SCS ENGINEERS

June 25 2024

# SCRRRA Compost Facility Development

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# Compost | Steps in Development

Overview

- Pilot test
- Siting
- Design considerations and approach
- Financial Pro-forma
- Planning and Zoning Approval
- State Permitting

# Goals/Requirements for Compost Facilities

## Resulting Product

- Produce high-quality, consistent compost
- Comply with regulations
  - Odors, air emissions
  - Contact water, stormwater
- Need to be cost-competitive

# Composting Process

Aerobic decomposition of organic materials under controlled conditions.

- Proper feedstock mix
- Moisture
- Oxygen
- Temperature

Rutgers (1985): "Composting is a robust process; resistant to outright process failure."

# Selecting the Technology

## Technology

- Turned Windrow
- Aerated Static Pile (ASP)
- In-vessel/ In-building
- Trend to hybrid systems
  - ASP followed by turned windrow
  - ASP: process and odor control
  - Windrow: cost efficiency

# Creating the Right Conditions

## Recipe

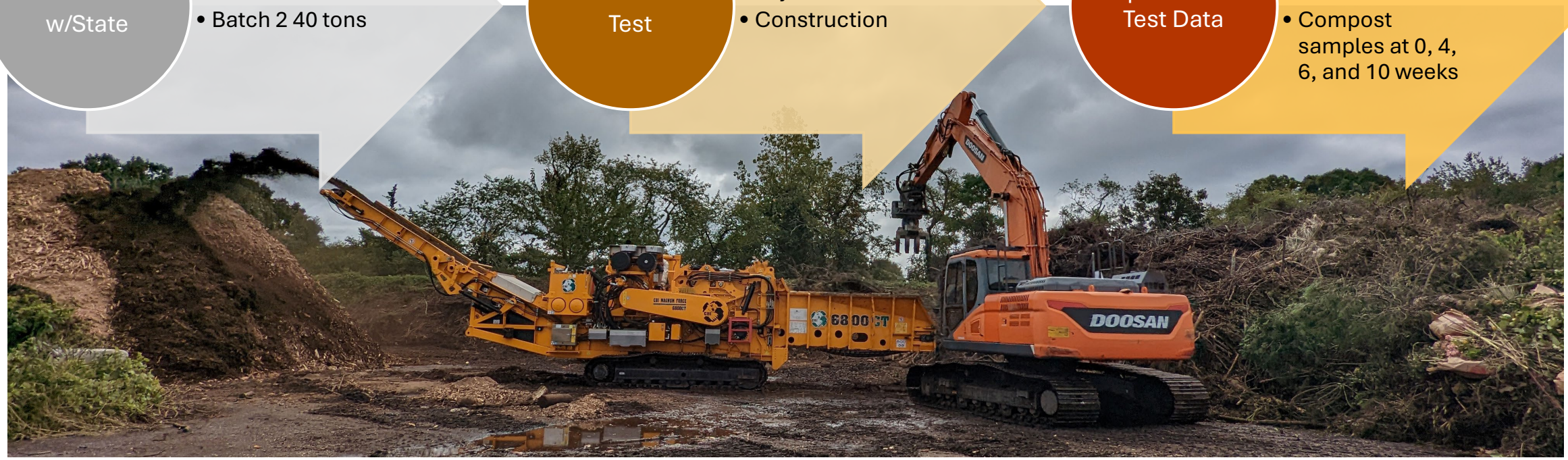
- Proper feedstock mix
  - C:N ratio: 25:1 – 40:1
  - Bulk density: 700 – 1000 lb/cy
- Moisture: 50-60%
- Oxygen: >10%
- Temperature: 130 – 140 F
- Forced aeration
  - Heat removal via vaporization of water
  - Supply oxygen
  - Caution: moisture depletion

# Pilot: Program and Test

**Coordination w/State**
- Batch 1 30 tons
- Batch 2 40 tons

**Facility Test**
- Layout
- Construction

**Operation & Test Data**
- Near-continuous temperature readings
- Compost samples at 0, 4, 6, and 10 weeks



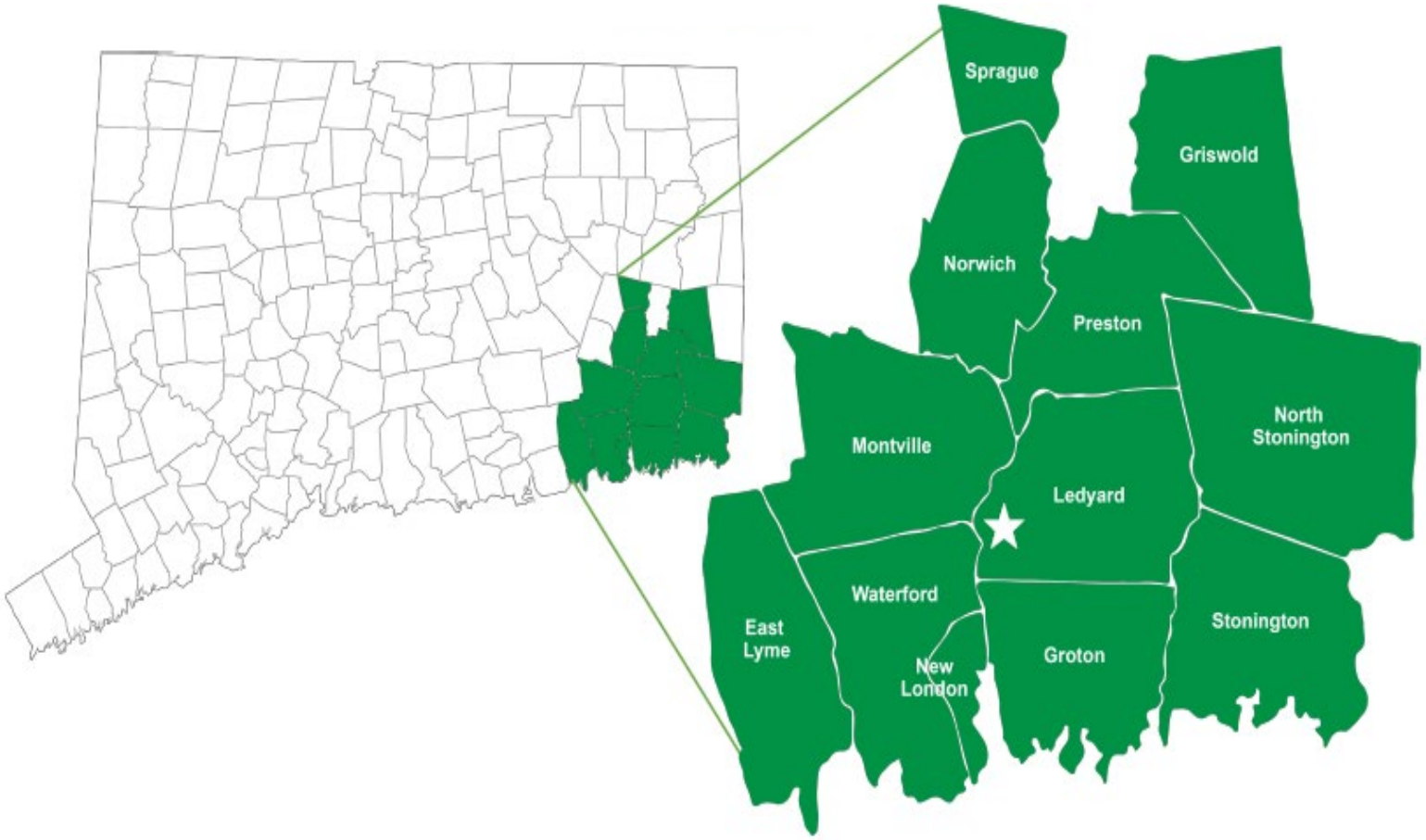
# Pilot: STA Certified Lab Test Results

Test Data

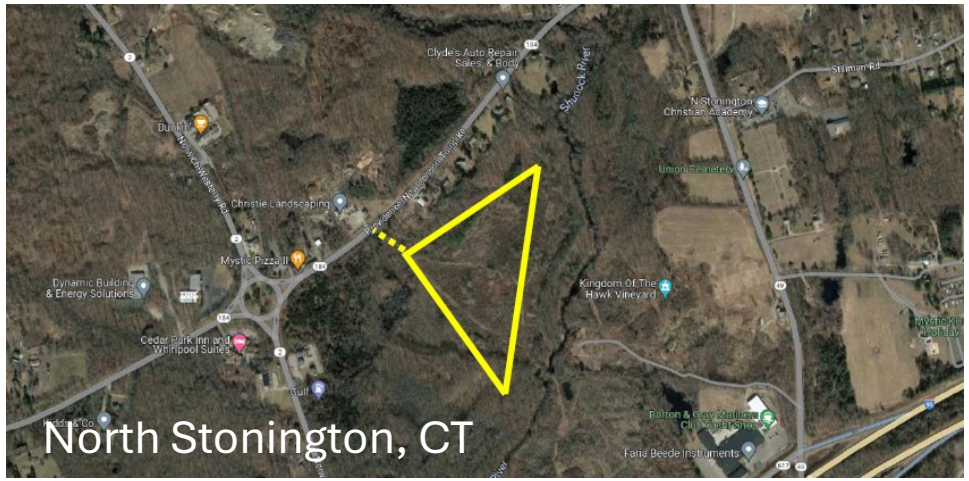
USCC Seal of Testing Assurance (STA) Program

- Stable, well-cured, finished compost with no odors or plant toxicity.
- Mature product that can be marketed as a bagged product, increasing its value.
- Safe regarding pathogens.
- Low heavy metals detected.
- Good source of nutrients and organic matter.
- Low salinity.

# Siting: Hard to Find and Secure



# Siting: Considerations



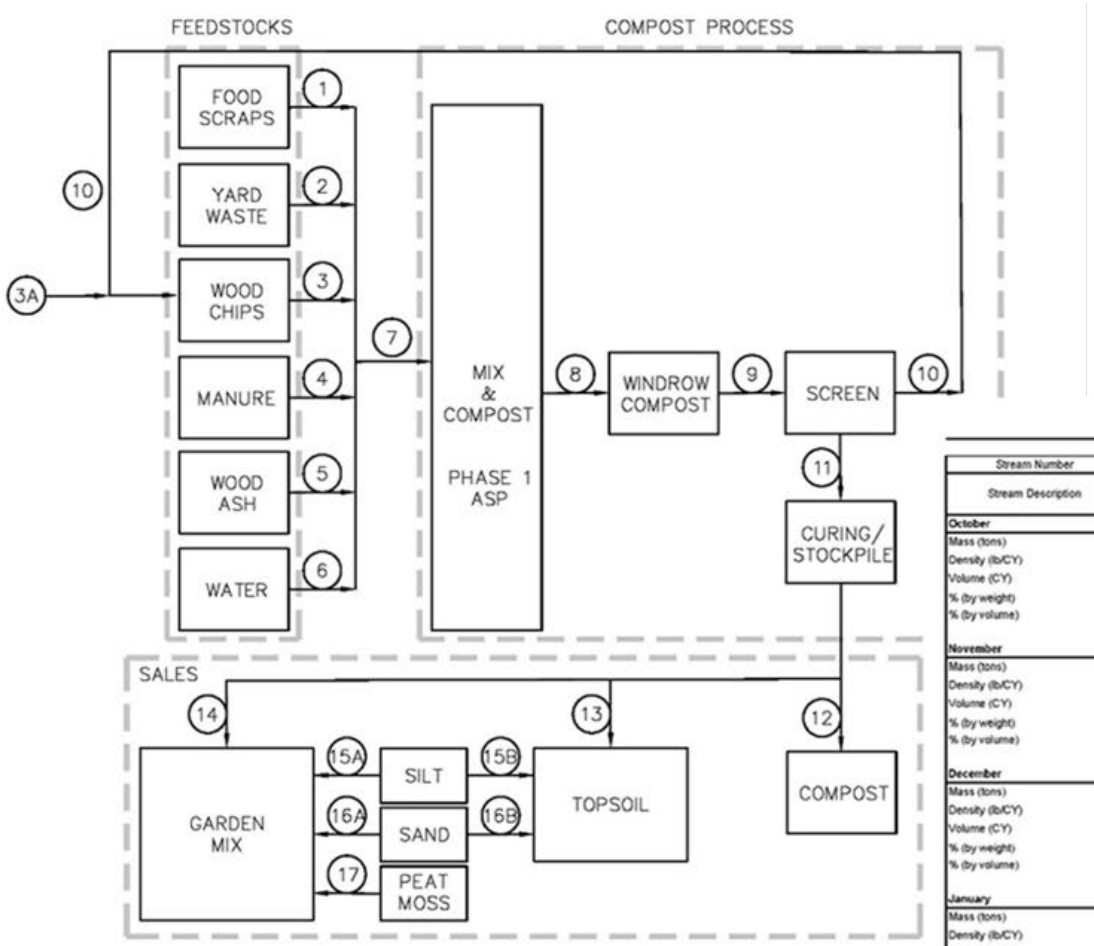
- Location within region
- Access to state highways
- Proximity to neighbors
- Sufficient size
- Topography / environmental impacts
- Environmental justice zones

# Siting: Final Site Preston, CT

# Design: Engineering

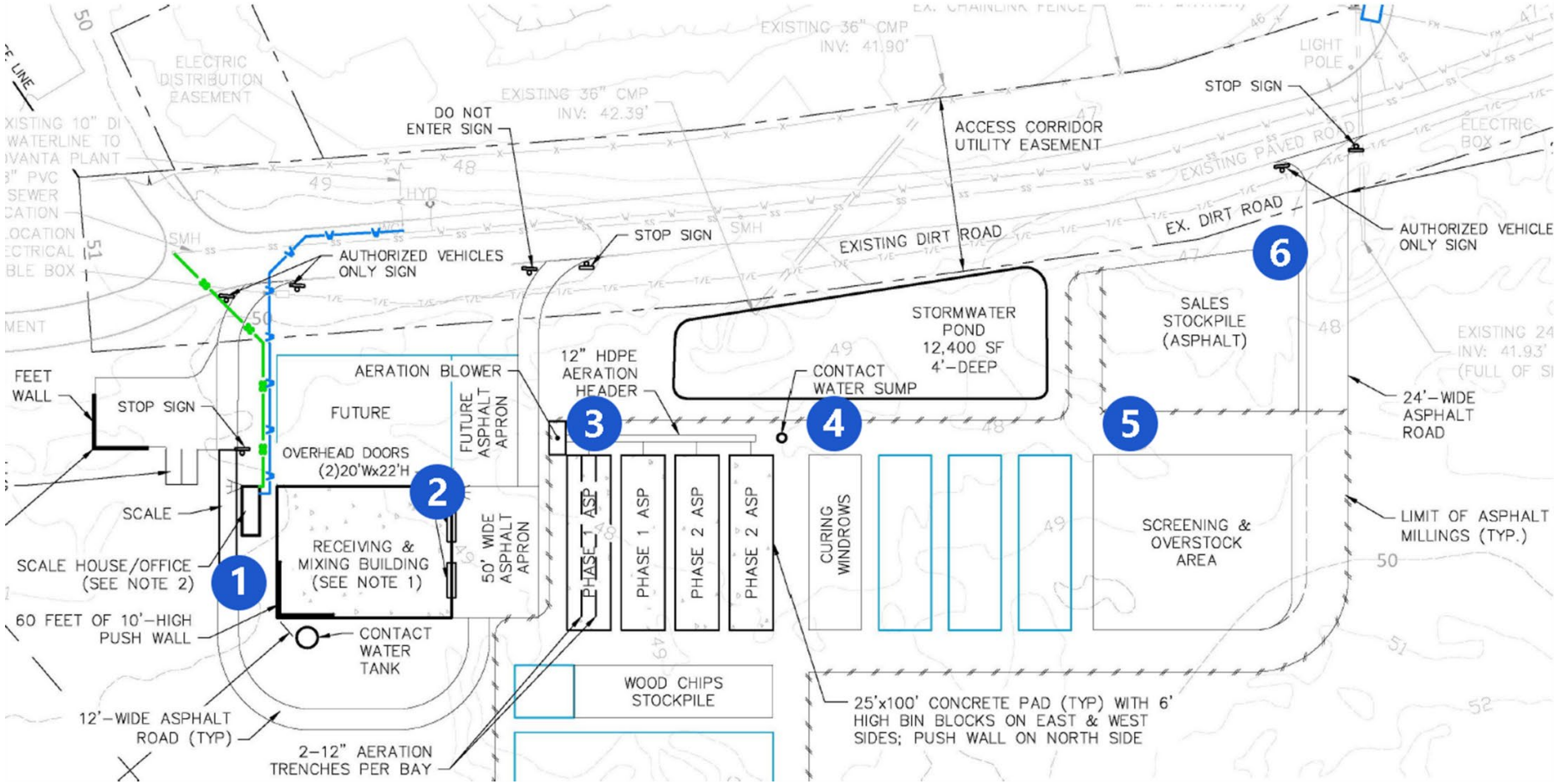
- Mass and volume balance
- Site layout for full and initial development
- Equipment selection
  - Aeration system sizing
  - Water management; pump/tank/pond sizing

# Design: Process Flow and Volume Balance




| | Feedstocks | | | | | | | Compost Process | | | | Sales | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Stream Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Stream Description | Food Scraps | Yard Waste to ASP | Wood Chips to ASP | Manure | Wood Ash | Water | Total Input to ASP | Windrows | Screen | Wood Chip Recycle | Curing | Compost | Topsoil | Garden Mix |
| **October** | | | | | | | | | | | | | | |
| Mass (tons) | 433 | 658 | 224 | 104 | 17 | 237 | 1493 | | | 41 | | | | |
| Density (lb/CY) | 1400 | 550 | 550 | 750 | 250 | 1685 | 843 | | | 550 | | | | |
| Volume (CY) | 647 | 1665 | 814 | 277 | 139 | 281 | 3542 | 2,657 | 1,993 | 150 | 1,843 | 373 | 174 | 202 |
| % (by weight) | 30% | 31% | 15% | 7% | 1% | 16% | 100% | | | | | | | |
| % (by volume) | 18% | 47% | 23% | 8% | 4% | 8% | 100% | | | | | | | |
| **November** | | | | | | | | | | | | | | |
| Mass (tons) | 388 | 392 | 198 | 89 | 15 | 204 | 1287 | | | 41 | | | | |
| Density (lb/CY) | 1400 | 550 | 550 | 750 | 250 | 1685 | 842 | | | 550 | | | | |
| Volume (CY) | 555 | 1426 | 721 | 238 | 119 | 242 | 3059 | 2,294 | 1,720 | 150 | 1,571 | 93 | 43 | 51 |
| % (by weight) | 30% | 30% | 15% | 7% | 1% | 16% | 100% | | | | | | | |
| % (by volume) | 18% | 47% | 24% | 8% | 4% | 8% | 100% | | | | | | | |
| **December** | | | | | | | | | | | | | | |
| Mass (tons) | 376 | 380 | 193 | 86 | 14 | 198 | 1248 | | | 41 | | | | |
| Density (lb/CY) | 1400 | 550 | 550 | 750 | 250 | 1685 | 841 | | | 550 | | | | |
| Volume (CY) | 537 | 1381 | 704 | 230 | 115 | 235 | 2966 | 2,225 | 1,668 | 150 | 1,519 | 47 | 22 | 25 |
| % (by weight) | 30% | 30% | 16% | 7% | 1% | 16% | 100% | | | | | | | |
| % (by volume) | 18% | 47% | 24% | 8% | 4% | 8% | 100% | | | | | | | |
| **January** | | | | | | | | | | | | | | |
| Mass (tons) | 366 | 369 | 189 | 84 | 14 | 193 | 1215 | | | 41 | | | | |
| Density (lb/CY) | 1400 | 550 | 550 | 750 | 250 | 1685 | 841 | | | 550 | | | | |
| Volume (CY) | 522 | 1341 | 689 | 224 | 112 | 229 | 2891 | 2,168 | 1,626 | 150 | 1,476 | 0 | 0 | 0 |
| % (by weight) | 30% | 30% | 15% | 7% | 1% | 16% | 100% | | | | | | | |
| % (by volume) | 18% | 46% | 24% | 8% | 4% | 8% | 100% | | | | | | | |
| **February** | | | | | | | | | | | | | | |
| Mass (tons) | 386 | 390 | 197 | 89 | 15 | 203 | 1279 | | | 41 | | | | |
| Density (lb/CY) | 1400 | 550 | 550 | 750 | 250 | 1685 | 841 | | | 550 | | | | |
| Volume (CY) | 551 | 1416 | 718 | 236 | 118 | 241 | 3039 | 2,279 | 1,709 | 150 | 1,560 | 47 | 22 | 25 |
| % (by weight) | 30% | 30% | 15% | 7% | 1% | 16% | 100% | | | | | | | |
| % (by volume) | 18% | 47% | 24% | 8% | 4% | 8% | 100% | | | | | | | |

# Design: Southeastern Connecticut Regional Resources Recovery Authority




1. Scale
2. Receiving building
   - Mix food scraps with ground wood
3. ASP
   - Phases 1 and 2
   - Two weeks each
4. Open windrows
5. Screening
6. Stockpile

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# SCRRA: Financial Pro-Forma

| Conceptual process design | Capital and operating costs | Revenues | Scenario modeling |
|---|---|---|---|
| • 2500 tpy food initial, 10% annual growth | • Site, facility, equipment<br>• Labor, utilities, maintenance | • Tipping fee for food only<br>• Compost sales | • 6 cases |

# SCRRA: Funding Sources

| Complete | Complete | Pending | Potential |
| --- | --- | --- | --- |
| USDA grant; Composting and Food Waste Reduction | SCRRRA reserve funds | EPA grant potential | CT Department of Energy & Environmental Protection (DEEP) grant potential |

# SCRRA: Town of Preston Planning and Zoning

**June 2023**

Initial meeting with the Town

**November 2023**

Initial application

**January 2024**

Response to comments: mainly site development questions such as noise, odor, dust

**January 25, 2024**

Board meeting and approval

# SCRRA: CT DEEP Permitting

**February 2024**

Pre-application meeting

**May 2024**

Solid waste application; VRP

- Forms
- Drawings
- O&M plan

**June 2024**

Stormwater registration

- General Permit
- SWPPP

Stormwater pond registration – post-construction approval

# Resources: Check CTDEEP website for More

## Helpful Links

USCC: The US Composting Council

CREF: Compost Research and Education Foundation

Organics Management

Federal Funding Opportunities
- EPA Grants
- Grants.gov
- Other Federal Agency Grants
- Other Relevant Grants


# Thank you!

SCRRRA Executive Director **David Aldridge**, and
**Greg McCarron**, PE,  Certified Compost Professional