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Barnstable County/Cape Cod Commission

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Date: November 5, 2021 Revised

Subject: Barnstable County MSW Diversion Options for Recyclable, Reusable and Hard to Dispose Waste Materials

Task 4: Processing Facility Needs, Locations and Estimated Facility Costs

1.0 INTRODUCTION

Tetra Tech conducted research on how the County could work with the Cape and Island towns to identify options to collaborate on MSW aggregation, processing and diversion. Those options could include public-private, public-public and public-military partnerships.

The analysis considers opportunities to incorporate existing local assets including the Town of Bourne ISWM, Town of Yarmouth, and potential sites at the Joint Base Cape Cod (JBCC) as options for materials management – all of which could require future planning through engineering and implementation.

1.1 OBJECTIVES

Conduct a high-level site characterization to include the type of facility, size, amount of property needed, siting requirements such as permitting, utilities and required site improvements, potential public health and environmental protection impacts and include transportation options.

- Describe the site characterization to include the type of facility size, siting requirements such as permitting, utilities and required site improvements and potential public health and environmental protection impacts.
- Evaluate potential costs for design, construction, operation, and maintenance of the facilities.

2.0 EXISTING LOCAL FACILITIES

Barnstable County is examining longer term waste diversion options by aligning its fifteen member municipalities, as well as Nantucket and the six towns of Martha's Vineyard, towards regional resiliency.

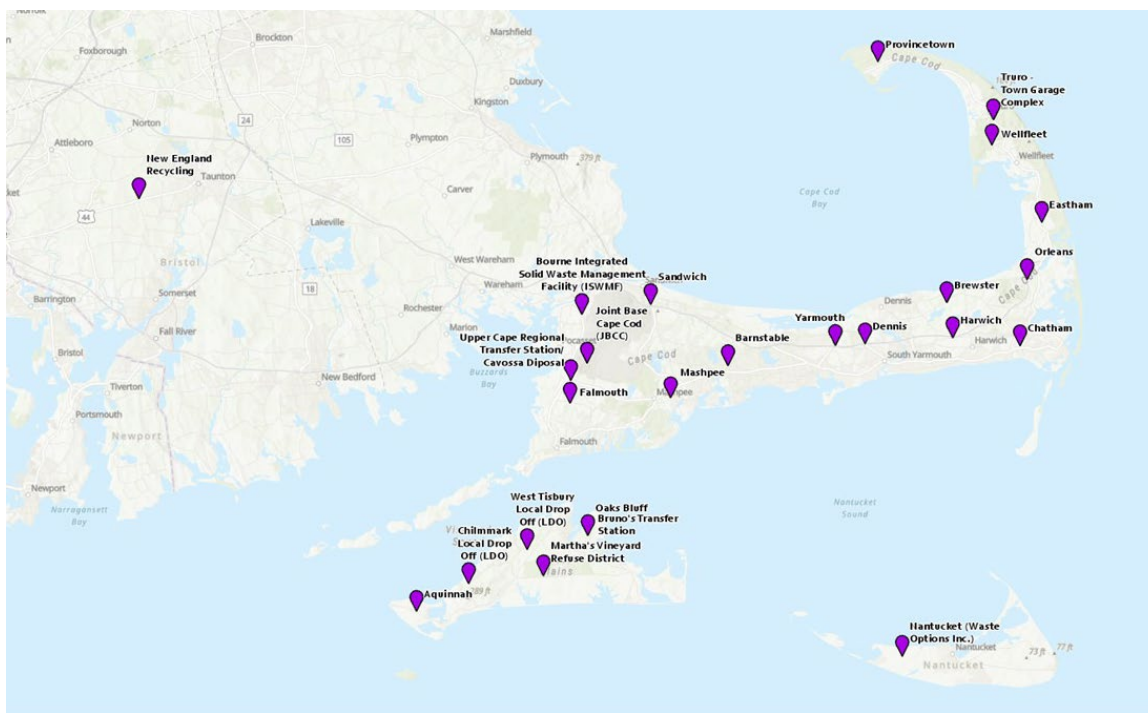
Cape Cod and the Islands have the resources and existing infrastructure to develop short and long-term plans for solid waste management. The County should work toward a consensus and help municipalities to develop a shared vision of resource sharing that will bridge future plans. The County should develop:

- Stepped, phase-in approach
- Vision and strategy to do future planning

The Cape and Islands transfer station facilities developed organically over the course of decades to serve as small, convenient drop-off locations for businesses and residents to deliver their solid waste. Over time, these facilities also incorporated small volume recycling/drop-off opportunities into their already limited facility footprints. None of the facilities were planned, located, or intended to serve as County-wide infrastructure for either waste consolidation or recycling processing and diversion.

Moreover, residential encroachment renders a great deal of these existing facilities as poor candidates on which to expand larger volume or comprehensive solid waste processing operations. **Figure 2-1** shows the town transfer stations located on the Cape and Islands and includes a large C&D processing facility located off Cape.

Figure 2-1: Locations Town Transfer Stations and Off Cape C&D Transfer Station



While the County is examining longer term waste diversion options by collaborating with the Cape and Island towns, it also seeks potential ways to engage existing local assets in the short to mid-term, developing interim steps that could encourage further alignment, resource sharing and cost diversion. **Table 2-1** presents six existing local assets.

Table 2-1: Existing Local Assets

| Location | Type of Facility | Potential Interim Step |
|---|--|--|
| Town of Bourne ISWM | Landfill Transfer station Truck hauling | Typical Recycling Program Materials Expand Boat Shrink-Wrap Program Latex Paint Collection should be continued |
| Town of Yarmouth | Wastewater treatment plant Rail head/haul to Covanta, and can also access CSX rail line | Wet Anaerobic Digestion Food Depackaging Operation Organics and biosolids processing |
| Town of Dennis | Transfer station | Expand Glass Recycling Program |
| Black Earth Compost, Falmouth | Composting (Yard and food material) | Food Material and Certified Compostables Collection for Composting |
| Watt Family Farm, Forestdale | Composting | ---- |
| Joint Base Cape Cod - Upper Cape Regional Transfer Station and Landfill (existing solid waste facilities) | Transfer Station with rail head/haul to CSX rail line; closed landfill | Long-Term Strategic Planning for Eco-Park Infrastructure |

2.1 TOWN OF BOURNE

The Town of Bourne Department of Integrated Solid Waste Management (ISWM) operates on a 111-acre site off of MacArthur Boulevard (Route 28 north) in Bourne, as an Enterprise Fund that is separate from the Town of Bourne's General Funds. The ISWM Enterprise Fund primarily generates revenue from gate receipts for its various operations, the largest of which is the landfill. The following is a brief overview of ISWM. For more information, including presentations, permit documentation and videos, ISWM maintains an informative website at <https://www.townofbourne.com/integrated-solid-waste-management>.

2.1.1 Bourne Landfill

The Town of Bourne landfill located on approximately 74 acres at MacArthur Boulevard started operations in 1967. Phases 1A, 1B and 1C ceased accepting waste in 1999 and are closed and capped. Phase 2, which is now closed and capped, was the first area with a modern liner system in 1999. Subsequently, all new landfill phases were constructed with a double composite liner system with leak detection prior to being required to do so by MassDEP. This is the state-of-the art design standard in the industry. The landfill is permitted to accepted 219,000 tons per year with an average of 600 tons per day.

Closed areas that have the liner system are Phase 3, Stages 1 through 3, Phase 2A/3A which filled in a valley and connected Phases 2 and Phase 3 with the old unlined phases, and Phase 4, Stage 1. Phase 4, Stage 2 and Phase 5 have reached grade and are in the process of being capped with an expected completion date sometime in the spring of 2022. Phase 4 is distinct in that was constructed in an area known as Phase 1D, which was an unlined area used in the 1970s, non-contiguous to the other unlined areas. ISWM received approval from MassDEP to remove the waste in this area and line it for use as Phase 4, thus removing a threat to the groundwater and providing added regional capacity. All the capped areas are connected with an extensive network of landfill gas extraction wells which utilize a vacuum to capture approximately 95% of the landfill gas and convey it to a large flare located in the northeast corner of the site. The flare is designed to destroy virtually all the methane in the landfill gas.

Since 2015, ISWM has had a contract with Covanta SEMASS to accept residual bottom and fly ash from its municipal waste combustor in Rochester, Massachusetts. The residual ash comprises approximately 85% of the annual permitted tonnage of the landfill, or 189,000 tons. Approximately 18,000 tons per year is utilized for MSW from the Town of Bourne and from the Town of Falmouth under a separate long-term contract. The remaining tonnage is allocated for other waste streams such as permitted soils, grits and screenings and water treatment residuals. ISWM currently operates in Phase 6 which began operation in 2019 in an area previously occupied by the Bourne DPW, which was relocated off-site.

2.1.2 Twenty-Five Acre Parcel

Currently, the facility has several operations in addition to the landfill which operate on an adjacent 25-acre parcel acquired by the town in 2001. This parcel is permitted to handle and process solid waste. Users of these facilities include residents from Bourne and nearby towns as well as commercial customers. This includes local construction contractors and commercial waste hauling companies.

Operations include:

- Residential recycling center that accepts materials from the Town of Bourne and neighboring communities
- Construction and demolition debris transfer station, open to commercial haulers
- Single stream recyclables transfer station, open to commercial haulers
- Compost site, including yard waste and brush
- Area for asphalt, brick and concrete recycling

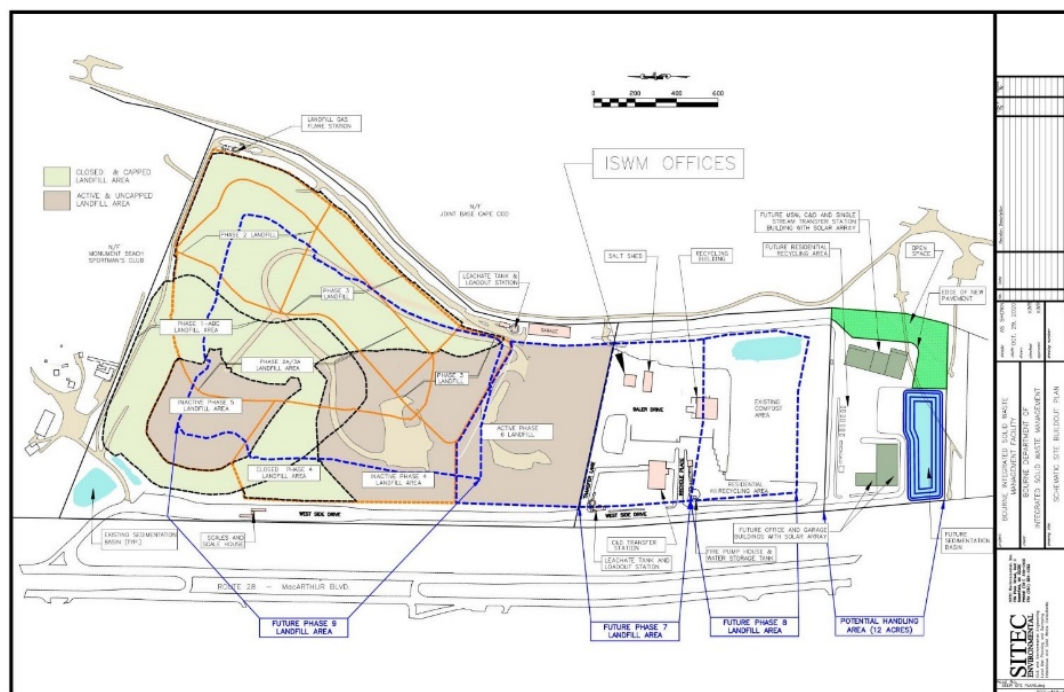
2.1.3 ISWM Site Development Master Plan

The Town is currently undergoing permitting for a final site development master plan that will incorporate both vertical and horizontal landfill expansions into Phase 7, Phase 8 and Phase 9, as well as a development plan for relocating transfer stations that will be displaced by the landfill expansion onto an adjacent 12-acre parcel acquired by the Town in 2016. The total estimated capacity created by these expansions is estimate at over 5,000,000 cubic yards and is projected to last until the early 2040s. ISWM submitted a Single Supplemental Environmental Impact Report describing this master plan to the Massachusetts Environmental Policy Act (MEPA) office and received approval from the MA Secretary of Energy and Environmental Affairs in December of 2020. Subsequently, ISWM submitted a Development of Regional Impact (DRI) application to the Cape Cod Commission (CCC) and received approval in September 2021. MassDEP is currently reviewing an application for a major modification to the existing site assignment related to the master plan which will then be reviewed in a public hearing by the Bourne Board of Health. This final process is expected to be completed in early 2022. Each phase of the landfill will still need a separate approval from MassDEP as will any new transfer stations.

Figure 2-2 shows the ISWM build-out plan for Phase 7, Phase 8 which are horizontal expansions and Phase 9, which will be a vertical expansion. There is also a conceptual layout of a potential multi-use transfer station, new offices and an improved maintenance facility at the southern end of the site on the now undeveloped 12-acre parcel. These facilities will be utilized by the Town in perpetuity after the landfill closes.

Tetra Tech conducted a high-level analysis on the potential for siting a modern materials recovery facility (MRF) at the ISWM site that could be scaled to support the Cape and Island Towns. However, it is unlikely for this type of facility to be sited at the ISWM location due to the landfill expansion, and the need for an administrative and maintenance facility to be located in the same area.

Figure 2-2: Conceptual Site Development Master Plan



2.1.4 Regional Zero Waste Initiatives

ISWM has been a leader in regional cooperation on Zero Waste initiatives in addition to its operations at the ISWM facility for household recyclables and compostables. These include regional programs for latex paint, mattresses and boat shrink-wrap. ISWM participates in regional planning with solid waste managers on Cape Cod and the MassDEP Municipal Assistance Coordinator to look for new opportunities to cooperate on a range of materials. This includes actively supporting permanent solutions through legislation requiring industry-run programs called Extended Producer Responsibility (EPR), which are commonplace in Canada and Europe.

2.1.4.1 Mattresses

Specifically, ISWM was the first host for the regional mattress recycling grant from MassDEP in 2016 which ran for three years. Based on the success of this program, ISWM continues to work with mattress recycling vendors to process and recycle mattress from residential and commercial generators. To date, well over 16,000 mattresses have been diverted from the landfill saving significant airspace and ideally positioning the town to comply with the upcoming waste ban on mattresses announced by MassDEP.

2.1.4.2 Latex Paint

ISWM was the project lead for the Cape Cod Latex Paint Collection and Recycling Initiative in 2018 and 2019 supported by a MassDEP grant. This involved writing a grant application on behalf of all fifteen towns and managing a budget of \$81,800 to promote, collect and recycle latex paint from collection events across the entire Cape. During this period approximately 60 tons of latex paint was diverted for recycling into new paint. ISWM continues to work with the Cape towns to provide an annual collection event in concert with the Town of Dennis in order to keep paint recycling in the minds of residents. The most recent collection in August 2021 diverted over 2,000 gallons of paint for recycling.

2.1.4.3 Boat Shrink-Wrap

ISWM historically collected boat shrink-wrap for many years but had suspended the program because of global market disruptions a few years ago. However in 2019, ISWM worked collaboratively with the Woods Hole Oceanographic Institute (WHOI) Sea Grant Program, Cape Cod Cooperative Extension, AmeriCorps, Chatham, Dennis, Eastham and Wellfleet to provide a network of drop off sites to collect shrink-wrap in the spring when boat owners prepare their boats for the season. Sea Grant paid for the public education materials, transportation and recycling expenses. In 2021, the five towns collected ten tons of boat shrink-wrap between April and June that was sent to a recycler in North Andover, Massachusetts. However, this was a temporary program, and the Cape communities cannot rely upon a grant program for 2022 and beyond. ISWM is part of the inter-municipal project team that is looking into new markets and logistics for the 2022 season as world commodity markets recover. This will likely include a fee structure to support the program.

2.1.4.4 Potential Pilot Project to Build-Out the Boat Shrink-Wrap Recycling Program

A recommendation is for the County to assist the five towns to collaborate and potentially work with Kelly Green Products in Connecticut on a pilot project to build up the current boat shrink-wrap recycling program. The MacDougalls' Boat Yard in Falmouth should also be included in the discussion and planning as they collect boat shrink-wrap and transport it to the Bourne ISWM. An expanded program could encourage other boat marinas to participate. The program could also include agricultural mulch films, other plastic films, and beverage cartons.

As a potential opportunity, the Islands and Cape towns could coordinate to transport materials to the Town of Bourne ISWM or Town of Yarmouth transfer station as an aggregation location. A transload operation would need to be organized to move materials to either of these transfer stations. Kelly Green could provide the truck hauling service (20 tons per truck) for the boat-shrink-wrap and pay the towns between \$5 to \$15 per ton. This would off-set the cost of the program.

Kelly Green Products is a regional recycler in Waterbury, Connecticut that manufactures green building materials from the recycled plastics films, closing the loop for the boat shrink-wrap program. The County would know the beneficial end-use market.

One consideration could be to work with a local waste hauler including Bruno's Rolloffs who might provide containers. Through collaborative strategic planning, a cost savings may or may not be realized, as a cost/revenue sharing opportunity is most likely.

The County and towns might consider a Cape-wide policy to recycle all boat shrink-wrap. Marinas and boat yards will have to include the cost of the recycling program into their service and pass this cost on to their boat customers.

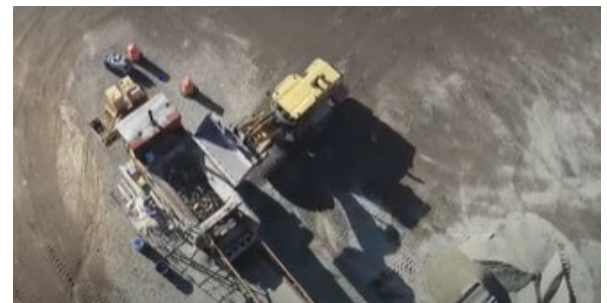
This type of a pilot project could serve as a preliminary exercise around a diversion collaborative approach and to gauge how the rest of the Cape and Islands would consider a cost-effective Cape-wide transportation option for waste materials that all communities would have access to, but all communities would share costs and potential savings. This pilot could serve as a potential interim step toward learning about Cape-wide preference for a material processing facility on Cape.

2.2 TOWN OF DENNIS

The Town of Dennis Department of Public Works opened a Glass Recycling Depot in 2019 through a Beneficial Use Determination (BUD) from the MassDEP. Dennis was awarded a \$120,500 Sustainable Materials Recovery Program grant from the MassDEP.

- Town of Dennis generated about 300 tons of glass annually. In total Cape towns' produce about 2,000 tons of glass recyclables annually.
- Towns of Harwich, Wellfleet and Barnstable, more recently the towns of Mashpee and Brewster, participate in the glass recycling program.
- Cape Cod municipalities can bring glass recyclables to Dennis at a cost of \$60 per ton.

Town of Dennis Glass Crush 2019



Many of the towns transport their glass off-Cape at significant cost, and this program offers a collaborative approach and potential cost-saving for aggregating glass.

The Town of Dennis recently came to an arrangement with Robert B. Our, a local construction company, to use processed glass aggregate (PGA) as a substrate in underground sewer installations in the Towns of Orleans and

Barnstable. In other cases, the glass could be collected by the non-profit Northeast Resource Recovery Association (NRRA) in Dover, New Hampshire that operates a recyclables marketing cooperative that directly connects towns with recyclable commodities to purchasers of those commodities. About 100 municipalities in New Hampshire, Vermont, and Massachusetts are recycling glass in partnership with the NRRA, which is headquartered in New Hampshire. The recycled glass is used in fiberglass insulation or crushing glass into PGA, which can be used in road and infrastructure projects in the place of gravel and sand.

There could be an opportunity to collaborate with New England Recycling (NER) on accepting the recycled glass to identify a potential cost savings or cost diversion.

2.3 COMPOSTING FACILITIES

Black Earth Compost

Black Earth Compost is a regional organics (food waste) collection, hauling and composting facility operator headquartered in Gloucester, Massachusetts that first offered food waste collection services to residents and commercial clients in Essex County. Black Earth currently operates the yard/food waste composting facility for the Town of Manchester-By-The-Sea, and recently reached an agreement with the Town to move the composting operation to the Town Landfill. This allows Black Earth to expand the composting operation into a regional facility, which will save the town costs on their curbside organics collection program over time, and will open the facility to receive organics from other towns.

On Cape Cod, Black Earth acquired Compost With Me LLC, a farm-based composting operation in North Falmouth in July 2020. Black Earth collects food waste from the Mashpee and Falmouth municipal transfer stations, continuing the service that Compost With Me started several years ago. Compost With Me started service in Falmouth in 2013, collecting residential food scraps from about 100 households and diverted an estimated 41.5 tons of food waste per year from landfill. Black Earth accepts certified compostable food service ware items and compostable bags.

Black Earth services commercial organics collection pick-ups on Thursdays and Fridays on the Cape. These commercial accounts include Snowy Owl Coffee Roaster, smaller restaurants, and a bowling alley that serves food. Moreover, Black Earth is looking to start a residential curbside collection service on the Cape. Since route density is important for an organics collection program, Black Earth needs around 75 households to pre-register before they start a curbside route.

Watts Family Farm

Watts Family Farm is a 14-acre farm in Forestdale. Watts Family Farm picks up food waste (fruits and vegetables) from commercial entities (i.e. grocers) for use to produce compost or as animal feed.

2.4 TOWN OF YARMOUTH

To advance toward a future development scenario with the Joint Base Cape Cod (JBCC), it is recommended that an initial step for the County is collaboration with the Town of Yarmouth. In the short-term Barnstable County should engage and cooperate with the Town of Yarmouth to support Yarmouth's plan to potentially develop an anaerobic digestion facility at their existing town transfer station.

The Town of Yarmouth transfer station and composting operation presents as the largest, best situated facility for the potential to incorporate waste diversion infrastructure on the Cape in the short to mid-term. Yarmouth is unilaterally pursuing its goals for managing waste and energy development and may provide an outlet for food material and biosolids processing needs on and off Cape.

The County should support the Town of Yarmouth's investments and expected operations. The County could help the Town of Yarmouth to build its model, and then the County should plan to build a larger regional scale organics infrastructure including anaerobic digestion and composting, potentially at the JBCC or other site (longer-term future plan), that does not compete with Yarmouth's plan.

To this end, Barnstable County should continue regular dialog with Yarmouth to formulate how food material and biosolids sourced from on and off Cape may assist Yarmouth in their development. Food waste and potential biosolids are needed to support Yarmouth with their proposed Cape Cod Energy Park and anaerobic digester pro forma.

3.0 SHORT TO MID-TERM PLANNING

In the short to mid-term Barnstable County should engage and cooperate with the Town of Yarmouth to support Yarmouth's development plan. Organics and potential biosolids are needed to support Yarmouth with their proposed Cape Cod Energy Park and anaerobic digester pro forma. The following are interim steps the County could take to begin the approach for the short to mid-term plan of collaboration toward the longer-term future plan.

Collaborate and assist with the Town of Yarmouth. The County can assist, with the cooperation of the Cape and Island towns, to organize and track **Organics and C&D materials** to aggregate the materials at Yarmouth; and **pursue grants for equipment or other needs**. Organics and C&D materials are the two largest waste material categories generated by volume. Moreover, there could also be potential combining of other waste material categories at Yarmouth for transportation to an off-Cape large handling facility, including New England Recycling in Taunton, Massachusetts.

3.1 SOURCE SEPARATED ORGANICS: POTENTIAL PILOT

A recommendation is for the County to consider an organics management program that would encourage both residents and businesses to source separate organics including all food materials and yard debris to be managed locally on the Cape. The organics program would also encourage residents and businesses to buy locally produced compost to use for gardens and landscaping. This could be a Cape-wide opportunity to develop a closed loop system for organics material management.

For local and regional entities looking to implement zero waste strategies, organics is one of the primary materials to divert from the solid waste stream. High waste diversion goals cannot be reached without managing the considerable organics fraction that is 30 percent of the municipal solid waste stream. Even for locations that have addressed recycling or made other progress, this is often a largely untapped area.

- Encourage organics collection drop-off at all transfer stations. Food scraps-filled totes can be transported to Yarmouth as feedstock for the digester. The County should provide consistent information and education to help reduce contamination of source separated organics (SSO).

- Yarmouth could possibly start working the small volume of reported source separated organics (SSO) that is residential food waste estimated at **205 tons of SSO per year** (about 17 tons per month).
- As Yarmouth plans to have a food waste depackaging facility operational in 2022, the County should collaborate with both the Massachusetts Food Association (MFA) and Massachusetts Beverage Association (MBA) on commercial food waste collection. After food donation, commercial food waste can be transported directly to Yarmouth for depackaging.
- Barnstable County should maintain ongoing conversations with commercial entities that may result in additional opportunities for Cape and Island towns for commercial organics diversion. The MassDEP commercial organics ban threshold is lowering to half-ton per week starting in November 2022. Additional businesses will need to be compliant with the new ban and have an outlet for their commercial food waste.

3.1.1.1 Keeping Organics Local To Reduce Cost and Greenhouse Gas Emissions

Managing organics locally allows organics management close to the source of diversion. This keeps truck hauling costs down and reduces GHG emissions. Overall, the County and towns benefit by keeping resources and money within the local communities. The County should assist Cape and Islands towns to purchase and use locally finished compost for public space beautification projects. The environmental benefits of locally produced compost for soil health, replacing synthetic petroleum-based fertilizers and pesticides are well known. ([US Composting Council](#))

The Islands of Nantucket and Martha's Vineyard already have an organics infrastructure in place; it makes sense to keep organics management local on the islands. However, the County could collaborate with the Islands to develop consistent educational materials to maintain their organics recycling programs, and increase participation in organics diversion across the Cape and Islands over time.

A recommendation for the County is to conduct an organics audit to gain insights on the potential amount of food scraps and yard debris generation from the Cape towns. The fundamental goal is to further refine the volumes identified in the Task 1 MSW analysis. The information collected could be used to identify areas to reduce waste and divert resources.

Greenhouse Gas Emissions

The State of California [SB 1383](#) (short-lived climate pollutants/methane emissions) requires counties to take the lead collaborating with the jurisdictions located within the county in planning for the necessary organic waste recycling and food recovery capacity needed to divert organic waste from landfills. Starting in 2022, all jurisdictions will need to provide organic waste collection services to all residents and businesses, and recycle these organic materials using anaerobic digestion facilities that create biofuel and electricity, and composting facilities that make soil amendments.

The Massachusetts Global Warming Solutions Act (GWSA), which became law in 2008, required the MassDEP to promulgate mandatory greenhouse gas (GHG) reporting regulations. The MassDEP issued 310 CMR 7.71 that identified facilities that need to report, establishes methodologies for calculating and verifying emissions, and allows voluntary reporting by facilities for which it is not mandatory. It is likely that this will tie-in directly with the State Solid Waste Master Plan 2030 (the Plan) as the MassDEP develops the Plan Action Items over time.

3.2 CONSTRUCTION AND DEMOLITION MATERIAL: POTENTIAL PILOT

A recommendation is for the County to consider a C&D materials management program to coalesce all materials at the Yarmouth transfer station for transportation by truck or rail haul. By aggregating C&D materials to one large transfer facility such as Yarmouth, Cape and Islands towns could potentially reduce hauling costs. With the potential to apply a collaborative approach for aggregation of C&D materials, rail could be utilized as this is a volume driven business, and C&D materials is the largest material category by volume generated by Cape and Islands towns. Based on the reported 2019 data, the generation of C&D materials collected at the municipal transfer stations is an **estimated 30,000 tons of C&D materials per year**. The C&D tons are assumed to be accounted for from six reporting locations (Brewster, Chatham, Eastham, Harwich, Wellfleet and Yarmouth).

New England Recycling Company (NER) currently services the towns of Harwich, Yarmouth, and Barnstable, and the private transfer station, S&J Exco, in South Dennis. There could be beneficial use opportunities through developing a relationship with NER to improve the collection of C&D materials for the Lower and Outer Cape towns.

At the Yarmouth transfer station, the residential drop-off area is south of the rail tracks. Currently residential traffic is backed up to Old Town House Road and there is typically a 30-minute wait to go over the scale. Due to the traffic and high volume of materials, significant changes would be needed to make space available for a 40-yard C&D collection trailer. Based on a reported high level of activity, Yarmouth might consider increased pricing to adjust for the high volume.

Massachusetts Coastal Rail (Mass Coastal) in Lakeville, Massachusetts currently transports municipal solid waste (MSW) on an interline move between the Yarmouth Commercial Transfer Station and the Covanta SEMASS facility in Rochester, Massachusetts. In addition to the Yarmouth Commercial Transfer Station, there is potential for Mass Coastal to utilize the Upper Cape Regional Transfer Station (UCRTS) rail head to transport C&D or other waste material categories off-Cape to a vendor for processing or an end market. As an example, it could be possible for the C&D to be rail hauled to New England Recycling in Taunton for processing. This could be an ordinate move for Massachusetts Coastal Rail, and there are at least three or four destinations that could facilitate this move in terms of transportation and disposal (T&D). What remains, is the fact that all of these rail served facilities send processed C&D materials to landfills in Ohio.

Moreover, both the Upper Cape Regional Transfer Station and Yarmouth Commercial Transfer Station have both options of truck and rail haul that give the towns flexibility, which is important given the quantity of C&D material generated and collected at the transfer stations. When comparing the costs of rail versus truck transportation, industry standard is to apply a ratio of 1:4, since one railcar equates to four truck loads.¹ It is estimated that each truckload would hold up to 20 tons of C&D material. There could be potential cost savings in rail haul as an option.

¹ <https://www.rsilogistics.com/blog/comparing-the-costs-of-rail-shipping-vs-truck/>

4.0 LONGER-TERM FUTURE PLANNING

Tetra Tech recommends for the County to engage with the Joint Base Cape Cod (JBCC) for longer-term planning for future development of waste processing/waste diversion infrastructure.

As stated in **Section 2.0**, there is limited opportunity to develop larger volume, County-wide solid waste processing infrastructure at existing town facilities. Developing larger scale solid waste processing infrastructure at a new location within the County is challenging due to lack of available land and to avoid locations proximate to development and sensitive receptors. The JBCC presents the opportunity to set aside large potential areas of land further removed from development than is available anywhere else in the County.

Successful infrastructure implementation at the JBCC will increase capacity of local government, communities and stakeholders to adopt and implement sustainable materials management policies, practices and incentives for decades to come. Identifying land to locate potential future technologies will place the Cape and Islands in the best position to take advantage of regional waste management opportunities.

Barnstable County Goals

- | | |
|--|--|
| • Reduce waste generated. | • Solid waste aggregation - lower disposal fees. |
| • Maximize the value of materials recovered. | • Better position with recycling markets. |
| • Maximize the amount of material reused, repurposed and recycled. | • Organics management or other means of disposal to be financially and environmentally viable. |
| • Do all of these for the lowest cost possible. | • Development of debris management under emergency circumstances. |

4.1 JOINT BASE CAPE COD: EXISTING SOLID WASTE FACILITIES

Recognizing the potential of the JBCC, at least two parcels have been identified that are already utilized as solid waste facilities. Moreover, the JBCC is located conveniently to service the towns, and located near the major roads and with a rail head. This makes it feasible to consider the JBCC sites as hypothetical options to allow for future solid waste management needs.

There could be other potential properties to be identified that could also service the towns as solid waste facilities options. However for this facility report, the JBCC is identified for hypothetical planning purposes. Based on the fact the two parcels are already used as solid waste facilities, that the capability already exists is an important aspect of the parcels. Two potential locations were identified for Longer-Term Future Planning: Existing Landfill (Parcel H 193.3ac) and the Upper Cape Regional Transfer Station (Parcel H 18.9ac). Although the landfill parcel (Parcel H 193.3ac) is within the base security fence and located just beyond the guard gatehouse, the parcel has a history of solid waste management use. Therefore Parcel H or a similarly sized land parcel could be utilized.

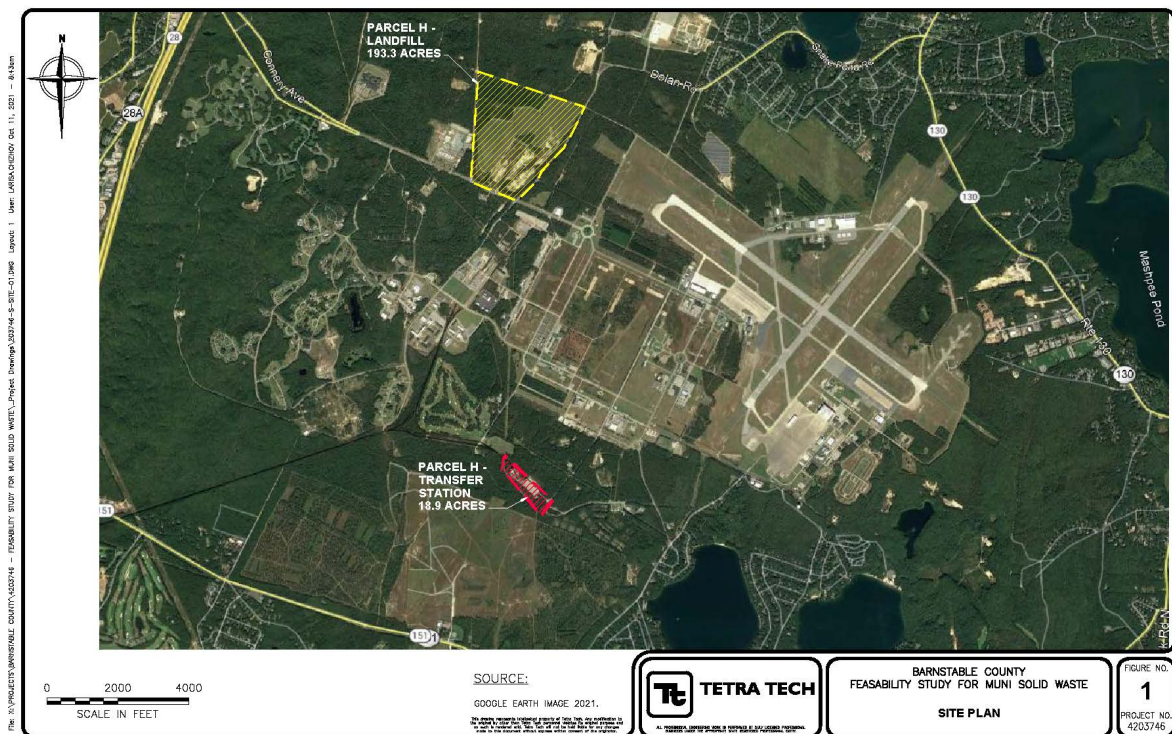
This is not likely a situation where a government entity would “sell” the property to another government entity. The property would most likely be “transferred” to the County under a land use agreement arrangement

with the military and/or state. Under this scenario, there are most likely soft costs involved in the pursuit and negotiation of the terms and the land use instrument to transfer the property or otherwise facilitate public infrastructure development. The County would probably conduct a **Phase I Environmental Site Assessment (ESA)** on the two identified parcels.

Additional investigations review might be necessary depending on the findings on the specific parcels in question. The cost of this is dependent on parcel size and specifics. A preliminary cost estimate of \$150,000 to \$250,000 for soft costs (attorney, land use experts) could be necessary to advance discussions and negotiations with the JBCC. An additional estimate of \$150,000 to \$250,000 may be needed for initial due diligence reports in support of acquisition efforts. Additional funding may be needed for further assessments.

Figure 3-1 shows the locations of the two parcels. Parcel H Landfill is outlined with a yellow hyphenated boundary. Parcel H Transfer Station is outlined with a red hyphenated boundary.

Figure 3-1: Existing Parcels identified as Existing Solid Waste Facilities



4.1.1 Existing Landfill

The closed landfill located at the Joint Base Cape Cod (JBCC) is on state-owned land but is regulated through the United States Environmental Protection Agency (USEPA). The landfill site is currently a waste site cleanup, as plumes of PFAS and 1,4, Dioxin have been detected, impacting the public water supply.

For the County's future planning purposes, it is recommended for the County to conduct a Fatal Flaw Analysis to understand what would be feasible and compatible at this landfill site, and how to potentially co-manage the landfill site with the state-level government.

For future planning purposes, the hypothetical development scenario looks at the closed landfill as a potential site for a regional organics management facility.



Photo courtesy: JBCC website

4.1.2 Upper Cape Regional Transfer Station

The Upper Cape Regional Transfer Station (UCRTS) Board of Managers is the body that oversees all operations for the municipally managed regional solid waste transfer station located on Joint Base Cape Cod (JBCC). Four towns manage the transfer station and rail head property through the UCRTS Board, including Bourne, Falmouth, Mashpee and Sandwich.

The existing UCRTS area is already accessible and currently utilized by a private waste hauling and processing operator. The site currently includes a transfer station tipping building with tipping floor and office space, a rail spur, a truck scale, and utilities. Tetra Tech recommends that the County examine options to expand the transfer station area **for an Eco-Park development and services**.

The UCRTS is located on a 19-acre parcel of land off Generals Boulevard on Joint Base Cape Cod. An existing 8,597 square foot building includes three roll-up doors, waste tipping and storage areas, a rail carload-out area and an office area. In 1988, the Sandwich Board of Health voted to grant site assignment for a solid waste facility, an 18-acre parcel of land located off Kittredge Road, subject to receipt of an approved construction permit, construction of wide access roads, and the installation of underground electrical lines. It should be noted that most future references to the UCRTS list the location as Generals Boulevard, which is the closest main road to the Facility.²

Up until January 1, 2015, the UCRTS served as a rail transfer facility for municipal solid waste (MSW) from the towns and private haulers. The transfer station has a permitted capacity of 89,100 tons per year, but has operated at less than 50,000 tons per year for the past several years. Prior to 2017, the transfer station had a rail

² Massachusetts Department of Environmental Protection, Approval with Conditions BWP SW 49-Certification for Transfer of Permit, letter dated October 16, 2017.

transportation contract with Massachusetts Coastal Railroad to provide the rail cars and hauling from their facility to the SEMASS facility. In 2017, the Facility transferred the permit for operation from the Town of Falmouth Department of Public Works to Cavossa Disposal Corporation (CDC) a commercial waste processing company.

Based on historical documents, MassDEP determined that the UCRTS is properly site assigned for operation of a transfer station and permitted to operate at a maximum daily tonnage of 286 tons per day Monday through Saturday. Acceptable materials included:

- Municipal Solid Waste
- Category 1 - Construction and Demolition Waste
- Category 2 - Construction and Demolition Residuals
- Category 3 - Bulky Waste

The Facility may accept and handle Universal Wastes only in compliance with 310 CMR 30.1000 Standards for Universal Waste Management, and any other regulations applicable to such wastes.³ Under the MassDEP permit, Cavossa is limited to accept Category 1 C&D waste materials to a maximum of 100 tons per day. In December 2017, MassDEP approved a permit modification to allow Cavossa to accept Category 1 C&D waste in CDC vehicles only and authorized Cavossa to accept Category 1 C&D waste from third party haulers. In 2018, MassDEP approved a permit modification to increase C&D processing 150 tons per day.

4.1.3 Eco-Park Vision

Tetra Tech conducted calls with MassDEP, and they have expressed a favorable attitude toward multi-community collaborative agreements to enhance and leverage contracts. MassDEP is also favorable to the idea of the town transfer stations continuing to collect their materials, then aggregate at a system-wide central facility for baling and hauling for recycling and reuse end-markets. MassDEP can provide model contracts and is open to further discussions to support the County's planning efforts.

Massachusetts solid waste regulations CMR 16.00 applies to site assignment for solid waste facilities. Under CMR 16.03(2), (a) Handling Solid Waste and (b) Handling Recyclable Material are defined as temporary solid waste storage activities and do not require a site assignment provided that the owner and operator incorporates best management practices in a manner that prevents an unpermitted discharge of pollutants to air, water or other natural resources of the Commonwealth, does not create a public nuisance, and does not present a significant threat to public health, safety or the environment.

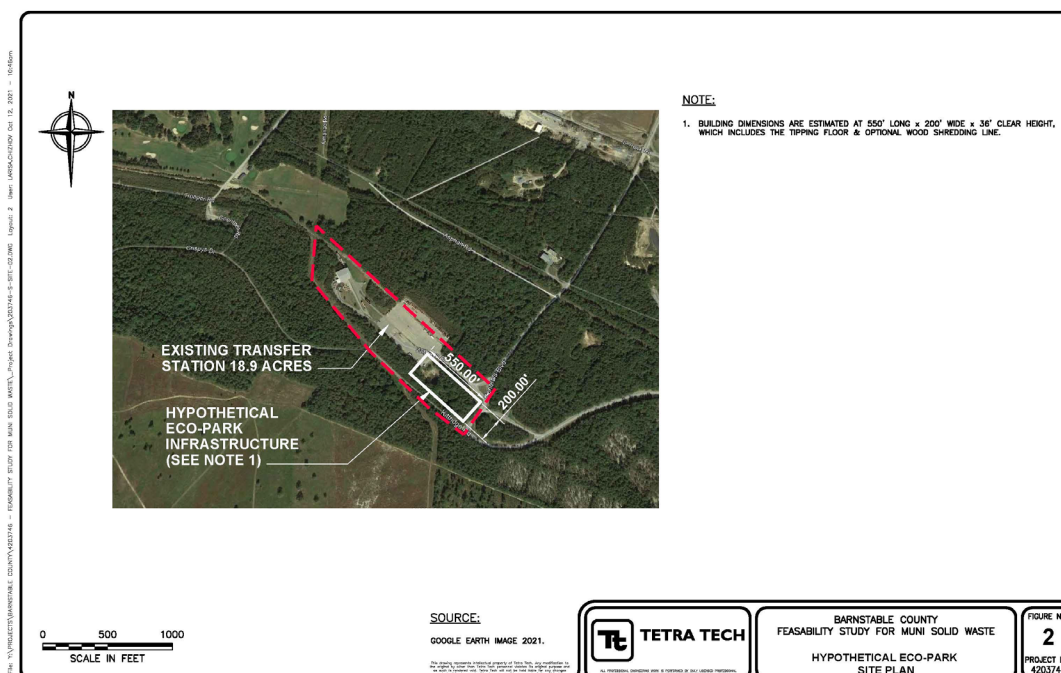
The concept of an Eco-Park addresses Barnstable County's vision to find a way to use the waste generated on-Cape and from the Islands, enhance the region's transfer station network, share resources, and identify processing facilities for the waste stream components for beneficial reuse and recycling, including organics. For the longer-term future plan, this type of arrangement could be implemented to create a solid waste facility at the existing former landfill, UCRTS or other potentially available properties at JBCC. Moreover, this is an opportunity to determine the JBCC's interest in working with municipalities.

³ *IBID*

Disaster debris management is of high importance to the Cape and Island towns. A recommendation would be to locate a disaster debris management area within or near the potential Eco-Park at the UCRTS area, as it is the parcel most readily available to the towns and closest to the major roads. The area near the UCRTS is a good location as it has areas for sorting materials and the transfer station with existing rail head can be utilized for moving large volumes of materials off Cape.

Figure 3-3 shows the existing UCRTS where an Eco-Park infrastructure with a potential solid waste infrastructure could be located.

Figure 3-3: Potential Infrastructure at Upper Cape Regional Transfer Station



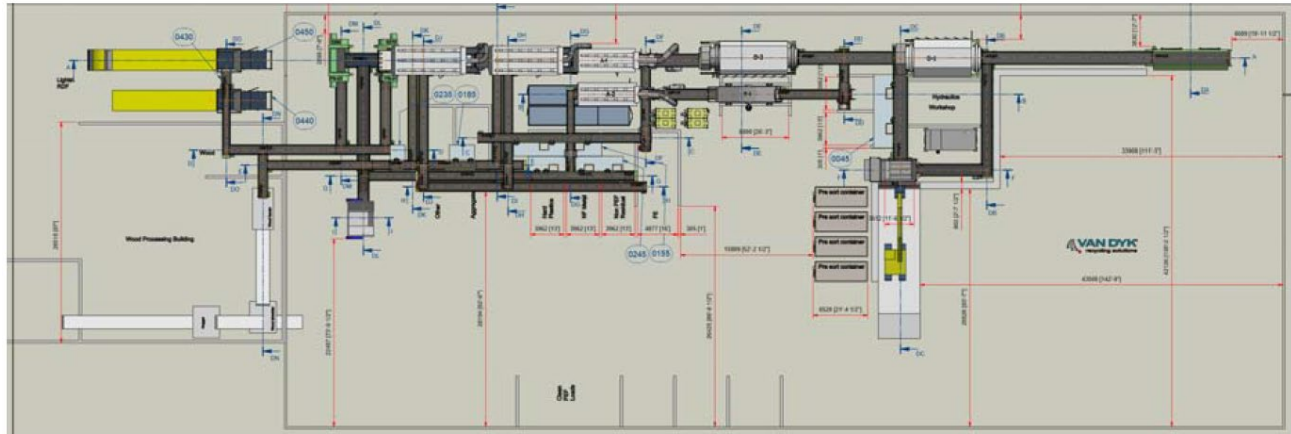
4.1.4 Construction and Demolition Materials Recovery Facility (MRF)

Shown in **Figure 3-4** is a hypothetical building structure that could be sited at the existing UCRTS. For example purposes, the building dimensions are estimated at 550 feet long x 200 feet wide with 36 feet clear height. This includes a tipping floor and an optional wood shredding line. This site plan was developed for a large construction and demolition (C&D) recycling facility with a processing capacity of 100 tons per day.

Construction costs are typically based on warehouse-type building square footage. About five to ten MRFs are built each year in the United States, with a typical fully equipped facility construction cost averaging \$20 M to \$30

M.⁴ The equipment is about half the cost of a MRF, with more automation being used that also drives up the equipment cost. The cost of installation is around 15% of the equipment cost.

Figure 3-4: C&D Material Recovery Facility



4.2 ESTIMATED PROCESSING AND FACILITY COSTS

The County has an opportunity to coordinate a regional solution for resilience and development of debris management under emergency circumstances. Furthermore, the development of an Eco-park infrastructure could include a materials recovery facility (MRF), and an organics management facility with both anaerobic digestion and composting that could be located at the JBCC.

When considering the potential acreage to set aside for an Eco-Park infrastructure, the County should consider engaging with all Cape and Island Towns and stakeholders in solving environmental challenges through research, education, energy generation, and resource recovery. The Eco-Park could serve as county-wide collaborative resource for producing renewable energy, recovering valuable materials, and providing unique opportunities for education, research, and tourism.

As an example, a modern materials recovery facility (MRF) could serve as a keystone operation sited at the Eco-Park and scaled to support the Cape and Island Towns. All of the non-C&D waste material streams collected at existing town transfer stations could be pre-processed at this new MRF. The facility could support innovative recycling programs including boat shrink-wrap, agriculture mulch films, beverage cartons, and other new

⁴ *Recyclingtoday.com*

programs that the towns choose to initiate. Moreover, the municipal and private hauler collection materials could also be aggregated here.

The main Eco-Park area could be structured as an approximate six-acre campus with reuse shops, fixit clinics, and include an Education and Administrative Center (EAC) for the County to engage with residents, visitors, businesses, and students to learn about environmental challenges and resources. The educational component could involve collaborations with institutions and universities to advance sustainable materials management research. **Table 4-1** presents options for infrastructure and potential construction costs.

Table 4-1: Options For Infrastructure: Organics Management, Disaster Debris and Eco-Park

| Facility Type | Technology | Waste Material Stream | End Product or Market | Acres ¹ | Facility Size ² | Costs ^{3, 4} |
|-------------------------------------|---|---|---|--------------------|---------------------------------|-----------------------|
| Organics Management Facility | Anaerobic Digestion, Dry (AD) | Yard and food waste, spent grain from local breweries, seaweed; food processing waste including fish waste, cranberries, other agricultural wastes, horse manure/bedding, storm debris (trees). | Alternative energy; biogas for power, heat, electricity and compression into CNG, and digestate | 5 acres | 30,000 to 60,000 tons per year | \$25 M - \$60 M |
| | Composting Operation, Covered Aerated Static Pile (CASP) | Digestate from AD, other food and organic materials including wood chips; certified compostable packaging. | Compost for local use at homes, public areas, and farms, DOT projects | 10 acres | 30,000 to 60,000 tons per year | \$6 M - \$12 M |
| | Equipment, access roads, storage, and parking | | | 10 acres | | |
| Disaster Debris Management | Mitigation plan to provide towns with a destination for stockpiling until materials can be transported. For staging and management of all debris materials after major events. Material sorting, storage and equipment, road access. | | Prepare for end-markets | 45 acres | | |
| Eco-Park | Existing Transfer Station with scale, tipping area and rail | Aggregation of materials for moving materials to vendors and markets. | | 19 acres | | |
| | Material Recovery Facility | Processing recyclable materials and baling; beverage cartons, plastic films, boat shrink-wrap and agriculture mulch films | vendors or end-markets; Kelly Green Products in CT and others | 2 acres | 30,000 to 100,000 tons per year | \$20 M - \$30 M |
| | Secondary Material | Processing hard to recycle plastics | Processing hard to dispose waste materials; plastics to | 2 acres | 20,000 to 30,000 | \$16 M - \$20 M |

| | | | | | | |
|------------------------------|---|---|--|------------------|---------------|-----------------|
| | Recovery Facility | | Chemical recycling facility (i.e. Brightmark), ADS Recycling | | tons per year | |
| | Innovation Technology Center | Pilot Program including waste technologies | Technology providers; develop case studies | 120 acres | | |
| | Eco Swap, Reuse Shop and Fixit Clinic | Reuse, recycling and zero waste opportunities | Local markets, trades/arts culture and clothing shops involved with reuse fashion; donations | 6 acres | | \$0.5 M - \$3 M |
| | Education Center & Administration (ECA) | Tours and learning, offices | Education and stakeholder outreach | | | |
| | Equipment, access roads, storage, parking | | | 10 acres | | |
| Estimated Total Acres | | | | 229 acres | | |

¹ Number of acres per technology option is provided only for the feasibility analysis, and can vary depending on parcel attributes, access and what is ultimately asked of it program and operationally.

² The size of a facility can vary depending on parcel attributes, access and what is ultimately asked of it, both as a program and operationally.

^{3,4} Costs are estimate for construction only, and does not include costs related to land procurement or facility operations, engineering or civil site work. All facility types will require equipment access, roads and storage, parking, administrative buildings

4.2.1 Potential Partnerships

Public-Private

A public-private partnership (PPP) can be arranged between two or more public and private sectors of a long-term nature. Typically, it involves private capital financing government projects and services up-front, and then drawing profits from taxpayers and/or users over the course of the PPP contract. PPPs involve governments and contracting corporations to design, build, finance, maintain and operate public projects like solid waste infrastructure, schools, hospitals and bridges.

For governments pursuing PPP for large infrastructure projects, capitalizing on the risk-management capabilities of the private sector could be a more efficient and effective approach. The partners should develop a well-written partnership agreement or contract that includes objectives and performance criteria, spells out risk-sharing and other responsibilities, and provides the consequences for not meeting the agreement terms.

Public-Public

Public-public partnership (PuP) is a partnership between two public authorities, or a non-profit organization, to provide services and/or facilities, Partners can include other local, regional, state and non-governmental organizations.

Public-Military

U.S. military installations have a long history of partnering with municipalities and other government organizations. Installation partnerships exist in a wide range of functional areas, including infrastructure and management partnerships for a variety of services including energy, environment, transportation, operations and maintenance, and emergency services.⁵

As an example, JBCC parcels could potentially serve as a county-wide hub for emergency storage, processing and transport of disaster generated debris and waste. This would greatly enhance the elasticity of the area network of waste transfer infrastructure to respond to these infrequent, but profoundly high volume “black swan” waste generation events.

In the event Barnstable County or another entity obtains the authority to develop waste management infrastructure at the JBCC or another potential site, and has organized multi-community agreements that can contractually direct waste to a facility, communities would be in a collectively empowered position to issue Request For Proposals (RFPs) to waste management companies and technology providers to propose privately funded solutions to the County’s requests.

This mechanism would not require the County or member communities to capitalize or operate these more progressive waste/recycling solution alternatives.

5.0 CONCLUSION

The existing network of Cape and Islands transfer station facilities developed organically over the course of decades to serve as small, convenient drop-off locations for businesses and residents to deliver their solid waste. Over time, these facilities also incorporated small volume recycling/drop-off opportunities into their already limited facility footprints. None of the facilities were planned, located, or intended to serve as County-wide infrastructure for either waste consolidation or recycling processing and diversion.

As the Cape and Islands communities grow overtime, it will get difficult to find more options for solid waste disposal. Tipping fees and costs will continue to increase. Moreover, residential encroachment renders a great deal of the existing transfer station facilities as poor candidates on which to expand larger volume or comprehensive solid waste processing operations.

Individually town costs for managing waste will continue to increase. Cost saving can be realized by managing waste materials locally, working collaboratively to lower costs. Aggregating divertible solid waste volumes can result in a better position for negotiation of disposal contracts with larger solid waste volumes being collected for lower disposal fees. Together the waste generated from the Cape and Island towns creates the potential for

⁵ www.rand.org/pubs/research_reports/RR1419.html

facilities such as a local organics management facility or other means of disposal to be financially and environmentally viable. Moreover, with a local processing facility unit cost goes down.

This report is intended to lay down the concept for the longer-term future planning of the Cape and Islands towns to manage divertible solid waste materials and create a more resilient infrastructure. The project team recognizes the opportunity at the JBCC, with two parcels already sited as solid waste facilities, as a potential location for future development of an infrastructure to support the region with alternatives to landfill and incineration. The idea is not to compete with existing local facilities, but to work together to support the goals of the municipalities that can benefit member towns through collaboration.

1. **In the short-term Barnstable County should engage and cooperate with the Town of Yarmouth to support Yarmouth's development plan.** Organics and potential biosolids are needed to support Yarmouth with their proposed Cape Cod Energy Park and anaerobic digester pro forma. The County can assist, with the cooperation of the Cape and Island towns, to organize and track **Organics and C&D materials** to aggregate the materials at Yarmouth; and **pursue grants for equipment or other needs.**
2. **Recognizing the hypothetical potential of the JBCC**, at least two parcels have been identified that are already utilized as solid waste facilities. Moreover, the JBCC is located conveniently to service the towns, and located near the major roads and with a rail head. This makes it feasible to consider the JBCC sites as hypothetical options to allow for future solid waste management needs.

There could be other potential properties to be identified that could also service the towns as solid waste facilities options. Further efforts should be made to advance what can be done to make suitable tracts of land available at the JBCC, or other potential sites, as a long-term platform to provide the County and member communities greater flexibility and control over their solid waste management and recycling/waste diversion.

The property would most likely be "transferred" to the County under a land use agreement arrangement. Under this scenario, there are most likely soft costs involved in the pursuit and negotiation of the terms and the land use instrument to transfer the property. The County would probably conduct a **Phase I Environmental Site Assessment (ESA)** on the two identified parcels.

In the event Barnstable County or another entity obtains the authority to develop waste management infrastructure at JBCC, or at other potential sites, and has organized multi-community agreements that can contractually direct waste to a facility, communities would be in a collectively empowered position to issue Request For Proposals (RFPs) to waste management companies and technology providers to propose privately funded solutions to the County's requests. This mechanism would not require the County or member communities to capitalize or operate these more progressive waste/recycling solution alternatives.

3. **Through county-wide coordination**, the County can engage as the facilitator to bring together its member towns and Island towns to share resources and establish policies and best practices. With the seasonal fluctuations of MSW tonnage between the summer and winter months, and increasing tonnage year to year, the County should develop a more formal solid waste management plan and infrastructure to manage these waste flow variations.
4. **An interim step is the idea of a Diversion Cooperative.** The County currently has a procurement department to provide support for group contracts and purchasing. The County could further explore with

towns Inter-Municipal Agreements (IMA) for resource sharing and collaboration. This could include ways to reduce the transportation of organic materials and finished compost by managing these materials locally.

5. **Under a diversion cooperative, the County could also work toward the development of a Regional Entity for Resilience for emergency storm debris management plan.** The County should be able to respond and handle when these types of events occur to provide a destination to manage and stockpile debris as events happen. A regional entity can incorporate the needs for the towns to be able to respond to situations for managing materials locally (until materials can be transported to markets).
6. **Longer-Term Future Plan incorporates the idea of a County Organics Management Facility at the Landfill and Eco-Park Design at UCRTS.** Potential use for the landfill area or another parcel could serve as a dedicated organics management facility site with anaerobic digestion (dry, high solids) to manage all types of organic materials including yard debris, woody material, seaweed, food scraps, and cranberry and fish processing waste. This organics management facility could be designed to produce alternative energy in the form of biogas and potential co-generation of heat and power. A composting facility could be co-located to manage the digestate from the anaerobic digestion process to manufacture compost as soil amendment for local use.