,000 tons/year using large-scale windrows with aeration laterals.

As a reference point, 500 tons per year is roughly 2 tons per working day, 2,000 tons per year is roughly 8 tons per working day, and 10,000 tons per year is roughly 40 tons per working day.

2.1 Key Takeaways

- **Estimated statewide food waste volume.** South Dakota generates an estimated 236,000 tons of food waste annually across permitted landfill wastesheds. Under a 10 percent planning scenario, approximately 23,600 tons per year is represented as potential initial food waste capture.
- **Large wasteshed opportunities.** The largest wastesheds, including Sioux Falls and Rapid City, present the strongest near-term opportunities for large-scale composting systems due to higher generator density, shorter hauling distances, and greater potential for economies of scale.
- **Mid-sized community opportunities.** Mid-sized communities such as Brookings, Pierre, Watertown, Mitchell, and Brown County could support mid-scale composting systems.
- **Community-scale opportunities.** Smaller wastesheds like Custer/Fall River align with community-scale composting models, which can begin with modest volumes and expand over time as participation increases and additional generators are incorporated.

3.0 Technology and Method Evaluation

To support effective food waste composting across a range of South Dakota communities, three primary composting technologies were evaluated: in-vessel composting, ASP, and windrow composting. These technologies offer different operational characteristics, capital requirements, and infrastructure needs. The assessment considered key considerations for each technology as well as site needs, typical scale, odor and vectors, staffing, capital, and operation and maintenance (O and M).

3.1 In-Vessel Composting

What it is: A fully enclosed system that enables precise control over temperature, moisture, and aeration.
Best for: Sites with space limitations or heightened concerns about odor and vectors. These systems are typically modular and can operate year-round, making them a strong fit for institutions or smaller communities with limited land. However, the higher capital and energy requirements may limit feasibility for some sites.
Typical scale: Approximately 60 to 300 TPY per vessel, expandable with additional modules.
Site needs: Vessel footprint is 20 feet by 8 feet by 8.5 feet, with a 20 cubic yard compost chamber. Power options are 200 to 240 volt single-phase at 40 amp or 400 to 460 volt three-phase at 30 amp.
Odor and vectors: Low with proper loading and maintenance.
Staffing: Low daily touch time after start-up.
Capital: Higher than outdoor methods.
O and M: Electricity plus routine wear items and periodic service.
Key considerations: Up-front cost and the need for clean feedstocks.

3.1.1 In-Vessel Composting Case Study: Traverse City, Michigan

Setting and partners: Launched in September 2024 with a containerized Earth Flow IM20[1]. SEEDS Ecology & Education Centers manage processing. Carter's Compost, a local food scrap collection service, handles collection and delivery. Finished compost is used in parks, green spaces, and community gardens.

Service model: The program operates two drop-off locations and provides limited curbside food waste collection in two neighborhoods. Residents may use the drop-off service for $4 per load or subscribe to curbside service for $24 per month with weekly pickup or $12 per month with every-other-week pickup. Members receive finished compost twice per year at no cost.

Equipment and capacity: The IM20 vessel has a capacity of about 20 cubic yards. Traverse City planned for 60-100 TPY in early operations. Vendor literature shows a higher upper bound with shorter residence times, which can only be used if operations expand.[2]

Budget and funding: Total project budget was $323,428, supported by a $255,396 United States Department of Agriculture (USDA) grant and a $68,032 Traverse City in-kind match. The budget included equipment costs of $136,360 for the all-inclusive in-vessel system (shipping, installation, and basic training included); supplies of $4,800; contractual services of $114,236, including SEEDS Ecology and Education Center services of $39,700 and an evaluation consultant of $5,000; site preparation of $69,536 for a concrete pad,

[1] City of Traverse City
[2] Intermodal Earth Flow Product Sheet

electrical work, sorting table, and shed; and an in kind match covering city personnel, site planning and fees, use of city equipment, a land lease, and donation of finished compost.

Operations: The system uses automated mixing, aeration, moisture addition, material movement, monitoring, and odor control with remote or local control capability. Typical electrical demand is approximately 25 kilowatt hours per day. Vendor materials indicate zero discharge leachate management and a processing cycle that produces finished compost in approximately 45 days.

Why it matters for South Dakota: Traverse City provides a current, fully itemized public budget for a community scale in-vessel unit with a defined partner model.

Figure 3-1 depicts the in-vessel system used in Traverse City.

Figure 3-1: Traverse City In-Vessel Composting System

3.2 Windrow Composting

What it is: Windrow composting involves placing compostable materials in long rows and turning them periodically to maintain aeration. Windrow composting is widely used and often has a lower capital cost than enclosed systems when land and equipment are available. Windrow systems are proven and dependable, particularly where land and equipment are readily available.
Best for: Communities with space and a loader.
Typical scale: Hundreds to tens of thousands of TPY.
Site needs: Large outdoor pad, water for dust and moisture, basic stormwater controls.
Odors and vectors: Moderate if piles are too wet or not turned on schedule.
Staffing: Equipment operator plus seasonal help.
Capital: Lowest of the three technologies.
O and M: Fuel, equipment maintenance, screening, water management.
Key considerations: Contamination and mud; winter handling of food waste needs extra bulking and cover.

3.2.1 Windrow Composting Case Study: City of Cedar Rapids and Linn County, Iowa

Setting and partners: The City of Cedar Rapids and Linn County Solid Waste Agency own and operate a compost and yard waste site[3]. The site accepts yard waste and food waste and is open to the public during posted hours. The Agency also operates a landfill with a Resource Recovery building.

Service model: The compost site accepts only fruits, vegetables, and baked goods (no sweets). The facility does not accept meat or dairy products. The only drop-off location is the compost site itself. Finished compost is sold at $32 per ton with a $15 minimum charge per load.

Equipment and capacity: The facility operates a straddle windrow turner equipped with onboard water spray for moisture and dust control, a loader for material handling, and on-site screening equipment. In Fiscal Year (FY) 2024, the facility accepted approximately 15,990 tons of yard waste, 4,447 tons of wood waste, and 4 tons of food waste for processing through its windrow composting system.

Budget and funding: The Agency published several compost-related revenue and cost line items in its adopted FY26 Operating and Capital Budget:

- **Raw materials revenue.** Compostable commercial and residential raw materials revenue was budgeted at $713,600.
- **Finished compost revenue.** Bulk composted finished materials revenue was budgeted at $169,600.
- **Testing costs.** Groundwater and compost lab testing costs were budgeted at $27,300.
- **Pad repair costs.** Compost pad repairs were budgeted at $20,000.

Operations: Materials are received at the scale house, blended, and formed into windrows that are turned on a routine schedule. Following active composting, the material is cured and screened, with finished compost typically produced within four to six months.

Why it matters for South Dakota: This example illustrates a practical windrow composting system that accepts food waste, relies on relatively simple equipment and operations, and provides publicly available budget information that can serve as a useful planning reference for South Dakota communities.

Figure 3-2 depicts the windrow composting system used in Cedar Rapids and the windrow turner.

[3] Compost & Wood Chips | Solid Waste Agency

Figure 3-2: Cedar Rapids, Iowa Windrow Composting

3.3 ASP Composting

What it is: ASP composting uses forced aeration through perforated pipes to provide oxygen and maintain composting conditions without turning the piles. This method is scalable and suitable for medium- to large-scale operations, particularly where staffing resources are limited but site space is available. ASP systems require a level pad and moderate infrastructure investment, making them a practical choice for regional facilities.
Best for: Medium to large programs that need better odor control but want to stay outdoors.
Typical scale: Hundreds to tens of thousands of TPY.
Site needs: Level pad, blowers, pipes, and power; simple enclosures optional.
Odor and vectors: Low to moderate with a compost cap and good controls.
Staffing: Lower daily equipment time than windrows.
Capital: Moderate for pad and air system.
O and M: Electricity for fans plus maintenance of the air grid.
Key considerations: Air distribution, condensate management, and keeping the cap intact.

3.3.1 Case Study: Resource Renew, Duluth, Minnesota

Setting and partners: Resource Renew, the brand of the Western Lake Superior Sanitary District (Resource Renew), is a public entity that operates a year-round organic composting facility that blends source-separated food waste from residents and businesses with yard trimmings[4]. The program serves the Duluth region and sells a premium compost certified by the United States Composting Council. Resource Renew began operations at the yard waste compost site in 1994 and subsequently added food waste composting in 2001. In 2010, a 200-foot-by-300-foot concrete pad was added to store materials. The compost site is situated on approximately 4.6 acres.

Service model: Resource Renew operates 13 drop-off sites. Most restaurants, colleges, hospitals, food processors, and caterers that conduct business within the Resource Renew service boundary are required to separate and compost their pre-consumer food waste per the ordinance.

Equipment and capacity: Piles sit on wood chips with embedded air pipes, capped with a compost blanket that acts as a biofilter. The materials are processed into Garden Green®, a compost product. The facility processed more than 2,600 tons of ASP in 2024. The site is permitted to process 10,000 tons of yard and food waste annually. Customers can purchase compost in bags or in bulk. The compost site produced approximately 1,900 tons of finished compost in 2024.

Budget and funding: The 2024 Resource Renew budget lists Organics Composting and Yard Waste total operations and maintenance of $421,553. Revenues supporting the program include $127,170 from compost and yard waste fees, $70,000 in State of Minnesota funds, and $224,383 from the Solid Waste Management Fee, a line item on property taxes. Bulk compost loaded by staff can be purchased for $30 per cubic yard, and self-loaded bulk costs $22 per cubic yard, with bag prices of $6 per bag. These rates help offset operations and maintenance while keeping the food waste drop-off free for residents.

Operations: Staffing includes two full-time equivalents (FTE) plus 0.3 FTE of supervisory allocation. The operations and maintenance budget includes staffing, salary and benefits. Leachate is collected in a pond

[4] Food Waste - Resource Renew

and pumped to the adjacent wastewater treatment facility for treatment. The process to make the finished compost takes approximately 9 months.

Why this matters for South Dakota: The ASP composting approach used by Resource Renew matches South Dakota's climate conditions. It uses chip beds with perforated pipes and a compost cap that can operate outdoors through winter which pairs well with the separate yard waste stream for bulking and can be sited at landfill locations without a new building. The documented Resource Renew budget and staffing provide a practical planning anchor for mid-scale to large-scale wastesheds. Compost sales can offset a portion of operating costs while keeping residential food scrap service affordable. **Figure 3-3** depicts the ASP composting system utilized at Resource Renew.

Figure 3-3: Resource Renew ASP Composting

3.4 Technology Summary

Each technology is suitable for different feedstock volumes and site conditions. This evaluation provides decision-makers with a comparative framework to match composting technologies to the unique environmental, operational, and financial conditions of South Dakota communities.

Regardless of technology, successful food waste composting depends on consistent feedstock preparation and contamination control, reliable access to bulking agents, a well-managed pad and stormwater system, and screening or other finishing steps matched to end-use markets. **Table 3-1** summarizes composting types and typical uses.

Table 3-1: Composting Types and Typical Uses

Composting Technology	Best Fit	Typical Scale	Land and Infrastructure Needs	Odor and Vector Risk	Relative Capital Cost	Relative O and M
In-vessel composting	Community-scale to mid-scale programs, tight sites, close neighbors, or sites needing stronger odor control	60 to 300 TPY per vessel, expandable with additional modules	Low land area; requires pad, power, access, and vendor-specific equipment	Low when properly loaded and maintained	High	Low to medium
ASP	Mid-scale to large-scale programs where odor control and reduced turning are priorities	Hundreds to 40,000+ TPY, depending on system design	Moderate to high; requires pad, aeration piping, blowers, power, and air distribution controls	Low to medium with proper cap and aeration controls	Medium	Low to medium

Composting Technology	Best Fit	Typical Scale	Land and Infrastructure Needs	Odor and Vector Risk	Relative Capital Cost	Relative O and M
Windrow composting	Mid-scale to large-scale sites with available land, loader access, and sufficient carbon material	500 to 40,000+ TPY	High land area; requires outdoor pad, stormwater controls, equipment access, and space for curing and screening	Medium, especially if piles are too wet or not turned on schedule	Low	Medium to high

Note: Relative capital and O and M costs are intended for planning-level comparison only. Actual land area, infrastructure, cost, odor control, staffing, and operating needs depend on site conditions, feedstock volume, available carbon material, and equipment.

South Dakota communities have three viable composting paths that align well with the tonnage-based system scales described in **Section 2.0.** In-vessel systems are typically best suited for smaller or space-constrained sites where odor control or year-round enclosed processing is a priority. Windrow systems rely on routine turning for aeration and are typically the lowest-capital-cost option where land, equipment, and carbon material are available. ASP systems use blowers and perforated piping to provide forced aeration with less turning, making them a practical option for mid-scale or larger landfill-based operations where odor control and labor efficiency are important. Some sites may benefit from a hybrid approach that uses forced aeration during active composting and windrows for curing and screening.

3.5 Key Takeaways

- **Viable composting technologies.** Three composting technologies are viable for South Dakota communities: in-vessel, windrow, and ASP. Each offers distinct advantages in scale, cost, odor control, staffing needs, and infrastructure requirements.

- **Technology fit.** Technology choice should align with community scale and site conditions. In-vessel systems work well for small or space-constrained sites; windrow systems offer the lowest capital cost when land and equipment are available; and ASP systems provide improved odor control and operational efficiency for mid- to large-scale facilities.

- **Relevant case studies**. Case studies from Michigan, Iowa, and Minnesota demonstrate successful implementation across different scales, from small community in-vessel units to regional windrow and ASP operations processing several thousand tons annually.

- **Core operational needs.** Successful food waste composting depends on consistent feedstock supply, contamination control, reliable carbon bulking materials, and proper site management, including stormwater controls and finishing processes matched to end-use markets.

4.0 Food Waste Collection and Transportation

An important factor in the success of any composting program is how food waste is collected, transported, and delivered to processing facilities. Collection models must balance convenience for participants, operational efficiency, and cost-effectiveness while also addressing contamination and seasonal variability. In South Dakota, strategies must adapt to a wide range of community types from urban areas to sparsely populated rural regions, each with distinct logistical and economic considerations.

This section evaluates the primary collection methods available, including curbside programs and centralized drop-off sites, and provides a planning-level cost estimate to illustrate the resources required to launch these services. The section also outlines contamination management practices to protect compost quality and maintain program viability. Together, these elements form the foundation of a practical food waste collection and transportation strategy for South Dakota communities.

4.1 Curbside Collection

Curbside food waste collection services, offered by both private haulers and municipal programs, provide a convenient and accessible way for households and businesses to manage food waste. Customers typically subscribe for a recurring fee that includes a designated food waste cart and scheduled pickups.

Residential food waste collection services often use smaller, dedicated plastic carts, 35 gallons or less, equipped with lids and wheels, collected weekly or every other week, depending on demand and waste volume.

In a commercial setting, source separation of food waste requires strategic container placement and regular emptying to control critters and odors. Carts and dumpsters located outside should be emptied at least weekly in the summer and every other week during the winter, depending on the amount of waste generated. Since food waste is heavy and wet, smaller containers are recommended inside buildings to ease logistics for emptying and effectively manage odors. For smaller areas such as kitchens and food preparation spaces, 5-10-gallon containers are ideal, while larger kitchens may require 10-20-gallon containers that are emptied frequently.

Across communities, residential food waste curbside collection programs vary in price, cart size, pickup frequency, and how the service is organized. Some cities use a universal model where all households receive the service, while others rely on opt-in subscriptions. Service delivery can also differ, ranging from city-provided or city-contracted service to open hauling models where residents choose from any hauler, with some jurisdictions requiring hauler licensing. **Table 4-1** provides examples of residential food waste collection programs in different cities, illustrating the diversity of service models and costs.

Table 4-1: Examples of Residential Food Waste Collection Programs

Community	Population [1]	Collection Model	Service Provider	Container Volume	Frequency of Collection	Price Per Household Per Month
Eden Prairie, Minnesota	62,905	Universal	Open market	35 gallons	Weekly	Average $6.83 [2]
Columbia Heights, Minnesota	22,358	Opt-in subscription	Private hauler - contracted	6 gallons	Weekly	$14.45 [3]
Park City, Utah	8,254	Opt-in subscription	Private hauler - contracted	5 gallons	Weekly	$19.50 [4]
Plymouth, Minnesota	78,551	Universal	Private hauler - contracted	35 gallons	Weekly	$3.50 [5]
Spokane, Washington	230,609	Opt-in subscription	City provided	96 gallons - includes yard waste	Weekly (reduced service in winter)	$18.01 [6]

1 U.S. Census Bureau QuickFacts: United States
2 Organics Recycling | City of Eden Prairie
3 Columbia Heights Rates
4 Park City Food Waste Recycling Service | Momentum Recycling
5 Organic Waste Reduction and Composting | City of Plymouth, MN
6 Composting Services - City of Spokane, Washington

As shown above, monthly household costs vary widely across programs, ranging from approximately $3.50 to $19.50 per month. Opt-in subscription programs typically have higher per-household costs than universal programs because lower participation reduces route density and limits economies of scale in collection, staffing, and transportation.

In addition to costs and program structures, visual cues help convey what participation looks like at the household level. **Figure 4-1** depicts examples of food waste collection bins on a curb for collection from Cambridge, MA and Columbia Heights, Minnesota.

Figure 4-1: Example Food Waste Bins Collection

Image from Cambridge, Massachusetts

Image from Columbia Heights, Minnesota

While these examples highlight existing program models, it is also important to understand what it might cost a municipality to implement a new food waste collection service. To support this, three scenarios were developed to represent a range of approaches, beginning with a small pilot program, followed by integration into existing collection routes, and ultimately a full-scale dedicated service. These scenarios reflect increasing levels of investment, operational complexity, and service coverage, and are intended to help communities evaluate options based on their existing infrastructure, staffing, and readiness to implement a program.

To illustrate the level of investment that may be required for municipal food waste collection, three planning-level collection cost scenarios were developed. These scenarios progress from a small pilot using existing municipal resources, to adding food waste to an existing collection route, to establishing a dedicated collection service. The scenarios are intended to show how costs change with service scale, route capacity, and use of existing staff and equipment. Key assumptions are summarized in **Table 4-2**.

Table 4-2: Collection Scenario Assumptions

Scenario	Participating Households	Vehicle Type	Weekly Vehicle Route Capacity	Route Capacity Used For Food Waste Collection	Estimated Miles Per Week	Container Type
Small pilot collection using flatbed truck	100	Flatbed truck	100	5%	20	7-gallon bin
Add food waste to existing collection service	500	Automated side-loader (ASL)	5,000	10%	100	35-gallon cart
New dedicated service	5,000	ASL	5,000	100%	500	35-gallon cart

Note: Assumptions are for planning-level comparison only. “Weekly vehicle route capacity” represents the approximate number of households a vehicle could serve in one weekly route. “Route capacity used for food waste” represents the portion of that weekly route assigned to food waste collection. Actual route miles, vehicle use, staffing, and container needs will vary by community layout, participation, collection frequency, and whether collection is added to an existing route or operated as a dedicated service.

Planning-level cost estimates presented in this section are based on standard assumptions for staffing, equipment, and operations. Vehicle capital costs are annualized using a 5 percent interest rate, while cart and bin costs are annualized on a straight-line basis over their expected service life. Fuel costs are estimated based on weekly route miles, weeks of service per year, vehicle fuel economy, and diesel price. These assumptions are intended for comparative purposes only and may vary by community.

Small Pilot Collection Scenario

The small pilot scenario is intended to help a community test food waste collection before committing to a larger curbside system. Under this approach, collection could be provided to approximately 100 households using a smaller city vehicle, such as a flatbed truck, rather than an ASL. Participating households would receive 7-gallon bins, and collection would likely be completed by existing city staff as part of their broader duties.

For planning purposes, this scenario assumes the pilot uses approximately 5 percent of one staff route or vehicle capacity. Because of its limited scale, the program relies on existing municipal staffing and equipment, with only a small share of staffing, fuel, and vehicle costs allocated to food waste collection. This approach allows communities to evaluate participation, contamination, routing, and operational

considerations before expanding service. **Table 4-3** provides a planning-level cost estimate for a small pilot collection.

Table 4-3: Planning-Level Cost Estimate for a Small Pilot Collection

Cost Item	Value
Participating households	100
Vehicle type	Flatbed truck
Weekly vehicle route capacity	100 households/week
Route capacity used for food waste collection	5.0%
Estimated route miles per week	20
Container type	7-gallon bin
Allocated base salary	$3,250
Allocated benefits	$1,138
Total allocated staffing	**$4,388**
Vehicle annualized capital cost	$864
Vehicle annual O and M	$125
Container straight- annualized capital cost	$150
Fuel cost	$1,040
Total annual cost	**$6,567**
Annual cost per household	**$66**

This scenario reflects a low-cost, low-commitment approach for testing collection logistics and participation. While the total program cost is relatively low, the cost per household is higher due to the small service area and limited ability to distribute fixed costs.

Adding Food Waste to Existing Collection

For communities that already provide residential solid waste collection, a practical approach may be to integrate food waste into existing routes rather than establish a stand-alone service. Under this scenario, the municipality uses available route capacity within its current fleet and staffing structure and provides participating households with organics carts.

For planning purposes, one ASL route is assumed to serve approximately 5,000 households per week. A program serving 500 households would use about 10 percent of one route, with staffing, vehicle, fuel, and maintenance costs allocated accordingly. This scenario represents a moderate, scalable approach and is likely a cost-effective curbside option for communities with existing collection service.

Table 4-4 provides a planning-level cost estimate for adding food waste to an existing collection service.

Table 4-4: Planning-Level Cost Estimate for Adding Food Waste to an Existing Collection Service

Cost Item	Value
Participating households	500
Vehicle type	Automated Side-Loader (ASL)
Weekly vehicle route capacity	5,000 households/week
Route capacity used for food waste collection	10%
Estimated route miles per week	100
Container type	35-gallon cart

Cost Item	Value
Allocated base salary	$6,500
Allocated benefits	$2,275
Total allocated staffing	**$8,775**
Vehicle annualized capital cost	$6,913
Vehicle annual O and M	$2,500
Container straight-annualized capital cost	$2,900
Fuel cost	$5,200
Total annual cost	**$26,288**
Annual cost per household	**$53**

Although the total annual cost for this scenario is less than $27,000, the cost per household appears relatively high at approximately $53. This is due to the limited number of participating households, with fixed costs distributed across a smaller customer base. As participation increases and a greater share of the collection route is utilized, the cost per household would be expected to decrease.

New Dedicated Collection Service

A third scenario reflects the development of a new, dedicated food waste collection service in an area without existing residential collection. Under this approach, a dedicated automated side-loader truck is purchased and operated, carts are distributed to participating households, and all staffing, fuel, vehicle, and container costs are fully assigned to the program.

For planning purposes, this scenario assumes a dedicated route serving 5,000 households, representing the full weekly capacity of one automated side-loader route. While this scenario has the highest total annual cost, it may result in a comparable or lower cost per household due to economies of scale. This approach may serve as a planning-level proxy for a municipality establishing a new service or a contractor evaluating market entry. Contractor-specific costs such as overhead, insurance, and profit are not included. **Table 4-5** provides a planning-level cost estimate for adding a new dedicated collection service.

Table 4-5: Planning-Level Cost Estimate for New Dedicated Collection Service Startup

Cost Item	Value
Participating households	5,000
Vehicle type	ASL
Weekly vehicle route capacity	5,000 households/week
Route capacity used for food waste collection	100%
Estimated route miles per week	500
Container type	35-gallon cart
Allocated base salary	$65,000
Allocated benefits	$22,750
Total allocated staffing	**$87,750**
Vehicle annualized capital cost	$69,128
Vehicle annual O and M	$25,000
Container annualized capital cost	$29,000
Fuel cost	$26,000
Total annual cost	**$236,878**
Annual cost per household	**$47**

This scenario has the highest total annual cost due to the need for dedicated staff, equipment, and a collection vehicle. However, the cost per household is comparable to the existing service scenario because fixed costs are distributed across a much larger number of households.

4.2 Drop-off Sites

Food waste drop-off sites can provide a flexible, lower-cost entry point for communities interested in launching food waste diversion programs. Compared to curbside service, drop-off sites require less equipment and allow municipalities to gauge community interest, refine logistics, and address contamination challenges before investing in larger-scale collection systems. By starting with a limited number of strategically placed drop-off sites, communities can build early participation, generate useful data on program performance, and establish a foundation for future expansion into curbside collection or hybrid systems that combine curbside service with strategically located drop-off locations.

In order to support participation and minimize operational issues, drop-off sites should be secure, well lit, easily accessible, and equipped with sealed lids to reduce odors and rodent activity. Sites may be located at public facilities, grocery store parking lots, school campuses, or other convenient community destinations. Containers may range from carts to labeled dumpsters, with collection frequency adjusted based on fill rates, season, and site conditions.

A practical planning approach is to locate drop-off sites densely enough that residents can incorporate participation into routine trips, then scale the program based on observed demand and operational performance. For example, West Hartford, Connecticut, launched four drop-off locations serving a population of about 64,000, or roughly one site per 16,000 residents. Early participation in West Hartford, with more than 500 participants in the first month, suggests that initial use may range from about 0.5 percent to 1 percent of residents before outreach and access expand. Based on municipal examples such as West Hartford, reported capture rates for residential drop-off programs commonly range from about 1 to 3 tons per site per month during early implementation. Best-practice guidance recommends managing growth deliberately, often through registration and capacity planning, and adjusting outreach, servicing frequency, and siting as participation, contamination, and operational needs become clearer. **Table 4-6** summarizes various food scrap drop-off programs and the number of residents per drop-off site.

Table 4-6: Example Food Waste Drop-off Programs by Population

Place	Population [1]	Food Waste Drop-off Sites	Residents Per Drop-off Site
Cloquet, Esko, and Carlton, Minnesota	15,775	3	5,258
Superior, Wisconsin	26,193	6	4,366
West Hartford, Connecticut	64,083	4	16,021
Tompkins County, New York	102,076	15	6,805

[1] U.S. Census Bureau QuickFacts: United States

Initial implementation for a given community could include two to four drop-off sites, each served by carts or small containers and serviced on a routine schedule, such as weekly in summer and every other week in winter. Residents may use compostable bags distributed at the sites, and the collection route may be

supported through a partial allocation of existing staff and fleet resources, particularly where communities already operate yard waste, brush, or similar seasonal services. Many drop-off sites would likely be open 24 hours per day and should include security cameras, staff oversight, or both, particularly at co-located public facilities.

Programs that require tied compostable bags and provide bag dispensers at the site often experience lower litter and fewer plastic bags, but communities should also account for bag restocking, dispenser maintenance, and clear public messaging about acceptable materials. Pilot design should also guide early planning. Identifying which collection methods to test, confirming site logistics and servicing needs, and considering how the program could expand after the pilot phase are all important to long-term success. Aligning contamination-reduction practices and operating procedures with pilot findings can help refine costs, improve participation, and support future program growth. **Figure 4-2** depicts a typical food waste drop-off collection site using carts and **Figure 4-3** depicts an example of a food waste drop-off collection site that uses a dumpster for collection.

Figure 4-2: Example of a Cart-Based Food Waste Drop-off Collection Site

Image from Solid Waste Authority of Central Ohio

Figure 4-3: Example of a Dumpster-Based Food Waste Drop-off Collection Site

Image from Resource Renew, a brand of the Western Lake Superior Sanitary District

To illustrate the level of investment that may be required, **Table 4-7** presents a planning-level cost estimate for a small network of four food waste drop-off sites serviced by a flatbed truck and supported through a partial allocation of existing staff time. This example is intended to represent an incremental startup approach rather than a dedicated stand-alone collection system.

Table 4-7: Estimated Startup Costs for Four Food Waste Drop-off Sites

Cost Item	Value
Drop-off sites	4
Route capacity used for drop-off program	10%
Estimated route miles per week	20
Vehicle type	Flatbed truck
Carts per site	1
Total carts	4
Allocated base salary	$6,500
Allocated benefits	$2,275
Total allocated staffing	**$8,775**
Vehicle annualized capital cost	$1,728
Vehicle annual O and M	$250
Cart annualized capital cost	$518
Fuel cost	$1,040
Total annual cost	**$12,311**
Annual cost per site	**$3,078**

Note: This planning-level estimate assumes the drop-off program is supported through a partial allocation of existing municipal staff and flatbed truck resources rather than a dedicated collection system. Annualized capital cost is based on the assumed interest rate and service life. Fuel cost is based on weekly route miles, weeks of service per year, vehicle fuel economy, and diesel price. Costs do not include site preparation, fencing, signage, contamination monitoring, education and outreach, compostable bags, processing fees, or administrative overhead.

Compostable bag consumption depends on participation and set-out habits; the estimate in **Table 4-7** assumes an initial annual supply sufficient to support early adoption at four sites.

4.3 Contamination Management

Contamination control is critical to maintaining finished compost quality and minimizing costs tied to sorting, processing delays, equipment wear, and disposal of non-compostable material. In this section, "contamination" refers to physical contaminants such as plastics, glass, metal, and noncompostable packaging. Contamination management should be set using two linked targets:

1. **Incoming contamination targets for collection programs.** These targets support education, cart tagging, and load checks.
2. **Finished compost quality targets tied to intended end use.** These targets support screening, testing, and market acceptance. Finished compost quality targets are addressed in **Section 9.7**.

For planning, programs commonly set incoming contamination targets in the range of 1 to 5 percent by weight, then align education, load checks, and screening to meet finished compost requirements discussed in **Section 9.7**.

4.3.1 Incoming Contamination Targets

Contamination levels depend heavily on how the material is collected and who is using the containers. Collection programs that require an intentional choice to participate, provide clear cues at the point of disposal, and limit access to containers typically produce cleaner feedstocks. Programs with automatic enrollment, shared public-facing bins, or limited oversight tend to see higher rates of non-compostable material and greater variability from site to site. The general patterns below summarize how the collection method and participant control influence incoming contamination rates.

- **Drop-off programs.** Participants who self-select and bring material voluntarily tend to be more committed, leading to very clean streams (often less than 1 percent by weight). Site design, signage, and monitoring further reduce contamination risks[5].
- **Subscription-based residential curbside.** Lower contamination than universal programs. Households that opt in are typically more motivated and conscientious, keeping contamination in the range of 1 to 3 percent by weight[6].
- **Universal residential curbside.** Can result in higher contamination risk. Automatic enrollment means some residents may not fully understand or support the program, resulting in contamination closer to the 5 percent range by weight, depending on education and enforcement[7].
- **Commercial and institutional subscription.** Typically lowest when material is staff-managed (back of house prep waste) and higher when bins are shared across many users or exposed to

[5] Neighborhood Food Scrap Drop-Off Hubs | BioCycle
[6] What Is In The Organics Cart? | BioCycle
[7] The Organics Capture Rate And What It Tells Us | BioCycle

customers (front of house). In commercial audits, contamination rates are commonly reported in the 3 to 6 percent range[8] by weight.

Drop-off Sites Strategies to Reduce Contamination
Drop-off programs can achieve low contamination when the site is designed to guide correct behavior and discourage misuse. Because participants make an intentional trip, they are often more motivated and receptive to instructions than households in universal curbside programs. However, drop-off sites can become high-contamination locations if containers are easy to access and are not staffed after-hours or if instructions are unclear. To maintain high-quality material, programs should prioritize:

- **Provide clear site design.** Provide secure containers with locking lids, clear signage, and step-by-step disposal instructions.
- **Control access.** Use fencing, lighting, and, in some cases, staffed hours to discourage misuse.
- **Monitor contamination.** Containers should be checked each time they are serviced, and high-contamination sites should receive targeted outreach.

Curbside Collection Strategies to Reduce Contamination (Residential and Commercial/Institutional)
Curbside collection includes route-based pickup of food waste from carts, totes, or dumpsters at homes and at commercial or institutional generators. Contamination performance typically improves when participation is intentional, containers are clearly labeled, and the set-out location is controlled by trained staff (for example, back-of-house collection at restaurants, schools, and hospitals). Programs should prioritize:

- **Use clear container design and labeling.** Provide clearly labeled carts or dumpsters with consistent colors and photo-based instructions at the point of disposal.
- **Provide education and training.** Pair resident outreach for households with staff training and refresher messaging for commercial and institutional sites.
- **Create feedback loops.** Use cart or container tagging, photo documentation, and direct follow-up with accounts that have repeat issues.
- **Manage service levels.** Use correctly sized containers, clear liner policies, and clear rules on accepted materials. Pair these practices with a contamination response ladder that starts with education and tagging, then escalates to direct follow-up, contamination surcharges, and service suspension for repeated noncompliance.

4.4 Key Findings

- **Collection approaches.** Two primary collection approaches can support food waste diversion in South Dakota: curbside collection and centralized drop-off sites. Each offers different tradeoffs related to convenience, participation rates, startup cost, and operational

[8] Oregon Metro Releases Commercial Food Scraps Contamination Report | BioCycle

complexity.

- **Drop-off programs.** Drop-off programs provide the lowest-cost entry point for communities beginning food waste diversion. They allow municipalities to test participation, refine logistics, and manage contamination before investing in more expensive curbside collection systems.
- **Curbside collection.** Curbside collection offers high convenience and participation potential but requires greater investment in vehicles, carts, and staffing.
- **Contamination management.** Contamination management is critical to maintaining compost quality and controlling operational costs. Successful programs rely on clear container labeling, participant education, monitoring of incoming materials, and graduated enforcement strategies to keep contamination rates low.

5.0 Storage Containers and Household Readiness

This section evaluates household container options to support effective food waste collection in both curbside and drop-off programs. The assessment focused on practical considerations that influence participation and program success, including container types and sizes, liner options, odor and moisture control, and ease of use for different household types. The goal was to identify storage solutions that are clean, user-friendly, and cost-effective while minimizing odors, pests, and contamination. Recommendations also address container labeling and education strategies to help households properly separate food waste and support consistent program performance.

5.1 Container Types and Sizes

Three container types were evaluated for household food scrap collection: countertop bins (1 to 2 gallons), intermediate storage buckets (5 gallons), and outdoor collection carts (approximately 20 to 64 gallons). Together, these container sizes represent the typical progression from kitchen collection to intermediate storage and final set out for collection or drop-off. Evaluation focused on practical household considerations such as ease of use, odor control, pest resistance, cleaning requirements, and compatibility with different collection models.

A 2-gallon countertop bin is designed for convenient food scrap collection at the point of generation in the kitchen. These bins are lightweight and easy to empty into a larger container. Ventilated designs paired with compostable liners can help reduce moisture and odors, while sealed containers work well when emptied more frequently. An example of a 2-gallon bin is provided in **Figure 5-1**.

Figure 5-1: Example of a 2-Gallon Bin

Image from The Home Depot

A 5-gallon bucket with a lid provides short-term storage in a garage or outdoor location and is commonly used in rural or drop-off programs. The tight-fitting lid helps control odors and prevents pests, while the size allows most households to store a week or more of food waste before transporting material to a compost site. Buckets stored in garages or sheltered areas can also reduce freezing issues during winter. An example of a 5-gallon bucket is provided in **Figure 5-2**.

Figure 5-2: Example of a 5-Gallon Bucket

Image from Bucket Outlet

A 35-gallon cart is commonly used for curbside collection. These carts are durable, compatible with automated collection systems, and large enough to accommodate weekly residential food scrap generation. Clear labeling, photo-based yes-or-no guidance, and distinct color coding help reduce contamination and improve program participation. An example of a 35-gallon cart is provided in **Figure 5-3.**

Figure 5-3: Example of a 35-Gallon Cart

Image from San Diego

Container costs were reviewed to estimate the potential investment required if a community chooses to provide bins or carts. **Table 5-1** summarizes typical retail and bulk purchase costs for common container sizes.

Table 5-1: Cost Per Container

Container Type and Size	Retail Range	Bulk Price (100 units)
Kitchen Bin - 1 to 2 gallon	$8 to $18	$6 to $12
Household storage bucket – 5 gallons	$12 to $25	$10 to $18
Curbside cart – 35 gallons	$60 to $95	$45 to $75
Curbside cart – 64 gallons	$85 to $140	$75 to $110

Note: Costs are planning-level examples and vary by vendor, quantity, and shipping.

5.2 Liners and Ventilation

Liners can be used with food scrap containers to reduce odors, control moisture, and make emptying containers easier. Programs typically allow compostable liners, paper bags, or no liner, depending on the composting process and contamination tolerance. Compostable liners are commonly used for kitchen bins and small storage buckets, while larger outdoor carts are often used without liners due to cost and bag durability limitations.

Table 5-2 summarizes common liner approaches and the practical tradeoffs for households.

Table 5-2: Pros and Cons of Liner Options for At-home Bins

	Compostable Liners	Paper Bags	No Liner
Pros	Limits odors and leakage, many size options available	Low cost and widely available, easy to carry and empty	Free, no installation, no extra waste
Cons	Expensive, longer composting times and some facilities prohibit	Not leakproof, limited size options	No protection of the container, compost can stick and cause odors
Best Fit	Curbside programs and households prioritizing odor control and clean handling	Short storage durations, drier waste, and situations where minor leakage is acceptable	Drop-off site users are able to rinse regularly, and households avoid ongoing liner cost

Liner costs were reviewed to estimate the level of investment required if a community chooses to provide compostable bags to residents. Pricing shown reflects typical bulk purchase estimates and can vary depending on manufacturer, thickness, bag size, and certification standards such as Biodegradable Products Institute (BPI) certification. Communities should confirm current pricing, minimum order quantities, and product specifications during procurement. Bag sizes are typically selected one size larger than the container to allow the bag to fold over the rim and be tied closed for transport. **Table 5-3** provides example container and compostable liner costs.

Table 5-3: Example Container and Compostable Liner Costs

Container Size	Typical Container Cost	Recommended Compostable Liner Bag Size	Estimated Compostable Liner Cost
1 gallon	$6	2 gallons	$88 per 500 bags
2 gallons	$15	3 gallons	$88 per 500 bags
5 gallons	$20	7 gallons	$105 per 500 bags

Note: Liner sizes are typically selected one size larger than the container so the liner can fold over the rim and be tied closed for transport. Costs are planning-level examples and vary by vendor, bag thickness, certification, quantity, and shipping.

Ventilated container designs can help manage moisture and odor in household food scrap storage. Countertop bins often feature small air vents in the lid and a replaceable activated charcoal filter. The filter allows air to pass through while capturing odor compounds released during the early stages of food

decomposition. Activated charcoal is effective because its highly porous structure traps odor molecules, reducing their release into the surrounding environment.

Ventilated designs are commonly used with 1 to 2-gallon countertop bins, where food waste may be stored for several days before being emptied into a larger container or taken to a compost site. Ventilation can reduce excess moisture and slow the development of strong odors, particularly when used with compostable liners or paper bags. Filters are typically located in the lid behind the vent openings and are designed to be replaced periodically as they lose effectiveness.

Filters used in countertop bins typically have a replacement interval of 2 to 4 months, depending on the amount of food waste generated and household conditions. Replacement filters are widely available and relatively inexpensive, allowing residents to maintain odor control without replacing the entire container.

Ventilated containers are typically constructed from durable plastic or stainless steel and are designed for short term storage at the point of generation in the kitchen. By controlling odors and moisture, ventilated bins can improve user experience and increase household participation in food scrap collection programs. **Figure 5-4** depicts a typical countertop compost bin with a charcoal filter.

Figure 5-4: Typical Countertop Compost Bin with Charcoal Filter

Image from Utopia Kitchen

5.3 Ease of Use and Accessibility

Ease of use and accessibility are important factors influencing household participation in food scrap collection programs. Containers should be easy to carry, open, and empty while minimizing spills, odors, and pest attraction. Smaller countertop bins placed near food preparation areas make it convenient to collect waste at the point of generation, while larger storage containers or carts allow households to store material until collection or drop-off.

Accessibility considerations should also account for a range of household needs. Lightweight containers with secure but easy-to-open lids can improve usability for elderly residents or individuals with limited

mobility. Handles, stable bases, and manageable container sizes can make it easier for residents to transport food waste to outdoor carts or drop-off locations.

Programs may also improve accessibility by providing clear instructions, consistent container types, and visual labeling to reduce confusion about acceptable materials. When containers are intuitive to use and convenient to access, households are more likely to participate consistently and maintain lower contamination rates.

5.4 Education and Labeling

Clear container labeling is an important tool for reducing contamination and helping residents understand what materials are accepted in food scrap collection programs. Labels placed directly on kitchen bins or carts provide guidance at the point of disposal and can reinforce broader education efforts. Effective labels typically include simple visual cues such as photos or icons showing accepted materials (for example, fruits, vegetables, coffee grounds, and food-soiled paper) and materials that should be excluded. QR codes can also be added to labels to direct residents to current sorting guidance, drop-off locations, and program updates.

Many programs also use color coding and consistent container design to help residents easily distinguish organics containers from trash and recycling. Durable lid decals or molded labels are generally more effective than temporary flyers because they remain visible throughout the life of the container.

An example of this approach is used by Hennepin County, Minnesota, which provides residents with a photo-based label showing common compostable items such as food waste, food-soiled paper, and certified compostable products. This visual format helps residents quickly recognize acceptable materials and reduces confusion at the point of disposal. **Figure 5-5** depicts an example of organics container labeling.

Figure 5-5: Example of Organics Container Labeling

When combined with outreach materials and program guidance, clear labeling can support higher participation rates and reduce contamination in collected food waste.

5.5 Key Takeaways

- **Container types.** Household food waste collection can include three container types: small countertop bins, typically 1 to 2 gallons, for kitchen collection; 5-gallon buckets for short-term storage or drop-off transport; and larger outdoor carts, typically 20 to 64 gallons, for curbside collection programs.

- **Liner options.** Liner choice affects odor control, cost, and maintenance. Compostable liners reduce odors and improve cleanliness but add cost. Paper bags provide a lower-cost option for short storage periods, and no-liner systems eliminate ongoing expenses but require more frequent container cleaning.

- **Collection model fit.** Container and liner selection should align with the collection model. Countertop bins paired with outdoor carts work well for curbside systems, while sealed buckets are practical for rural households and drop-off programs where residents transport food waste periodically.

- **Standardization and bulk purchasing.** Communities can reduce participation barriers and program costs by standardizing container options and purchasing in bulk. Standardization can lower per-unit prices, simplify program messaging, and reduce contamination caused by incompatible bags or containers.

6.0 Landfill and Solid Waste Facility Engagement

The target facilities for participating in a food waste composting pilot program are permitted landfills and solid waste facilities that have the space and infrastructure to support food waste composting operations. All sites selected to contact have an existing yard waste collection and composting program in place. To engage with facilities, a survey was created and emailed to six facilities deemed able to support a pilot program. The email provided context on the project and requested completion of the survey to establish interest and concerns. Four facilities responded to the survey. Upon receiving a completed form, a follow-up email requesting a meeting was sent to discuss the program further.

The survey was designed to collect information on current site operations and infrastructure, interest in adding food waste to existing streams, equipment, staffing, land constraints, odor or contamination concerns, and willingness to pilot or permit new composting activities. Both multiple-choice and open-ended questions were included to gather qualitative insights. **Table 6-1** summarizes responses from the landfills that filled out the survey. Complete copies of the surveys are provided in **Appendix A**.

Table 6-1: Summary of Landfill and Solid Waste Facility Survey Responses

Question	Brookings Landfill	Huron Solid Waste Facility	Rapid City Landfill	Sioux Falls Landfill
Materials Managed Currently				
Yard Waste	X	X	X	X
Manure/Ag		X	X	
Biosolids		X	X	
Other				
Approximate Area for Composting Operations	7 acres	3 acres	Unknown	5 acres
Current Composting Equipment				
Loader	X	X	X	X
Grinder/Shredder		X	X	X
Screen	X	X	X	X
Blower/Aeration System				X
Other		Windrow Turner	Windrow Turner	
Interest in Food Waste Composting				
Yes		X		
No				
Maybe/Need more info	X		X	X
Biggest Concerns				
Odors		X	X	X
Contamination	X	X	X	X
Regulatory Requirements	X	X	X	X

Question	Brookings Landfill	Huron Solid Waste Facility	Rapid City Landfill	Sioux Falls Landfill
Staffing	X	X	X	
Equipment	X		X	
Financial Costs		X	X	X
Other				
Willing to Participate in Pilot Program?				
Yes	X			
No				
Possibly, depending on support		X	X	X
Support Needs				
Grant funding	X	X	X	X
Permit Guidance	X	X	X	X
Technical Assistance			X	X
Composting Training			X	X
Public Education/Outreach Templates	X	X	X	
Connections with Haulers or Generators	X		X	X

Key findings from the survey showed that facilities' main concerns were contamination and regulatory requirements. The facilities expressed the greatest need for grant funding and permit guidance. All sites currently accept yard waste and have loaders and screens. All surveyed landfills and permitted solid waste facilities that completed the survey showed some interest in food waste composting but indicated they needed more information about the pilot program and support before committing.

Based on survey responses and a review of existing operations, no major regulatory barriers were identified that would prevent participating landfills and permitted solid waste facilities from accepting food waste. All surveyed sites currently operate yard waste composting programs, and food waste composting would likely require a permit modification and operational plan update rather than a new permit.

Survey responses indicated that facilities generally have the basic infrastructure required to support composting operations. Each site reported operating loaders and screening equipment. Existing equipment and site configurations suggest that windrow or ASP systems would be the most feasible composting approaches for these facilities.

Available land for potential composting expansion ranged from approximately 3 to 7 acres across responding sites. While staffing and equipment were identified as potential considerations for long-term operations, most facilities indicated that a pilot-scale program could likely be supported using existing staff and equipment.

To better understand the financial context for managing food waste at these facilities, a review of current tipping fee structures was also conducted. Existing tipping fees provide insight into the economic drivers that

influence material management decisions. In general, landfill tipping fees represent the baseline cost for disposal, while yard waste tipping fees reflect the current pricing structure for compostable materials already being managed at these sites. **Table 6-2** summarizes fees currently charged at the participating South Dakota landfills for MSW, yard waste and related organic materials.

Table 6-2: Current Disposal, Yard Waste, and Compost Fees at Surveyed Facilities

Material or Product Fee – Per Ton	Brookings Landfill	Huron Restricted Use and Transfer Station Facility	Rapid City Landfill	Sioux Falls Landfill
MSW and Mixed Loads	$49.25	$90	$66	$41
Yard Waste	$49.25	$20	$30	$11
Trees	$24.10	$35	$66	$11
Finished Compost	Free	0 to 10 tons: $10 More than 10 tons: $20	3/4 inch compost: $15 3/8 inch compost: $20	Free

MSW tipping fees vary significantly across the participating facilities, ranging from approximately $41 to $90 per ton. Yard waste tipping fees are generally lower, reflecting efforts to encourage diversion of organic materials from landfill disposal. In some cases, finished compost is offered at little or no cost to residents, which supports local reuse of organic materials and helps maintain site operations.

To provide additional context for potential food waste composting programs, tipping fee structures from regional composting facilities that currently accept food waste were also reviewed. These facilities provide a useful benchmark for understanding how food waste may be priced relative to landfill disposal and yard waste composting. **Table 6-3** summarizes the tipping fees charged at SET, A Mulch Store in Rosemount, Minnesota.

Table 6-3: SET, A Mulch Store Tipping Fees

Material Type	Fee Structure	Description
Source Separated Organics	$80 per ton	Food waste, BPI-certified compostable products
Yard Waste	$11 per yard or $36 per ton	Grass clippings, leaves, mulch, mixed loads of yard waste, straw/hay bales, plants, flowers
Brush	$19 per yard	Brush, logs, chips, stumps, no dirt or rocks
MSW – Rejected loads	$138 per ton	Tipping fee for rejected loads

SET, A Mulch Store, operates a commercial composting facility that accepts source-separated organics, including food waste. As shown above, tipping fees for food waste are significantly higher than those charged

for yard waste due to additional processing requirements such as contamination removal, material blending, and odor management. The facility charges approximately $80 per ton for source-separated organics, which is comparable to or slightly higher than landfill disposal rates in many areas.

Another regional composting facility, Dakota Prairie Composting, uses a slightly different pricing structure that varies by customer type and material stream. **Table 6-4** summarizes the fees charged at the Dakota Prairie Composting in Shakopee, Minnesota.

Table 6-4: Dakota Prairie Composting Tipping Fees

Customer Type	Fee Structure	Description
Residential	$10 to $25 per load	Yard waste, grass clippings, leaves, plants, flowers
Residential	$5 per bag	Source-separated food waste
Commercial	$25 per ton	Yard waste, grass clippings, leaves, plants, flowers
Commercial	Call for pricing	Source-separated food waste

Dakota Prairie Composting accepts both yard waste and food waste through residential drop-off programs and commercial hauler arrangements. Similar to other composting facilities, food waste pricing is typically structured through contracts or volume-based agreements.

Overall, the benchmarking results indicated that food waste tipping fees at regional composting facilities are commonly set at or near landfill disposal rates. This pricing structure helps offset the additional operational costs associated with processing food waste while still providing an incentive for generators to divert organic materials from landfill disposal.

For monetary support, small grants for equipment or pad upgrades may be available from the DANR. For the pilot program, funding for laboratory tests, thermometers, and maturity test kits could be provided to the facilities through this study. Although permitting will not be required until after the pilot, support for preparing the permit and a sizing guide will be developed with the aid of DANR.

Regulatory and operational factors will continue to be evaluated following completion of the pilot program. Lessons learned from pilot operations will help inform future permitting guidance and operational standards for food waste composting in South Dakota. In addition, regulatory approaches from other states were reviewed to understand common permitting practices and program structures; a summary of this research is provided in **Section 10.0**.

6.1 Key Takeaways

- **Pilot-ready facilities.** Permitted landfills with existing yard waste composting programs are strong candidates for food waste composting pilots because they already have basic infrastructure, equipment, and operational experience with organic materials.

- **Facility interest.** Survey responses indicated general interest in food waste composting across all participating facilities, although most sites indicated they would require additional information, technical guidance, and financial support before committing to a pilot program.

- **Common concerns.** Facilities most commonly identified concerns related to contamination, regulatory requirements, odors, staffing, equipment needs, and financial costs associated with expanding composting operations.

- **Support needs.** Facilities expressed the greatest need for grant funding, permit guidance, and technical assistance, suggesting that targeted State support and pilot program resources can help launch food waste composting initiatives.

7.0 Education, Investment, and Technical Assistance

This section presents the types of support that composting sites in South Dakota would need to successfully implement a food waste composting program. Findings are based on the facility engagement survey of four solid waste facilities (Brookings, Huron, Rapid City, Sioux Falls) discussed in **Section 6.0** and follow-up discussions. The analysis is organized into three support areas: education, investment, and technical assistance.

While the support needs identified in this section are broadly applicable across South Dakota, implementation conditions may vary across urban, rural, and tribal communities. Urban communities may have greater access to commercial generators, haulers, and processing infrastructure, which can support larger or more centralized composting programs. Rural and tribal communities often rely on self-haul systems, smaller transfer stations, and limited staffing, which may favor drop-off based composting models and shared regional services. Recognizing these differences can help tailor education, investment, and technical assistance strategies so that programs remain flexible and scalable across different community contexts.

7.1 Education

Education and clear communication are important components of successful food waste composting programs. While most communities are familiar with yard waste composting, food waste composting introduces additional materials and operational considerations that may not be widely understood by residents, businesses, or facility staff. Without consistent guidance on accepted materials and proper handling practices, programs may experience higher contamination rates or operational challenges.

In addition, many municipal and facility staff have limited direct experience managing food waste composting systems. Providing accessible educational materials and training resources can help support program implementation and improve long-term program performance.

7.1.1 Contamination Prevention

Survey results demonstrated that contamination is a universal concern across facilities. This points to a need for consistent, statewide or regional education materials that reduce the amount of non-compostable items entering the organics stream.

Support needed:

- **Accepted materials lists.** Develop standard accepted materials lists tailored to South Dakota conditions and common generator types, such as residential self-haul programs, commercial kitchens, and schools.
- **Visual signage and bin labels.** Provide signage and labels that are easy to deploy at transfer stations, compost drop-off areas, and public-facing collection locations.
- **Do and do not examples.** Use simple examples that address common problem items, such

as bags and liners, packaging, service ware, and produce stickers.

Why it matters to facility success:

- **Reduced contamination.** Lower contamination reduces staffing for sorting, lowers disposal costs for residuals, and protects compost marketability.

To support education and reduce contamination risks, outreach materials were developed for this study. A community flyer advertising a potential composting pilot program is presented in Appendix B, and a Yes vs. No infographic is included in Appendix C for communities to distribute and post at collection locations. The flyer provides an overview of the pilot program, including drop-off locations and participation details. The Yes vs. No infographic uses visuals and concise descriptions to clearly identify materials that can and cannot be placed in compost bins.

7.1.2 Staff Education

Facilities indicated a need for practical training that supports consistent daily operations and reduces the risks identified in the survey, including odor control, contamination management, and production of a usable finished product. A recurring training and continuing education program helps composting sites build and retain operator knowledge, particularly in communities with limited staffing capacity or higher turnover. The South Dakota Solid Waste Management Association is well-positioned to host or coordinate regular composting trainings and continuing education opportunities for landfill, compost site, and municipal staff. Training offerings could be structured as annual or semiannual sessions, paired with shorter refreshers to support onboarding and seasonal operations. Recommended training topics include:

- **Composting fundamentals.** Cover carbon-to-nitrogen balance, moisture targets, and bulking agent selection.
- **Food waste integration.** Address receiving procedures, mixing methods, turning or aeration practices, temperature monitoring, and integration of food waste with yard waste.
- **Odor prevention and response.** Include troubleshooting steps and complaint response protocols.
- **Contamination prevention and management.** Address load checking, rejection procedures, and documentation of common contaminants.
- **Finished compost quality.** Cover screening practices, residual handling, and end-use expectations.
- **Seasonal operating considerations.** Address cold weather receiving and processing adjustments relevant to South Dakota conditions.

In addition to periodic classroom-style training, facilities would benefit from written, site-level tools that translate composting concepts into consistent daily practices. Standard procedures can reinforce training content, support new staff onboarding and provide operators with a common reference during startup and seasonal transitions. To support this need, a Food Waste Collection and Compost Facility Standard

Operating Procedures (SOP) document was developed for staff and operators to use when implementing composting on site and is included in Appendix D. The SOP provides a detailed step-by-step procedure that can be adapted by individual sites and emphasizes the importance of developing a balanced composting feedstock to produce a usable final product.

To extend support beyond training events and written guidance, South Dakota communities could benefit from a regional compost advisor or circuit rider model and a centralized knowledge hub. Regional technical advisors could provide on-site coaching during startup, conduct periodic check-ins, and support troubleshooting focused on high-risk operational topics such as contamination removal, feedstock development, moisture management, and odor prevention. A train-the-trainer approach could help each facility build internal capacity over time. In parallel, a centralized knowledge hub could consolidate templates, the SOP, signage examples, training materials, and short guidance documents in one location, along with peer examples and case studies from South Dakota sites. A simple help-desk model could provide quick answers for routine questions, with escalation to a technical advisor when more detailed support is needed.

7.2 Investment

Investment needs for food waste composting vary based on program scale, existing infrastructure, and selected composting technology. Collection-related cost scenarios are presented separately in **Section 4.0**, including small pilot collection, integration into existing collection routes, and dedicated collection service. This section focuses on processing facility investment needs, including site improvements, receiving areas, composting pads, drainage and stormwater controls. The planning-level cost ranges presented below are intended to compare processing facility construction needs for windrow, ASP, and in-vessel composting systems. They do not represent total program costs.

7.2.1 Investment Needs

Many potential composting facilities in South Dakota already have a foundation for food waste composting, especially permitted landfill facilities that currently manage yard waste and have available land, access roads, staff, loaders, screens, and material handling areas. These sites may be able to begin pilot or early phase food waste composting with targeted capital improvements rather than major new infrastructure. Typical targeted improvements may include a defined food waste receiving area, composting pad improvements, drainage and stormwater controls, minor equipment upgrades, and basic monitoring equipment.

Communities without existing composting infrastructure may need more substantial capital investment before accepting food waste. These needs may include site preparation, composting pads, runoff and contact water controls, material handling equipment, water access, carbon storage areas, active composting areas, curing areas, and finished compost storage.

High priority processing facility capital and initial startup needs commonly include the following:

- **Site preparation and pad improvements.** Receiving areas, composting pads, curing areas, finished compost storage areas, grading, drainage improvements, and stormwater controls.
- **Processing equipment.** Loaders, windrow turners, aeration blowers, aeration piping, screens, water access, and related material handling equipment.

- **On-site storage and handling areas.** Designated space for carbon sources, incoming food waste staging, residuals, active composting, curing, screened compost, and finished compost inventory.

- **Monitoring equipment and records.** Compost thermometers, moisture monitoring tools, scales or volume tracking methods, and recordkeeping templates.

- **Initial facility startup materials.** Site signage, operating procedures, staff training materials, load inspection guidance, and basic safety and traffic control materials.

Costs for collection carts, public drop off containers, household bins, compostable bags, hauling, and route staffing are addressed in **Sections 4.0** and **5.0**. Routine compost testing, including maturity, stability, pathogen, pH, electrical conductivity, carbon to nitrogen ratio, metals, and physical contaminant testing, is addressed in **Section 9.7**.

To help communities understand the potential level of processing facility capital investment required for food waste composting, planning level construction cost estimates were developed for the three composting technologies evaluated in this study. These estimates are intended for screening and comparison only and do not represent total program costs. Actual costs will vary based on site conditions, design requirements, permitting, equipment selection, available infrastructure, labor market conditions, and procurement timing. Recurring costs, including staff time, fuel, equipment maintenance, collection service, outreach refreshers, compost testing, product marketing, and residual disposal, should be evaluated separately as part of annual operating budgets.

Baseline for Estimates

The planning-level cost ranges represent processing facility construction costs. They do not include food waste collection or hauling, land acquisition, long-term staffing, operations and maintenance, education and outreach, compost testing, end-product marketing, or revenue offsets from tipping fees or compost sales.

For sites that already operate yard waste composting programs, such as permitted landfill facilities with available land, access roads, drainage controls, staff, equipment, and material handling areas, actual startup costs may be lower than the ranges shown. These sites may be able to begin with targeted improvements, such as a receiving area, pad improvements, monitoring equipment, minor equipment upgrades, or initial compost testing. Communities without existing composting infrastructure may require more substantial investment before accepting food waste.

The cost ranges generally include site-related construction and processing infrastructure such as receiving areas, composting pads, drainage and runoff controls, aeration infrastructure where applicable, material handling improvements, and basic processing equipment. Cost estimates for windrow and ASP systems are primarily based on the Sioux Falls Food Waste Diversion Study (Burns & McDonnell, 2025), which identified an estimated $1.6 million cost to expand an existing compost facility to process approximately 4,695 tons of food waste annually. While this reflects a higher diversion rate than the 10 percent capture assumption used in this study, it provides a useful benchmark for larger-scale landfill-based systems. Cost estimates for in-vessel systems are based on vendor-provided data.

The estimated food waste tonnages shown in the following tables align with the community tiers and 10 percent capture assumptions presented earlier in this report.

Windrow Composting Facility

Windrow composting is typically the least capital-intensive option but requires the largest land area and more operational involvement. **Table 7-1** provides a planning-level cost estimate for the construction of a windrow composting facility.

Table 7-1: Planning-Level Construction Cost Estimate for Windrow Composting

Estimated Food Waste (Tons/Year)	Estimated Construction Cost	Notes
< 500	$250,000 - $400,000	Includes basic site preparation, such as an approved composting pad and small-scale equipment. Fixed site costs are a primary driver.
500 – 2,000	$400,000 - $800,000	Requires a larger footprint and more robust equipment.
>2,000	$800,000 - $1,500,000	Upper range approaches the Sioux Falls benchmark.

Aerated Static Pile (ASP) Composting Facility

ASP systems use forced aeration to reduce the need for turning, lowering staffing requirements while increasing upfront infrastructure costs. Table 7-2 provides a planning-level cost estimate for ASP composting.

Table 7-2 : Planning-Level Construction Cost Estimate for ASP

Estimated Food Waste (Tons/Year)	Estimated Construction Cost	Notes
< 500	$400,000 - $600,000	Higher cost reflects aeration infrastructure on a small scale. May be less cost-effective unless space or odor are constraints.
500 – 2,000	$600,000 - $1,200,000	Includes expanded aeration zones and controls.
>2,000	$1,200,000 - $2,200,000	Scaled system with multiple aeration zones and controls.

In-Vessel Composting Facility

In-vessel systems are well-suited for sites with limited space or stricter odor control requirements. These systems are typically modular and can operate year-round but require higher capital and energy inputs. **Table 7-3** provides a planning-level cost estimate for in-vessel composting.

Table 7-3: Planning-Level Construction Cost Estimate for In-Vessel Composting

Estimated Food Waste (Tons/Year)	Estimated Construction Cost	Notes
< 500	$200,000 - $700,000	Represents a single containerized unit such as a 40-foot Earth Flow system.
500 – 2,000	$400,000 - $1,400,000	Represents multiple containerized units.
>2,000	$1,800,000 - 2,800,000+	Requires multiple large-scale units or custom systems with supporting infrastructure. Less common for large community applications.

Surveyed South Dakota landfill and solid waste facilities generally reported having loaders and screens, which may reduce startup costs for pilot scale food waste composting at sites that already manage yard waste. Other equipment, such as skid steers, grinders, shredders, or trommels, may be needed as programs expand, if existing equipment is not available, or if finished compost will be distributed to outside users. **Table 7-4** summarizes common processing equipment and planning level cost ranges that communities can use when evaluating facility readiness and potential grant needs.

Table 7-4: Planning Level Costs for Composting Equipment

Equipment	Primary use	Planning cost
Front end loader	Mixes food waste with carbon material, builds piles or windrows, moves active and cured compost, loads screens, and loads finished compost.	$300,000-$450,000
Skid steer	Supports smaller material handling tasks, site cleanup, and movement of material in constrained areas.	$90,000 for a base unit, with attachments an additional cost
Grinder or shredder	Processes brush, wood, leaves, and other carbon sources into material suitable for blending with food waste.	$500,000 - $750,000
Screen or trommel	Removes oversized material, improves finished compost texture, and supports a more consistent finished product.	$75,000 - $200,000
Windrow turner	Turns windrows to restore oxygen, manage temperature, blend material, and improve process consistency.	$250,000-$600,000

Dedicated windrow turners are generally not required for smaller windrow systems if a front end loader is available, but they can improve efficiency, consistency, and labor needs for larger windrow systems. This distinction is important when evaluating startup costs because many communities may be able to begin with existing equipment and targeted site improvements, while others may need additional processing equipment as volumes increase. Because capital costs can be a barrier, particularly for smaller communities and pilot programs, grant and loan support will be important to implementation. Funding assistance can help

communities move from interest to action by supporting practical startup needs such as receiving area improvements, monitoring equipment, operator training, basic equipment upgrades, pilot or first year compost testing, and, where justified by scale, specialized equipment such as windrow turners.

7.2.2 Funding and Grant Opportunities

The Board of Water and Natural Resources is authorized to provide funding in the form of grants, loans, or a combination of both to qualifying applicants under the Solid Waste Management Program. These funds may be applicable to food waste composting projects where proposed improvements support solid waste diversion, recycling, or composting implementation.

Key program features include:

- **Application deadlines.** Applications are accepted quarterly, with deadlines of January 1, April 1, July 1, and October 1.
- **Local match.** Grants require at least a 20 percent local match.
- **Eligible match sources.** Matching funds may include public or private contributions, loans, federal grants, and eligible in-kind contributions.
- **Project preference.** State law provides a preference for recycling projects, which aligns with organics diversion and composting.
- **Selection criteria.** Selection criteria include readiness to proceed, technical feasibility, local contribution, rates, and availability of other funding sources.

DANR funding could be structured to support two common implementation pathways:

- **Pilot-ready sites.** Sites that can begin with targeted investments, such as receiving area improvements, training, sampling, basic equipment upgrades, and monitoring tools.
- **Under-resourced communities.** Communities that need a starter package to launch food waste composting, potentially paired with regional cooperation or shared services.

To reduce barriers for smaller communities, DANR could also consider a simplified application track for smaller pilot projects, along with example budgets and pre-scoped “standard packages” (e.g., minimal receiving upgrades plus a screen plus first-year testing). The state has also supported regional revolving loan fund activity for solid waste and recycling projects, which can be another pathway for communities that need flexible, smaller-dollar financing.

7.3 Technical Assistance

Communities and operators often need direct support to move from interest to implementation. Survey feedback shows uncertainty about permitting requirements and operating expectations. Targeted technical assistance can lower this barrier by giving practical tools, example documents, and access to experienced guidance during startup and early operations. Suggested technical assistance strategies include permit navigation, compost site planning, and design support.

7.3.1 Permitting Navigation

Permit navigation support would help facilities move from interest to implementation by reducing uncertainty about what is required to add source-separated food waste at permitted landfill compost sites. This could include developing clear permit pathway guidance that addresses common scenarios, such as a pilot-scale launch versus a long-term program expansion. Technical support should also help facilities adopt and tailor the SOP developed through this study (**Appendix D**). Operating practices, monitoring and recordkeeping, and response procedures for odor events, contaminated loads, and residual management align with permit expectations. Providing example permit submittal packages, including redacted examples of complete applications, would further streamline the process by showing facilities what a strong submittal looks like and what supporting documentation is typically needed.

7.3.2 Compost Site Planning and Design Support

Compost site planning and design support would help communities translate program goals into workable, safe, and scalable facility layouts. This assistance could include example site layouts and design concepts suited to common South Dakota conditions, addressing traffic flow, receiving and inspection areas, stockpile placement, setback considerations, and seasonal storage needs. Guidance should be appropriately sized to match community scale and available equipment, ranging from basic windrow operations to ASP systems, as appropriate. Design resources should also highlight best practices for stormwater management, leachate control, and efficient material handling to reduce nuisance conditions, such as odors and mud tracking, while protecting daily operations and long-term site performance. Compost pad design and construction support can further reduce startup risk by providing proven, buildable pad concepts that match anticipated volumes, equipment, and South Dakota weather conditions. Pad guidance should address surface selection (earthen versus impervious), structural section recommendations for heavy equipment, positive grading, and drainage features that separate clean stormwater from contact water. Where leachate or contaminated runoff is anticipated, design concepts should include collection and conveyance strategies consistent with compost facility best practices.

7.4 Key Takeaways

These strategies can reduce startup friction, improve operator confidence, and make it easier for more communities to participate in food waste composting. Over time, a consistent technical assistance structure would support reliable operations and help build a durable foundation for long-term program success statewide.

These targeted strategies would enable more communities to participate in food waste composting and help South Dakota build a foundation for long-term program success. Support needed for the food waste composting program is summarized in **Table 7-5.**

Table 7-5: Possible Needs and Support for Food Waste Composting Program Startup

Support Type	Need Identified	Recommended Support
Education	Contamination prevention	Provide standard-accepted materials lists tailored to South Dakota conditions and common generator types, paired with easy-to-deploy signage, bin labels and simple do and do not examples. Use the community flyer (**Appendix B**) and Yes and No infographic (**Appendix C**) as ready-to-use materials.
Education	Staff education	South Dakota Solid Waste Management Association to host or coordinate recurring composting trainings and continuing education, with refreshers for onboarding and seasonal operations. Provide the Food Waste Collection and Compost Facility SOP developed through this study as a step-by-step reference for staff and operators (**Appendix D**).
Investment	DANR grants	Use South Dakota DANR Solid Waste Management Program grants or loans to support site improvements, equipment, and product testing and quality assurance. Consider structuring funding for both pilot-ready sites and under-resourced communities, with simplified applications and pre-scoped standard packages for smaller pilots.
Technical Assistance	Permitting navigation	Provide permit pathway guidance for adding source-separated food waste at permitted landfill compost sites, covering pilot-scale and long-term expansion scenarios. Provide example permit submittal packages, including redacted examples, and support facilities in aligning SOP use, monitoring, and response procedures with permit expectations.
Technical Assistance	Composting planning and site design	Provide right-sized planning and design resources, including example site layouts addressing traffic flow, receiving and inspection areas, stockpile placement, setbacks, and seasonal storage. Include compost pad design concepts addressing surface selection, grading, and drainage and runoff management.

8.0 Pilot Composting Program

The purpose of the Pilot Composting Program was to identify practical and cost-effective methods for diverting food waste from the landfill and transforming it into a beneficial soil product through composting. As part of the broader Study, the pilot serves as a real-world demonstration of how a community can successfully incorporate source-separated food waste into existing yard-waste composting operations.

Based on the results of the Landfill and Facility Engagement survey presented in **Section 6.0,** the City of Brookings (City) was identified as the willing partner for this pilot effort. The City currently operates a compost site at its Citizen Campus, managing yard waste through a turned windrow system. This existing framework and extra available space on-site provided an ideal foundation for piloting the addition of food waste feedstocks without significant facility modifications.

The primary objectives of the City of Brookings pilot composting program were to evaluate operations, engage the community, and collect data to inform statewide guidance.

- **Evaluate operational feasibility.** Test the ability of the existing compost site to manage source-separated food waste using a turned windrow or pile method. This included monitoring temperature, moisture, odor, and contamination to assess operational performance under local climate and material conditions.

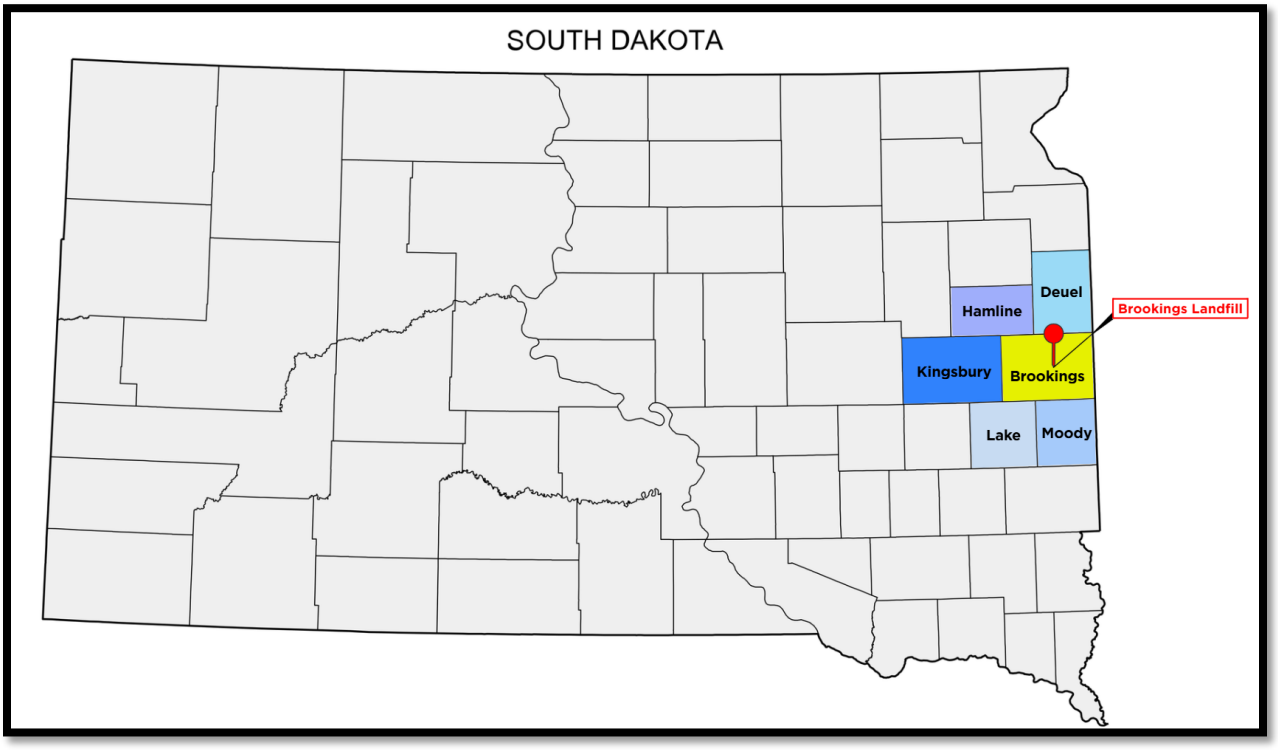
- **Engage the community.** Involve residents, local businesses, and institutions in food waste separation and collection to better understand participation levels, contamination rates, and public perceptions. Community involvement helped identify education and outreach strategies to improve program success.

- **Collect data to inform statewide guidance.** Generate data on feedstock volumes, composting process performance, and end-product quality. These findings support DANR in developing practical guidance and regulatory considerations for future food waste composting operations in South Dakota.

8.1 Existing Conditions

The Brookings Regional Landfill serves a wasteshed population of approximately 45,000 residents across Brookings County and portions of Deuel, Hamlin, Kingsbury, Lake, and Moody counties, highlighted in **Figure** 8-1. The City provides curbside yard waste collection from spring through fall and requires residents to use designated yard waste carts. Yard waste collection is suspended during the winter months; however, residents may bring yard waste to the Citizen Campus year-round at no charge. The compost site accepts flowers and weeds, grass clippings, leaves, stalks, vines, and small twigs less than one-half inch in diameter. Tree branches are accepted separately at the landfill or through the City's annual cleanup events. Finished compost is available free to residents, reinforcing the City's commitment to sustainable waste management and resource recovery.

Figure 8-1: Brookings Regional Landfill Counties Served



In preparation for the pilot, Brookings staff and the project team discussed operations, site footprint, and collection logistics. The pilot design incorporated the existing turned windrow system, using a mix of residential food waste and yard waste in accordance with the ratios established in the project's Pilot Composting Program Food Waste Collection and Compost Facility SOP (**Appendix D**). **Figure 8-2** depicts the layout at the Brookings Regional Landfill.

Figure 8-2: Brookings Regional Landfill Compost Pile Location

8.2 Planning Phase

Initial coordination for the pilot began in July 2025. A survey was sent to the City of Brookings on July 8, 2025, and returned the same day, confirming the City's willingness to participate. A follow-up memo dated July 18, 2025, provided additional details and requested a meeting to discuss the opportunity in more depth. The project team and City staff met on July 28, 2025, to review the draft concept, site logistics, and equipment needs. Additional information received on August 27, 2025, helped refine the program structure and outreach approach.

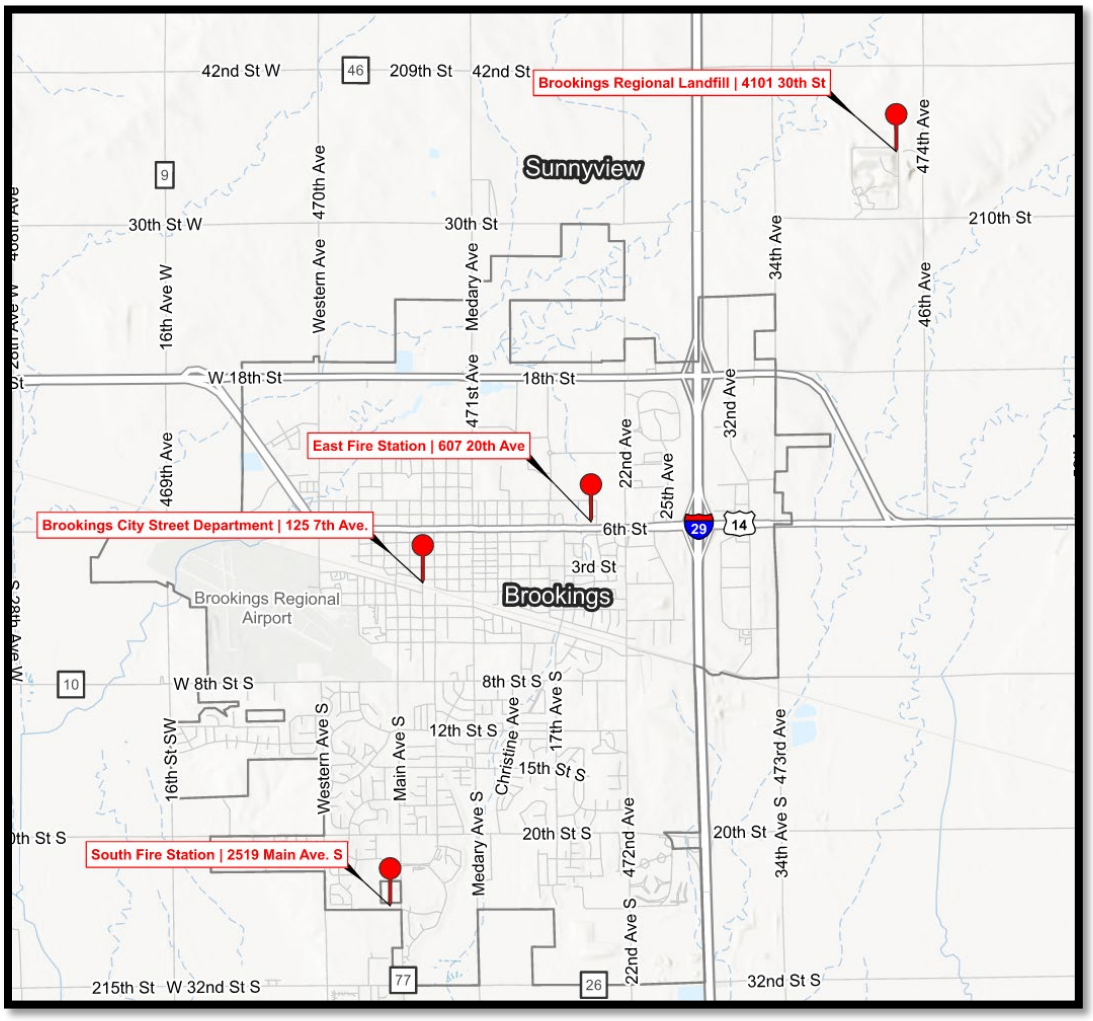
On September 23, 2025, the Solid Waste Manager presented the proposed Food Waste Composting Pilot Program to the Brookings City Council. The presentation described the City's participation in the statewide initiative sponsored by DANR. The pilot began on October 13, 2025, and was planned to continue through October 2026, extending beyond the completion of this study, with four public collection bins located across the community at the following locations:

- **East Fire Station**: 607 20th Avenue – northwest corner of the parking lot, open 24/7
- **South Fire Station**: 2519 Main Avenue South – northwest corner of the parking lot, open 24/7
- **Brookings City Street Department**: 125 7th Avenue – southeast corner of the building, open 24/7

- **Brookings Regional Landfill**: 4101 30th Street – west side entrance near the first building, open during landfill hours

Figure 8-3 illustrates the location of the four public collection bins for food waste.

Figure 8-3: Food Waste Compost Drop-Off Locations



Residents were invited to bring source-separated food waste to these drop-off sites. These bins were available to residents around the clock, and Solid Waste staff collected the material weekly or more frequently as needed and transported it to the landfill's Citizen Campus compost area. Compostable bags were stocked at each drop-off site to encourage participation and reduce contamination.

8.2.1 Outreach and Education

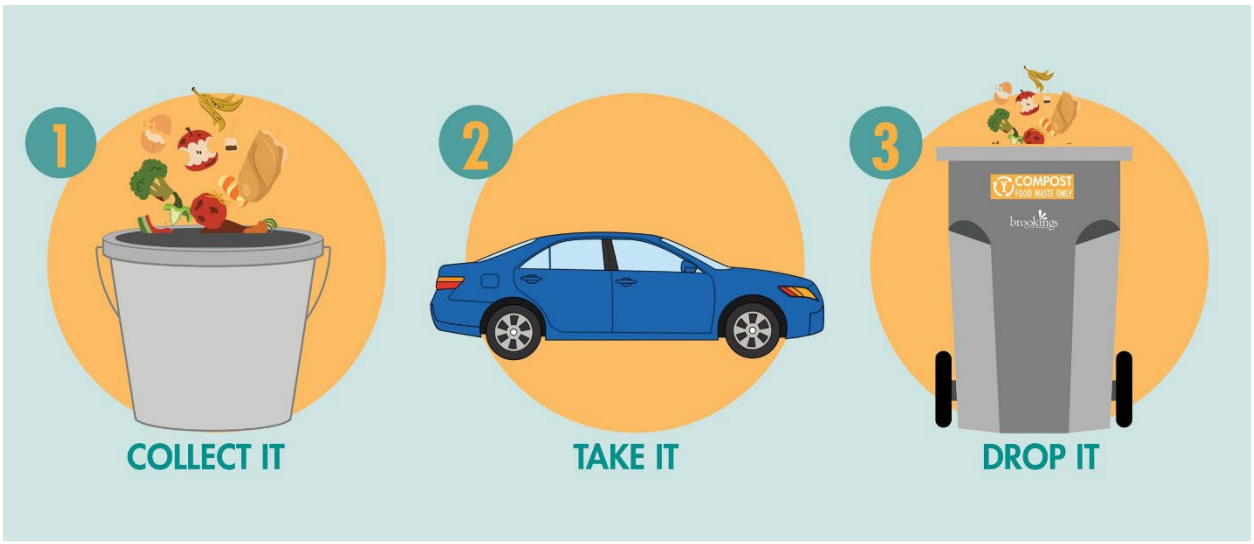
The City of Brookings used several outreach approaches to advertise the food waste pilot program and recruit participants. These included a dedicated webpage and city news release, local media coverage, and distribution of starter kits at community events such as the Brookings Farmers Market. Outreach was further supported through visible drop-off sites at public facilities, free compostable liners at collection locations, and promotion by local groups such as the Brookings Sustainability Council.

In addition to outreach methods, a set of visual communication tools was developed to support the pilot program and improve participant understanding. These materials included program flyers, informational graphics, and clear “Yes vs. No” sorting guides that illustrate which materials are acceptable in the compost stream. **Figure 8-4** provides some of the City of Brookings' communication tools.

Figure 8-4: City of Brookings Pilot Program Communication Tools

How to Participate

Participation is voluntary and is as simple as 1, 2, 3!



1. **Collect It:** Collect your "yep" items in a collection bucket. Your collection bucket can be stored in your kitchen, garage, or outside. You may even choose to store all your food waste in your freezer to reduce odors and pests before bringing it to a drop-off location. Tip: Line your bucket with compostable plastic liners or paper bags.

2. **Take It:** Once you have filled in your bucket, take it to one of the designated drop-off locations. Make sure your bucket is closed to prevent spilling during transport.

3. **Drop It**: Empty your container into the designated gray compost bin at a drop-off location. Compostable plastic bags can be tossed in the bin. No other plastic is allowed. **Tip:** While at the drop-off location, pick up additional compostable plastic liners from the self-serve container next to the compost bin.

Figure 8-5 depicts one of the City of Brookings drop-off locations.

Figure 8-5: City of Brookings Drop-off Location

Figure 8-6 depicts the compost signage used at the drop-off locations.

Figure 8-6: City of Brookings Compost Sign

Starter compost collection buckets were available for purchase at the Brookings Regional Landfill, or participants could use their own containers. Compostable plastic bags were provided free of charge at all drop-off sites. While their use was not required, they were recommended to help control odor and contamination. Participants also had the option to use paper bags or collect food waste loosely in their buckets. Businesses interested in participating in the pilot contacted the Brookings Regional Landfill to make collection arrangements. **Figure 8-7** depicts the food waste collection bucket.

Figure 8-7: Food Waste Collection Bucket

The City of Brookings developed a clear “What Goes In The Bin” label that uses plain language (“YEP” and “NOPE”) and example-based sorting guidance, with pictures, to reduce confusion and contamination. The label lists accepted items (e.g., fruit and vegetable scraps, coffee grounds and filters, eggshells, grains, and paper towels and napkins) and not accepted items (e.g., meat, dairy, plastics, wet wipes, grease, and produce stickers). It also includes contact information and a QR code that links residents to more program details, supporting consistent education across buckets, drop-off signage, and printed handouts. The bucket makes separation convenient at the household level, and the label reduces sorting errors by putting the rules right where decisions happen.

Table 8-1 illustrates the accepted and prohibited materials list used for community outreach.

Table 8-1: Acceptable and Prohibited Materials for the Brookings Pilot

YEP, Toss in the Compost Bin	NOPE, Not in the Compost Bin	
Vegetable scraps: peels, pits, shells, raw, cooked, moldy, frozen	Produce stickers	Rubber bands
Fruit scraps: peels, pits, spoiled, moldy, frozen	Oil, grease, or liquids	Frozen food containers
Eggs and Eggshells: raw or hard-boiled	Chewing gum	Charcoal, BBQ, coals, or ashes
Grains: pasta, rice, beans, nuts, seeds, bread, cereal, dough	Dairy products (cheese, milk, yogurt)	Cleaning wipes or chemicals
Soft shells: from shrimp or other soft-shelled crustaceans	Meat, fish, or bones	Corks, fur/hair, lint, dental floss
Tea: loose tea, paper or cotton bags, strings, paper tags	Compostable cups, plates, or utensils (due to composting time)	Litter, hygiene products, feces
Coffee: beans, grounds, paper filters (no K-cup filters)	Sourdough starters	Glass, Styrofoam, or plastic
Jelly: jellies, jams, preserves	Black walnuts or pecans	Latex of any kind
Scobies: such as from kombucha production	Receipts or shiny paper	
Flowers: flowers, small household plants (no dyed/diseased)	Wax, parchment or non-stick paper	
Paper: paper towels, napkins, newspapers, towel rolls	Wet wipes or soiled tissues	
Wood sticks: wooden chopsticks, coffee stirs, popsicle sticks	Foil-lined containers (chip bags, microwave popcorn bags)	

The City Council noted that the pilot aligns with Brookings' Sustainability Strategic Plan, which seeks to meet environmental, community, and economic goals without compromising future generations' quality of life. Startup costs were covered by the Solid Waste Enterprise Fund. While the pilot relied heavily on existing infrastructure and staff, several modest startup investments were required to support collection and outreach activities. These costs were primarily associated with collection containers, signage, and outreach materials rather than major infrastructure upgrades. **Table 8-2** summarizes the estimated start-up costs for the program.

Table 8-2: Food Compost Pilot Program Cost

Item	Quantity	Price
State Permits (waived by the State)	0	$0
Buckets	300	$1,395
Sign Stands	4	$932
Thermometer	1	$275
Bags/dispensers	4	$419
Carts	10	$800
Stickers	325	$870
Bag Stand	4	$1,200
TOTAL COSTS	--	$5,891

Once delivered to the landfill, food waste was weighed and placed in a designated composting area. Staff monitored the material and incorporated it into windrows with yard waste, following the ratios specified in the pilot SOP, allowing the team to evaluate composting performance under typical operating conditions.

The SOP and associated resources created for the pilot were provided to the DANR. The DANR requested an image of the site with the composting location highlighted. It was confirmed that pilot activities do not require a permit and comply with the state's guidelines. Once the pilot concludes, a permit will be required to continue composting food waste.

The City of Brookings drop-off program provided a practical example of how basic site features can reduce contamination and improve user experience. Key elements included secure containers and signage that guides residents through proper disposal. The site also includes a bag dispenser that provides compostable bags for residents who need a liner at the point of drop-off, helping keep buckets and containers clean and reducing the chance that residents will substitute noncompostable plastic bags.

Several elements of the City of Brookings approach may be particularly useful for other South Dakota communities considering similar programs. These include establishing convenient drop-off locations at familiar public facilities, providing starter collection supplies such as compostable bags, and using visual communication tools to reinforce sorting guidance. The use of existing composting operations also reduced startup complexity and allowed staff to evaluate food waste processing under real operating conditions.

8.3 Implementation Phase

The Brookings pilot officially launched on October 13, 2025, following the placement of collection containers, signage, and compostable bag dispensers at each of the four drop-off locations. Within the first week of the program, community engagement was strong; 140 residents signed up to participate and received starter collection buckets from the Brookings Regional Landfill.

Solid Waste staff began monitoring site activity immediately after launch. The first collection took place on October 20, just 7 days after the drop-off bins were placed. During this initial collection, staff recorded approximately 200 pounds of food waste, demonstrating both early participation and public enthusiasm for the new program.

Early observations indicated positive community response and smooth site operations. Residents reported that the drop-off locations were easy to access and appreciated the convenience of free compostable bags and clear signage. City staff noted minimal contamination in the initial collections, suggesting that education and outreach materials were effective in guiding participants on what materials were acceptable for composting.

8.4 Assessment Phase

The assessment phase evaluated pilot performance across participation, operations, process conditions, and overall program effectiveness. Information was gathered through staff interviews, operational observations, and program data. Because the Brookings pilot is scheduled to continue through October 2026, findings presented in this report reflect interim observations collected during the early implementation period.

8.4.1 Program Participation and Volumes

Approximately 200 collection buckets were distributed to residents throughout the pilot. While individual household participation could not be directly tracked, overall engagement was inferred through collected volumes and staff observations.

Participation was strong at launch, driven by targeted outreach and community interest. Following the initial surge, participation stabilized and remained consistent throughout the pilot period. City staff anticipates a similar increase in participation during the upcoming spring season with renewed outreach and another bucket distribution event.

Food waste was collected once per week, averaging approximately 300 pounds. Volumes remained relatively consistent throughout the pilot, with no significant fluctuations.

Overall, participation exceeded expectations. Staff reported positive feedback from residents and strong community support for the program.

8.4.2 Participation Feedback (Survey Results)

To supplement operational data, the City developed and conducted a participant survey to evaluate user experience, satisfaction, and opportunities for improvement. The survey received approximately 144 responses, including 127 responses to satisfaction and 103 open-ended comments. Full results are provided in Appendix E.

Survey results indicated that a majority of respondents actively used the program, with many reporting regular participation on at least a monthly basis. This aligns with observed collection volumes and staff reports of steady weekly material intake. A smaller portion of respondents indicated limited or no participation, with feedback suggesting that convenience, particularly proximity to drop-off locations, influenced usage.

Support for the program was strong. Approximately 122 respondents indicated that the program should continue beyond the pilot phase, with very few expressing opposition or no preference. Participants also reported a high level of satisfaction, with an average rating of 4.32 out of 5. This level of satisfaction is notable given that the pilot operated during winter conditions and did not achieve full composting performance, indicating that participants perceived value in the program even during early implementation.

Participant feedback consistently emphasized the importance of convenience and accessibility. Respondents expressed interest in additional drop-off locations and, in some cases, future consideration of curbside collection to further reduce barriers to participation. Feedback also highlighted the importance of clear communication and outreach, particularly in helping residents understand acceptable materials and increasing overall awareness of the program.

Overall, participant feedback aligns closely with operational observations. Staff reported low contamination rates and no odor complaints, which is consistent with survey responses indicating a general understanding of program requirements and a positive user experience. At the same time, feedback reinforces that participation levels are influenced by how easy the program is to use and access.

Taken together, the survey results confirmed that the Brookings pilot program was well received and provided value to participants. High satisfaction and strong support for continuation suggest that the program is meeting its primary objectives. For other communities considering similar programs, the results highlight the importance of convenient drop-off access, clear and consistent education, and visible community outreach as key factors in achieving participation and maintaining low contamination rates.

8.4.3 Hauling and Collection Operations

Collection and hauling were managed by existing solid waste staff. A rear-loading collection vehicle was used. Collection occurred at the end of an existing route, allowing the program to be integrated into current operations without dedicated equipment.

The weekly collection schedule was considered adequate, and no routing or operational challenges were identified. Total staff time was minimal, requiring approximately one hour per week for collection and an additional hour per week for compost pile management.

The program did not create operational strain on staff or existing services. While the rear-load truck functioned effectively, staff noted that a smaller vehicle or flatbed truck could be considered in the future, depending on program scale and container weights.

8.4.4 Process Performance

Process monitoring included temperature tracking and general observation of pile conditions. Temperature monitoring was conducted daily at the start of the pilot and later reduced to weekly.

Due to the small pile size and winter conditions, target composting temperatures were not consistently achieved. The material frequently froze, limiting biological activity and slowing decomposition. Moisture conditions were also impacted by seasonal factors, with dry and frozen conditions observed throughout much of the pilot period. Water could be added if needed, but it was not a primary operational focus during winter conditions.

As a result, the material did not break down as expected during the pilot timeframe. Staff indicated that future operations may incorporate food waste into larger, active yard waste windrows, pending regulatory approval, to improve performance.

Seasonal conditions were identified as a primary factor affecting process performance, particularly the combination of low temperatures and insufficient pile volume.

8.4.5 Odors, Complaints, and Contamination

No odor issues or public complaints were reported during the pilot.

Contamination levels were low overall. The most common issue involved compostable service ware items such as coffee cups, plates, and utensils, which were not accepted materials but were occasionally included by participants. These items were identified as a source of confusion rather than true contamination.

Aside from these materials, the feedstock was considered clean and acceptable for composting.

8.4.6 End Product Quality

Due to the limited duration of the pilot and reduced decomposition during winter conditions, a finished compost product was not produced. As a result, end product quality could not be evaluated.

8.4.7 Lessons Learned

The pilot demonstrated several key successes. The initial program rollout was highly effective, supported by strong communication, social media outreach, and clear educational materials. Community response was positive, and participation levels exceeded expectations. Maintaining the program as voluntary was also viewed as beneficial in limiting contamination.

Operationally, the primary challenge was launching the pilot immediately prior to winter with insufficient material volume to sustain active composting. This limited the ability to evaluate full process performance.

If repeated, staff indicated they would not significantly change the program approach but would consider timing and scale to better support composting conditions. Future plans include maintaining the current program structure, seeking permit approval to continue operations, and potentially integrating food waste into existing yard waste windrows.

At this time, the City intends to maintain the program at its current scale, with four drop-off locations, rather than expanding.

8.4.8 Cost and Practicality

Program costs were generally in line with expectations, with only minor differences from initial estimates. The hauling approach was considered cost-effective, and staffing needs aligned with anticipated levels.

Based on current operations and planned scale, additional staff or equipment are not required to continue the program.

Future considerations include potential funding for site improvements, such as a composting pad, and the development of a clear, streamlined regulatory pathway to support permanent program implementation.

8.5 Key Takeaways

- **Small-scale implementation.** Small-scale drop-off food waste programs can be implemented with minimal staff time and existing equipment without creating operational strain.

- **Participation and volumes.** Strong outreach drove high participation, with consistent weekly

volumes of approximately 300 pounds. Higher volumes are needed to support effective composting.

- **Seasonal and pile-size limitations.** Seasonal timing and low pile volume limited process performance by preventing sustained temperatures and full material breakdown.
- **Contamination and odor control.** Contamination was low, and no odor or complaint issues were reported, indicating good public understanding and low community impact.
- **Co-composting opportunity.** Co-composting with existing yard waste operations was identified as a practical path to improve performance and scale the program.
- **Regulatory and infrastructure support.** Staff suggested that clear regulatory guidance, such as a checklist, and financial support for infrastructure, such as a compost pad, could help transition the pilot into a permanent program.

9.0 Compost Market Analysis and Expansion Opportunities

This section evaluates opportunities to expand demand for finished compost in South Dakota and the surrounding region by connecting three elements that must align for a stable market: consistent product quality, predictable distribution channels, and customer confidence. South Dakota's compost market is shaped by the State's long-standing diversion of yard waste away from landfill disposal, which has made composting a common municipal practice and, in many communities, set an informal "price ceiling" through free or low-cost public access programs. Since 1995, yard waste has not been allowed for disposal in South Dakota landfills, and the State has promoted composting as the preferred management approach.

At the same time, most municipal programs do not publish routine production and sales data, and private sellers often bundle compost with other landscape materials or services, making it difficult to quantify current statewide demand for finished compost material. This section summarizes observable market signals (e.g., availability, pricing, and sales formats), identifies the sectors most likely to support sustained demand, and highlights strategies that help newer compost operations compete in value rather than simply on price.

9.1 Regulatory Context

South Dakota law treats compost as a distinct category by excluding "compost" from the definitions of both "commercial fertilizer" and "soil amendment." These definitions can be found in South Dakota Codified Law (SDCL), Chapter 38-19, and Chapter 38-19A. Even with that exclusion, state law still places an obligation on distributors: a distributor of compost must make product analyses available upon request to DANR and the end user. In addition, permit language developed by DANR's Waste Management Program provides information in how food waste composting is regulated. The permit requirements are provided in **Appendix F.** The food waste composting permit issued by DANR states that if mature food waste compost is not beneficially used within the permitted boundary of the site, the operator must register the product with DANR's Inspection, Compliance and Remediation Program as a soil amendment or fertilizer and comply with the associated rules.

Taken together, these requirements mean that once compost leaves the premises, operators should plan for routine testing and clear product documentation and should coordinate to confirm how the material will be treated for registration and labeling based on the product's marketing claims and intended end use.

9.2 Current Market Snapshot

Across South Dakota, the most visible compost supply is municipal yard waste compost distributed through landfill site operations. These programs commonly provide compost free to residents or sell it at prices that are well below private landscape material pricing in many regions. Examples include the following:

- Rapid City sells compost and wood chips by the ton, with screened yard waste compost priced at approximately $15 to $20 per ton.
- The City of Watertown provides up to 2 tons per year at no charge to residents with a utility bill

stub and charges $20 per ton beyond that threshold or for non-residents.

- The City of Brookings provides screened yard waste compost at no cost to residents, typically after seasonal screening.
- The City of Huron markets “Great Plains Classic Compost” and provides bulk pricing tiers, with published pricing as low as $10 per ton for larger quantities.
- The City of Sioux Falls provides free compost through its landfill yard waste composting center, with self-loading and limited availability depending on composting cycles.

Where tonnage data is available, data suggests that municipal yard waste systems can generate meaningful volumes of finished product. Rapid City reports receiving approximately 18,000 tons of yard waste annually, indicating that even a yard waste-only system can support large-scale processing and potentially large, finished product inventories, depending on screening and curing practices.

A second market signal is product risk perception. Several municipal programs publish advisory language related to herbicide carryover in yard waste compost, including guidance not to use compost for broadleaf crops, ornamentals, trees, shrubs, and similar sensitive plants. Rapid City’s compost page explicitly notes this limitation and positions the product as appropriate for turf and construction applications. Watertown also notes that small amounts of pesticides and herbicides may be present due to homeowner use and limits claims to what is contained on the label. These advisories tend to push municipal compost demand toward turf, topdressing, and roadside and construction applications, unless higher-grade feedstocks and testing protocols support broader horticultural uses.

Private-sector compost offerings in South Dakota appear to be less common than municipal programs, but unlike compost produced by municipal programs, private-sector compost is bagged, can be delivered, can be a custom blend, and can be sold alongside other landscape materials. Examples include the following:

- **C3 Compost.** A private producer in Wessington markets bagged and bulk compost through direct sales.
- **Landscape-oriented suppliers.** Suppliers in Rapid City and Watertown list compost as a stocked material or service add-on.
- **Landscape Garden Center.** In Sioux Falls, Landscape Garden Center operates Green Choice Rewards, a membership-based yard waste drop-off program tied to a retail landscape business. Landscape Garden Center processes yard waste in windrows on-site, creating a different model than landfill-based distribution.
- **SoDak Compost.** In Sioux Falls, SoDak Compost operates a community food waste composting model that relies on drop-off sites and a bucket swap system rather than curbside service or landfill-based distribution. The nonprofit has two drop-off locations and uses a donation-based participation model. It also sells basic collection supplies, such as 5-gallon buckets, countertop buckets, and liners, which helps standardize collection practices and

reduce contamination from non-compostable bags. From a distribution and market perspective, the model functions as a localized, closed-loop system. Collected food waste is composted through partner sites, and the finished material is used at the two host locations, which are community gardens, for soil building rather than retail sale.

Together, these conditions create a market where demand is real but uneven, with compost distributed through three distinct models. Community-based systems, such as SoDak Compost in Sioux Falls and the Landscape Garden Center Green Choice Rewards program, rely on drop-off based participation rather than curbside service. SoDak Compost uses a bucket swap model and directs finished compost back to partner community gardens for soil building, while Landscape Garden Center ties yard waste drop-off to a retail nursery operation where processed material can support plant production and related landscape uses.

Mid-scale systems include smaller municipal compost operations such as Brookings, where screened yard waste compost is typically offered to residents seasonally after screening and is available on a first-come, first-served basis while supplies last. This “limited supply” messaging reflects the reality that production and distribution are tied to yard waste seasonality and processing and screening cycles.

Large-scale systems include larger municipal landfill operations, such as Sioux Falls and Rapid City, that manage high volumes of yard waste and can distribute compost broadly to residents and contractors. These programs typically offer multiple product formats (for example, different screen sizes or wood chips) and can support higher throughput, but availability is still tied to composting cycles and on-hand inventory, so public messaging often notes that supplies may be limited at times.

Food waste can be incorporated into each of these pathways by pairing source-separated collection with contamination controls and processing capacity appropriate to the system's scale, allowing communities to expand organics diversion while aligning finished compost products with local markets and distribution channels.

9.3 Target Market Sectors

South Dakota’s compost demand is best understood as a set of end-use sectors that range from small, localized users to bulk purchasers. Each sector has different expectations for consistency, contaminant levels, screen size, delivery logistics, and documentation. The sections below describe typical use cases and the supply scale that most naturally fits each market.

9.3.1 Residents

Residential use is often the entry point for compost demand and typically aligns with large-scale municipal programs that distribute yard waste compost through landfill operations, as well as mid-scale community programs that make compost available seasonally. Many communities also use “give back” distribution as an incentive, offering residents who drop off yard or food waste finished compost at no cost or at a reduced rate. This approach provides a visible return on participation, reinforces correct separation behavior and can increase program use without adding complex enrollment requirements. It is most effective when paired with clear participation rules (for example, resident verification, seasonal limits, and contamination expectations) so the incentive supports diversion goals while protecting product quality.

9.3.2 Community Gardens

Community gardens align closely with community-based distribution models because they can use smaller volumes reliably and benefit from closed-loop messaging. Programs like SoDak Compost demonstrate how finished compost can be applied on site for soil building rather than being marketed as a retail product. This sector values simplicity, low contamination risk, and predictable seasonal availability, and it can be a visible demonstration platform that supports broader market education.

9.3.3 Landscaping and Nurseries

Landscaping contractors, retail nurseries, and landscape supply yards are typically the most dependable ongoing buyers for screened, consistent compost because it fits directly into existing purchasing behavior for topsoil, mulch, and soil amendments. This sector often aligns with mid-scale private suppliers and resellers who can offer delivery, blended products, and consistent screen size. It is also a practical pathway for market growth because product differentiation can be translated directly into value: consistent screening, maturity and stability information, and blend options can be matched to turf, planting mix, and soil building needs.

In Sioux Falls, Landscape Garden Center provides an example of a retail nursery model that already integrates organics management through its Green Choice Rewards yard waste drop-off program. This type of operation can function as both a distribution point and a processing channel tied to plant production and landscape material sales. Over time, similar retail nursery models could expand beyond yard waste by incorporating source-separated food waste from staff operations or select commercial generators, provided contamination controls and odor management practices are in place and processing capacity is adequate.

9.3.4 Agriculture

Agriculture can represent the greatest potential demand by volume, but only when pricing and logistics work. Compost use is most competitive when applied in targeted ways, such as high-value fields, problem areas, erosion control, and organic matter improvement, rather than blanket application everywhere, because transport distance can dominate delivered cost in lower-density areas. Compost benefits for soil health and water holding capacity are well documented, but the purchasing decision often turns on whether a producer can supply a consistent product at a delivered price that fits farm economics. This sector generally aligns with large-scale or regional production systems or coordinated mid-scale aggregation that can stage and deliver bulk volumes.

9.3.5 Local Governments

Local governments can create stable baseline demand by using compost in parks, boulevards, athletic fields, and right of way restoration, particularly when compost use is written into routine maintenance standards. South Dakota's composting guidance identifies common municipal applications such as erosion control and remediation uses. This sector can be served by mid-scale municipal operations and large-scale landfill-based programs, especially when procurement specifications define acceptable screen size, contaminant limits, and documentation.

Benchmark program observations also suggest that municipal end uses can be an effective outlet for compost streams that do not consistently meet higher retail expectations. Based on project site visits to the CreekSide Soils program in Hutchinson, Minnesota, residual physical contamination in compost produced from the residential food waste curbside stream limited broader marketability, so the material was primarily

reserved for government or municipal applications where minor residual physical contaminants can be better managed, and product risk is lower.

9.3.6 Construction

Construction and development markets can grow when compost is written into project standards for topsoil improvement, site stabilization, and green infrastructure applications. EPA identifies compost use in green infrastructure and stormwater management as a key opportunity area. This sector is most compatible with mid-scale and large-scale producers that can supply bulk quantities and meet project schedule requirements. Success depends on clear specifications, contractor familiarity, and reliable delivery logistics, since performance expectations are tied to construction timelines.

9.3.7 Institutional and Educational Campuses

Institutional and campus markets tend to be moderate in volume but high in visibility. They can serve as anchor partners for pilots and demonstration projects because they often have sustainability goals, food-service operations, and on-site landscape needs. This sector aligns well with community-based and mid-scale systems, where closed-loop messaging and operational simplicity help build participation and normalize compost use.

9.4 Benchmark Programs

This section summarizes three benchmark compost programs that illustrate different market and distribution models for producing and moving finished compost, as summarized below:

- **CreekSide Soils.** CreekSide Soils represents a long-running municipal curbside organics collection program with on-site processing and large volume bagged product sales. CreekSide Soils also supports other programs by providing bagging services for additional compost producers.
- **Tri-County Organics.** Tri-County Organics provides an example of a private, fee-supported drop-off and product sales model that serves both small users and bulk buyers.
- **Resource Renew.** Resource Renew shows how a regional public agency can build demand through a combination of direct sales and retail distribution, with clear evidence of strong seasonal sales.

Together, these examples highlight practical market levers that influence compost demand, including contamination controls, quality documentation, pricing structure, packaging and delivery options, and distribution channels beyond facility pickup.

9.4.1 CreekSide Soils Compost Facility

The CreekSide Soils Compost Facility (Creekside) is owned and operated by the City of Hutchinson, Minnesota. The City of Hutchinson has operated the facility and a successful curbside organics collection program since 2000. All single-family households (approximately 4,000) are provided with a 90-gallon cart for combined food and yard waste. Materials are collected weekly through the City's organized single-hauler system. Food waste is commingled with yard waste in the same cart, and participation averages approximately 40 percent.

All compost processing and bagging occurs on-site using covered ASP (six bunkers with capacity for six more) for food waste and windrows for yard waste. **Figure 9-1** depicts the Green Mountain Technologies covered ASP system at CreekSide Soils Compost Facility.

Figure 9-1: CreekSide Soils Compost Facility

Photo courtesy of Green Mountain Technologies

Approximately 1,500 tons of food waste and 13,500 tons of yard waste are processed annually. The facility bags yard-waste compost mixes to be sold by CreekSide as Seal of Testing Assurance (STA)-certified blends and also bags products for other composting facilities with their provided bags. Demand continues to grow, prompting consideration of purchasing an additional bagger.

Compost contamination (physical) reduction is a core focus. Plastic films, coated papers, glass, and hidden plastics remain top issues. Staff reported that contamination monitoring requirements will be included in the next hauler contract, with haulers checking every cart. When excessive contamination occurs, photos are sent to city staff: a first offense triggers a warning letter, and a second triggers cart removal. The goal is to keep contamination below 1 percent before food waste compost can be bagged and sold commercially. Currently, food waste compost is used internally by the city and county as a soil amendment. Odor concerns are minimal and limited to occasional humid conditions. All leachate is sent to the wastewater treatment plant.

Education and outreach, including a 2023-25 campaign, reduced contamination from 13 percent to 6 percent and increased food scrap capture from 2.7 percent in 2022 to approximately 13-14 percent in 2024-25. Outreach at churches, farmers' markets, and businesses strengthened engagement, and contaminated bins were tagged. Residents receive quarterly rolls of Eco-Safe bags, and distribution of kitchen bins (1,200 purchased; about 180 remain) supports participation.

CreekSide's finished compost products are sold at more than 160 locations across nine states, with about 900,000 bags sold annually. Contractors may pick up onsite; residents seeking bulk volumes are referred to Hanson's Tree Service and Landscaping. CreekSide contributed $120,000 to the City enterprise fund in 2025 and employs 11 to 12 staff. Funding success, including Minnesota Pollution Control Agency grants (e.g., VacMax purchase, Compost It Right contamination reduction initiative), has supported infrastructure improvements and education. Best-practice recommendations from CreekSide emphasized early action on contamination, targeted engagement, stream audits, community events, and use of visuals to demonstrate compost benefits.

9.4.2 Tri-County Organics

Tri-County Organics is a privately operated organics recycling and compost products facility in St. Cloud, Minnesota. The company diverts organic materials from landfills through a turned windrow approach, resulting in compost products marketed to residential, commercial, and agricultural customers. The facility accepts residential and hauler food waste and yard waste for drop-off. End-user sectors include homeowners, landscapers, gardeners, and small-scale agricultural users who purchase compost in bulk (per cubic yard) or in smaller amounts (per 5-gallon bucket). Tri-County sells certified, screened organic compost and participates in the STA Certified Compost program, testing compost every 3 months through the Composting Council's STA program under a "Garden Mix" product.

Finished product sales are structured to serve both small users and bulk buyers. The facility offers screened compost at $40 per cubic yard (or $5 per customer-provided 5-gallon bucket), a screened compost/soil mixture at $40 per cubic yard (or $5 per 5-gallon bucket), and unscreened compost at $20 per cubic yard. The product descriptions emphasize use in gardens, potting and planting mixes, and general soil amendment applications.

Tri-County Organics also supports distribution beyond on-site pickup by offering delivery through local hauling services for soil and mulch products, helping extend the customer base to users who cannot self-haul.

Tri-County also uses a fee-based drop-off structure to help cover operating costs and to signal the value of organics management. The facility lists residential permits for unlimited use ($40 for the first vehicle and $20 for additional vehicles in the same household), commercial permits by material type ($200 for grass and leaves only and $300 for woodchips), and a pay-per-dump option priced per axle ($30 per axle for grass, leaves, dirt, sod, rocks, and wood chips).

Contamination control is addressed through clear language prohibiting prohibited items. The facility explicitly prohibits brush, stumps, logs, trash (including plastic bags and containers), landscape fabric, and treated or painted wood, thereby helping protect product quality and reducing downstream sorting burdens. In addition, Tri-County's permit and fee structure functions as a contamination control tool by limiting anonymous drop-offs, creating a check-in point for rule communication, and reducing the incentive to use the organics site as a free outlet for mixed debris.

Figure 9-2 depicts the windrows and screening process at Tri-County Organics.

Figure 9-2: Tri-County Organics Compost Facility

Photo courtesy of Tri-County Organics

9.4.3 Resource Renew

Resource Renew in Duluth, Minnesota, produces premium compost at its ASP Organics Composting Facility. Food waste from residents, businesses, and institutions is blended with leaves, ground brush, and yard trimmings, then composted over several months in a closely managed process. Resource Renew's compost is tested by an independent certified lab following the U.S. Composting Council's STA program guidelines.

On the collection side, Resource Renew supports residential participation through household food scrap drop sites and detailed drop-off instructions that standardize set-out practices. Residents are directed to place food waste in securely tied BPI-certified compostable bags and not to use plastic shopping bags. The program also provides free compostable bags for replacement at Resource Renew drop sites.

Bagged Resource Renew compost is available for sale at the Yard Waste Compost Site, the Materials Recovery Center, and nine retail locations. Bagged premium compost is available for $6 per bag (approximately 40 pounds). Bagged compost commonly sells out at both Resource Renew facilities and retail partners.

Bulk premium compost is sold at the Yard Waste Compost Site for $22 per cubic yard for self-loading (minimum 1/4 yard) and $30 per cubic yard for staff loading (minimum 1/2 yard). Bulk compost typically sells out in late June or early July each summer.

Resource Renew also operates a Compost Grant-Exchange program that makes a limited annual compost supply available to nonprofit organizations, with applications considered beginning in January and awarded on a rolling basis until the grant supply is depleted.

Figure 9-3 depicts the Resource Renew Compost Facility.

Figure 9-3: Resource Renew Compost Facility

9.5 Market Growth Barriers

South Dakota's compost market has significant demand potential, but growth is often constrained by a limited set of predictable barriers. The most effective market development approach pairs each barrier with a practical solution that can be implemented through operations, procurement, outreach, and distribution planning.

Barrier: Inconsistent compost quality and limited buyer confidence. New programs often produce compost that varies in moisture content, maturity, nutrient levels, or particle size as operators refine feedstock, pile management, and screening practices. Physical contaminants such as plastic films, glass, and other inerts can further limit marketability, particularly for landscaping, nursery, and agricultural uses. When a facility cannot document product performance or provide consistent specifications, buyers may restrict use to low-visibility applications or avoid the product altogether.

Solution: Establish product specifications and quality documentation. Establish a defined product specification from the start (screen size, moisture range, maturity targets, and physical contaminant thresholds) and align feedstock acceptance and screening practices to meet it. Use routine lab testing and transparent reporting to demonstrate consistency, and consider third-party programs, such as the U.S. Composting Council's STA, to provide credible documentation for professional buyers. Preventing contamination upstream (e.g., clear accepted lists, container labeling, load checks) should be treated as a market strategy, not just an operational task.

Barrier: Limited product awareness outside of home gardening. In many communities, compost use is not yet standard practice in commercial landscaping, public works, or agriculture. Larger end users may be hesitant to switch from familiar fertilizers, topsoil, or peat-based products without clear performance evidence, application guidance, and peer examples.

Solution: Target outreach to decision-makers and specification writers. Focus outreach on decision-makers and specification writers, not just the general public. Demonstration projects in parks, roadside restoration, athletic fields, and high-visibility landscapes can show results and normalize compost use. Pair demonstrations with simple application guidance and cost comparisons. Partnerships with extension services, conservation districts, and professional landscaping networks can expand credibility and reach.

Barrier: Limited distribution infrastructure and product formats. Facilities often begin with bulk material and limited handling equipment, which can restrict access to customers who cannot self-haul or who prefer bagged product or blended mixes. Without delivery options or retail channels, compost can accumulate on site, and sales remain limited to nearby users. Remote facility locations can further reduce walk-up demand.

Solution: Develop distribution in phases. Start with bulk sales supported by clear loading procedures and posted pricing, then add delivery through partnerships with local haulers or landscape suppliers. Where feasible, establish reseller relationships with nurseries or landscape yards that already move soil and mulch products. Bagging and blending can be phased in later or provided through contract services, allowing the facility to test demand before investing in equipment.

Barrier: Seasonal availability and "until it runs out" messaging. Many yard waste-based programs screen and distribute compost seasonally, and customers are often told that the product is available only during certain windrows or until supplies are depleted. Unpredictable availability discourages repeat purchasing and makes it difficult for landscapers, contractors, and public agencies to rely on compost for planned projects.

Solution: Improve inventory planning and availability communication. Improve inventory planning and communicate availability in a predictable way. Setting aside contracted volumes for repeat buyers, publishing seasonal availability schedules, and maintaining a minimum inventory target can strengthen buyer confidence. Incorporating source-separated food waste can also help stabilize production volumes, as

food waste is generated year-round, supporting more consistent processing, screening schedules, and product availability for customers.

9.6 Strategies to Expand Demand

To build and stabilize the compost market, strategies should focus on increasing buyer confidence, creating predictable demand, and reducing barriers to first-time use.

9.6.1 Outreach and Education

Outreach and education are most effective when they target the specific needs of each market sector rather than general messaging. For residents, this means simple guidance on where compost performs best and how to apply it. For professional users such as landscapers, contractors, and agricultural producers, outreach should emphasize performance outcomes, application rates, and product specifications, supported by local demonstration projects that show measurable benefits such as improved turf establishment, reduced erosion, or better soil structure.

9.6.2 Public Procurement

Public procurement can be a powerful market stabilizer because it converts interest into recurring, predictable demand. Local governments can incorporate compost into standard specifications for parks, boulevards, athletic fields, and right of way restoration, and agencies can include compost requirements or preferences in bid documents for landscaping and construction projects. Establishing clear purchasing specifications, such as acceptable screen size, maturity, and physical contaminant thresholds, also signals quality expectations to producers and helps align processing practices with market needs.

9.6.3 Incentives

Incentives can reduce the risk for early adopters and help move compost into higher-volume applications where upfront costs are a barrier. Incentives can be structured to support demonstration projects, offset transport costs for agricultural or remote users, or help cover initial purchases for community gardens and public works projects. Similarly, grant funding can support market-enabling infrastructure, such as screening, storage improvements, or limited bagging capacity, thereby expanding access and reducing distribution constraints.

9.6.4 Partnerships

Partnerships with South Dakota State University Extension, South Dakota's Conservation Districts, and related technical assistance providers can expand both credibility and reach. These organizations are well-positioned to translate compost use into practical guidance, recommend appropriate application strategies, and connect compost producers with farms and land managers who can use compost for soil health and erosion control. Coordinated outreach through these partners can also support data collection on performance and economics, strengthening future market development and helping compost use become a routine practice rather than a one-time trial.

9.6.5 Conclusions on Expanding Demand

These strategies work best when they are applied as a coordinated package rather than as stand-alone actions. Outreach builds awareness and correct use, procurement creates predictable demand, incentives reduce the cost and risk of first-time adoption, and partnerships provide technical credibility and access to

established networks. Once these tools are defined, the next step is to match them to the needs of specific end-user sectors, since the compost purchasing drivers vary by market. Different market sectors respond to different demand-building approaches. For example, agriculture and construction applications are often most sensitive to delivered cost, logistics, and project specifications, while landscaping and nursery customers place a higher value on consistent screening, predictable performance, and convenient purchasing options. Local governments and institutions may have strong interests but still face internal procurement constraints and limited staff familiarity, which can slow adoption without targeted support. Understanding these sector-specific drivers helps focus strategies and match product offerings to buyer needs.

Table 9-1 summarizes current compost use, growth potential, and the key adoption challenges by end-use market sector, providing a quick reference for where demand-building efforts are likely to have the greatest impact.

Table 9-1: Compost Use and Consumer Demand

End-Use Market	Baseline Demand	Growth Potential	Challenges
Agriculture	Moderate – typically for soil health and erosion control, but varies by crop and awareness	High – with outreach, agronomic data, and pricing support	Cost competitiveness with synthetic fertilizers, transport distance
Landscaping and Nurseries	High – strong existing demand, especially for premium blends	Moderate to High – continued product quality and distribution improvements	Product consistency and packaging; awareness in rural areas
Local Governments	Low – used in parks and right-of-way projects where budgets allow	High – adopt compost use in routine maintenance/specs	Budget constraints; staff familiarity
Construction and Development	Low – growing potential through green infrastructure mandates	Moderate – promote compost for stormwater	Lack of standard compost specifications in project requirements
Institutions and Campuses	Low – interest in sustainability growing, limited by procurement channels	Moderate – develop tailored procurement tools and educational outreach	Internal purchasing complexity; limited awareness
Residents/Home Gardeners	Moderate – common use for gardens, lawns, and landscaping when compost is available and easy to access	High – community outreach can increase participation	Seasonal demand, transportation, and distribution logistics
Community Gardens and Urban Agriculture	Moderate – compost is frequently used to improve soil fertility and organic matter	High - partnerships with cities, schools, and nonprofit organizations can expand use	Limited space for bulk material storage and a need for coordinated deliveries

9.7 Quality and Product Guidelines

Compost market growth strategies described in **Section 9.6** depend on the ability to offer products that meet end-user expectations for consistency and performance. A compost quality program links operational

controls to measurable product standards that can be documented and communicated to buyers through product labels or specification sheets. South Dakota does not prescribe a specific compost testing protocol in statute. Instead, soil amendments are regulated under SDCL, Chapter 38-19A, which requires product registration, labelling, and proof of claims supporting the product's effectiveness. The Department of Agriculture and Natural Resources may conduct sampling and analysis to verify label claims and compliance. As a result, compost producers can rely on industry-standard testing programs to demonstrate product quality and support market acceptance.

A typical compost quality testing program evaluates parameters that confirm both product safety and performance. Common testing parameters include:

- Stability and maturity
- Pathogens
- Physical contaminants
- Metals
- pH
- Soluble salts

Together, these parameters help verify that compost is safe, stable, and suitable for its intended use.

One widely used quality documentation framework is the U.S. Composting Council's Seal of Testing Assurance (STA) program. Under STA, participating facilities conduct routine laboratory testing and publish standardized product labels based on test results. Sampling frequency is based on the facility's annual compost production, as shown in **Table 9-2.**

Table 9-2: STA Sampling Frequency by Annual Production

Annual Compost Production	Sampling Frequency
1–6,200 wet tons	1 sample every 3 months
6,201–17,500 wet tons	1 sample every 2 months
17,501+ wet tons	1 sample every month

For STA reporting, wet tons refer to finished compost that has not been dehydrated. Annual production is calculated as the amount sold during the year plus inventory remaining at the end of the year. Facilities that track production in cubic yards can estimate tons using a conversion factor or site-specific density values.

In addition to voluntary programs such as STA, several states establish minimum compost sampling requirements. These requirements typically scale with production volume, as shown in the state compost testing requirements summarized in **Table 9-3**.

Table 9-3: Example State Compost Testing Requirements

State	Sampling Requirement
California	Sample every 5,000 cubic yards of compost produced or at least once per year
Washington	Sample every 5,000 cubic yards produced or every 365 days

9.7.1 Stability and Maturity

Stability and maturity describe whether compost has finished its active decomposition and will perform predictably in storage and in soils. Stability refers to the level of ongoing biological activity, while maturity refers to plant compatibility and the absence of phytotoxic effects. Compost that is not stable can generate odors, attract vectors, and reheat in stockpiles. Compost that is not mature can cause plant stress due to oxygen demand, organic acids, or excess ammonia. Temperature targets and time at temperature are important for pathogen reduction, but, by themselves, they do not confirm that compost is stable or mature for end use.

A stability and maturity program typically includes the following elements:

- **Temperature trend and reheat potential.** A stable pile should show declining temperatures during curing and should not reheat after turning, screening, or pile disturbance. Tracking temperatures during curing and after disturbance is a practical operational indicator that complements lab testing.
- **Solvita maturity and ammonia indicators.** Solvita is widely used as a practical maturity screen for market readiness. Solvita is a rapid compost maturity and stability test that measures microbial respiration by detecting carbon dioxide and ammonia released from compost samples. The test provides a simple index value that indicates whether compost is still actively decomposing or has reached a stable, mature condition suitable for use. A common benchmark used by compost programs is a Solvita Maturity Index of 5 or higher.
- **Curing time and management.** Curing is a process control step that supports maturity. Facilities typically define a minimum curing period and manage piles to maintain aerobic conditions and prevent rewetting or compaction that can create odors or slow stabilization.

The curing phase is the transition from active composting to a market-ready product. It allows biological activity to decline, improves stability and maturity, and helps further reduce odors before screening and distribution. Compost is typically considered ready to enter curing when windrow temperatures remain below around 105°F (40°C) after the active phase, the material does not reheat after turning, and maturity testing indicates progress toward a stable product (for example, a Solvita Maturity Index greater than 5). During curing, compost is moved to a designated area that is physically separated from active processing to prevent cross-heating and contamination. Curing piles are managed as static piles or uniform windrows, and no fresh feedstocks are added, as this can restart thermophilic activity and delay stabilization. Curing duration is commonly 4 to 8 weeks, with the actual time influenced by the feedstock mix, ambient temperature, and moisture and aeration conditions. Compost is typically screened and released for sale after curing criteria are met and maturity and contamination targets are confirmed.

9.7.2 Pathogens

Pathogen reduction is a baseline requirement for producing compost that can be distributed for broad public use. Many regulatory frameworks include process performance standards that specify minimum time and temperature conditions during active composting. **Table 9-4** summarizes benchmark state requirements by composting method.

Table 9-4: State Process Standards for Pathogen Reduction (Time, Temperature and Turning)

State	In-Vessel	Windrow	Aerated Static Piles
California and Texas	131°F or higher for 3 days	131°F or higher for 15 days, minimum of 5 turnings	131°F or higher for 3 days
Iowa	131°F or higher for an appropriate time per BMPs	131°F or higher for an appropriate time per BMPs	131°F or higher for an appropriate time per BMPs
Minnesota	131°F or higher for 24 hours	131°F or higher for 21 days, turned once every 3 to 5 days	131°F or higher for 7 days

Because temperature records alone do not confirm that the final product is safe, many programs also rely on finished compost pathogen testing using indicator organisms before compost is land-applied, sold, or provided for household use. Finished compost pathogen testing is commonly evaluated using fecal coliforms and Salmonella as indicator organisms. Results are typically reported on a dry weight basis using the most probable number (MPN), a statistical estimate of bacterial concentration. For example, Ohio requires finished compost to contain less than 1,000 MPN of fecal coliform per gram of total solids and less than 3 MPN of Salmonella per four grams of total solids. Iowa uses the same numeric thresholds and allows compliance to be demonstrated by meeting either the fecal coliform limit or the Salmonella limit before compost can be applied to land, sold, or given away for household use. California applies a more stringent approach for compost facilities by requiring both fecal coliform and Salmonella results to be below the maximum concentrations prior to removing compost from the facility.

9.7.3 Physical Contaminants

Several states have adopted numeric limits for physical contaminants in finished compost, usually expressed as a percent by weight (often dry weight) above a specified screen size such as 4 millimeters. These standards are useful benchmark targets when setting finished compost quality goals because they translate market expectations into measurable thresholds and clarify how plastics are treated within the broader “inerts” or “foreign matter” category. **Table 9-5** provides standards for physical contamination from other states.

Table 9-5: Example State Standards for Contamination

State	Finished compost physical contaminants standard	Sieve or size basis	Plastic sublimit	Citation
California	Not more than 0.5% (dry weight) of physical contaminants greater than 4 mm	> 4 mm	Film plastic greater than 4 mm, less than or equal to 0.1% (dry weight)	Cal. Code Regs. Tit. 14, § 17868.3.1 - Physical Contamination Limits | State Regulations | US Law | LII / Legal Information Institute
Texas	Foreign matter cumulatively not greater than 1.5% (dry weight) on a 4 mm screen	4 mm screen	Not specified in this clause	30 Tex. Admin. Code § 332.72 - Final Product Grades | State Regulations | US Law | LII / Legal Information Institute
Minnesota	Class I (unrestricted use): not greater than 3% inert materials (dry weight) ≥ 4 mm. Class II (restricted distribution): not greater than 4% inert materials (dry weight) ≥ 4 mm	≥ 4 mm	Not specified in this clause	7035.2836 - MN Rules Part
Ohio	Inert matter not more than 1.0% by weight on a No. 5 sieve (4 mm screen)	No. 5 sieve (4 mm)	No more than one-fourth of that inert matter may be plastic, which equals 0.25% by weight plastic within the 1.0% cap	3745-560-330_20251201.pdf

These examples show that physical contaminant limits commonly fall in the range of 0.5 to 4 percent by weight, typically measured on a 4-millimeter screen, with some states adding specific caps for plastic. When establishing finished compost quality targets, communities and facility operators can use these benchmarks to select a target range that matches local end uses and market expectations, then align collection requirements, education, load checks, and screening practices to consistently meet that target. Setting a clear finished compost target also supports consistent messaging to generators and provides a measurable basis for managing incoming contamination and evaluating program performance over time.

9.7.4 Metals

Metals testing is a standard component of compost quality verification because it provides a public health screen for land application and broad distribution. Many compost programs reference the U.S. Composting Council's Seal of Testing Assurance (STA) benchmark limits, which establish maximum concentrations for common metals in finished compost on a dry weight basis.

Several states use similar benchmark limits with minor variations. California generally follows the same numeric limits used in the STA program but also requires sampling for chromium. Iowa adopts the same limits for most metals in compost that is land-applied, sold, or distributed, but establishes a lower selenium limit. Minnesota uses similar limits for most metals but includes additional constituents such as molybdenum and polychlorinated biphenyls (PCBs) and applies a more stringent mercury limit. **Table 9-6** summarizes benchmark metal concentration limits commonly used for compost quality verification.

Table 9-6: Compost Metal Concentration Limits (Dry Weight Basis, mg/kg)

Metal	STA Benchmark	California	Iowa	Minnesota
Arsenic	41	41	41	41
Cadmium	39	39	39	39
Copper	1,500	1,500	1,500	1,500
Lead	300	300	300	300
Mercury	17	17	17	5
Nickel	420	420	420	420
Selenium	100	100	36	100
Zinc	2,800	2,800	2,800	2,800
Chromium	N/A	Requires sampling, no limit	N/A	N/A
Molybdenum	N/A	N/A	N/A	18
PCB	N/A	N/A	N/A	6

9.7.5 pH

pH is a basic indicator of compost chemistry and affects nutrient availability and plant tolerance. Most compost users prefer material with a near-neutral pH, but acceptable pH varies by application. Ohio notes that optimal pH depends on the end user and is typically 5.5 to 8.5. Compost producers can use pH results to guide product positioning, for example, separating general soil amendment uses from more sensitive horticultural or growing media applications and should include pH on product literature when marketing to professional users.

9.7.6 Soluble Salts

Soluble salts, commonly reported as Electrical Conductivity (EC), are a practical indicator of how compost may perform in plant-sensitive applications. Salts can be elevated in composts with higher nutrient feedstocks or when material is not fully stabilized, and elevated EC is most likely to cause issues in seedlings, container plants, and blended growing media. Ohio notes that optimal soluble salt levels vary by end use and identifies an optimal EC range of 0.5 to 4.5 millimho per centimeter for growing media (compost amended soil). Ohio also notes that compost producers may provide pH and soluble salts information in product literature for the intended end-user application, in accordance with industry standards.

9.8 Compost Testing Costs

Testing frequency and cost will vary based on program scale, annual compost production, intended end use, and whether the facility participates in a voluntary product documentation program such as the U.S.

Composting Council STA program. The STA program bases sampling frequency on annual finished compost production, ranging from quarterly testing for smaller producers to monthly testing for larger producers.

For pilot and community scale programs, testing may begin with basic field monitoring and maturity screening, then expand as compost is distributed to broader or more sensitive end users. The SOP developed for this study, provided in **Appendix D**, recommends daily temperature monitoring and routine moisture checks for process control, Solvita or similar maturity testing during midpoint and maturation phases, and a final quality check before compost is approved for use. The SOP identifies approximate Solvita test kit costs of about $245 to $250 for a six pack, laboratory Solvita testing of about $50 to $100 per sample, and final quality testing with optional pathogens at approximately $250 per sample. **Table 9-7** summarize recurring compost testing costs.

Table 9-7: Recurring Compost Testing Costs

Test type	Purpose	Typical timing	Planning level cost consideration
Solvita or similar maturity test	Screens compost maturity and biological stability before use or distribution	Midpoint, curing phase, and final quality review	About $245 to $250 for a six pack, or about $50 to $100 per lab sample
pH, electrical conductivity, and carbon to nitrogen ratio	Documents product quality and helps match compost to appropriate end uses	Final quality check and recurring product testing	About $150 per sample
Pathogen indicators	Provides public health verification before broader distribution	Final quality check, especially before public, residential, agricultural, or retail distribution	About $125 for Fecal Coliform and an additional $25 for E. Coli
Metals	Documents product safety for broader land application or market use	Periodic finished compost testing	About $125 per sample
Physical contaminants	Measures remaining plastic, glass, metal, and other inert materials in finished compost	Periodic finished compost testing, especially for market ready compost	About $80 per sample

9.9 Key Takeaways

- **Existing compost market.** South Dakota already has an established compost market driven largely by municipal yard waste programs. Many of these programs provide compost at no cost or very low cost to residents, creating a strong baseline supply while also setting a low-price ceiling for new compost producers.

- **Market demand.** Demand exists across several sectors, including residents, landscaping and nurseries, agriculture, local governments, construction projects, community gardens, and

institutional campuses. Landscaping and nursery markets currently represent the most consistent buyers.

- **Market expansion needs.** Market expansion depends on consistent product quality, reliable distribution channels, and buyer confidence. Standardized product specifications, routine testing, and contamination control practices can strengthen buyer confidence.
- **Demand-building strategies.** Strategies to expand compost demand include targeted outreach, public procurement policies, incentives for early adopters, and partnerships with organizations such as extension services and conservation districts. These strategies can help normalize compost use and build stable long-term markets.

10.0 Siting Criteria and Regulatory Review

Food waste composting facilities must be sited and designed to protect environmental resources while supporting efficient and reliable operations. Appropriate siting and regulatory considerations vary depending on facility scale, feedstock type, and operational complexity.

This section summarizes key siting considerations, outlines South Dakota's current regulatory framework, highlights emerging considerations, and compares approaches used in other states. Together, these elements provide a foundation for identifying key planning considerations for compost facility development across South Dakota.

10.1 Siting Criteria

To support the development of food waste composting infrastructure across South Dakota, siting criteria should reflect the scale and operational complexity of different composting systems. Community-scale operations generally require minimal infrastructure, while larger regional facilities require engineered sites and more extensive permitting.

Key siting considerations include the following:

- **Feedstock proximity.** Locate facilities near feedstock generators to reduce transportation costs and improve program participation.
- **Transportation access.** Provide access to suitable transportation routes, particularly for facilities receiving commercial or regional material.
- **Stormwater and leachate management.** Manage stormwater and leachate to prevent impacts to surface water and groundwater.
- **Odor, noise, and vector controls.** Incorporate controls to minimize nuisance conditions.
- **Land use compatibility.** Consider surrounding land uses and available buffer distances from residences.
- **Site grading and drainage.** Evaluate site grading and natural drainage patterns to support runoff management.
- **Utility availability.** Confirm availability of utilities, including water and, where applicable, power for aeration systems.

Table 10-1 summarizes typical siting and regulatory characteristics across different compost facility scales to illustrate how operational complexity and permitting considerations increase with facility size.

Table 10-1: Siting and Regulatory Criteria Comparison Table

Siting Criteria	Community-Scale	Mid-Scale	Large-Scale
Minimum Land Area	<1 acre	1 to 4 acres	5+ acres
Population Density Served	Low density (rural, small towns, schools, farms)	Moderate density (small cities, regional hubs)	High density (urban centers, regional service areas)
Logistical Efficiencies	Localized collection or self-haul; limited hauling distances	Combination of local and regional collection; moderate hauling distances	Regional or multi-jurisdictional collection; optimized hauling and transfer systems
Access Requirements	Local road access	Good gravel or paved road	Paved road suitable for frequent truck traffic
Zoning Compatibility	Agricultural, institutional, or low-density residential	Agricultural, public works, or light industrial	Industrial zoning or landfill co-location
Infrastructure Needs	Basic pad, water source, fencing, loader access	Pad, water source, drainage, power, loader	Engineered pad, stormwater controls, power, truck scale, office, and parking
Permit Complexity	Low (may align with simplified or general permit pathways)	Moderate (individual permit likely)	High (full permitting and engineered site plans)
Setback from Residences	100-200 feet	200-300 feet	500 feet
Setback from Water Bodies	100 feet	200 feet	300 feet
Setback from Roads	50-100 feet	100-200 feet	200+ feet

Siting, infrastructure, and permitting considerations vary significantly with facility scale, with larger operations requiring more robust design, access, and environmental controls. Aligning facility type with local conditions, including population density, feedstock availability, and hauling logistics, is an important factor in successful program implementation.

10.2 Existing South Dakota Regulatory Framework

South Dakota regulates composting facilities under SDCL, Chapter 34A-6 and ARSD, Chapter 74:27, which governs solid waste management facilities. The primary regulatory pathway currently available is the yard waste compost general permit, which applies to facilities processing leaves, grass, and similar materials.

This general permit establishes siting and operational requirements intended to protect public health and the environment. Key requirements include the following:

- **Setbacks.** Facilities must meet setback requirements from surface water, wells, and occupied dwellings. Under the general permit, composting sites cannot be located within 100 feet of a property boundary without written permission of the adjacent landowner(s).
- **Location restrictions.** Facilities are restricted from locating in wetlands or floodplains or where the primary subsurface material is sand or gravel.
- **Stormwater controls.** Facilities must use stormwater controls to divert run-on and runoff.

- **Operational controls.** Facilities must conduct routine inspections, maintain records, and implement operational controls such as vector and odor management.

At present, food waste is not explicitly addressed within the yard waste compost general permit. As a result, facilities accepting food waste are required to pursue an individual solid waste permit depending on the scale of operations and the types of materials managed.

In addition to facility permitting requirements, finished compost that is distributed off-site is regulated under SDCL Chapters 38-19 and 38-19A. Compost may be subject to registration as a soil amendment or fertilizer depending on how the product is marketed and used.

10.3 Emerging Considerations

As interest in food waste composting grows, there is increasing recognition that existing regulations may not fully reflect the range of composting systems and feedstocks currently under consideration.

Discussions with state staff and review of draft and conceptual permitting materials suggest several areas of active consideration. Examples of design and operational considerations include the following:

- **Access control.** Operators may need to maintain site access controls, including fencing around the facility, locked gates, and signage.

- **Composting pad construction**. Pads may be constructed of compacted earthen material, asphalt, or concrete. Earthen pads may need to achieve low permeability, for example on the order of 1×10^{-7} cm/s, to minimize infiltration and leachate migration.

- **Stormwater and runoff management**. Berms or containment structures may be used to divert run-on and contain runoff, with design criteria based on storm events such as a 25-year, 24-hour storm, approximately 4.7 inches. These features are intended to prevent contact water from leaving the composting area. A construction stormwater permit from DANR is required if more than one acre of land is disturbed during compost pad construction.

- **Authorized and unauthorized wastes.** Only yard waste and food waste may be accepted for composting under the conceptual framework reviewed. All other waste materials are considered unauthorized.

- **Vector control.** Operators may need to prevent or control on-site populations of disease vectors, such as rats, rodents, and mosquitoes.

- **Leachate control.** Leachate generated from composting activities may need to be contained within the composting area and managed on-site or reused within the composting process.

- **Operational controls.** Operational controls may include timely incorporation of food waste, such as within four operational days, routine inspections, temperature monitoring for pathogen reduction, and basic recordkeeping to support compliance and minimize odor and environmental impacts.

- **Compost testing.** Temperature monitoring may be required to document that the material maintains an internal temperature between 130 and 160°F for at least three consecutive days. Mature compost testing may also be recommended to document that a carbon-to-nitrogen ratio between 25:1 and 30:1 has been achieved.

- **Compost registration.** Operators may be responsible for registering mature compost with DANR as a soil amendment or fertilizer if the product is not beneficially used within the permitted boundary of the site.

These considerations reflect a broader effort to align regulatory frameworks with evolving composting practices while maintaining environmental protection and public health standards. Final regulatory approaches may vary as the State continues to evaluate options.

10.4 Regulatory Observations

A review of South Dakota's existing regulatory framework, including the existing solid waste facility categories based on annual tonnage, and the food waste composting permit requirements provided by DANR indicated several factors that may influence the development of food waste composting infrastructure:

- **Food waste differentiation.** South Dakota's yard waste compost general permit is primarily oriented toward yard waste. DANR has developed food waste composting permit requirements that identify conditions for facilities accepting food waste, including authorized feedstocks, composting pad design, stormwater controls, food waste handling, leachate management, vector control, compost testing, recordkeeping, closure, and financial assurance.

- **Small scale operations.** Smaller operations may benefit from clear guidance describing the information needed before initiating food waste composting, particularly where an existing yard waste composting operation is considering the addition of source separated food waste. Guidance could address operating area, pad design, feedstock acceptance, incorporation timing, odor and vector controls, leachate management, stormwater controls, monitoring, recordkeeping, finished compost use, and when a permit amendment or individual permit may be required.

To support more widespread composting, several opportunities exist to improve clarity and flexibility within the current regulatory framework:

- **Establish** a general permit option or permit-by-rule pathway for community-scale systems.

- **Clarify** acceptable inputs and site design criteria for food waste composting.

- **Develop** pre-approved siting templates or checklists for common facility types.

- **Provide** technical support or guidance documents to assist local zoning officials.

These approaches could help reduce barriers for new and existing operators while maintaining environmental protection and public health standards.

Other states have addressed similar challenges by adopting permitting frameworks that scale requirements based on facility size, feedstock type, and operational risk. These approaches provide useful context for how South Dakota's regulatory framework could evolve over time. A summary of permitting guidelines in other states is provided in **Table 10-2.**

Table 10-2: Benchmark States Permitting Guidelines

State	Exempt from Permit	Permitting	Rule
California	<100 cubic yards (CY) and 750 square feet (SF) of food/yard waste any one time	≤12,500 CY: Registration Permit; ≥12,500 CY: Full Solid Waste Permit	California Code of Regulations
Washington	<25 CY of food/yard waste at any one time	<250 CY of any material at any one time, not to exceed 1,000 CY per year: Conditional Exempt Permit; >250 CY: Solid Waste Permit	Washington Administrative Code
Iowa	<2 tons of food/yard waste per week received at the facility	Solid Waste Composting Facility Permit	Iowa Administrative Code
Texas	Only source-separated yard trimmings, clean wood, vegetative material, and paper	Facility Permit	Texas Administrative Code
Minnesota	<120 CY of yard/food waste at any one time	Solid Waste Management Facility Permit	Minnesota Administrative Rules

Across benchmark states, a consistent pattern is the use of tiered or scaled permitting approaches that reduce regulatory burden for smaller, lower-risk operations while maintaining more comprehensive requirements for larger facilities.

10.5 Key Takeaways

The regulatory review and benchmarking analysis highlighted several important considerations for supporting food waste composting in South Dakota:

- **Existing regulatory foundation.** Existing regulations provide a foundation for composting but are primarily oriented toward yard waste management.
- **Food waste permitting clarity.** Clarifying how food waste and mixed organics fit within existing permitting pathways could reduce uncertainty for operators.
- **Scaled permitting approaches.** Scaled or tiered approaches used in other states provide flexibility for community-scale and pilot projects while maintaining environmental protections for larger facilities.
- **Siting criteria.** Clear siting criteria, including setbacks, stormwater management, and buffer

requirements, remain important across all facility scales.

- **Implementation support.** Additional guidance, templates, and technical support can help bridge the gap between regulatory requirements and implementation.

Taken together, these findings suggest that aligning regulatory approaches with facility scale, feedstock type, and operational risk can support a broader range of composting opportunities while maintaining public health and environmental safeguards.

11.0 Next Steps

The findings of this study provide a foundation for advancing food waste composting in South Dakota through a phased and scalable approach. Next steps should focus on building on the pilot program, reducing implementation barriers, and supporting long-term market and infrastructure development.

11.1 Near-Term Actions (0 to 12 months)

Initial efforts should focus on expanding pilot activities, refining operational practices, and providing immediate support to interested facilities.

- **Continue evaluating** the Brookings pilot program to document operational performance, contamination rates, participation levels, and compost quality outcomes.
- **Share** study findings through presentations for communities, solid waste facility operators, and other interested stakeholders.
- **Identify and support** additional pilot locations at permitted landfills or municipal sites with existing yard waste composting infrastructure.
- **Develop and distribute** standardized outreach materials, including accepted materials lists, signage, and labeling templates to reduce contamination.
- **Provide** technical assistance to participating facilities, including guidance on feedstock mix, site operations, and contamination management.
- **Support** pilot-scale funding through DANR grants for equipment, pad improvements, and testing.
- **Develop** a simple permit guidance document outlining pathways for pilot projects and early-stage food waste composting efforts.

11.2 Mid-Term Actions (1 to 3 years)

As pilot programs mature, efforts should shift toward program expansion, regulatory clarity, and market development.

- **Expand** collection programs through additional drop-off sites and, where feasible, pilot curbside collection in higher-density communities.
- **Refine** operational standards based on pilot results, including contamination thresholds, composting practices, and product quality targets.
- **Develop** guidance for compost site design and siting, including example layouts and stormwater management approaches.

- **Establish** a consistent compost quality framework, including recommended testing parameters and product specifications aligned with market needs.
- **Support** market development through public procurement, partnerships with landscaping and agricultural users, and demonstration projects.
- **Provide** training programs and continuing education for facility operators, municipal staff, and stakeholders.

11.3 Long-Term Actions (3 to 5+ years)

Long-term efforts should focus on system integration, regulatory alignment, and market stabilization.

- **Evaluate** opportunities to clarify or refine regulatory pathways for food waste composting, including consideration of scaled or tiered approaches based on facility size and risk.
- **Expand** regional composting capacity in areas with sufficient feedstock volumes, including mid-scale and large-scale facilities.
- **Develop** regional or multi-jurisdictional partnerships to improve collection efficiency and share infrastructure.
- **Strengthen** compost markets through consistent product quality, distribution channels, and end-user engagement.
- **Monitor** program performance and incorporate lessons learned into ongoing guidance and support materials.

Successful implementation of food waste composting in South Dakota depends on aligning program scale with local conditions, including population density and feedstock availability; maintaining strong contamination control through education and operational practices; providing consistent technical assistance and funding support; and building market confidence through reliable product quality and distribution. A phased approach that builds on existing infrastructure and pilot program results allows South Dakota communities to expand composting in a practical and cost-effective manner.

Appendix A - Landfill and Solid Waste Facility Survey Responses

City of Brookings

Current Infrastructure

1. Do you currently manage the following materials?

   X Yard waste

   ☐ Manure or agricultural waste

   ☐ Biosolids

   ☐ Other organics: _____

2. Approximate area available for expansion or composting: 7 acres

3. What equipment do you have that supports composting?

   X Loader

   ☐ Grinder/Shredder

   X Screen

   ☐ Blower/aeration system

   ☐ Other: _____

Interest in Food Waste Composting

4. Are you interested in accepting food waste for composting?

   ☐ Yes

   ☐ No

   X Maybe / Need more information

5. What are your biggest concerns?

   ☐ Odors
   X Contamination
   X Regulatory requirements
   X Staffing
   X Equipment
   ☐ Financial cost

   ☐ Other:

6. Would you consider participating in a pilot food waste composting program?

   X Yes
   ☐ No
   ☐ Possibly, depending on support/resources

Support Needs

7. What support would be most helpful?

X Grant funding for equipment or pads
X Permit guidance
☐ Technical assistance
☐ Composting training
X Public education/outreach templates
X Connections to haulers or generators
☐ Other:

8. Additional comments or questions:

City of Huron

Current Infrastructure

1. Do you currently manage the following materials?

   X Yard waste

   X Manure or agricultural waste

   X Biosolids

   ☐ Other organics: _____

2. Approximate area available for expansion or composting: have 3 acres concrete

3. What equipment do you have that supports composting?

   X Loader

   X Grinder/Shredder

   X Screen

   ☐ Blower/aeration system

   X Other: Windrow Turner

Interest in Food Waste Composting

4. Are you interested in accepting food waste for composting?

   X Yes

   ☐ No

   ☐ Maybe / Need more information

5. What are your biggest concerns?

   X Odors
   X Contamination
   X Regulatory requirements
   X Staffing
   ☐ Equipment
   X Financial cost

   ☐ Other:

6. Would you consider participating in a pilot food waste composting program?

   ☐ Yes
   ☐ No
   X Possibly, depending on support/resources

Support Needs

7. What support would be most helpful?

X Grant funding for equipment or pads
X Permit guidance
☐ Technical assistance
☐ Composting training
X Public education/outreach templates
☐ Connections to haulers or generators
☐ Other:

8. Additional comments or questions:

Rapid City

Current Infrastructure

1. Do you currently manage the following materials?

   X Yard waste

   X Manure or agricultural waste

   X Biosolids

   ☐ Other organics: _____

2. Approximate area available for expansion or composting: At this time, unknown

3. What equipment do you have that supports composting?

   X Loader

   X Grinder/Shredder

   X Screen

   ☐ Blower/aeration system

   X Other: Windrow Turner

Interest in Food Waste Composting

4. Are you interested in accepting food waste for composting?

   ☐ Yes

   ☐ No

   X Maybe / Need more information

5. What are your biggest concerns?

   X Odors
   X Contamination
   X Regulatory requirements
   X Staffing
   X Equipment
   X Financial cost

   ☐ Other:

6. Would you consider participating in a pilot food waste composting program?

   ☐ Yes
   ☐ No
   X Possibly, depending on support/resources

Support Needs

7. What support would be most helpful?

X Grant funding for equipment or pads
X Permit guidance
X Technical assistance
X Composting training
X Public education/outreach templates
X Connections to haulers or generators
☐ Other:

8. Additional comments or questions:

City of Sioux Falls

Current Infrastructure

1. Do you currently manage the following materials?

   X Yard waste

   ☐ Manure or agricultural waste

   ☐ Biosolids

   ☐ Other organics: _____

2. Approximate area available for expansion or composting: 5 acres

3. What equipment do you have that supports composting?

   X Loader

   X Grinder/Shredder

   X Screen

   X Blower/aeration system

   ☐ Other: _____

Interest in Food Waste Composting

4. Are you interested in accepting food waste for composting?

   ☐ Yes

   ☐ No

   X Maybe / Need more information

5. What are your biggest concerns?

   X Odors
   X Contamination
   X Regulatory requirements
   ☐ Staffing
   ☐ Equipment
   X Financial cost

   ☐ Other:

6. Would you consider participating in a pilot food waste composting program?

   ☐ Yes
   ☐ No
   X Possibly, depending on support/resources

Support Needs

7. What support would be most helpful?

X Grant funding for equipment or pads
X Permit guidance
X Technical assistance
X Composting training
☐ Public education/outreach templates
X Connections to haulers or generators
☐ Other:

8. Additional comments or questions:

Appendix B - Compost Pilot Flyer

COMPOST PILOT

JOIN THE FOOD WASTE COMPOSTING PILOT

Reduce waste. Support healthy soils. Participate in community initiative.

WHAT GOES IN THE COMPOST BIN

YES — Place in Compost

- *Fruit and vegetable scraps*
- *Coffee grounds and paper filters*
- *Meat, fish, and dairy scraps*
- *Bread, pasta, and grains*
- *Eggshells*
- *Nuts and shells*

NO — Do Not Place in Compost

- *Plastic bags or packaging*
- *Glass, metal, or containers*
- *Animal or pet waste*
- *Rocks, soil, or debris*
- *Paper towels or napkins*

👉 **When in doubt, leave it out**

HOW TO PARTICIPATE

1. Prepare Your Container

Place a container in your kitchen, garage, or freezer to collect food scraps.

2. Collect Food Scraps

Add accepted materials to your container throughout the week.

3. Drop Off Materials

Bring your container to a designated drop-off location.

PROGRAM DETAILS

Drop-off Locations

- *Add locations*

Pilot Timeline

Start:

Finish:

Questions? *Contract: Name, number, email*

Appendix C - Yes vs. No Infographic

COMPOSTING YES vs NO

YES

- Fruit, vegetable, meat and dairy scraps
- Egg shells, bread and grains
- Coffee grounds, brown coffee filters
- BPI certified compostable bags
- Leftover food

NO

- Pizza boxes
- Glass and plastic
- Animal waste
- Oil, cooking fat and grease
- Rocks, soil and construction debris
- Paper, compostable cutlery/tableware

When in doubt, throw it out!

Appendix D - Food Waste Collection and Compost Facility Standard Operating Procedures

Food Waste Collection and Compost Facility Standard Operating Procedures

Community, South Dakota

Contents

Tables

Purpose

This Standard Operating Procedure (SOP) provides guidance for the COMMUNITY on the collection of food waste and the evaluation of food waste composting operations at the FACILITY, a municipal composting site that currently accepts yard waste and other organic materials. The recommended practices, site conditions, and record-keeping guidelines are tailored to a turned windrow composting system for incorporating source-separated food waste.

This SOP applies to:

- COMMUNITY staff and contractors responsible for site operations
- Haulers delivering food waste or yard waste
- Community members participating in the drop-off program
- Businesses pre-approved by the COMMUNITY to participate

Accepted Materials

This section defines acceptable and unacceptable materials for composting at the COMMUNITY FACILITY. Proper sorting of food scraps, yard trimmings, and carbon-rich materials helps maintain a healthy composting process and prevents contamination that could compromise compost quality or require landfill disposal.

Accepted Materials

Food Waste

- Fruits and vegetables (raw and cooked)
- Grains (bread, rice, pasta, cereal)
- Coffee grounds and unbleached paper filters
- Tea bags (paper based only, no plastic mesh)
- Eggshells
- Meat, dairy, and oily foods may be allowed only if authorized by the City for the pilot phase
- BPI-certified compostable liner bags (must meet ASTM D6400 standards)

Yard Waste

- Grass clippings
- Garden trimmings and plants

Carbon Sources (Browns)

- Wood chips or shavings
- Dry fall leaves (store for year-round use)
- Sawdust (from untreated wood)

Prohibited Materials

To protect compost quality and avoid equipment damage or regulatory issues, the following materials are prohibited:

- ❌ **Plastic** (including "compostable" or biodegradable plastics)
- ❌ **Compostable Products** (including cups, utensils and takeout containers)
- ❌ **Glass**
- ❌ **Metals** (cans, foil, twist ties, cutlery)
- ❌ **Pet waste** (dog or cat feces, litter)
- ❌ **Hazardous or medical waste** (sharps, pharmaceuticals, bandages)

Collection

For the purposes of this start-up program, the recommended food waste collection system is residential drop-off sites. We recommend referring to these locations as “Food Waste Drop-Off” sites. The following outlines the preferred collection method.

- The COMMUNITY can use 64-gallon carts for collection or 3-cubic yard dumpsters.
- Carts may be lined with compostable bags to manage odor and moisture.
- A typical drop-off site consists of six to eight 64-gallon wheeled, lidded containers or one 3-cubic yard dumpster.
- An ideal location is convenient for residents but not so visible or accessible that it creates issues with public traffic or misuse.
- Site security and oversight should be considered in siting decisions. Where possible:
    - Choose locations with lighting, surveillance cameras, or passive visibility (e.g., foot traffic or staff presence).
    - Use locking mechanisms or secured enclosures to prevent access outside of designated drop-off hours, if needed.
- Drop-off locations adjacent to public facilities are easier to monitor.
- Drop-off carts should be serviced weekly. In winter months, servicing every other week may be acceptable if carts are lined to prevent frozen contents from sticking.
- Educational signage should be installed to instruct residents on site use, accepted materials, and contamination prevention.
- Participation in the drop-off program may be extended to pre-approved businesses on a case-by-case basis, at the discretion of the COMMUNITY.

Receiving and Inspection

The food waste receiving area serves as the initial control point in the composting process and plays an important role in minimizing contamination, managing leachate, and preparing materials for successful composting. This section outlines the receiving area and inspection process.

- The receiving area, where incoming food waste is unloaded, should be pre-staged with a base layer of carbonaceous material such as wood chips, shredded leaves, or finished compost.
- The receiving area should also include a space for storing fall leaves for year-round use.
- Berms are typically constructed in a U-shape along the perimeter of the receiving pad, built several feet high with carbonaceous material. These berms help contain liquids from incoming food waste and facilitate initial mixing.
- The food waste receiving pad may be constructed from compacted clay, concrete, or asphalt. It should be sized appropriately to accommodate the expected volume of food waste delivered from all drop-off sites. Proper grading and drainage should be considered to manage leachate and runoff.
- Operators should visually inspect each load upon arrival for contamination, including plastic, glass, metal, or other non-compostable materials.
- Loads with unacceptable levels of contamination should be rejected and redirected to the landfill or another approved disposal site.
- Accept if less than 5 percent non-compostables by visual volume; reject and redirect to landfill if greater than 5 percent.
- Automatically reject loads regardless of percent with: glass, batteries, e-waste, chemicals, pet waste, diapers, dead animals, black/opaque plastic bags and loads with predominately contained non-compostable plastic bags.
- Any observed contamination should be documented, including the date, source (if known), and type of contaminant, to inform future education or enforcement efforts.
- Fresh loads of food waste should be incorporated into a compost windrow within one to two hours of delivery to minimize odors and pest attraction.
- If food waste cannot be incorporated by the end of the working day, it should be covered with a sufficient layer of finished compost, dry leaves, sawdust, or another suitable carbon source to deter vectors, birds, and odors.

Material Preparation

Effective composting begins with achieving the right balance between food waste and carbon-rich materials. The structure and chemical composition of the compost feedstock directly influences microbial activity, oxygen flow, and overall pile performance. The following defines the best management practices for prepping materials.

- Have a supply of carbonaceous material (e.g., wood chips, shredded leaves, ground brush) readily available for mixing with incoming food waste.
- Materials such as wood chips, tree trimmings, and ground brush add structure to the compost pile, helping maintain adequate porosity and free air space for aerobic decomposition.
- Avoid using too many fine particles (e.g., sawdust or shredded leaves alone), as they can compact easily, closing off air channels and restricting oxygen flow.
- Conversely, too many large particles may introduce excessive air, cool the pile, and slow microbial activity.

- Food waste and yard waste should be blended to achieve a carbon-to-nitrogen (C:N) ratio of approximately 25–30:1, which supports effective composting.

What is the 25–30:1 C:N Ratio

- Microorganisms responsible for breaking down organic material require carbon (C) as an energy source and nitrogen (N) to synthesize proteins and grow.
- A C:N ratio in the range of 25–30:1 is considered optimal for rapid, balanced, and odor-free decomposition.
- If the mixture contains too much carbon (e.g., too many dry leaves or wood chips), the composting process will slow down significantly.
- If there is too much nitrogen (e.g., excessive food waste or grass clippings), the pile may become wet, odorous, and overheat, potentially creating anaerobic conditions.
- Mixing materials thoroughly and monitoring pile conditions will help maintain an appropriate balance for successful composting.

Table 1 lists some common materials and their C:N ratios.

Table 1 Common Material C:N Ratios

MATERIAL	ESTIMATED C:N RATIO	TYPE
Fruit & vegetables	15:1	Nitrogen-rich
Coffee grounds	20:1	Nitrogen-rich
Grass clippings (fresh)	15–20:1	Nitrogen-rich
Sawdust	200–500:1	Carbon-rich
Dry leaves	30–60:1	Carbon-rich
Wood chips	100–200:1	Carbon-rich

How to Implement C:N Management at the Facility

- Estimate the carbon-to-nitrogen (C:N) ratio of incoming materials and blend accordingly.
- A practical mixing ratio for small-scale blending is:
  → 1 bucket of food waste + 2 to 3 buckets of carbon-rich material
  This ratio helps balance moisture and nutrients while reducing the risk of odors and anaerobic conditions.
- Batch Recipe Example:
  - For every 1,000 pounds of food waste (approximate C:N = 15:1), mix in 2,000–2,500 pounds of high-carbon material such as leaves, ground brush, or sawdust to achieve the target 25–30:1 C:N ratio.
- Adjust based on observation and conditions:
  - Too wet or smelly? Add more carbon (e.g., dry leaves, wood chips).
  - Too dry or not heating up? Add more nitrogen (e.g., fresh grass clippings or additional food waste).
  - Target texture: The material mix should resemble a wrung-out sponge—moist but not dripping, with good structure and air space.
- Mixing should be performed using a front-end loader to incorporate materials evenly and maintain a uniform pile.
- Bulking agents such as coarse wood chips or ground brush should be added as needed to preserve porosity and structural integrity, ensuring sufficient airflow throughout the composting process.

Windrow Construction

Proper windrow construction is essential to support efficient composting operations and consistent process control. The size, shape, and layout of windrows influence critical factors such as aeration, moisture retention, and equipment access. Constructing windrows on a stable, well-drained pad helps maintain operational efficiency while minimizing leachate concerns. The following guidance outlines key considerations for forming windrows that accommodate turning equipment, promote aerobic conditions, and adapt to seasonal and site-specific variables.

- Construct windrows on a compacted, graded pad made of clay, asphalt, or concrete to promote drainage and support equipment movement.
- Windrows should be approximately 3 to 12 feet high and 6 to 20 feet wide at the base. These dimensions can be adjusted seasonally based on weather conditions, material moisture content, and equipment capabilities.
- Leave sufficient spacing between windrows to allow safe and efficient access by turning equipment, such as a front-end loader. Adequate spacing also promotes airflow and reduces the potential for cross-contamination between piles.

Turning Schedule

Turning windrows is a critical part of the composting process that helps maintain aerobic conditions, regulate temperature, and manage odors. Regular and well-timed turning promotes even decomposition and supports the microbial activity needed for pathogen and weed seed destruction. However, turning must be approached with care—especially in relation to weather, odor control, and neighborhood impacts. The guidance below outlines best practices for establishing a turning schedule.

- Windrows should be turned at least once every 1–2 weeks, with a minimum of five turns over the active composting period to support uniform decomposition, temperature management, and odor control.
- Monitor weather conditions and prevailing wind direction prior to turning. Avoid turning piles during periods of high wind or when atmospheric conditions may carry odors toward neighboring properties or public spaces.
- To reduce odor emissions, a cap with a layer of finished compost, wood chips, or ground yard waste could be added to windrows. This cap functions as a biofilter, helping to trap odors and maintain pile temperature.
- Adjust the turning frequency based on pile temperature, moisture content, and odor. Use a compost thermometer to verify that internal temperatures reach 131°F–160°F during the active phase for effective pathogen and weed seed reduction.

Monitoring and Sampling Schedule

Effective composting requires close monitoring of temperature and moisture to support pathogen destruction, weed seed inactivation, and optimal microbial activity. This facility uses the turned windrow method, which relies on elevated temperatures and periodic turning to meet regulatory and performance standards.

The U.S. EPA's Process to Further Reduce Pathogens (PFRP) standards apply specifically to the safe use and disposal of biosolids; however, many composters adopt similar practices voluntarily. States such as Iowa and California follow the standards outlined below:

- Pile temperatures must remain between 131°F and 160°F for at least 15 consecutive days during the active composting phase.
- Windrows must be turned at least five times during this 15-day period to promote uniform heating and oxygenation.
- If temperatures drop below 131°F, corrective actions—such as turning, adjusting moisture, or re-blending materials—should be taken. Affected sections may need to restart the 15-day cycle.

Temperature Testing Protocol

1. Use a thermometer with a 20-60 inch stem (long enough to reach the center of a windrow).
2. Take daily readings in the morning or prior to turning or watering.
3. Take readings at a fixed interval between 50-150 feet along each pile, or a minimum of 3 locations per windrow.
4. Insert the thermometer at a height of about 2/3 to 3/4 the height of the pile and angle it towards the windrow's core
5. Measure temperature at each location for two depths between the exterior and center of the pile. Consider marking the thermometer stem for ease of replicating these depths.
6. Record:
    - Windrow ID
    - Date/time
    - Temperature readings
    - Observations (e.g., odor, color, consistency, moisture)
7. Interpret the resulting temperature to Table 2 for potential action.

Table 2 Interpretating Temperatures

TEMPERATURE (°F)	COMPOSTING PHASE	ACTION
<100 °F	Slow (mesophilic)	May need nitrogen, moisture or mixing
100-130 °F	Moderate activity	Normal for early or curing stages
131-160 °F	Ideal (thermophilic)	Pathogen/weed kill zone; monitor closely
>160 °F	Too hot	May kill microbes; turn pile, check moisture

Best Practices

- Too cold? Add nitrogen-rich material, water or turn pile.
- Too hot? Add bulking agent, reduce pile size, or turn pile if in cold weather conditions.
    - Cautiously deconstruct pile with plenty of access to water if temperatures exceed 170°F, smoldering fire is likely and may escalate when exposed to oxygen.

Moisture Testing Protocol

Moisture is equally critical, too little will slow decomposition, while too much will create anaerobic conditions and odors. The ideal moisture range is 50 to 60 percent.

How to perform the squeeze test for moisture level:

1. **Put on gloves.**
   Compost can contain pathogens, especially during active decomposition.
2. **Collect a sample.**
   Grab a handful of compost from 4 to 6 inches below the surface.
3. **Squeeze it firmly.**
   Close your hand tightly around the material for 2 to 3 seconds.
4. **Observe the result.**
   Document the result and compare the observation to Table 3.

Table 3 Squeeze Test

OBSERVATION	WHAT IT MEANS	MOISTURE ESTIMATE
Feels dry, falls apart, leaves behind powder on hands	Too dry - add water or wetter material	<40%
Compost does not remain in ball after squeezing	Borderline dry – consider adding water or wetter material	40-50%
A ball of compost forms but breaks apart when tapped	Borderline dry – consider adding water or wetter material	45-50%
A ball of compost forms, remains intact when tapped, no sheen of water visible	Ideal – moist like a wrung out sponge	50-55%
No drops of water, but moisture sheen visible on hand	Ideal – moist like a wrung out sponge	55-60%
A few drops of water	Borderline wet – consider adding dry carbon, turn pile	60-65%
Water drips freely	Too wet - add dry carbon, turn pile	>65%
Material mushy or anaerobic smell	Likely saturated & lacking oxygen	Very high moisture

Best Practices

- Do the test weekly during active composting.
- Perform it in multiple locations of the windrow to get a representative result.

- If results vary, adjust water or carbon content and turn the pile to redistribute moisture.
- Too wet? Turn pile and mix with dry material.
- Too dry? Use a drop hose to water on top of the windrow.

Together, these monitoring practices help maintain aerobic conditions, support effective decomposition, and confirm compliance with pathogen-reduction performance goals. Documentation should be kept for all temperature and moisture readings throughout the composting process.

Curing Process

The curing phase is a critical step in compost production. It allows biological activity to gradually decline, promotes compost stability and maturity, and further reduces odors and pathogens before final use or distribution. The following describes the curing process.

Curing Criteria

Material is considered ready for curing when:

- Windrow temperatures remain below 105°F (40°C) after the active composting phase.
- No temperature increase is observed after turning.
- The Solvita Maturity Index is greater than five. Attachment A– Solvita Compost Maturity Test Guide provides a guide to completing this test.

Curing Procedure

- Move compost to a designated curing area, physically separate from active composting operations, to prevent contamination and cross-heating.
- Curing piles may be formed into static piles or uniform windrows for ease of monitoring and handling.
- Do not add fresh feedstocks to curing piles, as this may restart thermophilic activity and delay stabilization.
- The curing phase typically lasts 4 to 8 weeks, depending on:
    - Feedstock mix (e.g., food waste vs. carbon sources)
    - Ambient temperatures
    - Moisture and aeration levels

Curing Completion Indicators

- Pile temperature has declined to near ambient and remains stable.
- The Solvita Index test result is greater than seven, indicating maturity and low biological activity.

Testing

Compost quality monitoring is a key component of any program. Compost will be considered finished when it is stable, odor-free, and consistent in texture.

The following tests are recommended:

- Temperature – for process control and pathogen reduction monitoring
- Moisture content – for ongoing process management
- Solvita or similar maturity testing – to assess biological activity and maturity
- pH, EC, and C:N ratio – to track nutrient balance and stability (optional)
- Pathogen reduction – if required for site-specific compliance or end-use

A potential Testing Plan is provided in Table 4

Table 4 Testing Plan

PHASE	TIMING	PURPOSE	TESTING	FEE
Startup	Week 1	Establish baseline	Moisture content, C:N estimate	Free
Active Composting	Weeks 1-8	Process control	Daily temperatures, moisture	Free
Midpoint Monitoring	Week 6	Evaluate Performance	Solvita	6-pack is ~$250
Maturation Phase	Weeks 9-14	Track stability and maturity	Solvita	6-pack is ~$250
Final Quality Check	Week 14 or 15	Approve compost for use	Solvita, pH, EC, C:N, pathogens (optional)	~$250 per sample (includes pathogens like Salmonella and fecal coliform)

Monitoring, Vector and Odor Control, and Recordkeeping

Ongoing monitoring and accurate recordkeeping are essential for verifying that composting operations meet performance goals, comply with regulatory standards, and support continuous improvement. In addition, effective monitoring supports proactive vector and odor management, which is critical for maintaining public trust and a sanitary composting environment.

Daily Monitoring

- Temperature readings at a minimum of three locations per windrow, using a long-stem thermometer.
- Odor Assessment: Monitor for strong or unusual smells that may indicate anaerobic conditions or excess nitrogen.
- Incorporation of incoming food waste: Food waste must be incorporated into a windrow the same day it is received. If not immediately incorporated, cover with a carbon-rich bulking agent (e.g., wood chips) or finished compost to suppress odors and deter pests.

- Odor Complaint Log: If off-site odor complaints are received, they must be logged and investigated within 24 hours. Record the nature of the complaint, wind/weather conditions, and corrective actions taken.

Weekly Monitoring

- Moisture Content: Use the squeeze test (see Moisture Testing Protocol) to assess pile moisture.
- Pile Condition: Evaluate structure, texture, microbial activity, and signs of compaction or dryness.
- Contamination Check: Look for and remove visible plastics, metals, or other non-compostable items.
- Vector Activity Inspection: Check for signs of rodents, flies, or birds (e.g., burrows, droppings, fly concentrations, scavenging).
- Corrective Action Documentation: Note any corrective actions (e.g., turning piles, applying cover, removing attractants).

Monthly Tracking

- Volume Tracking: Estimate the quantity of food waste and yard waste received, and volume of finished compost produced (e.g., post-curing or screening).
- Windrows can be measured as follows: measure length (L), height (H), top width (Wt), and base width (Wb) in feet.
- Windrow volume (cubic yards): $L \times H \times (Wb + Wt) \div (2 \times 27)$
- Operational Challenges: Document weather events, equipment failures, or process disruptions and actions taken in response.

Recordkeeping Requirements

- All monitoring data must be documented daily, weekly, and monthly using the spreadsheet provided in Attachment B – Recordkeeping.
- Records must include:
    - Temperature and moisture data
    - Odor and vector observations
    - Contamination checks
    - Complaint responses and corrective actions
    - Volumes of material processed and compost produced
- Logs must be maintained in digital and hard copy formats and retained for a minimum of three years.
- These records serve as the foundation for operational reviews and continuous improvement.

Distribution and End Use

Finished compost produced during the pilot program may be distributed for beneficial use, supporting soil health, water retention, and nutrient cycling in the community. All distributed material should meet maturity and quality benchmarks described in **Error! Reference source not found.** and **Testing**.

Approved End Uses

Finished compost may be used for:

- Municipal landscaping projects (e.g., roadway medians, tree planting)
- Agricultural applications (e.g., soil amendment for city-leased or partner fields)
- Residential distribution to residents (e.g., self-haul or bulk pick-up events)
- Commercial distribution (e.g., landscapers, plant nurseries and garden centers)

Distribution Tracking (Optional)

Distribution may be voluntarily tracked by volume and recipient type (e.g., municipal, agricultural, residential). Basic records should include:

- Date of distribution
- Estimated volume (cubic yards)
- Recipient type or general location
- Purpose (if known)

Equipment and Pad Maintenance

Maintaining the composting pad and operational equipment is essential for site functionality, safety, and environmental compliance. Corrective action should be taken as needed to maintain proper grading, minimize runoff, and support year-round access for equipment and pile management.

Pad Maintenance

The composting pad should be inspected weekly for signs of:

- Ponding water
- Erosion or surface damage
- Obstructed drainage

Equipment Oversight

Any repairs or maintenance should be documented by site staff using existing protocols already in place at the facility.

Leachate Management

Leachate refers to liquids that contact food waste or active/curing piles. Manage leachate within the composting area using controls appropriate to the site and state requirements.

Approach

- Conduct tipping, mixing, and turning on the contained pad with basic perimeter controls to keep liquids on the pad.
- Direct liquids to the site's established collection point and handle them through the landfill's existing leachate management practices, consistent with current authorizations.

Routine Practices

- Incorporate incoming organics in a timely way and apply a cover layer as needed.
- Maintain simple berms/caps and schedule activities to limit exposure to precipitation and wind.
- Keep clean stormwater routed away from active areas where practical.

Inspections and Maintenance

- During operating days, look for ponding, erosion, or off-pad flow and address issues when observed.
- After notable weather, confirm containment and the flow path to the collection point; touch up berms/caps as needed.

Recordkeeping and Coordination

- Make brief notes in the daily log on observations, actions taken, and coordination with landfill operations.
- Coordinate with staff on any transfers or follow-up actions.

Emergency Procedures

Site staff should be prepared to respond to unplanned events promptly to protect health, safety, and the environment. The following procedures outline initial actions for common emergency scenarios during composting operations.

Fire

- Call 911 or notify the Fire Department immediately in the event of visible flames, smoke, or smoldering conditions.
- Isolate the affected windrow by clearing space around the pile to prevent the fire from spreading.
- Suppress the fire using water, soil, or other materials as directed by emergency personnel.
- Do not turn or agitate smoking piles, as this can introduce oxygen and worsen combustion.

Spill or Release

- Contain the spill immediately using absorbent material, berms, or equipment to prevent runoff.
- Clean up the material following standard procedures.
- If hazardous material is suspected (e.g., chemical waste, petroleum products), stop work and report immediately to the appropriate supervisor or emergency response authority.

Odor Complaint

- Log all complaints using the Odor Complaint Log located in Attachment B – Recordkeeping.
- Investigate the source by inspecting windrows, recent feedstock deliveries, or storage areas.
- Adjust operations as needed, such as increasing cover material, rebalancing the carbon-to-nitrogen ratio, or turning piles to improve aeration.

Training and Orientation

Site staff and any personnel involved in composting activities should receive a basic orientation to support safe and consistent operations.

At minimum, staff should be familiar with:

- Composting fundamentals – including the role of carbon/nitrogen balance, moisture, and aeration.
- Load inspection – how to visually screen for contamination before material is added to windrows.
- Odor and vector control – understanding the importance of prompt covering and pile management.
- Emergency procedures – including who to contact and initial steps for fire, spills, or complaints.
- Use of monitoring tools – such as compost thermometers and moisture testing using the squeeze test.

Attachment A– Solvita Compost Maturity Test Guide

Solvita® Compost Maturity Test – Quick Guide

The Solvita Compost Maturity Test is a simple and effective method for determining whether compost is mature, stable, and ready for use.

How the Test Works

1. Place a sample of compost in the provided Solvita test jar.
2. Insert the CO_2 (carbon dioxide) and NH_3 (ammonia) gel paddles.
3. Seal the jar and allow it to sit at room temperature (68–77°F) for 4 to 24 hours.
4. Compare the paddle colors to the Solvita color chart or use a digital reader.
5. Determine the Solvita Maturity Index (1–8).

Solvita Maturity Index

1–3: Immature – compost is still decomposing, not suitable for use.
4–5: Moderately stable – use with caution, not ideal for seedlings.
6–7: Mature – suitable for landscaping and gardens.
8: Very stable – excellent for commercial and sensitive applications.

Why Use Solvita Maturity Test?

- Quick and inexpensive assessment of compost readiness
- Helps identify when compost is too raw or unstable
- Tracks performance of composting operations
- Accepted by many agencies as part of compost quality testing

Cost and Tools

- DIY test kits (6-pack): approx. $245
- Lab testing (with Solvita): $50–$100/sample
- Purchase at: https://solvita.com

Attachment B – Recordkeeping

DAILY

	Windrow ID	Date	Temperature (°F)	Odor Assessment	Comments
EX.	W-01	8/19/2025	142	mild	turned pile today; good moisture

WEEKLY

	Windrow ID	Date	Moisture (Squeeze Test)	Turned? (Y/N)	Turn Number	Pile Condition	Visual Observation	Comments
EX.	W-01	8/19/2025	50-55%	Y	1	Good	Steam visible when turning	Added bulking agent (wood chips)

MONTHLY

	Windrow ID	Date	Food Waste (CY)	Yard Waste (CY)	Carbon Sources (CY)	Estimated C:N Ratio	Sampling Event? (Y/N)	Sample Type (e.g., Solvita, C:N, EC)	Solvita Index (1–8)	C:N Lab Result	pH	EC (dS/m)	Comments
EX.	W-01	8/16/2025	3.5	6	2	28:1	Y	Solvita	2	NA	NA	NA	Compost is immature

FINISHED VOLUME

	Finish Date	Finished Volume (CY)	Volume Notes
EX.	8/19/2025	18	screened compost, good quality

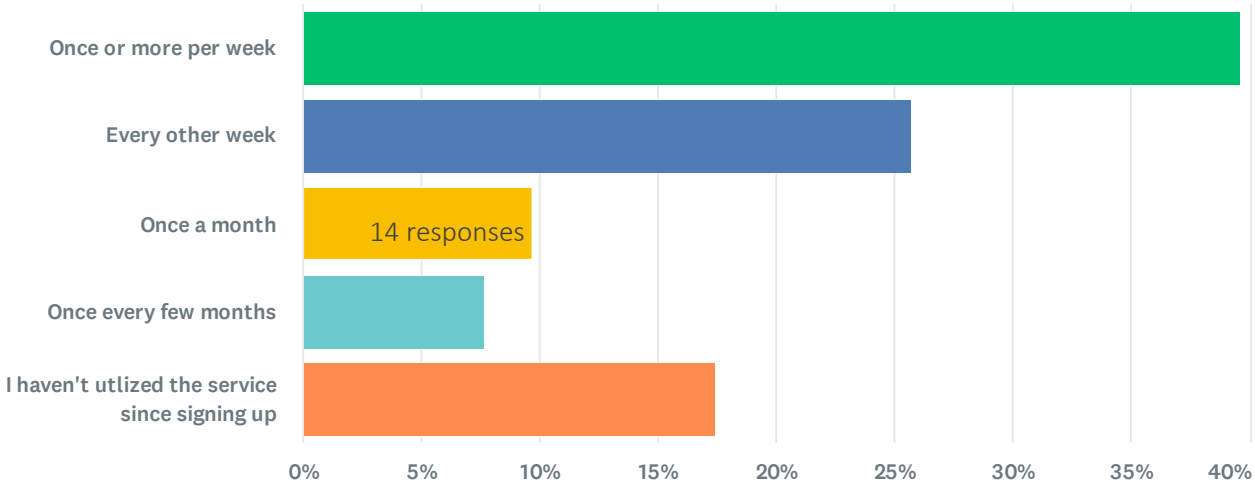
COMPLAINT LOG

	Date/Time Received	Method	Complainant Name/Contact	Odor Description	Duration/Frequency	Weather Conditions	Notes from Complainant	Who Investigated/Date	Site Conditions Observed/Action Taken	Follow-up Date	Resolution Status	Staff Notes
EX.	8/19/2025 15:15	phone	J. Smith 867-5103	rotton food odor	30 mins, intermittent	warm, light wind	concerns about smell	K. Johnson	piled turned, moisture adjusted	8/20/2025	resolved	complainant satisfied, no repeat

Appendix E – Food Waste Compost Pilot Program Survey Developed and Administered by the City of Brookings

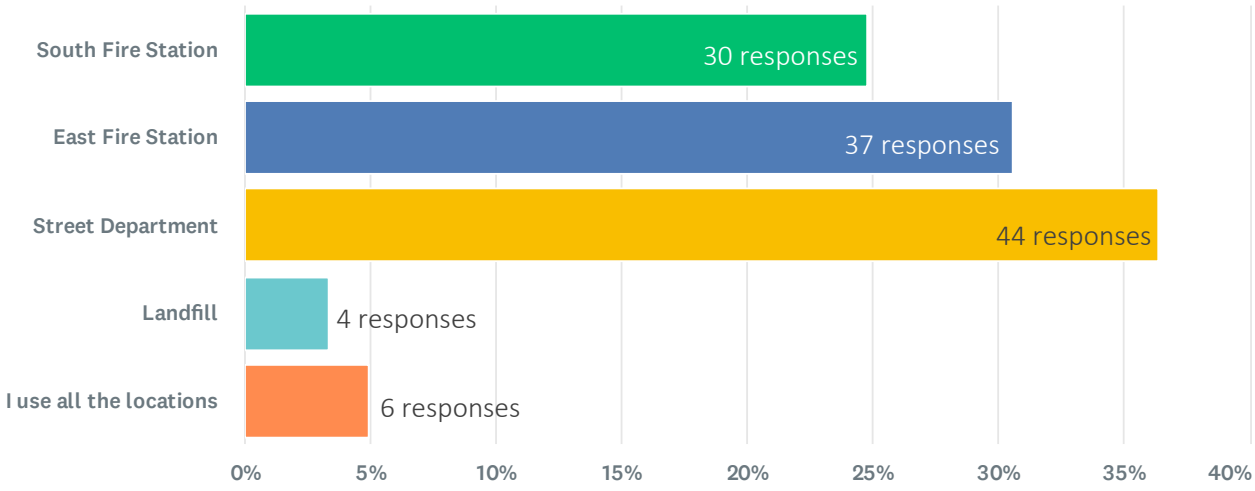
Q1 144 responses

On average, how often do you utilize the food waste drop-off locations:



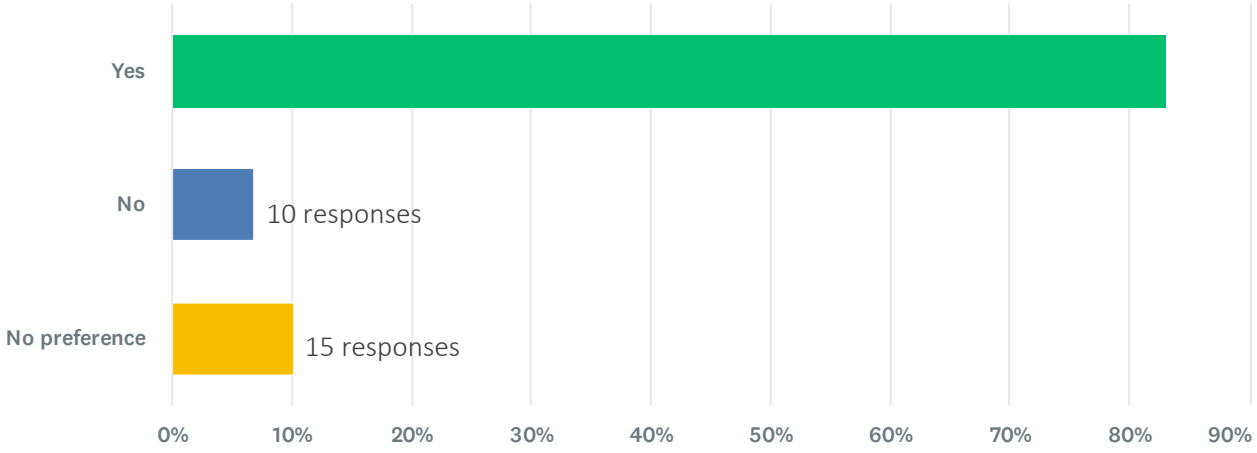
Q2 121 responses

Which drop-off location do you use most frequently?



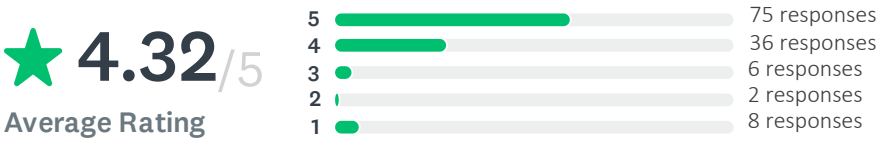
Q3 147 responses

Would you like to see the food waste compost program continue after the pilot ends?



Q4 127 responses

How satisfied are you with the pilot program?



Q5 We'd love to hear your feedback. What changes/improvements would you like to see for the program?

Answered: 103 Skipped: 44

#	RESPONSES	DATE
1	Better advertising for the program so more people hear about it and contribute.	4/27/2026 7:41 PM
2	Please continue!!	4/27/2026 12:00 PM
3	There may be good reason for the size of the pail you chose based upon feedback from other programs but I would like to have you consider using a larger receptacle for the food waste. We would actually put more food waste in the pail but it would fill up more quickly resulting in more trips to the drop off than I'd like. Maybe the answer is just another pail? I think this is a worthwhile project. Good work!	4/26/2026 8:08 PM
4	Maybe more drop off spots.	4/26/2026 7:48 PM
5	Stronger biodegradable bags to put refuse in. Would like a drop off site in SE Brookings. Thanks	4/25/2026 9:14 PM
6	Recycling bags disintegrate too fast with any moisture and make a big mess.	4/25/2026 5:35 PM
7	A couple of times the bag dispenser was empty. Perhaps that will improve as the compost program continues. Otherwise, well done	4/24/2026 10:16 PM
8	Bags rip all little to easy.	4/24/2026 9:02 PM

9	This has been going on only during winter months. Those things are going to attract so many flies, bugs, and bees during the summer! And not to even mention the smell of rotting food during the hot months.	4/24/2026 6:02 AM
10	This is an awesome idea for our community!	4/23/2026 8:41 PM
11	I love having the composting supported by the city! It is incredibly useful and helpful. As someone who lives alone composting just myself is harder but to have community composting allows me to live my values on multiple fronts. I also really appreciate that one of the drop-off points is within walking distance of my house. About every 10 days I go the two blocks to drop one bag off and get a fresh one. All that said, I have no specific improvements that I hope for other than keeping the program.	4/23/2026 7:45 PM
12	The bags tend to break easily. Not sure if there are stronger bags available. It would also be nice to have the cans marked at the fire station.	4/23/2026 5:07 PM
13	Smelly bins with rotting food around town, especially now that it's getting warmer. How many pests and rodents will this draw. I feel its a waste of resources.	4/23/2026 4:21 PM
14	This program is a waste of city time and resources.	4/23/2026 4:12 PM
15	Waste of time of and fuel	4/23/2026 4:11 PM
16	I really love this idea but I had a lot of trouble with implementing. The bags deteriorated so quickly that they leaked all over the bucket before the bag was full. I didn't foresee having to make trips to the drop-off location every other day. I started lining the bucket with a grocery store plastic bag which I would then throw away which sort of defeated the purpose. Also, the waste materials became smelly in some cases depending on what vegetable waste I had. It wasn't very fun to try to drop off a bag when the weather was bad this winter. One time I went and there were no new bags available. I tried this for a few months and then gave up when I didn't have any bags. I do like the idea. It would be great if the bags could last just a little longer before decomposing.	4/23/2026 2:53 PM
17	I love having the opportunity to compost through the city and really hope the program continues! I'm curious to know more information about the plastic bags. I have been using them but wonder what the cost factor is and how easily they break down into compost. I've wondered if there is enough negative impact that I should be going without the bag or if it is minimal and worth the value of the convenience they offer. I'd like to see some kind of incentive/encouragement for businesses to participate. Daily break room coffee grounds alone would add up let alone businesses that have food scraps. I'd like to see increased promotion and visibility for those who still aren't aware of the project. Perhaps having pop-up drop offs at convenient locations like the farmer's market to get people talking and asking about the program. Maybe publicize testimonials from participants to increase interest: a creative or decorative solution for how someone collects or stores their waste (doesn't have to be in a gray bucket), stories of how much households collect in a week (I'm a 1 person household and fill a bucket nearly weekly on mostly banana peels and coffee grounds). Thank you so much for the trial, the environmental advocacy, and the continued search for improvements!!	4/23/2026 1:47 PM
18	Looking into the future, if it were possible to work with SDSU to add compost-designated trash bins around campus, I think that a fair amount of students and faculty would use them. Also, providing larger compost bags would helpful.	4/22/2026 11:13 PM
19	We hope the program continues and we use it all the time. Didn't realize how much less garbage we have by composting and recycling	4/22/2026 4:14 PM
20	Seems like a good program if there is a good use for the compost and it saves landfill space.	4/22/2026 3:00 PM
21	Would like to see it curbside. With the type of items that are collected, why could it be combined with yard waste?	4/22/2026 9:28 AM
22	Would you consider pick up at some point? Great way to reduce food waste in landfill. Offer compost to residents.	4/22/2026 9:14 AM
23	I can't think of any big changes. We LOVE the opportunity to participate; it's been a real difference maker in our household waste. Maybe a rinse spigot at the drop-off locations?	4/21/2026 9:44 PM
24	We really are glad this program is here! We fill up two buckets a week and are glad to keep our scraps out of the landfill!	4/21/2026 8:08 PM

25	Is there a way to designate the resulting compost for gardens who worry about herbicides in the regular/grass clipping compost? Could additional drop sites be added?	4/21/2026 6:29 PM
26	There weren't always extra bags available.	4/21/2026 6:28 PM
27	PLEASE KEEP THIS PROGRAM GOING! It's so amazing to hear that it's been such a success so far. Love seeing the updates of tonnage collected on socials, too. I feel like next steps could be turning the compost into something usable for gardens (and the Food Forest!) in the community. If it could be promoted more to expand to commercial levels eventually, that would be so cool. It's a win, win, win all around. Thank you for piloting this, and please keep it up!	4/21/2026 2:08 PM
28	More drop offs would be nice.	4/21/2026 12:56 PM
29	A drop off at the corner of the big lot across from 3M entrance would be awesome. Great program 👍	4/21/2026 12:34 PM
30	Very satisfied with program. Amazed how fast it accumulates. Glad it is not going to the landfill.	4/21/2026 12:27 PM
31	Thank you SO much for offering this program!! I hope it will continue after the pilot concludes. It is very helpful for us since we live in an apartment building and do not have a place to compost. I would love to see the program expanded to include more restaurants/commercial food waste. It would also be amazing to add residential compost pick up to city waste services if possible, but if not, keeping the drop-off sites would be great. Perhaps consider adding a drop-off site on the southeast side of town. Another idea for improvement would be to have more outreach/educational events to help more people get involved in the compost program (at farmers markets, schools, SDSU, the library, churches, etc.). Thanks! Keep up the great work!	4/21/2026 11:12 AM
32	I do need to figure out a receptacle for summer, or I will have flies all over my garage. I just don’t get near a dropoff point more than once a week. I would like to see the program expand, because composting is an area where I can feel I’m making a difference. So much plastic is never recycled, but I know my contributions to the compost pile are being used. The bags you provide are gross. The instant food is in them, they turn slimy. I ordered my own compost bags off Amazon.	4/21/2026 10:47 AM
33	Very happy with this program. The only way it could improve was if you picked up at houses, like yard waste, but understand why we dont.	4/21/2026 10:14 AM
34	I don't use the program since I compost at home, but the people I know that use it are really happy about it and would like it to continue.	4/21/2026 9:51 AM
35	Curb side pick up would be very helpful	4/21/2026 9:04 AM
36	Had a problem with bag quality , not opening all the way, early on but it seems to be better now.	4/21/2026 8:44 AM
37	I just wish there were more drop off locations in town. I love the program!	4/21/2026 8:43 AM
38	The collection buckets and bags are so handy and it is easy to collect food and drop it off. I appreciate the effort to reduce food in the landfill and collecting it for compost. It is a great program and I would love to see it continued!	4/21/2026 8:29 AM
39	Future curb side pick up similar to the yard waste collection program	4/21/2026 8:11 AM
40	I would love curbside pickup!	4/21/2026 7:31 AM
41	Add a program that helps individuals start composting at home. Even just an education course: how-tos, dos and dont’s, etc.	4/21/2026 7:27 AM
42	I have made some modifications to how I use the bucket to make it a little less messy. I use a grocery plastic bag to hold the green compostable bag. I secure both of them with a rubber band around the rim of the bucket. This keeps the bucket cleaner and makes it easier to carry the compost to the drop-off location. I also put a little baking soda in the bottom of the bucket to help with odor. I usually wash the bucket after every one or two bags. I also like the pictorial instructions. I have wondered about avocado pits, though. I have enjoyed participating n this program and appreciate having it available.	4/21/2026 6:54 AM
43	I eventually stopped using the bags because they were very fragile and some spilling occured; instead I bring the whole container to dump it. So perhaps you could dispense with the bags.	4/21/2026 6:14 AM

44	Accepted vs not accepted too hard to separate most times	4/21/2026 6:14 AM
45	This program has been a great introduction into composting for our family. It takes some time to establish the new habit of putting items in the compost bucket rather than the trash, but this makes it so easy. We are composting more and more.	4/20/2026 10:09 PM
46	Expensive waist of time	4/20/2026 9:43 PM
47	Great program!	4/20/2026 9:09 PM
48	I didn't know about the program, and I'm curious to know how it actually works.The logistics of it	4/20/2026 9:01 PM
49	Those compostable bags are total crap. Maybe a paper liner would be more sturdy, and keep the bucket from getting slightly less nasty, but that's also kind of wasteful. Imo, the compostable bags are entirely useless though - and I bet they're not cheap. Curbside pickup? (Yeah right!)	4/20/2026 8:24 PM
50	Thank you, it’s a great program!	4/20/2026 8:20 PM
51	The only improvement would be having a bin at my house that is picked up by a truck - similar to trash, recycling, and yard waste. I love the program and have loved being able to get rid of food scraps without filling my trash bag. Thank you for giving this pilot program support!	4/20/2026 8:16 PM
52	We just haven’t ever used it.	4/20/2026 8:12 PM
53	I love the program and am happy to see it succeeding. Please continue	4/20/2026 6:59 PM
54	Great program! I hold my compost until I have three of the bio bags full in a 5 gallon bucket, then take them to the bin at the south fire station every couple of weeks. I certainly hope the program continues.	4/20/2026 6:49 PM
55	The dropoffs are not in a convenient location for me.	4/20/2026 6:45 PM
56	Maybe just bigger buckets for us to use at our homes, sometimes it fills so fast and I can't get to the drop off location quickly. Otherwise, thrilled to have this service	4/20/2026 6:40 PM
57	None really. Maybe a couple more drop-off locations around town, but otherwise, I think it's been great!	4/20/2026 6:39 PM
58	I wish there was an option to have it picked up with trash, recycling, or yard waste	4/20/2026 6:23 PM
59	Stronger bags for the buckets. They seem to break down quickly.	4/20/2026 6:18 PM
60	As it stands, I'm very satisfied. But suspect more drop off locations would stimulate participation. Hope the program continues past the pilot.	4/20/2026 5:50 PM
61	The bags seem unnecessary given they don't withstand liquids. Are they required? I would like to have additional drop off locations added, and eventually, curbside collection offered. Will the food compost be added to yard waste at the landfill, or kept separate? If it's kept separate, is it possible for residents to pick it up at the landfill? Thank you!	4/20/2026 5:29 PM
62	I’d love to see more drop off locations if possible. The bucket for our kitchen has made separating the items really easy, but then getting the bags to the drop off site before they start disintegrating has been harder for our family. Overall, I think this is a great program and I hope it continues to grow and thrive. Thanks for doing a great job everyone!!! We appreciate you!!!	4/20/2026 5:25 PM
63	I don’t feel it is necessary	4/20/2026 5:02 PM
64	It is easy to use and hopefully will help improve life of the landfill	4/20/2026 5:00 PM
65	Hand sanitizer at the drop-off locations please.	4/20/2026 4:58 PM
66	More pickup locations	4/20/2026 4:57 PM
67	My only real complaint is that the biodegradable bags start to biodegrade while still in use. I guess we know they're effective!	4/20/2026 4:56 PM
68	We are very supportive of this program. More people should take advantage of recycling.	4/20/2026 4:47 PM
69	I was so happy to hear about this program. The state I came from had a compost program (threw into our greens bin, but with the same restrictions as the Brookings program with	4/20/2026 4:43 PM

	respect to approved compostables). I currently have a fruit tree and come harvest time last year, I was happy to have a composting capability for all the cores. I also like having it for egg shells, banana peels, orange peels, and onion dried layer pieces. It makes me feel good to know it's staying out of the main dump site and being reused. There have been multiple times I've tried to use the street department site and had to go to a different site because the bin was overflowing. If keeping as a drop off site, I recommend more frequent pickups or multiple cans at that site. No issues like that at the other sites. I would love for this to become a bin that gets picked up on regular trash days. If going the way of bin pickup, I recommend having a bin (or multiple) at apartment complexes to keep more compost material out of the main dump. I'm sure people at apartment complexes would participate if it was made as easy as it is currently for putting their trash and recycling in the designated areas. Please continue the program.	
70	.faithful for 3 months and stopped. would do it again if containers bigger and bags did not decompose so quickly. did reduce a significant amount of trash in the weekly garbage	4/20/2026 4:41 PM
71	I use the bucket for my personal compost. I have a compost heap in my garden. I didn't realize how inconvenient it would be to take the compost to a centralized site.	4/20/2026 4:33 PM
72	I would like to have more drop off locations thru out town so that people can easily access to it (especially during the cold months). or people may participate more if we combine compost collection with yard waste collection. I did not use compositable plastic bags and bucket we had from the city much. I used my larger containers/bowl to collect vegetable scraps and brought it to the drop off sight. I would like to see the end product, finished compost people can use for their garden/yard out in public. (City building parking lot or drop off site that somewhere people can see and use. Landfill is great but people never see or go out there and never use the finished compost. It is the resource people does not use fully)	4/20/2026 4:32 PM
73	Different bags for the buckets. They don’t hold up well when full and don’t stay in buckets properly.	4/20/2026 4:30 PM
74	I think this is a great addition to the community. Composting is something I would have done before, but I don’t have the space to do it. I am glad to participate	4/20/2026 4:25 PM
75	Very happy with the program! Possibly a small shelf to set the bucket on to remove the bag?	4/20/2026 4:20 PM
76	Great program! Would be great to have more dropoff locations in neighborhoods. Driving smelly juicy compost across town is a bit nervewracking	4/20/2026 4:13 PM
77	Until this pilot program, I hadn’t realized how much produce we throw away. I’m glad to know that it gets to be reused in some capacity and stays out of a landfill. Please continue this useful service.	4/20/2026 4:10 PM
78	It has been great to have an option for getting rid of food waste in a greener way than the landfill. I am highly satisfied and would like to see the program continue!	4/20/2026 4:10 PM
79	I hadn’t heard any information about the program until now or would’ve been utilizing it! I consider myself “in the know” staying current on reading the Register and social media posts from the city and county, too!	4/20/2026 4:09 PM
80	I compost at home, but if more widely available, I would compost for the city, especially if I had access to the byproduct.	4/20/2026 4:07 PM
81	I would like to see another size of pail liner. A five gallon pail size.	4/20/2026 4:01 PM
82	More convenient drop of places.	4/20/2026 4:00 PM
83	I would like to see stronger bags. Most of the bags have broken before I get them returned.	4/20/2026 3:51 PM
84	I think you did a great job with the sheet that says what can and can’t be composted. The biggest problem I had was that the bucket I was given was nearly impossible to use. I was unable to get the cover on or off. I ended up just using an empty ice cream bucket. I’m curious if you see this going to a house pickup like my son has in Canada.	4/20/2026 3:35 PM
85	After finding out about the program, I do plan to contribute and utilize these services.	4/20/2026 3:25 PM
86	Easier drop off	4/20/2026 3:21 PM
87	Pleased with the program and concept to keep food waste out of the landfill. I didnt realize how much food waste our family of 2 had until participating in the compost program. I hope it continues and more participate.	4/20/2026 3:18 PM

88	Waste of money	4/20/2026 3:16 PM
89	I did not fully understand all the items that were acceptable. After now printing off the chart of items I am willing to give it a try.	4/20/2026 3:15 PM
90	I think you've made it very simple to do the composting. It would be great if this grew enough where a food cart could be picked up curbside.	4/20/2026 3:12 PM
91	biggest problem is that if you wait a week or so, the is moisture that than becomes water and the bags then leak. Initially bags were not available but has been better lately	4/20/2026 3:12 PM
92	Continue to offer the free compost bags, please.	4/20/2026 3:11 PM
93	Waste of resources	4/20/2026 3:09 PM
94	Heavier and ongoing promotion. I think i would have joined in before but forgot about it, and now need to look into it.	4/20/2026 3:09 PM
95	Never even heard about it	4/20/2026 3:08 PM
96	Thank you for offering this program. I hope it continues.	4/20/2026 3:08 PM
97	Wish the bags lasted a little longer. They only lasted us about 3 days and then would disintegrate on the bottom. We did notice that our garbage was greatly reduced in size and we rarely used the garbage grinder. That used to be daily, with a lot of water use to send it into the sewer system. We would like to see the program continue.	4/20/2026 2:12 PM
98	Bags decompose so quickly.	4/20/2026 1:19 PM
99	We think it's a big step in the right direction. Like the idea of composting and recycling much better than burying and converting to methane	4/20/2026 12:44 PM
100	I love the program! It would only be better if collection was at our home.	4/20/2026 12:36 PM
101	definitely need to continue the program. Expand it to include restaurant/fast food businesses	4/20/2026 11:05 AM
102	The bags sometimes dont open, they get fused together. Really have to work to get the bag stretched over the Lil of the pail. I think it's a great program.	4/20/2026 10:36 AM
103	Enjoy being able help. Program seems to be working!	4/20/2026 10:36 AM

For question 5 What changes/improvements would you like to see:

- 48 (46.6%) of comments expressed support for the program and wanted to see it continue.
- 28 (27.2%) of comments were about the bag quality. Most of these comments were about:
    - Needing stronger bags/bags disintegrate too fast and make a mess and/or rip too easily
    - Bags not always opening all the way
    - Wanting larger bags
    - Wanting paper liners instead
    - Wanting to see free compost bags continue
    - Bags not always being available at the drop-off locations
- 19 (18.5%) of comments expressed a desire for more drop-off locations and some expressed that the drop-off locations were not convenient for them. Specific locations expressed included:
    - Pop-up drop-offs at convenient locations like the farmers market to get more interest
    - A drop-off at the corner of the big lot across from 3M entrance
    - A drop-off on the southeast side of town
    - Additional pickup times or another bin at the Street Department as that one has many times been overfull and had to go to other sites
    - More drop-off locations in neighborhoods
    - Drop-off location at SDSU
- 15 (14.6%) of comments expressed a desire to see the program move to curbside collection in the future. A couple of these comments included confusion over why food waste couldn't be placed in the brown yard waste bins and whether the compost pile was the same as the yard waste compost.
- 13 (12.6%) of comments expressed a need and/or desire for increased promotion, outreach or education. Comments included that the participant:
    - Found the pictorial instructions on the bucket and sheet helpful (but wondered specifically about avocado pits)
    - Didn't hear about the program until the survey or forgot about the program
    - Like the updates on social media
    - Wants to see testimonials/stories from households
    - Wants to see education at the Farmers market
    - Wants to see home composting education
- 7 (6.8%) of comments expressed that the program was a waste of time/resources.
- 6 (5.8%) of comments expressed a desire to see the compost made available for residents.
- 5 (5.8%) of comments were about the buckets, with most expressing a desire for larger buckets. One response expressed concern for the bucket lid and bucket being difficult to use.
- 4 (3.9%) of comments expressed a desire to see the program expanded for businesses
- Other notable comments for changes/improvements included:
    - Having the cans marked at the fire station
    - Having a rinse spigot at drop-off locations
    - Having hand sanitizer available at drop-off locations
    - Having a small shelf available to set the bucket on to remove the bag at the drop-off location
    - Making it easily available for apartment complexes
    - Finding the drop-off locations inconvenient and would rather do home composting

Appendix F – DANR Food Waste Composting Permit Requirements

1.0 GENERAL REQUIREMENTS

1.01 Operator Representations Incorporated

This permit incorporates by reference all representations made by the operator regarding plans, controls, designs, operations, and environmental impacts contained in the permit application dated XXXXXX and in supplemental documents.

1.02 DANR Limitation of Liability

This permit and all rights under it are expressly conditioned on the truth and accuracy of the representations made by the operator in the application and documents cited above. The Department of Agriculture and Natural Resources - Waste Management Program (DANR-WMP) assumes no liability for the accuracy and truth of such representations made by the operator.

1.03 Duty to Comply

The operator shall construct, operate, and maintain this facility in accordance with South Dakota Codified Laws and the Administrative Rules of South Dakota: SDCL 34A-6 and ARSD 74:27. If the provisions of the laws, rules, or any conditions of this permit are violated, DANR-WMP may take action to suspend or revoke this permit as provided for by SDCL 34A-6-1.21; may assess a civil penalty pursuant to SDCL 34A-6-1.4 and 34A-6-1.31; or issue a notice of violation with penalties pursuant to SDCL 34A-6-1.22.

1.04 Related Laws, Regulations and Permits

No provision of this permit exempts the operator from the requirements of any local, state, or federal laws, regulations, or rules in existence or promulgated after this permit becomes effective. It is the responsibility of the operator to obtain any other required permits and licenses.

1.05 Procedure for Requesting Amendments

The operator must contact DANR-WMP to request a permit amendment prior to any significant deviation in the design or operation of the facility, and before any expansion beyond the permitted site boundaries. This permit may be reopened and amended, following proper administrative procedures, to include the appropriate requirements of ARSD 74:27, SDCL 34A-6, and promulgated federal or state laws, rules, or regulations. Any permit modification shall be in compliance with ARSD 74:27, SDCL 34A-6, and applicable federal regulations.

1.06 Administrative Changes Authorized

DANR-WMP reserves the right to incorporate administrative changes and/or modifications to this permit at any time. When an administrative change is made to this permit, DANR-WMP shall notify the operator, in writing, within 10 business days of instituting the change. Administrative changes are authorized for the purposes of changing or correcting:

(a) typographical errors;
(b) regulatory references;
(c) titles of organizations or regulatory agencies; or
(d) items which do not substantially change the requirements of this permit.

1.07 Severability

The provisions of this permit are severable. If any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the

application of such provisions to other circumstances and the remainder of this permit shall not be affected thereby.

1.08 Duty to Provide Access

The operator shall allow DANR-WMP unrestricted entry during regular business hours for site inspections, waste sampling, and reviewing facility records.

1.09 Duty to Provide Information

The operator shall furnish to DANR-WMP, within 10 business days, any information which DANR-WMP may request to determine compliance with this permit.

1.10 Variances Approved

DANR-WMP specifically recognizes and approves the variances listed in Attachment A of this permit, based on the reasons and documentation stated therein.

2.0 DESIGN AND CONSTRUCTION REQUIREMENTS

2.01 Access Control

The operator shall maintain access controls at the site. These shall include a fence around the entire facility, locked gate(s), and sign(s) stating the operator's name and phone number, hours of operation, acceptable waste types, and directions for disposal.

2.02 Composting Pad

A composting pad must be constructed for the storage of all raw food waste materials and composting operations. The composting pad shall be constructed of compacted earthen material with a thickness no less than two feet with a permeability of 1×10^{-7} cm/s to minimize runoff and leachate. In lieu of a compacted earthen liner, composting pads may also be constructed of concrete or asphalt materials. The DANR-WMP requires that a detailed construction plan including construction quality assurance testing be submitted to this office prior to construction of any composting pad.

2.03 Acreage Limitation

The operator shall not exceed the XXXX acre total operational area identified in the permit application.

2.04 Storm Water Control

The operator shall construct and maintain soil berms or containment structures around food waste composting pads and storage areas. The berms or containment structures should be designed to divert run-on and contain runoff from a 25-year, 24-hour storm event (4.7 inches). The berms shall be adequately compacted.

A construction stormwater permit from the South Dakota Department of Agriculture and Natural Resources - Water Quality Program (DANR-WQP) must be acquired if more than an acre of land will be disturbed in the construction of composting pads, storage pads and other composting related activities. The operator will also need to obtain an Industrial Storm Water from the DANR-WQP prior to composting activities starting. The contact phone number for the DANR-WQP is (605) 773-3351. Additional information can also be found at:
https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/stormwater/StormWaterConstruction.aspx.

3.0 OPERATIONAL REQUIREMENTS

3.01 Emergency Requirements

The operator shall notify DANR-WMP, within one business day, of any emergency situation at the facility. For the purposes of this section, an emergency is defined as any unplanned event that could be a threat to personnel, the general public, or the environment.

3.02 Authorized and Unauthorized Wastes

The operator may accept the following yard waste materials for composting: small animal or fish carcasses, food preparation wastes, leftover foods, expired foods, meats, vegetables, and dairy products from residential homes, restaurants, schools, and other establishments. Leaves, branches and woodchips may be incorporated into the compost. Food waste may not be open burned.

All other types of waste materials (garbage, construction debris, furniture, waste tires, scrap metal, appliances, etc.) are considered unauthorized waste and may not be accepted at the facility. Unauthorized wastes must promptly be removed from the facility and be disposed at a facility permitted to accept the waste material or taken to an approved recycling facility.

3.03 Routine Inspections Required

The operator shall inspect the facility at least weekly to evaluate permit compliance and to prevent and/or detect the acceptance of unauthorized wastes. The site inspections shall be documented as required by Section 4.01(c) of this permit.

3.04 Vector Control

The operator shall prevent or control on-site populations of disease vectors (rats, rodents, mosquitoes, etc.) by using techniques appropriate for the protection of public health and for preventing degradation of the environment.

3.05 Food Waste Composting Requirements

The operator shall place food waste to be composted in piles or windrows on a compacted earthen pad or on an equivalent impermeable pad as stated in condition 2.02. The piles or windrows of food waste shall be turned as needed to provide the material sufficient air for composting and to prevent the generation of an unpleasant odor. Moisture levels in food waste piles or windrows shall be maintained to promote biological decomposition. Precipitation that collects within the bermed area may be used to maintain moisture levels.

Reminder: Permit condition 2.04 requires the operator to divert storm water run-on around the composting pad and contain runoff from the composting pad.

3.06 Food Waste Handling and Storage

The operator shall only store food and animal waste on the composting pads. Food and animal waste must be incorporated into the piles or windrows as soon as physically possible but at least every four (4) operational days. Leak resistant and covered containers may be used for storage of raw compost materials.

3.07 Leachate Management

For the purposes of this permit, leachate is defined as any water or fluid that comes into contact with food waste or is generated from the food waste composting process. Leachate shall not be allowed to leave the compost pad under any circumstances. If leachate is collected, it must be stored and disposed of in a manner that is approved by the DANR-WMP. Food waste leachate may be used as a moisture additive to the composting process. Records of leachate collection or disposal and testing are subject to the recordkeeping and reporting requirements in Section 4.01 of this permit.

3.08 Food Waste Compost Testing

The operator shall perform tests to monitor the maturation of the compost. The temperature of the material shall be tested to ensure that an internal temperature between 130 and 160 degrees Fahrenheit is maintained for at least three consecutive days. It is recommended that mature compost material is tested to ensure that a carbon: nitrogen (C:N) ratio between 25:1 and 30:1 is achieved.

3.09 Compost Registration

The operator must ensure that any mature compost product that is not beneficially used within the permitted boundary of the site is registered with the South Dakota Department of Agriculture and Natural Resources – Inspection, Compliance and Remediation Program (DANR-ICR) as a soil amendment or fertilizer and that all the related rules are followed. The contact phone number for the DANR-ICR program is (605) 773-4432. Additional information can also be found at: https://danr.sd.gov/Agriculture/Inspection/FertilizerSoilAmendments/default.aspx.

4.0 RECORDKEEPING AND REPORTING REQUIREMENTS

4.01 Required Records

The operator shall maintain all records required by this permit and shall make records available to DANR-WMP as stated in ARSD 74:27:13:22. At a minimum, the records shall include:

(a) the amounts, sources, types, and dates for the compost material received;
(b) documentation of any unauthorized waste found on-site and the steps taken in response;
(c) documentation of the weekly site inspections;
(d) copies of the current solid waste permit, permit application, and any other permits required by state, local, or federal laws, rules, and regulations;
(e) records of any emergency conditions at the facility;
(f) records of leachate disposal;
(g) documentation of complaints received and responses to complaints; and
(h) documentation identifying the quantity and destination of all material removed from the site (tires, white goods/metals, compost, municipal solid waste, leachate, etc.).

4.02 Maintenance of Records

The operator shall maintain all required records for a period of three years from the date the records were generated.

5.0 CLOSURE REQUIREMENTS

5.01 Closure Notification

The operator shall notify DANR-WMP of the intent to close any portion of the site at least 90 days prior to closure.

5.02 Startup of Closure Activities

The operator shall begin closure activities for all waste disposal areas of the facility within 30 days of receipt of the last load of waste.

5.03 Removal of Stored Wastes

The operator shall remove all compost and other remaining compost materials prior to closing the site.

5.04 Final Closure Requirements

The final cover and closure activities for the site shall meet the requirements of ARSD 74:27:15:03 and include:

(b) incorporating contours of the food waste composting area into the contours of the surrounding area;
(c) grading to prevent ponding of water; and
(d) seeding and revegetating the food waste area in consultation with the County Extension Agent or local Natural Resources Conservation Service representative.

5.05 Completion of Final Closure

The operator shall complete closure activities for all waste disposal areas within 180 days of receipt of the last load of waste.

5.06 Certification of Closure

Upon completion of closure of the food composting facility, the owner or operator shall provide the DANR-WMP with a certification confirming that the provisions of the closure plan (if applicable) have been carried out, and the facility has been closed in accordance with this permit and the applicable performance standards of ARSD 74:27:15.

5.07 Notation on Deed Required

The operator shall record a notation on the deed to the property or on some other instrument that is normally examined during a title search. The notation shall state that the land has been used as a solid waste facility.

6.0 FINANCIAL ASSURANCE

6.01 Financial Assurance Requirement

DANR-WMP will not require financial assurance for the permitted facility as long as the operator complies with the environmental laws and rules of the state and the conditions of this permit.


BURNS
McDONNELL