Report to the Vermont Legislature:

SOLID WASTE INFRASTRUCTURE ADVISORY COMMITTEE

February 4, 2015

Prepared by:

Solid Waste Infrastructure Advisory Committee pursuant to Section 7 of Act 175 of 2014
with assistance from the
Solid Waste Management Program
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I. Executive Summary

Through Act 175 (S.208 of 2014) the Vermont General Assembly charged the Solid Waste Infrastructure Advisory Committee (SWIAC) with evaluating the sufficiency of existing solid waste infrastructure to successfully manage and process additional volumes of recyclables and organics (food scraps, leaf and yard debris) generated as a result of Vermont's Universal Recycling law (Act 148 of 2012), which when fully implemented would achieve a 50% diversion rate (recycling and organics management).

The numbered sections below directly correspond to the requirements of SWIAC under Act 175. After each section is a brief narrative summarizing the discussion and response or recommendations of the Committee.

1. **Sufficiency of Existing Infrastructure:** Act 175 required that SWIAC review the *Systems Analysis of the Impact of Act 148 on Solid Waste Management in Vermont*, (prepared for the State in October 2013 by DSM Environmental, the Tellus Institute, and Robert Spencer) to determine whether existing solid waste management facilities operating in the State provide sufficient services to comply with Universal Recycling requirements for facilities, and can meet any demand for services.

   Recycling: SWIAC members agree that recycling processing capacity is sufficient at the two single stream materials recovery facilities (MRFs) in Williston and Rutland to meet the projected demand. However, these MRFs are a significant distance from certain areas of the state, such as the Northeast Kingdom, which increases the cost to collect and transport recyclables from these areas.

   Organics: Vermont's composters, on-farm digesters, farm animal feed operations, and food rescue operations have the potential capacity to meet the projected organics demand as Universal Recycling is implemented. However, facility expansions, upgrades and/or pre-processing infrastructure are likely needed at many composting and/or on-farm digesters to ensure that this capacity is readily available.

2. **Infrastructure Needs and Gaps:** Act 175 required that SWIAC summarize the locations or service sectors where the State lacks sufficient infrastructure or resources to comply with the requirements of and demand generated by Universal Recycling, including the infrastructure necessary in each location.

   Recycling: The majority of Vermont is served by single stream recycling collection services, including places such as commercial transfer stations where haulers can bring these materials (see Appendix C, Maps 1-A and 1-B). However, some regions of the state, such as the Upper Valley/Springfield regions, have limited single stream recycling transfer stations available to haulers increasing costs for collecting recyclables. The Northeast Kingdom stands out as an area that does not have a commercial transfer station for single stream recycling or even dual stream recycling. SWIAC does not recommend mandating single stream recycling collection, but instead recommends that solid waste management entities be allowed flexibility to choose the system best suited to them. For example, some SWIAC members identified a need for recycling collection containers (wheeled carts and dumpsters) for waste generators in certain areas of the state, while others have already made those investments.

   SWIAC members recommend the State adopt purchasing policies that can improve local markets for tough to recycle materials, such as glass.

   Organics: Composting and anaerobic digesters can be complimentary treatment options for organics. Maps of existing composting facilities show "gaps" in organics processing capacity in the Rutland region and the Upper Valley/Springfield regions. However, composters in Bennington and Brattleboro suggest that they can access these areas via the Route 7 and I-91 corridors. Additionally, a recent pilot project is being launched in the Rutland area to begin collecting and processing food scraps to be fed to an on-farm anaerobic digester. Consequently, specific organics collection infrastructure gap areas were not identified. Organics processing infrastructure needs were identified, and are outlined below.

- Improve markets for compost products through state purchasing policies.
- Source carbon feedstocks for composters such as through state requirements in brush/tree clearing and chipping contracts.
- Increase pre-processing capacity for food scraps to be acceptable at farm digesters.
- Ramp up education, outreach, compliance and enforcement of the organics bans to boost markets for organics haulers and facility operators.
- Support building food rescue capacity in the state.
- Foster curbside, residential organics collection pilot projects.
- Ensure affordable home composting bins for homeowners.

SWIAC recommends administering grants or loans to existing organics processing facilities to increase their capacity before investments are made in new facilities. Potential funding mechanisms to support the grants or loans are outlined below.

3. **Cost Estimates:** Act 175 required SWIAC to estimate the cost of constructing the necessary infrastructure identified under item two above. SWIAC reviewed and considered the estimated costs projected by the Systems Analysis. With time being limited and in recognition of the assumptions made to produce these estimates, SWIAC accepted these estimates as the best available data that provided baseline cost estimates. Table 1 below summarizes the Systems Analysis costs the Committee used.

TABLE 1. Systems Analysis Universal Recycling Costs Summary Table:

INFRASTRUCTURE	COSTS	YEAR(S) WHEN THE COST IS EXPECTED TO BE INCURRED
Recycling Collection		
New Trucks	$ 11,701,879	2015
Containers (Carts)	$ 4,101,500	2015
Organics Collection		
New Trucks	$ 261,340	2014-2020
Containers	$ 6,534,302	2014-2020
Drop-Off Transfer Station Capacity	$ 968,456	2014-2020
Organics Processing		
Facility Capital Cost	$ 21,900,000	2014-2020
TOTAL COST:	**$ 45,467,477**	

4. **Funding Options:** Act 175 required SWIAC to review options for generating the revenue sufficient to fund the costs of constructing necessary infrastructure.

SWIAC members recognized the need to create a more sustainable solid waste funding system that does not rely only on the amount of trash disposed, especially in light of current Universal Recycling waste reduction goals. The Committee determined that approximately $12 million dollars (25% of the $45 million) was needed to support related infrastructure. Funds would be administered through loans or grants made to private or public solid waste management entities. The following is a summary of the SWIAC member's funding recommendations, determined by majority vote. The full recommendations can be found on page 12.

- Evaluate and implement a Solid Waste Service Fee on solid waste collection/drop off services (including trash, recycling, and organics) for Vermont generated solid waste. Similar to Minnesota's Solid Waste Management Tax, this would close a sales tax loophole for solid waste services and replace the statewide franchise fee of $6/ton. The revenue from this fee would need to be approximately $5.4 M/year ($3.4M that ANR currently receives from the franchise fee and $2M per year for Universal Recycling implementation) and should take effect July 1, 2016 or before. The goal is to create a more sustainable solid waste revenue stream as trash volumes decrease over time.

- Implement a Disposable Bag Tax of $0.05 per bag (on both plastic and paper bags) at the point of sale.
- If one of the two funding options above (Solid Waste Service Fee and Bag Tax) are passed by the Vermont Legislature, then prioritize up to $100,000 of the Solid Waste Management Assistance Fund (SWMAF) revenue for planning and feasibility studies for Universal Recycling infrastructure implementation in gap areas. The SWMAF would be paid back once revenue from the Service Fee or Bag Tax were received.
- Funds should be made available as 25% public grants with 75% match required.
- Both private and public entities should be eligible to receive funds.

II. Authority and Scope

Background - Act 175 of 2014 and Act 148 of 2012: In 2014 the Vermont General Assembly enacted Act 175 (S.208), which addressed several solid waste issues including the requirement that the Secretary of Natural Resources convene a nine member Solid Waste Infrastructure Advisory Committee (SWIAC) to evaluate the sufficiency of existing solid waste infrastructure—specifically solid waste facilities—to accept mandated recyclables, leaf and yard debris, and food waste under Vermont's Universal Recycling law (Act 148).

Universal Recycling was passed unanimously by the legislature in 2012 to dramatically increase Vermont's recycling (including organics recovery) rate to 50% by 2022, which has lagged between 30-36% for a decade. The law targets the materials below to be diverted from disposal.

- mandated recyclables (metal, glass, plastics #1 & #2, and paper/cardboard);
- leaf and yard debris; and
- food scraps (leaf and yard debris and food scraps are often referred to as "organics")

Universal Recycling incentivizes investment in the systems and infrastructure necessary to manage "materials" rather than "wastes." The goal is to fully realize the benefits of recycling and organics recovery, from resource conservation and significant greenhouse gas reductions, to job creation and the support of green businesses. The law also requires solid waste haulers and facilities that collect trash to collect recycling and organics, providing consistent and convenient services for all Vermonters. See the Universal Recycling Timeline in Appendix E for a full list of implementation dates.

Legislative Request of SWIAC: Act 175 charged SWIAC with:

- Reviewing the systems analysis of the State waste stream to determine whether existing solid waste management facilities operating in the State provide sufficient services to comply with Universal Recycling requirements for facilities, and can meet any demand for services.
- Summarize the locations or service sectors where the State lacks sufficient infrastructure or resources to comply with the requirements of and demand generated by Universal Recycling, including the infrastructure necessary in each location;
- Estimate the cost of constructing the necessary infrastructure identified under item 2 above; and
- Review options for generating the revenue sufficient to fund the costs of constructing necessary infrastructure.

Solid Waste Infrastructure Advisory Committee Members: The Solid Waste Infrastructure Advisory Committee (SWIAC) met six times from August 2014-January 2015 (for a full list of meeting dates see Appendix B). SWIAC consists of the following members:

- Secretary of the Agency of Natural Resources or his or her delegate: **Cathy Jamieson,** Solid Waste Program Manager, ANR, DEC Waste Management and Prevention Division;
- Three representatives of the solid waste management districts or other solid waste management entities:
  - **Paul Tomasi,** Executive Director, Northeast Kingdom Waste Management District
  - **Tom Moreau,** Executive Director, Chittenden Solid Waste District
  - **Kenneth Sanderson, Jr.**, Town of Burke (independent town)
- One representative of a solid waste collector that owns or operates a material recovery facility:
  - **Karen Flanders**, Casella Resource Solutions representing John Casella

- Two representatives of solid waste commercial haulers, provided that one of the commercial haulers shall serve rural or underpopulated areas of the State:
    - **Jeff Myers**, Myers Container Service
    - **Eric Davis**, All-Clean Professional Services of Northfield (serving rural areas of the State)
- One representative of recyclers or food residuals or leaf & yard residuals:
    - **Trevor Mance**, TAM Organics
- One Vermont institution or business subject to the Universal Recycling requirements
    - **Jim Harrison**, Vermont Retail and Grocers Association

Other participating, but non-voting members of SWIAC, have periodically included: Tony Barbagallo Casella; Michael Batcher Bennington Regional Planning Commission; Steve Changaris Northeast Waste & Recycling Association; Alex DePillis Agency of Agriculture; Karen Horn Vermont League of Cities and Towns; Taylor Johnson Vermont Public Interest Research Group; Rebecca Ramos Necrason Group; Lisa Ransom Grow Compost; Al Sabino Casella Resource Solutions; Pat Sagui Compost Association of Vermont; Frank Stanley Myers Container Service; Ted Siegler and Natalie Starr DSM Environmental Services; and staff from ANR DEC Waste Management Prevention Division (Division Director Chuck Schwer, former Director George Desch and staff including: Danika Frisbie, Ben Gauthier, Josh Kelly, and Bryn Oakleaf). Trey Martin, DEC Senior Counsel for Government Affairs, now Deputy Secretary of the Agency of Natural Resources, acted as the facilitator of SWIAC during most meetings.

SWIAC Agreement Process: At the second SWIAC meeting held on September 22, 2014, the group agreed to the following decision-making process:

1. Non-voting members may participate in discussion, but will not participate in any vote concerning action items to be included in the legislative report.
2. After debate and discussion, if a decision does not reach consensus, a final vote from voting members will decide what recommendations are to be included in report.
3. The final report does not need to be limited to only a list of recommendations. A narrative may be included to provide background information on the decisions of the committee.

Limitations: The SWIAC members are a diverse group. Over nearly six months SWIAC members invested a great deal of time, energy, travel, and expense to meet, discuss existing solid waste conditions and needs, and attempt to assess a very complex and constantly changing landscape for solid waste management in Vermont. It was challenging to assess and predict the various needs and costs of Universal Recycling and to develop recommendations in such a short period of time. The needs for Universal Recycling could change depending on how the law is applied and takes effect. In spite of these limitations this report summarizes SWIAC's findings for the potential costs, needs, and recommendations for the implementation of Universal Recycling. Some Committee members would welcome the opportunity to continue building on the SWIAC discussion and to be invited back in a year to review Universal Recycling progress.

III. Sufficiency of Existing Infrastructure and Identified Gaps

Act 175 required SWIAC to:

1. Review the systems analysis of the State waste stream to determine whether existing solid waste management facilities operating in the State provide sufficient services to comply with Universal Recycling requirements for facilities, and can meet any demand for services and
2. Summarize the locations or service sectors where the State lacks sufficient infrastructure or resources to comply with the requirements of and demand generated by Universal Recycling, including the infrastructure necessary in each location.

The Committee reviewed the current infrastructure for recycling and organics within the state and identified some of the needs and challenges in managing each of these materials to effectively implement the Universal Recycling law. This section of the report includes information on the current infrastructure and identified gaps or needs for the

management of recyclables and organics. Infrastructure for these materials was considered by SWIAC through the lens of four categories of solid waste or "materials" management:

1. **Containers** for waste generators (such as wheeled carts and/or dumpsters)
2. **Hauling** (Collection and Transport)
3. **Facilities** (Processing)
4. **Markets** (Utilization)

Further SWIAC acknowledged that collecting any solid waste whether trash, recyclables, or organics is challenging in a rural state like Vermont. A lack of density results in increased costs for collection and transport of these materials.

RECYCLING

Recycling Infrastructure Today:

Vermont's recycling infrastructure is fairly robust, having developed over the past 25 years, and includes a network of haulers, drop-off centers, transfer stations, and recycling processing facilities. SWIAC agreed that there are significant benefits to recycling such as resource conservation, job creation, and greenhouse gas reductions.

Map 1-A in Appendix C, illustrates some of the current recycling processing infrastructure in the State, called materials recovery facilities or "MRFs". In addition, there are a few small residential source separated recycling drop off facilities in the state that are not included on Map 1-A. It should be noted that some amount of in-state recyclables are processed at out-of-state MRFs, such as the facility located in Albany, New York. Map 1-B shows the multiple public and private transfer stations and recycling centers where recyclables can be collected from residents, businesses, and in some cases commercial haulers.

When discussing the State's current recycling infrastructure, SWIAC agreed that the state's two single stream materials recovery facilities, located in Williston and Rutland, have enough processing capacity to meet the projected recycling demand that might result from Universal Recycling. However, these MRFs are a significant distance from certain areas of the state, such as the Northeast Kingdom, which increases the cost to collect and transport recyclables from these areas. SWIAC agreed that single stream recycling collection for mandated recyclables is easier for residents and businesses and results in greater recycling participation rates. However, some solid waste districts, towns and private solid waste business owners collect or accept recyclables separated by material type (e.g. metal, glass, plastics, paper/cardboard) allowing them to conveniently bail these materials and sell them directly to recycling markets. Switching to single stream for some would mean the loss of this revenue, however dual stream systems or single stream options for commercial haulers in conjunction with source separation for residential recyclables collection, may provide a middle ground where some revenue from recyclables is still maintained.

While Map 1A shows four MRFs, only two of them can handle single stream recyclables. Windham Solid Waste District operates a dual stream MRF in Brattleboro. The source-separated recycling MRF located in the Northeast Kingdom (Lyndon, VT) is not currently able to process commercial hauler loads of single stream or dual stream recyclables; anyone bringing recyclables to this facility currently is required to separate glass, metal, paper and plastic. Many haulers from this region have said that this separation is not feasible for them, especially when they collect mixed loads of single-stream recyclables from residential and business/institution customers. The cost to transport single stream recyclables from this region as well as some other regions to single stream MRFs is a challenge for some solid waste haulers, increasing costs.

Recycling Gaps in Implementing Universal Recycling:

Containers: Some solid waste districts expressed a need at the SWIAC meeting for recycling collection containers (especially wheeled carts) for waste generators (residents, businesses, institutions). They were interested in any assistance the State could provide via grants or low interest loans to help them improve recycling in their regions. Larger districts and larger haulers had already invested in carts and generally felt that their regions were sufficiently served and that it may be unfair to them if other districts or smaller haulers who haven't prioritized these investments

were provided grants for recycling containers. Limited time and this disagreement prevented SWIAC from making a recommendation to allocate funding for recycling containers.

Transfer Station Capacity: The Committee identified the need for hauler recycling transfer station capacity for single stream recyclables (e.g. a place for haulers to bring mandated recyclables) in areas such as the Northeast Kingdom region. Some SWIAC members felt that other areas of the state such as the Upper Valley/Springfield regions could benefit from additional hauler recycling transfer station capacity to create competition and potentially reduce the tipping costs for dropping off single stream recyclables.

Markets: Fluctuations in recycling markets make it difficult for public and privately run recycling facilities to cover costs associated with collecting, sorting and shipping recyclables. Some solid waste districts and materials recovery facilities have requested state assistance with building in-state markets for low value recycling materials such as glass. There are also some concerns over the viability of future markets for paper and plastics #3-7. In particular if China builds the capacity to produce plastics from raw petroleum products, there is an expectation that demand for US recycled plastics (namely #3-7) will decrease. SWIAC recommend that the State help create and support in-state markets for glass through a purchasing policy by the Agency of Transportation or other state agencies to use recycled glass in road and other construction projects.

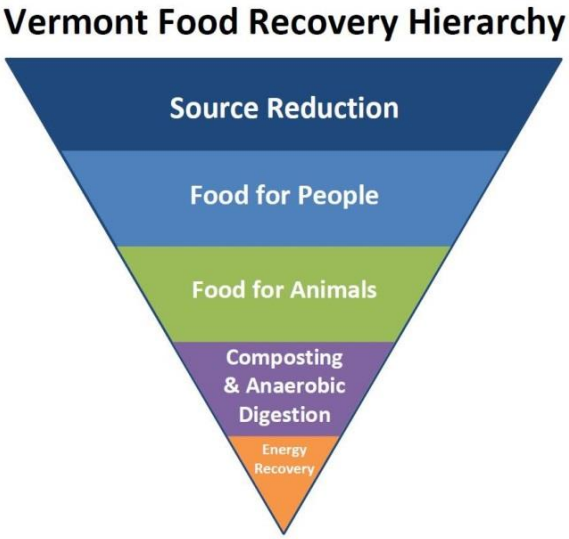
ORGANICS

Organics Infrastructure Today:

The State's organics management infrastructure is not yet developed to the degree of the recycling infrastructure. However, Vermont is well ahead of other states. In fact, the State currently has approximately twelve commercial-scale and four smaller-scale food scrap haulers. Brattleboro is the only town that currently has robust curbside residential organics collection, which is a service provided by the Town's contractor, Triple T Trucking.

The Universal Recycling law promotes organics to be managed in accordance with a hierarchy of options (see the Vermont Food Recovery Hierarchy below). Many of these options were explored by SWIAC and are summarized here along with a brief assessment of their capacity and their challenges or needs in order to help meet the Universal Recycling goals for organics recovery.

Source reduction (smart meal planning, eating leftovers), food for people, animal feed, and backyard composting were all acknowledged by SWIAC for the role they could play in reducing some of the demand for new organics processing infrastructure.



Using food scraps for animal feed is more common and often best suited to small-medium scale operations. Animal feeding operations are generally challenged by a limited ability to expand and accept large volumes of food scrap material. In addition there are some concerns about animal health. Vermont law administered by the Agency of Agriculture does not permit the feeding any food waste containing meat or having come in contact with meat to pigs when the pork is sold for consumption. While there are many farmers feeding animals (cows, pigs, poultry) food scraps or food processing residuals (such as whey), data does not currently exist on how much food scrap material is being diverted for animal feed at this time.

Composting is the most common recycling option for food scraps in Vermont, but can be challenged by thin margins, the need to improve markets, contamination (trash, persistent herbicides), and available/affordable carbon feedstocks (wood chips, spoiled hay, leaves). See Map 1-C that shows permitted composters in the state. Currently Vermont's permitted food scrap

composting facilities (about 10 are active) process approximately 4,800 tons per year of food scraps. These composters have permitted capacity to receive ~15,000 tons per year of food scraps, though this would require some facility upgrades. It is estimated that 10,000 tons per year of food scraps could be processed without upgrades.

Anaerobic digesters (ADs) can process food waste as well as agricultural wastes such as manures and some crops. Other than dry anaerobic digestion or "high solids" digestion (none currently exist in Vermont), ADs are not commonly able to process large amounts of leaf and yard debris. Map 2-E illustrates the location of the eighteen on-farm ADs and four ADs at waste water treatment facilities that generate and utilize heat, power or both.

On-farm ADs commonly process manure and a few also process liquid food processing waste from food manufacturing such as ice cream, frozen foods, and soup companies. As with other renewable energy projects, on-farm ADs benefit from special energy rates on electricity they sell to the grid.

According to the *Systems Analysis of the Impact of Act 148 on Solid Waste Management in Vermont*, (prepared for the State in October 2013 by DSM Environmental, the Tellus Institute, and Robert Spencer) 10% of existing on-farm ADs capacity could meet the projected 28,500 tons per year of food scraps. However, there are some challenges for on-farm ADs accepting food scraps such as:

1. high capital costs for things such as holding tanks, additional generators, or pulping/processing equipment.
2. the need for pathogen kill,
3. permitting,
4. trash contamination,
5. a nutrient management plan for the resulting digestate, and
6. the need for feedstock regularity and consistency (regular supply of liquefied food scraps).

Processing compostable disposables (bio-plastic bags, cups, utensils, bowls, and plates) is also challenging for ADs because of their shorter retention times, weaker bacteria, and lower operating temperatures. Therefore ADs may not be able to accept compostable disposables or will need to find ways to separate and screen them out.

Two AD pilot projects are currently assessing the potential for food scraps to be digested at two existing on-farm AD facilities (Rutland and Randolph Regions).

Many of the challenges for the management of food scraps at on-farm ADs are shared by non-farm based digesters and waste water treatment facility (WWTF) digesters. Many waste water treatment facilities landfill or incinerate their sludge. According to 2013 data collected by the Department of Environmental Conservation, Residuals Management Section, only about 17% of WWTF sludge was used for agronomic benefits and approximately 24% of septage sludge was treated and land applied. Landfilling sludge or digestate from a WWTF digester that contained food scraps would not be considered a priority beneficial use since the food scraps are still being disposed of in the landfill. Because of the relatively high rates of landfilled sludge currently in the state, diverting food scraps to WWTF digesters will likely be a lower priority for food scraps than diversion to on-farm or other non-farm digesters or other organic processing methods.

Organics Gaps in Implementing Universal Recycling:

SWIAC identified several gaps in the organics management infrastructure, including containers, hauling vehicles, transfer capacity, treatment facilities, and markets for products.

With Universal Recycling in effect, DSM's Systems Analysis projected a 60% recovery rate for organics by 2022. This would require ~44,000 tons per year of organics processing infrastructure (including composting, AD, animal feed, etc.). This figure includes an estimated 28,500 tons per year of projected food scraps with the remainder being mixed yard waste and compostable paper. Existing composting facilities could handle approximately 10,000 of these tons with existing on-farm anaerobic digesters potentially handling the remainder; however these digesters would require upgrades. The locations of these existing facilities may not always be in close proximity to where food scraps are being

generated. Food rescue outreach campaigns, incentive programs for businesses, and financial support for expanding food rescue capacity at food donation centers are needed to decrease the amount of edible discarded food that would otherwise need to be managed and processed at animal feed, composting, or anaerobic digestion facilities. Data is unavailable to determine how much food scraps are fed to livestock and how much of an increase is possible.

Containers: Residential composting options should include backyard composting, drop-off, and curbside service. Several solid waste management entities have identified a need for organics collection containers to be provided or purchased with grants or low interest loans from the State.

Hauling: While commercial-scale organics (food scraps) collection—from colleges, hospitals, supermarkets, and restaurants—is viable in the State (a dozen haulers already offer the service), residents who wish to have curbside organics collection could find it costly. As a result many residents may opt to manage these resources through home composting and drop-offs. This factor coupled with the expense of organics collection equipment, and the cost of offering a third collection route, make it challenging for haulers, both large and small to offer residential organics collection at an affordable cost. Towns that provide all residents with curbside trash, recycling, and organics collection services, such as the town of Brattleboro, may gain the efficiencies necessary to provide reasonably priced curbside residential organics collection. Pilot projects in Vermont's denser cities and towns may also prove the viability and cost effectiveness of residential organics collection.

Transfer Station Capacity: Some SWIAC members feel that there is a need to add hauler transfer station capacity for organics in recognition of transportation needs in some of the gap areas. This could assist with the viability of existing composting facilities or anaerobic digesters by bringing them larger volumes of materials, increasing revenues, and/or the amount of compost or digestate for sale. These organics transfer stations may even include some pre-treatment of food scrap material (such as trash removal, and pulping) to make it more suitable as a feedstock for facilities.

Facilities: While the State currently has a network of composters, there are some areas where service area gaps may exist. Map 1-C in Appendix C illustrates the existing composting facilities in Vermont with a 20-mile radius area delineated around each operating facility. Areas outside of these 20-mile circles appear as gaps. However, some composters participating on SWIAC asserted that north-south corridors (VT Route 7 and I-91) may actually provide expansion for composters from Bennington, Brattleboro, and possibly other regions of the State, which may in effect cover these apparent gaps areas. At least three composters have stated that they are looking for more materials and considering collecting organics from more distant regions.

In order to accept larger volumes of food scraps composters need more sources of carbon (wood chips, spoiled hay, leaves and yard debris, paper) to attain the right compost feedstock mix. It is uncertain if dirty paper will be able to offset that carbon need or will risk increasing contamination. Anaerobic digesters do not require carbon since it is not a necessary ingredient to feed their specific populations of bacteria. Therefore, this carbon need may be reduced if ADs process food scraps. However, nutrients from these ADs still need to be managed in accordance with a nutrient management plan and some AD facilities may choose composting as a way to manage these nutrients.

While there are some challenges, costs, and limited in-state examples of on-farm ADs processing source separated food scraps from restaurants, schools, grocery stores, and institutions, two pilot projects have recently been launched to test this viability by Casella Resource Solutions (in partnership with Blue Spruce Farm in the Rutland Region) and Grow Compost (in partnership with the Vermont Tech Digester in the Central Vermont Region). In general on-farm ADs that begin accepting food scraps will need to ensure that they can sufficiently manage the additional nutrients from these materials through their nutrient management plan for their farm. In addition, most on-farm ADs that accept food processing residuals (whey, frozen dinner processing waste, etc.) accept it because it is already liquid and trash free allowing it to easily be pumped into their digesters. Pre-processing food scraps (slurried, trash removed) will help on-farm digesters accept these materials.

Markets: Improved markets for compost products are needed to help encourage private investment. Some Committee members recommend a state purchasing policy for compost by the Agency of Transportation and Buildings and General Services to be used in disturbed or newly constructed road shoulders and medians and on the grounds of state offices and any new construction sites. Measured applications of compost can help soils retain water, reducing flooding and erosion. The Vermont Storm Water Management Manual is currently being updated by the Agency of Natural Resources and will include quality requirements for disturbed soils such as the incorporation of organic matter.

Other Considerations:
Many of the SWIAC members are concerned about the quality of organics, specifically how to limit trash contamination, notably plastic packaging, stickers, bags and film, that jeopardizes the processing and marketability of products such as compost. There was general agreement that keeping organics free of trash will help all organics managers including haulers, composters, AD operators, and farmers.

Education and outreach, compliance assistance, and enforcement was agreed to be needed to increase the volume and cleanliness of food scraps. This will help incentivize investment in organics hauling and processing infrastructure.

IV. Estimate of Costs

Act 175 required SWIAC to estimate the cost of constructing the necessary infrastructure. SWIAC reviewed and considered the estimated costs projected by the Systems Analysis. The Systems Analysis report was a requirement of the Universal Recycling law (Act 148). With time being limited and in recognition of the assumptions made to produce these estimates, SWIAC decided to use the Systems Analysis cost estimates (summarized in Table 1. below) for Universal Recycling infrastructure as a baseline for their cost discussions.

SWIAC identified two main phases of equipment and infrastructure costs that will be incurred under Universal Recycling.

- Phase I – Recycling: State will need more recycling carts, new or retrofitted trucks, and additional hauler transfer station capacity to collect mandated recyclables in either single stream or potentially dual stream systems.
- Phase II – Organics: State will need organics carts, additional trucks, and new infrastructure in the form of processing infrastructure for organics (compost, AD, farms, etc.).

The table below represents infrastructure capital cost estimates summarized from Table 54A, "System 3(A), Capital Costs" from page 124 of the Systems Analysis. Table 54A provides estimated Universal Recycling infrastructure costs under the existing solid waste system including single stream as well as dual stream recycling systems.

TABLE 1. Systems Analysis Universal Recycling Costs Summary Table:

INFRASTRUCTURE	COSTS	YEAR(S) WHEN THE COST IS EXPECTED TO BE INCURRED
Recycling Collection		
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Organics Processing		
Facility Capital Cost	$ 21,900,000	2014-2020
TOTAL COST:	**$ 45,467,477**	

SWIAC confirmed that new trucks for recycling collection are needed in 2015, as predicted in Table 1. However, the predicted amount of $11.7 million for new recycling trucks may be high, depending on whether haulers retrofit or use

existing vehicles to collect recyclables. Addison County as well as Chittenden County haulers coped with similar requirements in the mid-1990s when recycling was mandated there. Haulers within the Addison County Solid Waste Management District adjusted primarily by retrofitting existing vehicles to keep costs low. The $11.7 million represents approximately 70 trucks at about $170,000 each. New trucks cost approximately $185,000 each.

SWIAC members also questioned if the approximately $22 million predicted in organics processing facility capital costs might be high, given the existing on-farm anaerobic digester capacity available in the State. However, members agreed that making food scraps suitable for use in digesters—including processing to remove trash contaminants and to create a pumpable slurry—may require significant investments.

SWIAC members and the authors of Systems Analysis agree that recycling processing capacity is sufficient at the two in-state material recovery facilities (MRFs) in Williston and Rutland to meet the projected demand Universal Recycling creates. Investments are not needed in this category.

V. Recommendations

Solid Waste Infrastructure Advisory Committee (SWIAC) recommendations fall into three broad categories: recycling, organics, and funding to finance recycling and organics needs. Within those three broad categories, Committee members further broke down the recommendations to consider markets, infrastructure, costs and other categories. The formatting of their recommendations was kept below.

RECYCLING RECOMMENDATIONS

1. MARKETS – Do not require single stream recycling infrastructure statewide. Let the market work that out.
2. MARKETS – Try to support local markets for tough materials, e.g. State use of glass in road construction.
3. INFRASTRUCTURE – Continue to allow municipal choice for collection and consolidation of services.
4. INFRASTRUCTURE – Consider supporting the municipal and private sector with grants or loans for recycling equipment and hauler transfer stations. Funds should be applied based on the specific merits of a project, including a strong business plan that shows significant recycling impact to residents/businesses (e.g. access to convenient recycling services for a significant amount of residents or businesses).
5. CHARGING RECYCLING COSTS – Some SWIAC members felt that solid waste haulers and facilities should be able to charge customers for recycling collection services rather than bundling those costs with trash fees.

ORGANICS RECOMMENDATIONS

1. MARKETS – Work to increase markets for compost. Consider a State purchasing policy for compost by Buildings and General Services and the Agency of Transportation that utilizes compost in a manner that protects water quality.
2. INFRASTRUCTURE:
    a. Support existing organics facilities interested in scaling up their operations, and able to be permitted to accept greater quantities of organic material. These facilities should receive priority over new facilities. Support may include grants and loans. Secondly invest in new facilities in identified gap areas.
    b. Do not provide renewable electricity subsidies for any anaerobic digestion facility that seeks to collect food scraps in any area that directly competes with a pre-existing composting facility.
    c. Identify and support regional options to expand food rescue.
    d. Support existing and new animal feeding operations with regulatory considerations.
3. COMPLIANCE (Outreach and Enforcement) – The State and local solid waste management entities should increase outreach, education, compliance assistance, and then enforcement of the leaf, yard, and food scrap bans, to promote awareness, participation, and the highest quality of either edible food or feedstocks possible. This will result in reduced trash contamination and increase the volume of organics, which will both improve markets for organics and incentivize investment in organics collection and processing infrastructure.
4. HAULING – Consider residential curbside organics collection options and support small pilot programs to investigate residential organics collection viability in relation to population density.

5. RESIDENTIAL ORGANICS MANAGEMENT:
    a. Provide affordable home composting bins following workshop attendance for residents.
    b. Review and change solid waste permitting rules to encourage food scrap drop-off where people frequently travel (e.g. gas stations, grocery stores).

FUNDING RECOMMENDATIONS

SWIAC recognizes the need to create a more sustainable solid waste funding system. Current funding relies on the amount of trash disposed. A shift in this system is needed, as Universal Recycling's goal is to decrease trash disposal, resulting in revenue decreases.

The majority of SWIAC members recommend the following funding options to provide financial support for some of the infrastructure needed to implement Universal Recycling. Funding recommendations were voted on by the SWIAC members and results of the voting are shown after each recommendation.

1. Evaluate and implement a Solid Waste Service Fee on solid waste collection/drop off services (including trash, recycling, and organics) for Vermont generated solid waste. Similar to Minnesota's Solid Waste Management Tax, this would close a sales tax loophole for solid waste services and replace the statewide franchise fee of $6/ton. The revenue from this fee would need to be approximately $5.4 M/year ($3.4M that ANR currently receives from the franchise fee and $2M per year for Universal Recycling implementation) and should take effect July 1, 2016 or before. The goal is to create a more sustainable solid waste revenue stream as trash volumes decrease over time. (8 approved, 1 opposed)
2. Implement a Disposable Bag Tax that charges a $0.05 fee per disposable bag (on both plastic and paper bags) provided by the retailer at checkout. This would be applied to all grocery stores and retailers as soon as possible. (6 approved, 3 abstained)
3. If one of the two funding options above (Solid Waste Service Fee and Bag Tax) are passed by the Vermont Legislature, but money will not be available in 2015, then SWIAC recommends prioritizing up to $100,000 of the Solid Waste Management Assistance Fund (SWMAF)—a fee on disposal currently collected by the DEC's Solid Waste Program and spent on DEC staff and grants to solid waste districts and municipalities—for planning and feasibility studies for Universal Recycling infrastructure implementation in gap areas. These funds would be paid back to the SWMAF once the revenues from the Solid Waste Service Fee and/or Bag Tax funding options were received. (all approved)
4. Any funds created should be made available as 25% public grants which would require 75% matching investment by the applicant. With an estimated $45 million in Universal Recycling infrastructure needs, 25% of these funding needs would be approximately $12 million dollars.
    a. Applicants may be private or public entities.
    b. It should be determined whether the Vermont Economic Development Authority could provide low interest loans for the required 75% match.
    c. Grantees must provide sound business plans for specific Universal Recycling projects and justify the need within their region.
    d. In all cases, applicants must be able to provide documentation of 75% matching funds. (all approved)

Other funding options were considered by SWIAC and are included in Appendix D. These additional options were either less desirable, less feasible, or in need of much more time for evaluation.

VI. Appendices

Appendix A. Excerpt of Act 175 Requiring SWIAC
Appendix B. Solid Waste Infrastructure Advisory Committee Meeting Schedule
Appendix C. Maps of Solid Waste Infrastructure
Appendix D. Summary Tables of Subcommittee Meeting Findings
Appendix E. Universal Recycling Timeline

* * * Solid Waste Infrastructure Advisory Committee * * *

Sec. 7. SOLID WASTE INFRASTRUCTURE ADVISORY COMMITTEE

(a) The Secretary of Natural Resources shall convene a Solid Waste Infrastructure Advisory Committee to review the current solid waste management infrastructure in the State, evaluate the sufficiency of existing solid waste management infrastructure to meet the requirements of subsection 6605(j) of this title, and recommend development or construction of new solid waste management infrastructure in the State.

(b) The Solid Waste Infrastructure Advisory Committee shall be composed of the Secretary of Natural Resources or his or her designee and the following members, to be appointed by the Secretary of Natural Resources:

(1) three representatives of the solid waste management districts or other solid waste management entities in the State;

(2) one representative of a solid waste collector that owns or operates a material recovery facility;

(3) two representatives of solid waste commercial haulers, provided that one of the commercial haulers shall serve rural or underpopulated areas of the State;

(4) one representative of recyclers of food residuals or leaf and yard residuals; and

(5) one Vermont institution or business subject to the requirements under subsection 6605(j) of this title for the management of food residuals.

(c) The Solid Waste Infrastructure Advisory Committee shall:

(1) review the existing systems analysis of the State waste stream to determine whether the existing solid waste management facilities operating in the State provide sufficient services to comply with the requirements of subsection 6605(j) of this title, and meet any demand for services;

(2) summarize the locations or service sectors where the State lacks sufficient infrastructure or resources to comply with the requirements of and demand generated by subsection 6605(j) of this title, including the infrastructure necessary in each location;

(3) estimate the cost of constructing the necessary infrastructure identified under subdivision (2) of this subsection; and

(4) review options for generating the revenue sufficient to fund the costs of constructing necessary infrastructure.

(d) Report. On or before January 15, 2015, the Solid Waste Infrastructure Advisory Committee shall submit to the Senate and House Committees on Natural Resources and Energy a report that includes the information and data developed under subsection (c) of this section.

* * * Effective Date * * *

Sec. 8. EFFECTIVE DATE

This act shall take effect on July 1, 2014.

Date Governor signed bill: June 4, 2014

APPENDIX B: Solid Waste Infrastructure Advisory Committee Meeting Schedule

From August 2014 through January 2015, the SWIAC committee convened six times. In addition to the regular monthly meeting schedule, two subcommittee meetings were held to look more closely at funding options and implementation costs.

The following is a list of all SWIAC meetings and subcommittee meetings:

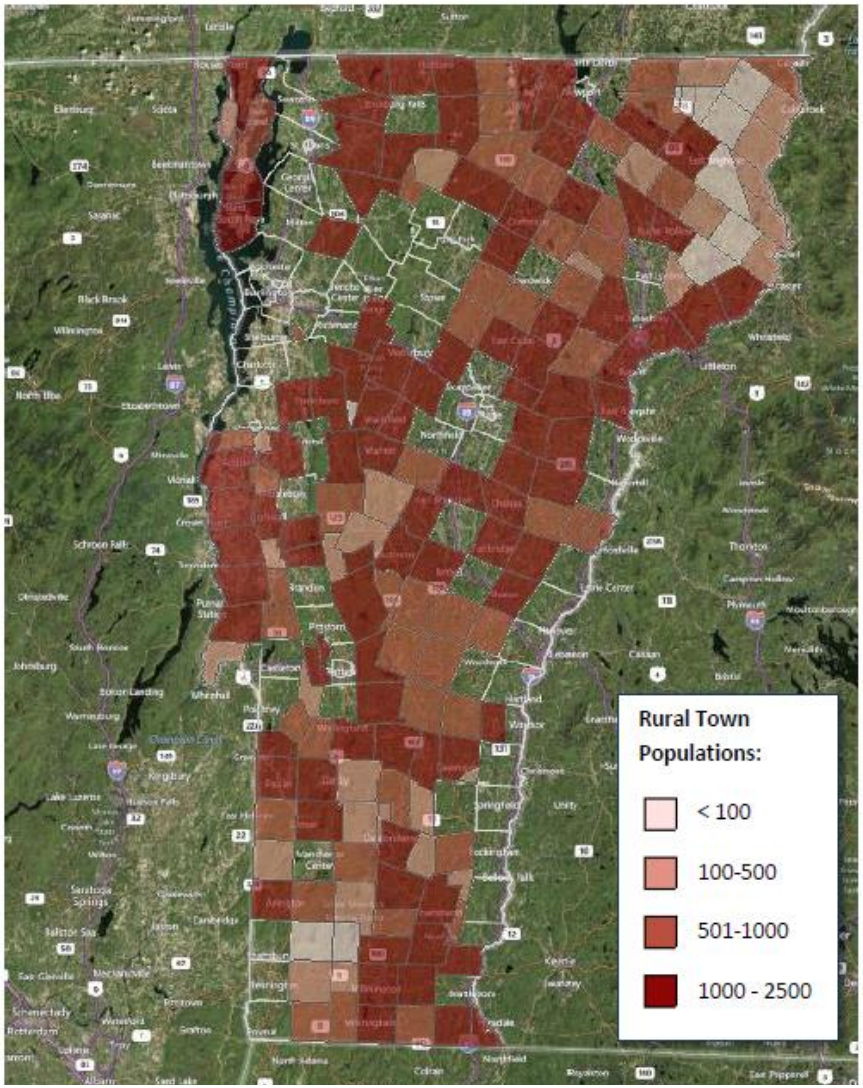
Solid Waste Infrastructure Advisory Committee Meetings

1. August 26, 2014
2. September 22, 2014
3. October 29, 2014
4. December 9, 2014
    a. December 16, 2014—*Subcommittee on Funding Options*
    b. December 31, 2014—*Subcommittee on Implementation Costs*
5. January 5, 2015
6. January 13, 2015 (via conference call)

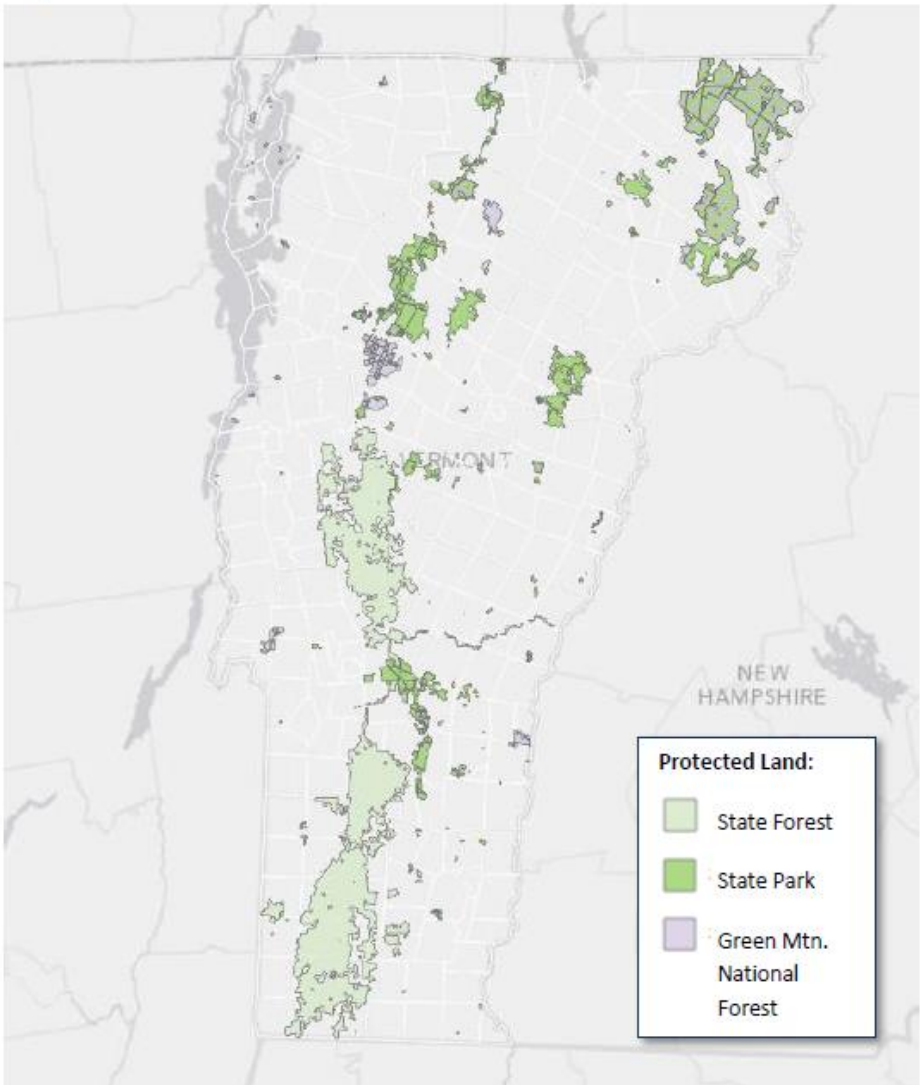
Minutes from all SWIAC meetings can be found on the **Solid Waste Advisory Committee web page.**

BASE MAP

Layer 1



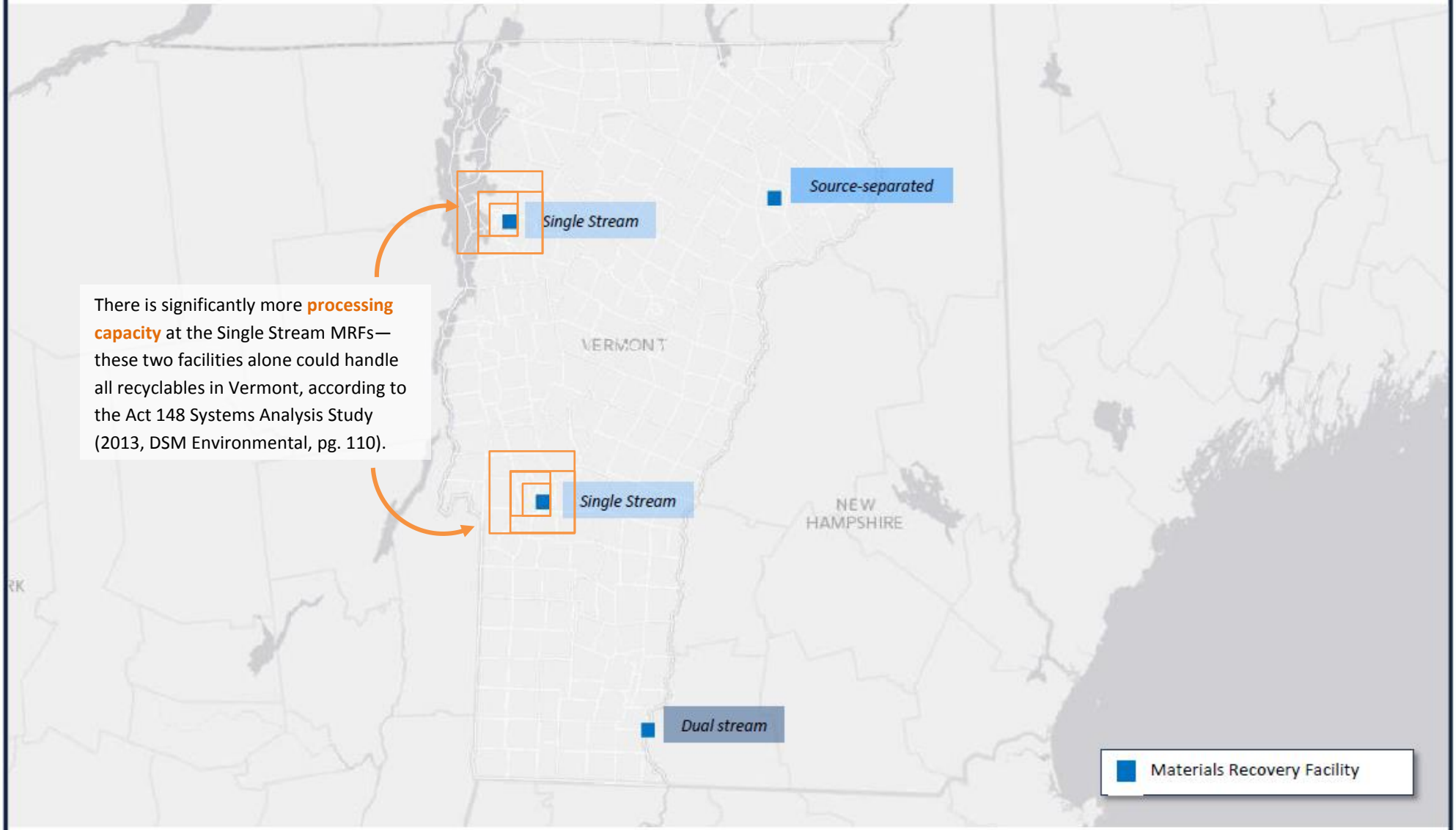
Layer 2



On the left, contrasting polygons display population classes of rural towns in Vermont. The U.S. Census Bureau defines "rural" as a geographic area with a population less than 2,500 people. On the right, State Forest and Green Mountain National Forest boundaries are displayed. These areas of protected, mountainous land have an obvious relationship to areas with the lowest rural densities (Layer 1), and may explain some of the gaps in the underdevelopment of current solid waste infrastructure in specific areas of the state.

MAP 1-A

MATERIALS RECOVERY FACILITIES

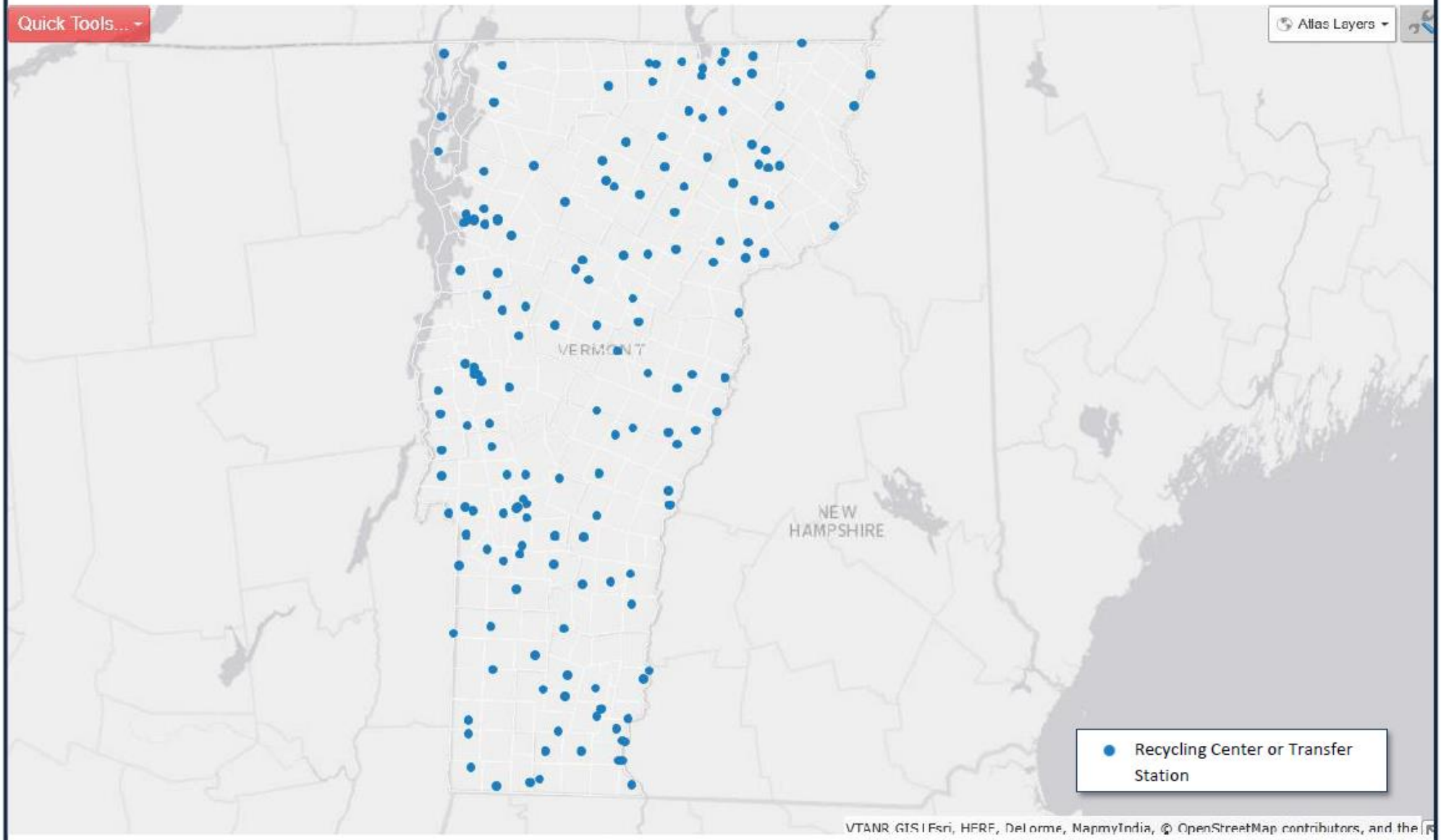


There is significantly more **processing capacity** at the Single Stream MRFs—these two facilities alone could handle all recyclables in Vermont, according to the Act 148 Systems Analysis Study (2013, DSM Environmental, pg. 110).

There are currently four materials recovery facilities (MRFs) in the state of Vermont: two are single stream facilities, one is dual stream, and one is completely source-separated.

MAP 1-B

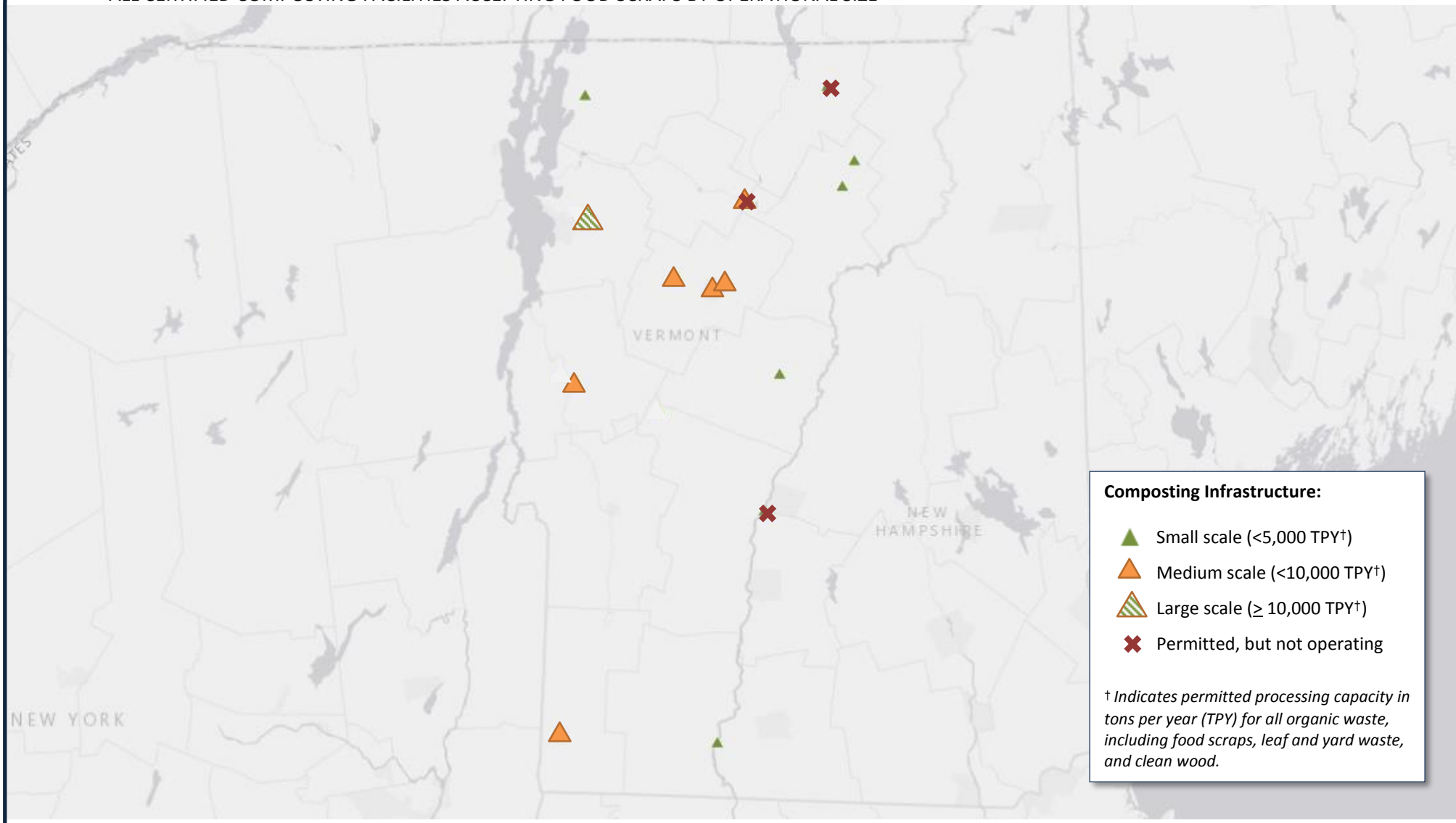
ALL TRANSFER STATIONS & RECYCLING CENTERS



There are more than 200 transfer stations and recycling drop-offs state-wide. This map does not differentiate between the size and capacity of facilities, but rather demonstrates the layout of current drop-off and transfer station siting. It is useful as a base map for considering future residential drop-off convenience.

MAP 1-C

ALL CERTIFIED COMPOSTING FACILITIES ACCEPTING FOOD SCRAPS BY OPERATIONAL SIZE



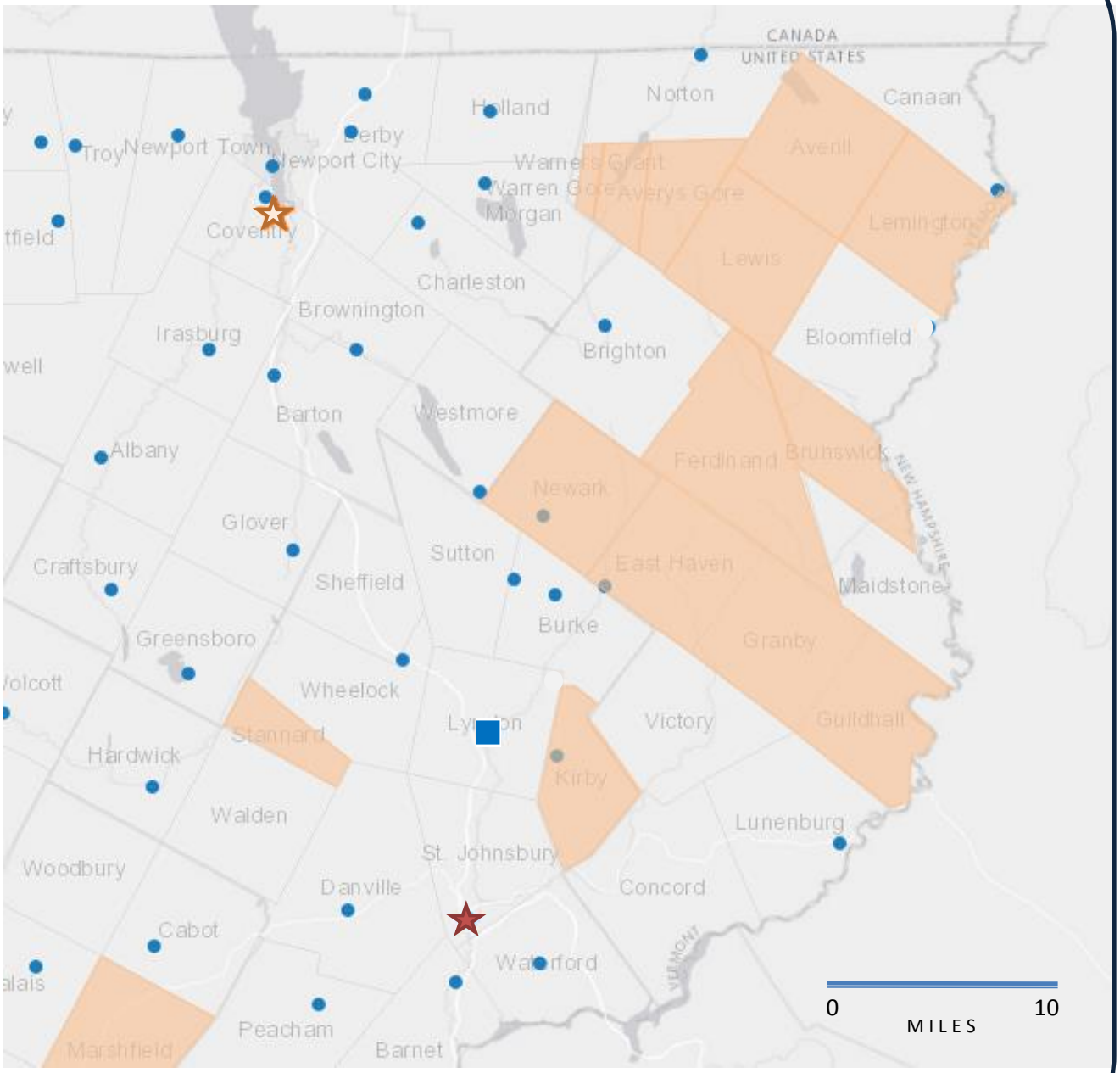
The Solid Waste Program grants three types of composting facility certifications: Registration certificate (small composter); Categorical certificate (medium composter); and Full certificates (large composters). The only large-sized composter in Vermont is Green Mountain Compost in Williston, VT. The facilities marked with an "x" are permitted to collect and compost organics, but are currently not operational.

MAP 1-D

EXAMPLE OF RECYCLING INFRASTRUCTURE DISTRIBUTION IN A RURAL REGION

A snapshot of current drop-off infrastructure in the Northeast Kingdom. This map does not identify which facilities are **private vs. public**, but does highlight the limited locations **which have commercial drop-off capacity**.

Haulers in this area have noted that the number of facilities where commercial haulers can drop-off large loads of recycling is inadequate.



Commercial Transfer Stations:

- N.E. Waste Services Landfill
- WSI St. Johnsbury Transfer Station

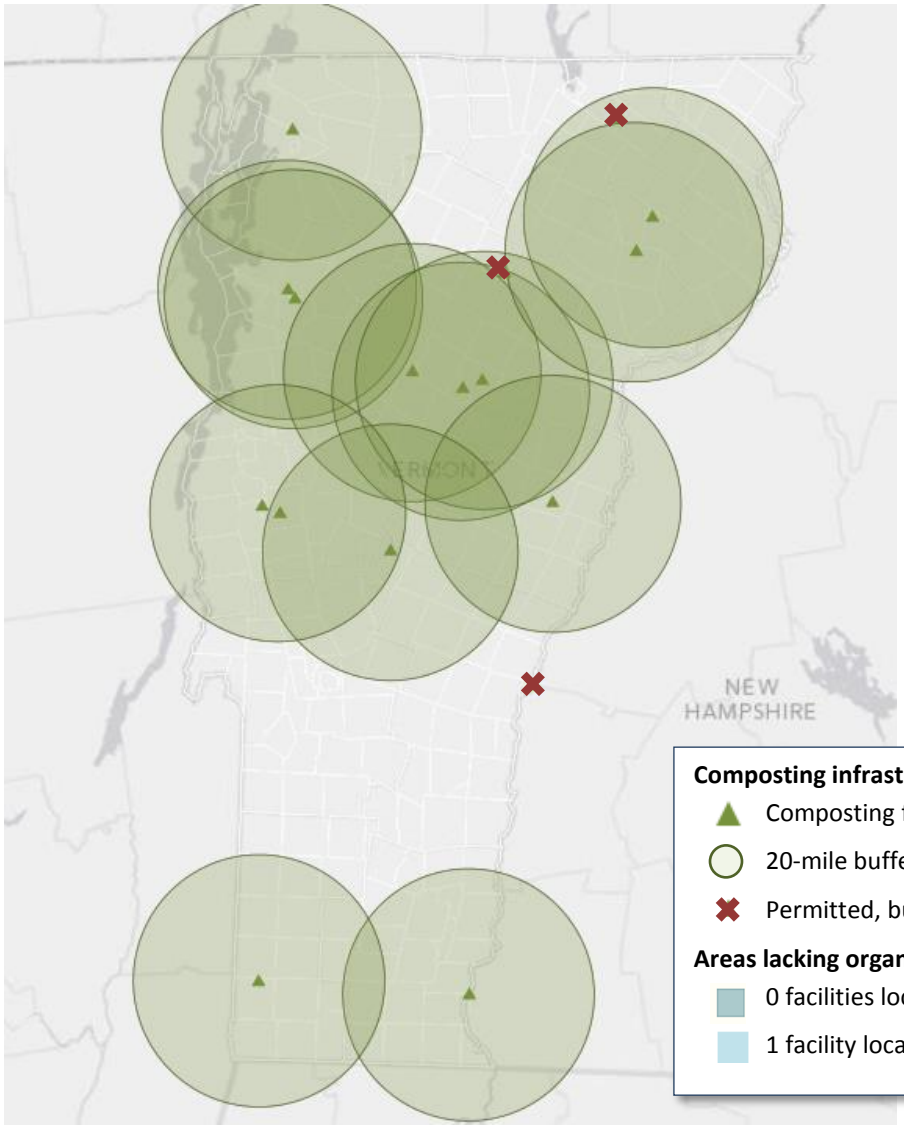
Other:

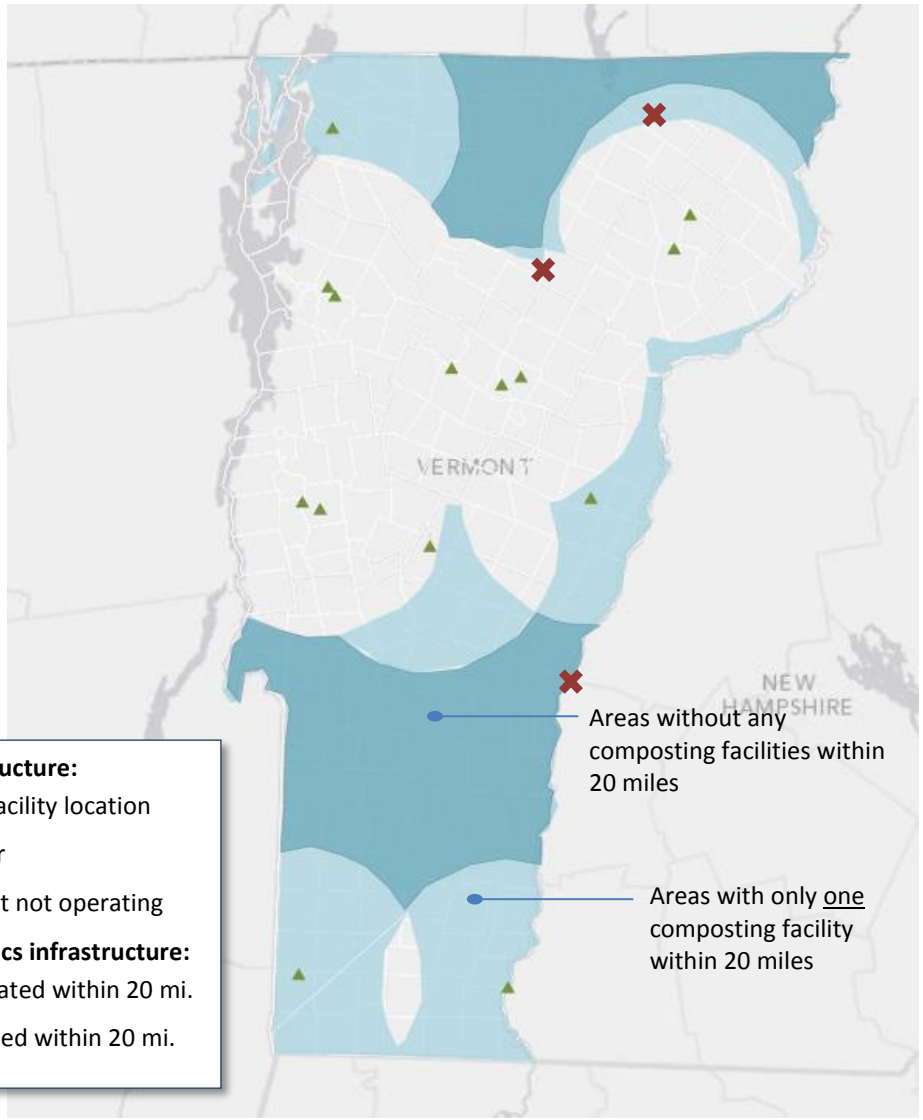
- Materials Recovery Facility
- Drop-off facility (residents only)
- Town with population <500

MAP 2-A

CURRENT COMPOSTING FACILITIES AND AREAS WITH ORGANICS INFRASTRUCTURE NEEDS

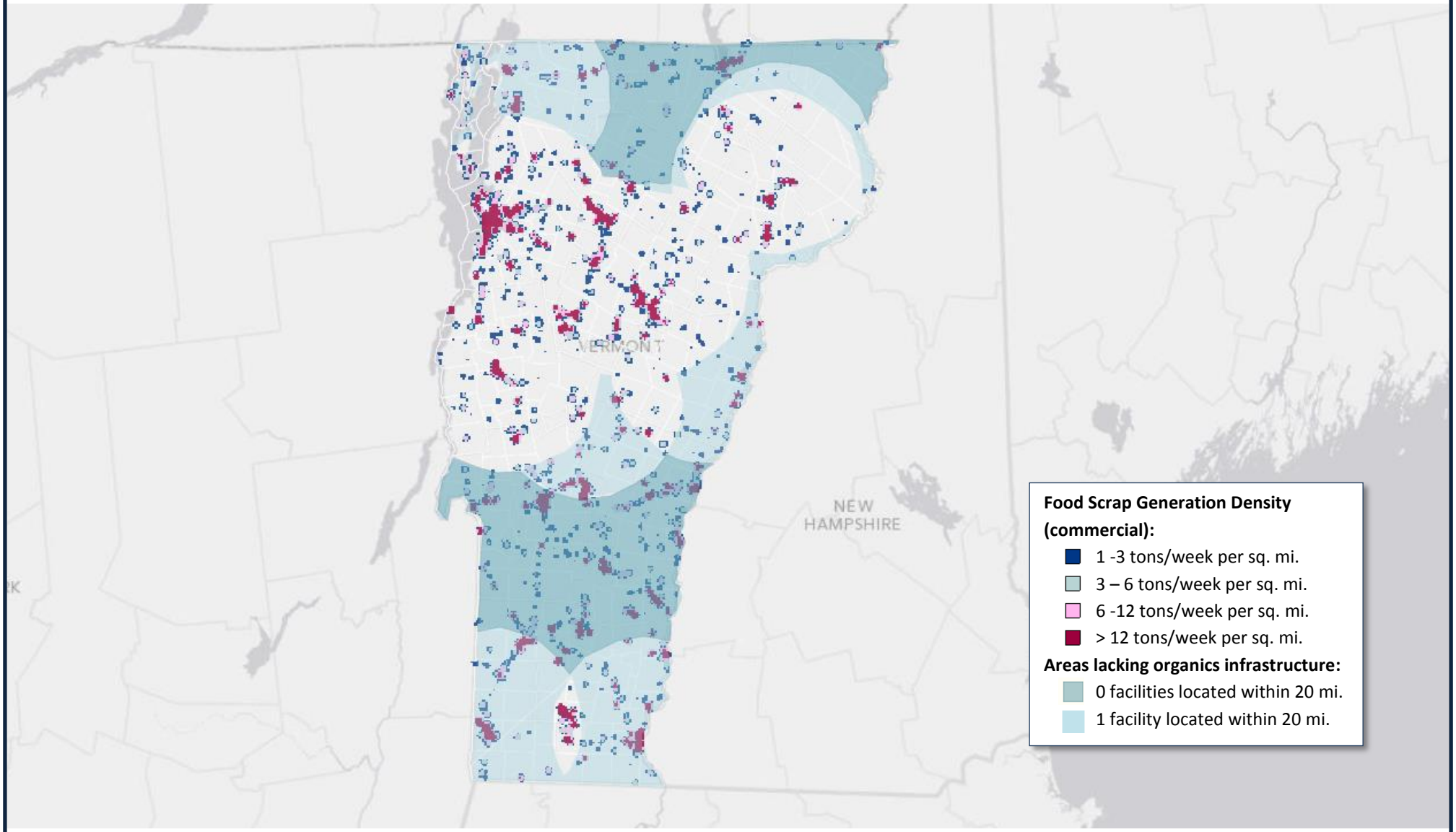
Inversion: showing areas with lack of access to composters





MAP 2-B

ORGANICS INFRASTRUCTURE NEEDS (CONT.)

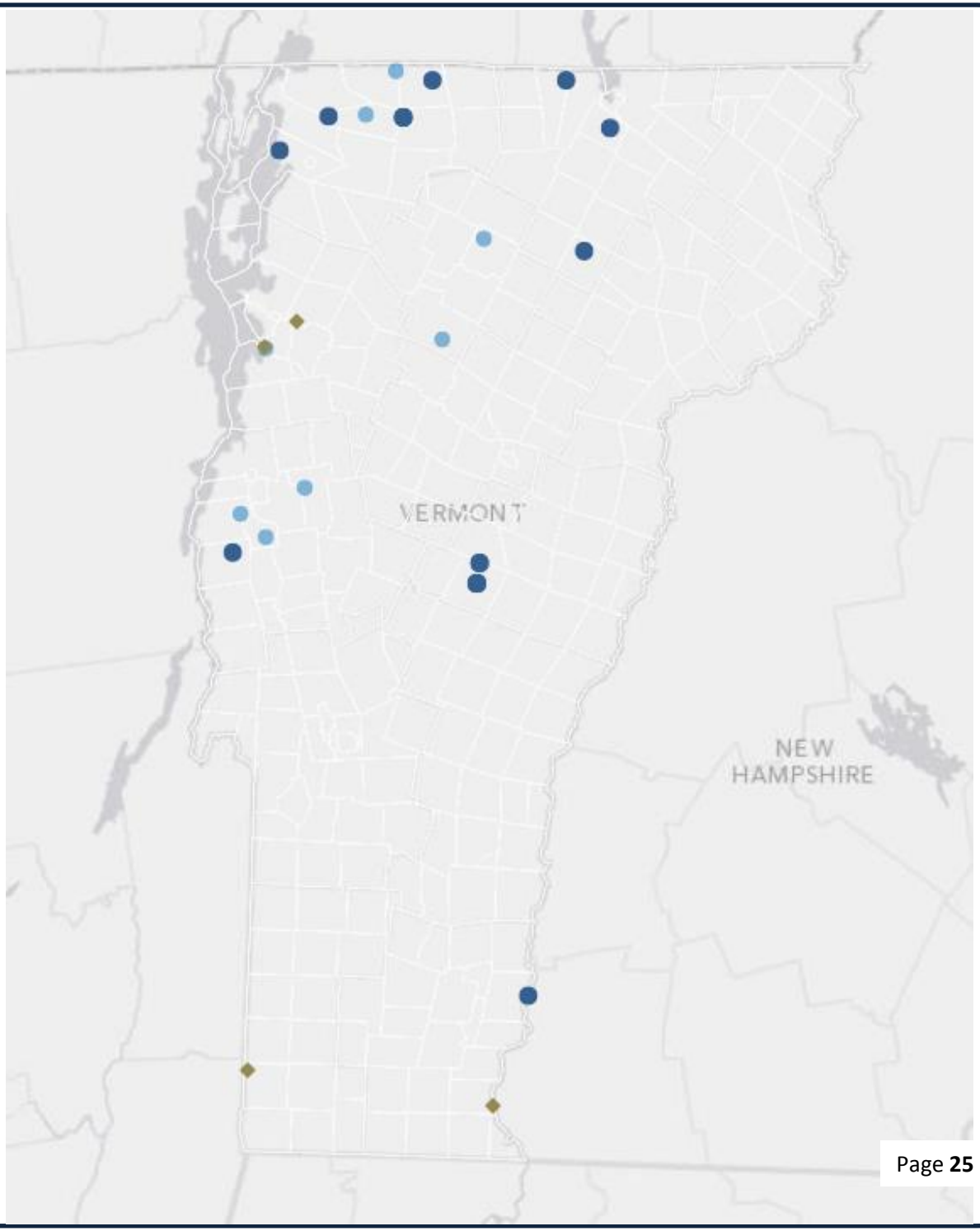


MAP 2-C

EXISITNG ANAEROBIC DIGESTERS

Vermont currently has 18 operating on-farm methane digesters, none of which are currently permitted under ANR's Solid Waste Program. According to Michael Raker of Agricultural Energy Consultants, LLC., Vermont's current on-farm digester infrastructure could theoretically process approximately 76,000 tons of organic material.

Wastewater treatment plants also represent an unexplored opportunity to process the state's organic material. There are currently 3 wastewater treatment plants that have on-site methane digesters for energy recovery (heating) and practice beneficial reuse of biosolids through EQ composting and/or land application.



On-Farm Digesters:

- Permitted to accept food processing residuals
- Not permitted to accept food processing residuals

Other Digesters:

- Wastewater Treatment Plant

SWIAC Subcommittee Summary

January 2015

I. COSTS & BUDGET Subcommittee (December 31st)

Areas of Agreement

Systems Analysis Cost Estimates ($45M) Sufficient: figures may be optimistic and based on a number of caveats and assumptions, but ultimately act as a sufficient estimate of total Universal Recycling costs.	ALL AGREE
Small Feasibility Study Grants: Out of total public money raised, an amount of $70-80,000 should be made available for feasibility studies for private or public entities for things such as transfer station needs/siting.	ALL AGREE
Containers (recycling and organics) are a priority for grant funds, but should require matching funds from applicants (public or private) and business pro forma.	MOSTLY AGREE
25% Public Grant; 75% Match Investment Proposal: 1. State offers 25% grant funds for public or private UR projects, requiring 75% matching funds. 2. Applicant may apply to VEDA (see if possible) for low interest loans for 75% match and—if possible—to manage the grants too. 3. Grantees must provide sound business plans for specific UR projects and justify the "need" within their region. 4. In all cases, applicants must be able to prove where remaining 75% of project funding comes from. 5. Other criteria TBD.	ALL AGREE

Additional Considerations of the Costs & Budget Subcommittee:

1. Enforcement was identified as a significant need by all subcommittee members to drive implementation of Universal Recycling, creating markets for haulers and processors as well as ensuring a level playing field.
2. Education and outreach were identified as a priority by several subcommittee members since this is a significant cost to their business to maintain a clean stream of organics.
3. Other materials such as C&D were discussed by several members of the subcommittee as needing priority and support from State in terms of grant and low interest loan funding and supportive policies.

II. FUNDING OPTIONS Sub-Committee (December 16th)

Potential Funding Options

Option	Unit Amount Increase	Est. Amount Raised	Duration(s)
Increase Franchise Fee	$4 initially, drop to $2	~$2m, then$1m / year	On going, with reduction
Claim Escheats			
100%		~$1.42m*	One time
50%/50%		$710k /year	Ongoing**
Bag tax			
Option A	$0.05	$1.5-2m total	~18mo before decline
Option B	$0.10	$3-3.5m total	~18 mo before decline
Option C	$0.05	TBD	Largest retailers only
Increase Pass Through %			
Option A	3% from DEC & 3% from SWME	$192k (or $96k each)	1 year
Option B	3% (split DEC & SWME)	$96k (or $48k each)	1 year
Non-Recyclable Packaging	TBD	TBD	Ongoing
Apply Franchise Fee to Alternative Daily Cover	$6/ton	~$375K	Ongoing
SWMAF		TBD	

*See Table 46 in the Systems Analysis for the estimated amount under the current BB system.

** New York and Michigan split escheats 75% to the state and 25% to retailers.

Targets Identified by Funding Subcommittee:

1. $60-70k available in grant form for planning and feasibility (potentially 90% Grant and 10% match). Could potentially be funded with SWMAF pass through funds (See Pass Through, Option B above).
2. $3-5m total raised in public funds for UR law implementation (does not include education & outreach), with combination of funding sources. Funds could be distributed using revolving loans that are accessible to public and private sector. Would need to develop a prioritization process for awarding loans along with priority list guidance to allocate funds fairly.

APPENDIX E: Universal Recycling Timeline

Universal Recycling Law
TIMELINE

JULY 1 2014

- Transfer stations/Drop-off Facilities must accept residential recyclables at no separate charge
- Food scrap generators of 104 tons/year (2 tons/week) must divert material to any certified facility within 20 miles

JULY 1 2015

- Statewide unit based pricing takes effect, requiring residential trash charges be based on volume or weight
- Recyclables are banned from the landfill
- Transfer stations/Drop-off Facilities must accept leaf and yard debris
- Haulers must offer residential recycling collection at no separate charge
- Public buildings must provide recycling containers alongside all trash containers in public spaces (exception for restrooms)
- Food scrap generators of 52 tons/year (1 ton/week) must divert material to any certified facility within 20 miles

JULY 1 2016

- Leaf, yard, and clean wood debris are banned from the landfill
- Haulers must offer leaf and yard debris collection
- Food scrap generators of 26 tons/year (1/2 ton/week) must divert material to any certified facility within 20 miles

JULY 1 2017

- Transfer stations/Drop-off Facilities must accept food scraps
- Haulers must offer food scrap collection
- Food scrap generators of 18 tons/year (1/3 ton/week) must divert material to any certified facility within 20 miles

JULY 1 2020

- Food scraps are banned from the landfill

VERMONT
AGENCY OF NATURAL RESOURCES

- For more information, visit www.recycle.vt.gov