TETRA TECH

FINAL MEMO

To:	Patty Daley, Michele White, Kari Parcell Barnstable County/Cape Cod Commission
Cc:	----
From:	Debra Darby, Doug Allen, Wilbert Yang Tetra Tech
Date:	October 25, 2021
Subject:	Barnstable County MSW Diversion Options for Recyclable, Reusable and Hard to Dispose Waste Materials; Task 3 – Beneficial Use

1.0 INTRODUCTION

Paradigm shifts in solid waste management have occurred over time. Historically, landfilling and waste-to-energy have been the long-term, cost-effective, and environmentally compliant solutions for the management of waste. While we continue to have these waste solutions, the paradigm for materials management continues to evolve as markets shift and new technologies become available allowing us to realize a larger fraction of value from resources that are discarded bringing us to a more circular infrastructure and economy.

At the request of Barnstable County and Cape Cod Commission (the County), Tetra Tech performed analysis of potential beneficial use and processing requirements of the components of the municipal solid waste (MSW) material stream. The County seeks to understand and explore the various challenges, current systems in place and potential options for increased recycling and beneficial use of material components identified and characterized from Task 1. This task will be performed in conjunction with Task 4 and Task 5.

The Project Team researched potential beneficial use (BU) and general processing requirements, including transportation, and processing facilities or co-processing opportunities, and identified existing beneficial use programs. In addition, Tetra Tech researched how the Towns of Yarmouth and Bourne, Joint Base Cape Cod (JBCC), and Upper Cape Regional Transfer Station (UCRTS) could improve on-Cape processing, markets, and transportation outcomes. It is planned that the results of the analysis will form the basis for decisions by the towns assisted by the County as to potential changes in the way solid waste materials will be managed as a future planning effort.

1.1 OBJECTIVE

The Project Team conducted research on how the municipalities on the Cape and Islands might collaborate on how materials are managed with existing on-Cape and on-Island facilities to provide economic and environmental benefits to the towns.

The County looks to define beneficial use (BU) as a means to help reduce costs for the towns by giving the towns a variety of potential outlets for their solid waste material streams. The County defines BU not as landfill or waste to energy, as in incineration, but should be interpreted as broadly as possible. The County's broader BU definition aims for the future planning for managing and processing the waste stream materials with local infrastructure that could include waste conversion technologies rather than landfill or incineration.

- Identify various processing methods to transform components into BU end-products
- Potential transportation methods and processing and transportation costs.
- Identify existing beneficial use programs on the Cape.

2.0 MASSACHUSETTS SOLID WASTE REGULATIONS

Waste diversion through bans in Massachusetts are designed to increase recycling and capture the valuable resources. Massachusetts acknowledges that waste bans can capture resources, save energy, decrease greenhouse gas emissions, and lessen our reliance on landfills and incineration[1].

2.1 BANNED MATERIALS

The Massachusetts Department of Environment (MassDEP) has disposal bans on the following material categories:

1. Construction and Demolition
2. Commercial Organics – *one ton or more food waste generated per week*
3. Leaves and Yard Waste
4. Electronics
5. Recyclable Paper, Cardboard, and Paperboard
6. Ferrous and Non-ferrous Metals
7. Glass and Metal Containers
8. Single-resin narrow necked plastic Containers
9. Large Appliances
10. Treated and Untreated Wood and Wood Waste *(banned from landfill only)*
11. Whole Tires *(banned from landfill only)*

The 2030 Massachusetts State Solid Waste Master Plan (SWMP) indicates materials with high priority diversion to include food waste, textiles, bulky materials, untreated wood, and cardboard, while looking to develop local markets for these materials. The SWMP also sites increasing capacity of managing waste material through rail transportation, construction, and demolition (C&D) processing, and anaerobic digestion for managing food waste. The SWMP includes three new waste ban amendments (310 CMR19.00) to be promulgated in November 2022. These are:

- Mattresses
- Textiles
- Commercial Organics – *lower threshold to one-half ton of food waste generated per week*

Additionally, the MassDEP has prioritized additional diversion potential on a tonnage basis focused on opportunities to reduce waste by phasing out use of single use products and disposable packaging, increase recycling, reuse and donation, and develop opportunities for local market potential.

[1] https://www.mass.gov/guides/massdep-waste-disposal-bans

2.1.1.1 Beneficial Use Determinations (BUDs)

Massachusetts Department of Environmental Protection (MassDEP) drafted the Interim Guidance Document for Beneficial Use Determination Regulation, (310 CMR 19.060 March 18, 2004) with four categories of Beneficial Use for Secondary Materials in:

- Commercial Products
- Regulated Systems
- Restricted Applications
- Unrestricted Applications

The categories maintain the general standard of protection of public health, safety and the environment; however, each category has options for demonstrating how the general standard has been met. Specific uses of secondary materials with lesser contamination and greater material control have a simpler demonstration to make.

The application process for a beneficial use determination (BUD) is divided into two phases; pre-application, and application process. During the pre-application phase, the applicant provides the MassDEP with a clear picture of the proposed beneficial use, and then, working with the Department, outlines the steps necessary to demonstrate that the proposed use meets the requirements of the beneficial use regulations.

Minimum Performance Standards (MPS) are established for C&D handing facilities to meet the Massachusetts Department of Environmental Protection (MassDEP) waste ban regulations and waste ban compliance plans. MPS aim to provide guidance for measurable performance criteria to ultimately reduce improper disposal of mixed C&D without adequate processing for sorting banned and recoverable materials.

MPS went into effect in February 2020 and applies to permitted C&D processors and large C&D transfer stations, together known as C&D Handling Facilities. Large transfer stations that handle the C&D processing are working to develop new markets for C&D materials. As an example, recycling the clean wood for landscape mulches.

The MPS established two performance criteria for the separation of banned and recoverable C&D materials. The first performance criteria, to achieve minimum threshold for the Process Separation Rate (PSR) defined as the ratio of the **quantity by weight of the materials recycled** as feedstock, biomass fuel, or diverted as determined by the DEP, **compared to the quantity by weight of the total inbound material accepted.**

Figure 2-1: Minimum Performance Standards (MPS)

$$\frac{\textit{Quantity by Weight of Material Recycled}}{\textit{Quantity by Weight of Total Inbound Material Accepted}}$$

3.0 DEFINITIONS OF BENEFICIAL USE

3.1.1 U.S. Environmental Protection Agency

The United States Environmental Protection Agency (USEPA) identifies the beneficial use of industrial non-hazardous secondary materials (secondary materials) as a key part of EPA's Sustainable Materials Management (SMM) effort. The potential benefits associated with the use of secondary materials include preservation of natural virgin resources, reduced air and water pollution from extraction activities, reduced greenhouse gas emissions, reduced production costs, and avoided use of landfill space. Non-hazardous secondary materials are

any materials that are not the primary product of a manufacturing or commercial process, and can include post-consumer material, post-industrial material, and scrap. Typical examples of secondary materials from industry include coal ash, spent foundry sands, and construction and demolition (C&D) materials.

As an example, the EPA proposed to approve the Minnesota Power and Blandin Paper Company in Duluth, Minnesota request for a non-waste determination regarding the paper roll fiber cores to burn as fuel at the Minnesota Power Rapid Energy Center (REC) in Grand Rapids, Minnesota. The fiber core materials were historically combusted in the REC boilers for many years, and the cores are already a permitted fuel in the Title V air permit.

The USEPA defines Sustainable Materials Management (SMM) as a systems approach to use and reuse of product or material over the entire life cycle of the product or material. There are three strategic priorities including construction of buildings, food waste management, and packaging and materials recycling. **All these priorities are focused on developing programs for managing the materials for circularity.**

USEPA also recognizes a preferred hierarchy for managing the material waste streams that places an emphasis on reducing, reuse and recycling as key **Sustainable Materials Management.**

3.1.2 Minnesota Pollution Control Agency

Minnesota Pollution Control Agency (MPCA) set standing beneficial use determinations (BUDs) for a variety of materials. A standing BUD refers to the generator or end user of a material for only the specific solid waste and specific uses as designated in the application. Highly regulated and other uses of solid waste are not authorized and must follow strict procedures for approval. Materials with standing BUDs include:

- Clean wood, wood chips, bark and sawdust for use as mulch, landscaping, erosion control and bulking agent for composting operations
- Newspaper for insulation or animal bedding
- Clean glass when used as a sandblast agent
- Unusable latex paint for the production of cement
- Reclaimed glass and porcelain fixtures as a substitute for aggregate or subgrade for Minnesota Department of Transportation projects *(Standard Specification for Construction 2016 Edition 3128.2 A2)*

3.1.3 Massachusetts Department of Environmental Protection

Massachusetts Department of Environmental Protection (MassDEP) defines beneficial use as reuse of solid waste materials as effective substitutes for a commercial product or commodity that is beneficial and will not harm public health or the environment. The material is then classified as a secondary material and not as a solid waste. The approval may limit use of the material to a specific location or to a specific application of the material, or both. This is typically done through permitting to regulate the reuse to protect public health, safety, and the environment.

As an example, New England Recycling (NER) in Taunton, Massachusetts processes 500 tons of construction and demolition (C&D) materials per day. NER recycles clean wood separated from the construction and demolition (C&D) materials to make mulch for landscaping.

In the 2030 Solid Waste Master Plan, MassDEP established a policy framework for reducing materials in the waste stream, setting reduction goals towards a reuse Zero Waste future. The following potential beneficial use markets could present opportunities for the County and Islands towns to consider and lead by example.

3.1.4 Barnstable County

For the purposes of this study, the County defines beneficial use in a broad fashion to potentially include as many options as possible for the towns. For the purpose of this report, Tetra Tech recommends for the County to consider a broader definition that encompasses *Beneficial Reuse and Recycling* as the longer-term process for managing Barnstable County waste stream materials including conversion technologies rather than landfill or incineration, and incorporates Reuse, Recycling and Zero Waste options.

The value of waste material processing should be based on a hierarchy of use and reuse, with diversion of materials prior *(that prevent disposal)* to landfill or waste-to-energy *(incineration)* as highest beneficial use. As an example, repurposing C&D material residuals as a fuel source for cement kilns or asphalt production would be considered as “beneficial reuse” as opposed to landfilling the C&D residuals.

Reuse	The practice of using an item for its intended purpose or to fulfill a secondary function, which is different from recycling.
Recycling	To break apart a used item for the raw material inputs into a new product.
Zero Waste	Aims at conservation of resources and to minimize waste.
Circularity	Focus on regenerative processes that maintain highest utility and value of materials.

4.0 BARNSTABLE COUNTY WASTE STREAM COMPONENTS

Barnstable County has a population of ±216,294 in 2020 *(2020 Cape Cod Commission).* With the influx of summer residents and tourists, the population density increases to more than 500,000 during the summer months. Key trends include the summer tonnages increase with distinct seasonal variation with the recycling rate peaking during July 1st to September 1st in each year. In addition, the summer MSW tonnages are increasing year to year, from 2017 to 2020.

The Project Team conducted an analysis of MSW components based on how the data was reported by material categories collected from the Cape and Islands town transfer stations. **Table 4-1** shows the ten waste stream material categories.

Table 4-1: Barnstable County Material Categories

	Materials	Materials collected at Town Transfer Stations segregated from HHW[1]
1	Recycling Program Typical Materials	All commodity recovered materials at the transfer stations including glass bottles, plastics, cardboard, mixed fibers (mixed paper, chipboard, and newspaper), and metals
2	Construction and Demolition (C&D)	Wood (treated and untreated), metals, plasterboard, shingles; asphalt, brick, and concrete (ABC)
3	Organics	Yard debris, food scraps/waste, and compostable papers
4	Textiles	Clothing, fabric, rags, carpets/rugs
5	Mattresses	Mattress and box spring
6	Bulky Items	Couches, chairs, rigid plastics including lawn furniture, tool cases, crates
7	White Goods	Appliances such as stoves, fridges, ovens, dish washers, washing machines and dryers
8	Tires	Vehicle tires
9	Electronic (E-waste)	Computers, TVs (CRTs), printers
10	Universal Waste	Household batteries, electric car batteries, propane tanks and fire extinguishers, aerosol cans, CFLs

1) *Omitted from the study are household hazardous wastes (HHW), due to a concurrent and separate study being conducted by Barnstable County.*

Besides the recycling program typical materials, the two largest components of diverted materials are construction and demolition materials (C&D) and organics (food scraps and yard debris). For the total divertible materials, there was a total 71,284 tons of divertible materials collected annually within Barnstable County from the fifteen town transfer stations in 2019. **Table 4-2** shows the multiple waste streams of divertible materials collected at the municipal transfer stations.

Table 4-2: 2019 Estimated Total Generation Tons Per Year for Multiple Waste Streams

Municipality	Sticker Holders	MSW	C&D[1]	Recycling	Compost	Food Waste	Textiles	Tires	Batteries
Barnstable	8,600	6,071		3,077	938	7	67	14	14
Bourne	8,135	5,743		1,948	1,781	23	64	13	13
Brewster	3,509	1,131	516	840	768	10	28	6	6
Chatham	3,160	3,091	802	1,280	837	22	17	4	16
Dennis	7,031	3,769		1,308	1,540	20	55	5	12
Eastham	3,759	3,513	545	708	823	11	33	1	6
Falmouth	21,000	11,510	148	2,899	4,599	3	165	5	35
Harwich	5,541	8,184	12,311	1,344	1,974	16	67	8	9
Mashpee	4,464	3,556		1,240	978	17	20	9	2
Orleans	3,825	2,700		916	838	11	30	6	6
Provincetown	2,348	1,658		562	514	7	18	4	4
Sandwich	5,020	2,783		1,988	1,266	14	39	3	4
Truro	3,348	1,624		418	733	10	26	5	6
Wellfleet	3,309	835	515	534	725	8	26	6	5
Yarmouth	9,434	8,308	15,321	1,472	1,062	27	81	48	6
Total Estimated Tons		**64,476**	**30,158**	**20,534**	**19,376**	**205**	**736**	**132**	**143**
Total Measured Tons		**66,010**							

Key:

Reported tonnages

Estimated (calculated) generation tonnages

(1) C&D tons assumed to be accounted for in 6 reporting locations. Yarmouth and Harwich likely get most commercial C&D tons. We assumed that most of the Cape's C&D is going to these two larger transfer stations, therefore we don't estimate tonnages for each town.

Islands

Nantucket reported outbound waste material streams in tons.

Table 4-2.1: 2019 Total Generation Per Year: Nantucket

Electronics	Mattresses
36 tons	63 tons

Tisbury reported materials collected at the drop-off in tons.

Table 4-2.2: 2019 Total Generation Per Year: Tisbury

Mattresses and Other Bulky Items	Bulky Metals/ Appliances
2.86 tons	16.96 tons

Table 4-3 shows waste stream material categories received from municipal transfer stations in consolidated units. As referenced in Task 1 Memo Appendix**,** universal waste materials included a few fire extinguishers, fluorescent lights, and chlorofluorocarbon (CFCs or aerosols) were recovered at Mashpee, Wellfleet and Yarmouth transfer stations. These hard to dispose material categories are not included in the **Table 4-3.**

Table 4-3: 2019 Consolidated Units Received from Barnstable County Transfer Stations

Municipality	Sticker Holders	Electronics in units	White Goods in units	Other Bulky in units	Mattresses in units	Propane Containers in units
Barnstable	8,675	-	1,959	-	3,204	470
Bourne	5,675	-	-	-	-	-
Brewster	1,131	-	-	-	-	-
Chatham	5,140	1,711	1,212	716	899	1,414
Dennis	3,769	-	-	-	2,101	546
Eastham	3,570	450	262	-	244	79
Falmouth	11,510	756	231	-	375	-
Harwich	4,490	-	742	-	2,663	-
Mashpee	3,517	842	775	-	1,340	638

Orleans	2,476	-	-	-	-	-
Provincetown	3,025	-	-	-	-	-
Sandwich	2,783	4,492	193	-	838	179
Truro	1,048	-	-	-	-	-
Wellfleet	774	600	435	846	562	91
Yarmouth	8,428	1,911	-	-	667	-
Total in Units		**10,762**	**5,809**	**1,562**	**12,893**	**3,417**

5.0 RECYCLING AND REUSE PROGRAMS AND MARKETS

Tetra Tech researched reuse programs for the Barnstable County material categories, and how these materials are currently being managed through recycling and reuse programs, and potential end-markets that are currently not implemented in Barnstable County.

5.1.1 Recyclable Program Typical Materials

Mixed Paper and Cardboard

The Northeast Recycling Council (NERC) recently published a report on the potential increased recycled paper capacity (January 11, 2021). Per the report, in 2017 China announced it would ban import of mixed paper effective January 1, 2018. Within three years China banned all imported wastepaper and corrugated box materials from the U.S.

Although China was an important end market, it was not the major end market for American wastepaper. In fact, U.S. based mills continued to purchase 60% of American wastepaper. As of January 2021, twenty-eight paper recycling mills were expanding operations in the U.S. Nine of these mills completed expansion. The majority of new mill capacity is aimed at producing linerboard and corrugated medium from old corrugated cardboard (OCC) as feedstock. Several mills in the Northeast and Mid-Atlantic plan to increase use of residential mixed paper (RMP) from curbside collection programs. **Table 5-1** shows the names of the mills, location and road miles from Cape Cod, and the type of recycled paper material accepted.

- The private development firm CorrVentures LLC is constructing a new paper recycling mill sited on a 102-acre brownfield location near Albany, New York with plans to be fully operational in early 2022 with a processing capacity of 300,000 tons. The recycled containerboard mill is referred to as the Hudson Valley Paperboard Project and plans to accept mixed residential paper and OCC. The transportation cost for one truck load (30

tons) round trip from Massachusetts to the Hudson Valley Paperboard Project in New York was not available to the Project Team at this time.[2]

Table 5-1: Paper Recycling Facilities in the Northeast and Mid-Atlantic Regions

Mill Name	Location	Distance from Cape Cod	Materials Accepted
CorrVentures	Albany, New York	230 miles	Residential mixed paper and Cardboard (OCC)
Nine Dragons	Rumford, Maine	247 miles	Cardboard (OCC)
Empire Recycled Fiber	Fairless, Pennsylvania	328 miles	Residential mixed paper and Cardboard (OCC)
Cascades	Hanover, Virginia	578 miles	Residential mixed paper and Cardboard (OCC)
Total Recycle Fiber	Chesapeake, Virginia	621 miles	Residential mixed paper and OCC
Domtar	Kingsport, Tennessee	878 miles	Residential mixed paper and OCC
Sonoco	Hartsville, South Carolina	900 miles	Mixed paper and OCC
Ecomedlida	Orangeburg County, South Carolina	971 miles	Food/beverage cartons, and paper byproducts

Metals

Iron and steel scrap metal, known as ferrous scrap, is generated from consumer products including household appliances and automotive parts, in addition to industrial structures and equipment. Nonferrous scrap metal includes the base metals of aluminum, copper, lead, nickel, tin and zinc. Ferrous and nonferrous metals are highly recyclable. Moreover, due to the chemical properties of nonferrous metals, these metals can be repetitively recycled and not lose material quality. The Institute of Scrap Recycling Industries, Inc. (ISRI) reports that over 70 percent of the scrap metal processed in the United States is used in domestic manufacturing.

Mid-City Scrap Iron & Salvage Company in Westport, Massachusetts is a local metals recycler that accepts scrap metals from municipalities, commercial contractors and businesses. The company owns a fleet of trucks and containers for the collection of metals from transfer stations, construction sites and residents. Mill-City publishes an online Public Scrap Metal Pricing. Larger quantities and materials without contamination are eligible for better pricing.

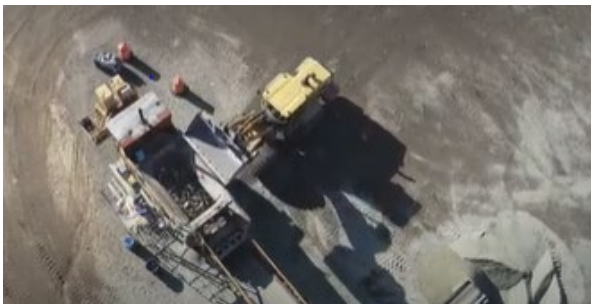
Scrap metal markets fluctuate with global demand. The best possible solution for metals recycling is and will be a competitive bid process with the dealers vying for the quantities of metal scrap that the County towns as a whole can offer.

[2] Given fluctuations in fuel costs and hauling contracts this will have to be determined based on aggregation of services among participating municipalities. The mileages in **Table 5-1** should provide a helpful guideline.

Glass

The Town of Dennis Department of Public Works opened a Glass Recycling Depot in 2019 through a Beneficial Use Determination (BUD) from the MassDEP. Towns of Harwich, Wellfleet and Barnstable, and more recently the towns of Mashpee and Brewster, send their source separated glass to Dennis. Many of the towns transport their glass off-Cape at significant cost, and this program offers a collaborative and cost-saving approach. Cape Cod municipalities can bring glass recyclables to Dennis at a cost of $60 per ton.

Town of Dennis Glass Crush Operation (2019)



The recycled glass is used in fiberglass insulation or crushing glass into processed glass aggregate (PGA), which can be used in road and infrastructure projects in the place of gravel and sand.

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. This local glass reuse initiative helps to reduce the amount of material that local governments will need to manage. Shared recycling and reuse programs are an option that more and more communities are focusing on to avoid infrastructure costs.

Plastic Water Bottle Bans

Across the County, thirteen towns have municipal bans, and seven towns have commercial bans on single-use water bottles. There is interest in access to refillable water bottle stations, and refillable and reusable water bottles. The town of Brewster's program "Drink Brewster Tap" was launched in conjunction with the single-use water bottle ban. Brewster's Water Commissioners and Recycling Commission approved the launch of "Drink Brewster Tap," an educational campaign to encourage people to drink Brewster's award-winning tap water and avoid purchasing water in plastic bottles.

In Middlesex County, the Town of Concord installed water bottle filling stations (bubblers) near parks and athletic fields, and near the Town Visitor Center. The new bubblers have a spigot to make it easier for residents and visitors to fill up their refillable water bottles. The County should consider a regional effort for installing and mapping water bottle filling stations across the Cape and Islands.

Businesses in Falmouth are prohibited from selling drinking water in single-use plastic water bottles effective September 1, 2021. Falmouth adopted the bylaw in a voice vote during a town meeting on September 14, 2020. The Falmouth Health Department in collaboration with the Falmouth Chamber of Commerce is enforcing the ban and has already sent out notices to local businesses that carry food permits. Similar bans passed in both Wellfleet and Brewster that went into effect on September 1, 2021. Plastic water bans are already in effect in Harwich, Orleans and Provincetown. Sustainable Practices, a Cape-based nonprofit, was responsible for spear-heading the petition through its Cape Plastic Bottle Ban initiative.

5.1.2 Plastics Films for Renewable Fuels, and Home Building Materials

Boat Shrink-Wrap

Cape Cod, Massachusetts

Two Cape Cod facilities launched the boat shrink-wrap recycling effort for #4 low-density polyethylene (LDPE), the Woods Hole Oceanographic Institution (WHOI) Sea Grant Program and the Bourne Integrated Solid Waste Management Facility (ISWM).

The Woods Hole Oceanographic Institution (WHOI) Sea Grant program in collaboration with the Cape Cod Cooperative Extension offers free boat shrink-wrap recycling from April to June. Between 7.5 ton to 10 tons of boat shrink-wrap is typically collected during the three-month timeframe. The recycled shrink wrap can be re-used in a variety of durable plastic products including decking material and outdoor furniture.

All Cape and Islands towns are eligible to apply for the grant, which covers the fee for containers and transportation by a waste hauler. The program currently has five drop-off recycling locations at town transfer stations including Bourne, Chatham, Dennis, Eastham, and Wellfleet. Boat-owners can bring clean, bundled shrink-wrap without ropes, vents, strapping or other contaminants to these recycling locations. MacDougalls' Cape Cod Marine Service in Falmouth also collects boat shrink-wrap and delivers it to the Bourne ISWM, where the plastic wrap is hauled away for recycling.

The boat shrink-wrap recycling program is funded by the National Oceanic and Atmospheric Administration (NOAA) Marine Debris Program and the National Sea Grant College Program.

State of Rhode Island

The Rhode Island Marine Trades Association (RIMTA), founded in 1964, represents the recreational boating industry in Rhode Island. Its mission is to advocate legislation to build a skillful workforce and opportunities to share ideas and business. RIMTA launched two environmental programs focused on recycling and waste diversion. These programs include a boat shrink-wrap recycling program, and the Rhode Island Fiberglass Vessel Recycling (RIFVR) Pilot Project boat recycling.

RIMTA started its boat shrink-wrap program, one of the first in the country to recycle shrink wrap, a material that typically ends up in landfills after the shrink-wrap is removed from boats at the beginning of the boating season. In 2018 and 2019, this industry wide effort diverted almost 35 tons of discarded shrink-wrap from landfills.

Rhode Island Fiberglass Vessel Recycling (RIFVR) Pilot Project boat recycling provides an alternative option for disposing of fiberglass boats, as most fiberglass boats are crushed and buried in landfills. There is an increasing number of recreational fiberglass boats that reach their useful end of life without a sustainable disposal option. Boats are also abandoned by their owners at boat yards, marinas or in coastal areas where these derelict vessels become marine debris and can harm the environment. The RIFVR Pilot Project conducts research on the sustainable disposal of fiberglass boats through dismantling and re-processing of fiberglass hulls into cement as an alternative to landfill.

Plastic Bags and Films

State of Massachusetts

There are 160 municipalities with plastic bag bans in Massachusetts even though there is no statewide single use plastic bag ban or policy. The MassDEP reports the quantity of plastic film in the waste stream is not known, and there is a market capacity need for plastic film recycling and local end markets. Plastics films include, but not limited to, boat shrink-wrap, pallet and packaging shrink-wrap, plastic package films and bags.

Brightmark, San Francisco, California

Brightmark is a solid waste solutions company focused on recycling plastics to make renewable plastics and energy through chemical recycling. Plastic waste is collected and processed for conversion by shredding and pelletizing. The pelleted plastics material is heated and vaporized in an anaerobic environment; where the vapor is cooled into hydrocarbon liquid and processed into commercial grade ultra-low sulfur diesel, naphtha, and wax. Brightmark has a new facility under construction in Northeast Indiana for mixed plastic waste. A second facility is planned in Macon, Georgia that will convert Styrofoam cups and other plastics in to fuel and chemicals.

Brightmark pioneered a boat shrink-wrap recycling program with the Northeast Indiana Solid Waste Management District (NISWD) to convert boat shrink-wrap into transportation fuel and wax. The program is planned to expand to marinas located in four counties in Indiana: DeKalb, LaGrange, Noble, and Steuben.

Trex, Winchester, Virginia

Trex manufactures composite materials for use in the home building market including deck boards made from 95% recycled materials from reclaimed wood, sawdust and recycled plastic overwrap. The Trex deck products are manufactured from recycled plastic films, primarily single use plastic bags collected at supermarkets.

5.1.3 Beverage Cartons and Plastic Films for Green Building Materials

In Massachusetts, food and beverage cartons are not considered a typical recyclable program material. Gable top and aseptic cartons are used for juice, milk, water, broth, soy drinks, and other consumable liquids.

Kelly Green Products, Waterbury, Connecticut

Kelly Green Products is a beverage carton and plastic film recycler located in Waterbury, Connecticut. They are collaborating with the Carton Council (Council), an industry organization focused on carton recycling, to build local and regional markets for recycling cartons. The Council offers grants to municipalities for carton collection equipment *(collection bins)* at transfer stations and to start school collection programs. Cartons from the programs are collected and transported to Kelly Green's new facility dedicated to carton and single use plastic bags recycling. The recycling facility is currently operating a single line. A second line is scheduled to start operations in early 2022. Kelly Green repurposes cartons into high performance green building materials including commercial roofing, interior wallboards, exterior sheathing, and floor under-layment.

Kelly Green Products Recycling Program:

- Pays the Towns for collected beverage cartons, average of $5-$15 per ton.
- Accepts boat shrink-wrap; might consider agricultural mulch film if the material is clean.
- Arranges for a carrier to pick up materials at no cost to the towns. Covers cost for a truck to pick up the aggregated material (22 ton minimum) at a transfer station and hauling to Waterbury CT.

- Arrangements can be made for smaller tonnage quantities, that could accommodate seasonal pick up for boat shrink-wrap.
- Material should be baled

Franklin County Solid Waste Management District, Massachusetts

Franklin County Solid Waste Management District works with the Carton Council on a carton recycling program. The County accepts milk and juice cartons, and drink boxes in the source separated recycling stream. All straws and caps are removed, and the carton is flattened. Municipal recycling is processed at the Springfield Materials Recycling Facility (MRF), a public facility owned by the Massachusetts Department of Environmental Protection (MassDEP) that is operated by Waste Management Recycle America (WM) under contract.

- WM ships a 20-ton load of cartons every six to eight months; the material was transported to various locations.
- Load of cartons have a historic value around $0-$20/ ton.
- A current 20-ton load will be transported to Kelly Green Products.

Reusable and Refillable Containers

Town of Plymouth, Massachusetts: Voluntary Guidelines for Reusable Containers

The Town of Plymouth, Massachusetts passed a voluntary reusable container guideline in June 2019, in an effort to mitigate use of plastics and Styrofoam containers. The Town implemented official guidance to allow for voluntary use and acceptance of reusable containers for food and beverages. Containers can be metal, glass, food grade silicone, bamboo, or other plant-based fiber material.

The reusable container guidance is aimed at businesses to support their efforts to reduce single use plastic containers that contribute to climate change and leaching of contaminants from the containers into the environment. The Town's guidance document adheres to the *Massachusetts General Law, Chapter 111, Public Health, Section 127A, State Sanitary Code, and 105 Code of Massachusetts Regulations 590 Chapter 4, Equipment, and Utensils.*

The County might consider recommending a similar guidance, bylaws and ordinances to reduce single use plastics, to eliminate the barrier and allow certain containers as reusable or refillable.

Zero Waste Stores

Zero Waste stores are opening in Massachusetts that offer refillable shampoos, soaps, and buying products in bulk to eliminate plastic packaging, and more. Examples of zero waste stores include Green House Goods in Newburyport, Massachusetts, and Uvida in Boston, Massachusetts.

The City of Boston provides a website BostonZeroWaste as a resource to find package-free products in the Boston area.

Upstream Solutions develops national reuse campaigns and programs for public and private entities.

Refillable Bottles and Bottle Redemption Centers

State of Oregon

In 2018, the State of Oregon launched the first statewide refillable bottle bill system, and seven local craft breweries in Oregon are using a universal refillable beer bottle. The refillable bottle was developed by the Oregon Beverage Recycling Cooperative, the group that runs Oregon's bottle deposit system with support from major beverage distributors. The word “refillable” is stamped into the beer bottle glass and also on the packaging to market the program to consumers.

Cape Cod and Islands

This type of refillable bottle program could work for the fifteen breweries and two wineries located on Cape Cod and the Islands. **Table 5-2** shows the potential brewers and wineries located in the County and Islands that could collaborate for a refillable bottle program. Nearby breweries and wineries in Southeastern Massachusetts could also be included in this effort.

Table 5-2: Breweries and Wineries in the County and Islands

Brewery/Winery	Town
Cape Cod Beer	Hyannis
Barnstable Brewing	Hyannis
Hog Island Beer Company	Orleans
Devil’s Purse Brewing Company	South Dennis
Naukabout Brewery and Taproom	Mashpee
Provincetown Brewing Company	Provincetown
Bad Martha’s Farmer’s Brewery	Falmouth
Aquatic Brewing	Falmouth
Tree House Brewing Company	Sandwich
Buzzards Bay Brewing	Bourne
Finn’s Craft Beer Tap House	Hyannis
Cisco Brewers	Nantucket
Sea Dog Brew Pub	South Yarmouth
The Jailhouse Tavern	Orleans
Truro Vineyards of Cape Cod	North Truro
Cape Cod Winery	East Falmouth
First Crush Winery	Harwich

Expanding Bottle Bills and "Bottle Drop" Redemption Centers

At one time, almost all soda and beer bottles were sold as returnable and refillable containers. Oregon is known for updating the state bottle bill and deposit to ten cents for redemption at bottle redemption centers. The Bottle Drop program provides residents convenient return options through self-serve machines and hand counts at full-service Redemption Centers.

State of Massachusetts

Massachusetts state legislature Committee on Telecommunications, Utilities and Energy is currently reviewing a proposal to increase the state bottle deposit for redemption from five cents to ten cents, and include other plastic and glass containers for wine, hard cider, water and sports drinks and miniature liquor bottles called "nips". State environmental officials report the original bottle bill has proven effective. The MassDEP data shows 80% of the cans and bottles with a five-cent deposit are recycled statewide, and only 23% of containers with no bottle deposit are recycled.

5.1.4 Construction and Demolition (C&D)

C&D material residuals used as a fuel source for cement kilns or asphalt production are considered beneficial use as opposed to landfilling. This would reduce or eliminate the amount of fossil-based fuels, including oil and natural gas, and offset fossil fuel use (i.e., lower GHG emissions) for the production of cement. **Table 5-3** shows a list of cement manufacturing facilities in the Northeast.

- Lafarge North America cement kiln in Ravena, New York is the one cement manufacturing facility that is close to Massachusetts. The Project Team contacted New England Recycling Company (NER) about potential interest in hauling C&D material residuals to Lafarge. NER is currently working to estimate the transportation cost from NER in Taunton, Massachusetts to Lafarge in New York. A truck can haul 30 tons of C&D residuals in one day.

Table 5-3: Cement Manufacturing Facilities in the Northeast

Facility	Location	Distance from Cape Cod	Type of Fuel Used for Kiln
Lafarge North America	Ravena, New York	223 miles	Recycled tires, but a new law prohibits burning tires. Facility is allowed to burn natural gas, coal, pet coke, or fuel oil.
LafargeHolcim	Whitehall, Pennsylvania	345 miles	Uses 2 million recycled tires per year and provides 30% of its fuel. Also uses Plastic Derived Fuel, or type #4 through 7 plastics that are processed to a size and composition ideal for use as an alternative fuel.
Lehigh Hanson - Glens Falls Cement Plant and Terminal	Glens Falls, New York	275 miles	Uses Raggertail, which is made up of 60% plastic trimmings removed from cardboard boxes and other paper products, and 40% paper/cardboard fiber.

Lehigh Hanson - Evansville Cement and Slag Plant Terminal	Fleetwood, Pennsylvania	366 miles	20% of the plant's kiln fuel comes from alternative fuels such as recycled tires and wood.
Buzzi Unicem USA	Stockertown, Pennsylvania	344 miles	The facility is permitted to use up to 5.2 tons per hour of alternative fuels split between two kilns. In 2021, the plant was upgraded to a walking floor configuration with the goal to stabilize the delivery of materials to the kilns and ultimately increase the usage to above 20%. Blends separate alternate fuels such as tire chips, tire fluff, and green fuel, the plant can strike a favorable balance between performance and economic benefit. In addition to these primary alternative fuels, the plant has the capability to mix switchgrass ***(energy crop***) grown on the site into the blend.
Giant Cement Company - Keystone Cement	Bath, Pennsylvania	349 miles	Blend high-BTU liquid hazardous waste into fuel which is used as a supplement to coal in its cement manufacturing process.

5.1.5 Organics

Organics Collection: Yard Debris and Food Scraps

Cape Cod Towns

Yard waste drop-off collection is available at eight town transfer stations. Food scraps collection (source separated organics)

Yard Waste Collection	Food Scraps Collection
Barnstable	Barnstable
Chatham	Brewster
Eastham	Chatham
Harwich	Dennis
Mashpee	Falmouth
Sandwich	Mashpee
Wellfleet	Truro
Yarmouth	Wellfleet
	Yarmouth

Islands Towns

On Martha's Vineyard, residential food waste is collected at five of the six town transfer stations. Nantucket also provides food scraps drop-off for residents. Nantucket operates an in-vessel composting operation in which co-mingled MSW, food waste and other compostable materials are screened and processed into a composted material.

Food Waste Collection on Martha's Vineyard
Chilmark
Edgartown
Oaks Bluff
Tisbury
West Tisbury

Town of Hamilton, Massachusetts: Mandated Source Separated Organics

In Essex County, Massachusetts the Town of Hamilton decided to mandate curbside collection of source separated organics (food scraps recycling). Hamilton was the first community in Massachusetts to implement a town-wide organics recycling to composting program. Each household received a town official 13-gallon compost container. On the regular trash pickup day, a separate truck collects the organic waste at the curb. The food scraps are taken to the local composter, Brick Ends Farm located in Hamilton. The composter sells bagged compost for residents to purchase, closing the loop on organics recycling.

5.1.6 Textiles and Carpets

Nantucket

The Island of Nantucket hosts a Textile Reuse and Recycling Collection Program that could be replicated in most other towns throughout the Cape and Islands, as all the transfer stations and municipalities have textile collection bins. Organized by the Nantucket Department of Public Works (DPW), these are drop-off only events intended to divert textiles from the landfill. Clean and bagged textiles are accepted, including shoes, belts, handbags, and ripped, stained clothes or rags are accepted.

The Town of Nantucket held three textile collection events in 2021 and collected a total 15.6 tons of textiles. The trailer is hauled to a local Salvation Army collection center. While the Take-It-Or-Leave (TIOLI) Swap Shop has been closed due to COVID, the town continues textile collection once a month at the Recycling Center on Sundays from 8:00am-12:00pm. Surplus textiles from the local thrift shops are also collected each week.

Loop Industries, Quebec, Canada

Loop Industries can recycle plastic fiber from textiles, carpets, and from polyethylene terephthalate #1 PET plastic and polyester fibers. The recycling technology breaks down the waste material into 100% recycled plastic resin for use in new products including food-grade packaging and water bottles. The depolymerization technology removes dyes, additives, contaminants, and other plastic materials. Loop Industries is producing 100% recyclable plastic resin from a facility in Spartanburg, South Carolina for companies including Estee Lauder/L'Oréal to meet the consumer packaging brand's goal for 100% recycled packaging.

Carpets for Renewable Floor Covers

Conigliaro Industries is a large recycling facility in Framingham, Massachusetts involved with the collection of carpet for recycling and transport to the state of Georgia, where the major carpet and textile recyclers are located. The major textile recyclers in Georgia include Interface Group, Shaw Environmental, and Mohawk Group. All three companies are involved with post-consumer carpet recycling through the Carpet America Recovery Effort (CARE).

The Interface Group offers a range of recycled content carpet tiles. Carpet tiles are designed for heavy foot traffic areas, where the individual tiles can be replaced when the carpet tiles look worn. Carpet tiles are frequently used in business and commercial offices spaces, and residential apartment common areas. Both Shaw and Mohawk are large recyclers of carpet and flooring and manufacture high recycled content products.

State of California

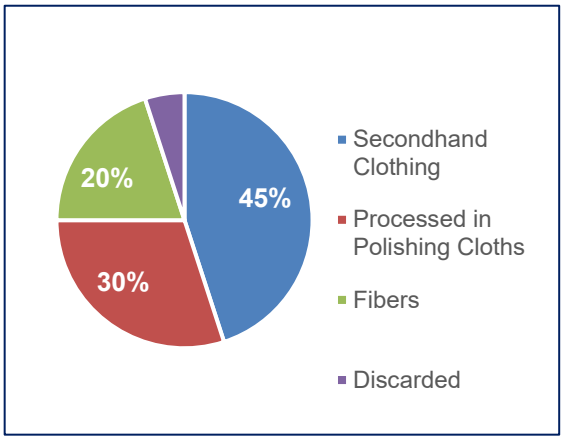
California implemented a carpet extended producer responsibility (EPR) law (AB 2398), the first state to require statewide carpet recycling. The law requires manufacturers of carpets sold in California to submit a carpet stewardship plan to CARE.

A carpet stewardship policy is needed in Massachusetts to encourage and develop a local carpet recycling market. The Institute for Scrap Recycling Industries (ISRI) reports that 45% of recycled textiles are sold as secondhand clothing exported to developing countries. About 30% of recycled textiles are made into polishing cloths and 20% are recycled for fibers as raw material for a variety of consumer products including automotive fabric, mattresses, and home furnishings.

Photo courtesy: CalRecycle

Figure 5-1 shows the recycled textile general market uses.

Figure 5-1: Recycled Textile General Market Uses



Eureka Recycling, Minneapolis, Minnesota

Eureka Recycling is a community-based nonprofit recycler in Minnesota. Eureka has provided recycling and zero waste services to the Twin Cities metro area since 2001. Eureka operates a materials recovery facility (MRF) that processes 400 to 450 tons of recyclable materials per day. Eureka developed a best practices document for Municipal Textile Collection Programs with recommendations for municipalities to develop policies that incentivize reuse and repair, and recycling textiles as a last resort.

Repair Lair, Minneapolis, Minnesota

Repair Lair specializes in repairing outdoor clothing and camping equipment, and also offers consignment sales of repaired clothing and camping gear.

The Renewal Workshop, Cascade Locks, Oregon

The Renewal Workshop is a company that realized the need for brands and retailers to recover value from unsellable clothes, by taking discarded clothes and textiles for upcycling or recycling the material into renewed products. The Renewal Workshop opened its initial factory in Cascade Locks, Oregon in 2016. A second factory opened in Amsterdam, Netherlands in 2019.

5.1.7 Mattresses

There are two mattress recycling facilities in Massachusetts including UTEC in Lawrence and Green Mattress Recycling in Milford, and one in Rhode Island, Ace Mattress Recycling. Most of the mattresses and box springs collected from the County and Islands town transfer stations are transported to Ace in Rhode Island.

Mattress Recycling Council

The Mattress Recycling Council (MRC) is a nonprofit organization formed by the mattress industry and operates recycling programs in states that have passed mattress recycling laws. In November 2022, MassDEP will promulgate a mattress ban. Over 75% of a mattress can be recycled into other products. **Table 5-4** shows the components from mattress recycling and beneficial use.

Table 5-4: Mattress Recycling Beneficial Use

Mattress Components	Beneficial Use
Foam	Carpet underlay or animal bed padding
Fabric and fibers	Industrial oil filters and other textile applications
Steel springs	Recycled as scrap metal
Wood frame	Shredded for landscaping mulch, or biomass (alternative fuel source)

Source: Mattress Recycling Council

5.1.8 Bulky Items - Large Plastic

Eco-Cycle, Boulder, Colorado

Eco-Cycle is a CHaRM (Center for Hard-To-Recycle Materials) outdoor facility that opened in 2001. This first of its kind facility in the nation aimed at the collection of electronics, plastics bags, and other "unusual" materials. Users of the facility are charged a $3.00 facility fee for every vehicle entering the CHaRM. The facility is partially funded by the City of Boulder through the city trash tax. The CHaRM collaborates with innovative local companies to expand the list of materials for reuse or recycling. Effective June 2021, a revised fee schedule was implemented due to the rising cost of business.www.ecocycle.org/images/CHaRM/2021_CHaRM_Fees_Web.png

Eco-Cycle/CHaRM recycles large bulky plastic items including crates and furniture made from #2 HDPE plastic for beneficial reuse into recycled plastic durable railroad ties. Recycled plastic replaces use of virgin hardwood lumber ties injected with creosote.

Plastic Bottles #2 HDPE

Advanced Drainage Systems, Minster, Ohio

Advanced Drainage Systems (ADS) manufactures Green Line Polymers made from recycling of high-density polyethylene (#2 HDPE) plastic bottles for water management solutions. ADS acquired the Green Line Polymers and renamed the business unit as ADS Recycling. ADS has eight U.S. recycling facilities, two of these are located in the Northeast. These facilities are located in Waverly, New York (400 miles distance from the County) and Shippenville, Pennsylvania (576 miles distance from the County).

ADS Recycling is a major recycling company with a continuous demand for HDPE materials. ADS will pick-up and process very large quantities of HDPE plastic scrap from commercial and government entities. ADS purchases HDPE from manufacturers, plastics extruders, and from post-consumer material recovery facilities (MRFs).

It is unlikely that the volume of #2 HDPE generated by the Cape and Island town transfer stations alone would be sufficient for ADS Recycling to send a truck for collection. However, there could be potential to aggregate HDPE with off-Cape towns to generate greater tonnage and have this material coalesced at a single MRF for ADS to pick up. ADS Recycling

5.1.9 White (Large) Appliances

ReUse Minnesota

ReUse Warehouse in Hennepin County, Minnesota is a salvaged building materials center and retail outlet for appliances and fixtures. The ReUse Warehouse is part of the nonprofit organization Better Futures that works directly with Hennepin County to recycle appliances collected at the County's drop-off locations.

The organization teaches job skills while reducing waste and toxic materials, and provides training and licensing to safely remove freon, mercury, PCBs and other refrigerants from large appliances. Through their deconstruction services and reuse center, the ReUse Warehouse was able to divert over 700 tons of building materials and large appliances from landfill disposal.

5.1.10 Tires

U.S. scrap rubber manufacturers recycle an estimated 110 million tires per year. There are two processing methods for recycling tires. One is a shredding process that reduces tires into small pieces. The other method is a cryogenic process utilizing liquid nitrogen to freeze the tire rubber, which changes the physical property of the rubber to become brittle. The tire is then placed in an enclosure and mechanically smashed into small pieces.

Recycled tires are primarily used for playground surfaces, artificial turfs, and for rubberized asphalt for road durability and reducing noise. The steel beads that are the non-rubber component of a tire are also recycled into specification grade products used by steel mills.

Some manufacturers are combining recycled rubber with plastics to produce roofing tiles and automotive parts. The use of recycled rubber in molded products for consumer and industrial products reduces greenhouse gas emissions by 25-80% compared with use of virgin plastic resins. *(Source: Institute of Scrap Recycling Industries)*

5.1.11 Electronics (E-Waste)

Eco-Cycle/CHaRM in Boulder, Colorado recycles electronic waste onsite through a program with Blue Star Recyclers[3], a company that employs people with autism and other disabilities in Colorado. Employees are trained as recycling technicians to disassemble electronics inside a retrofitted warehouse located at the CHaRM. With electronics recycled onsite, the CHaRM can provide a chain of custody and is certified to the e-Stewards standard. The e-Stewards Standard[4] is a North American initiative aimed to make progress in establishing and ensuring e-waste recycling best practices

5.1.12 Universal Waste

Massachusetts regulates several materials under the Universal Waste Rule *(310 CMR 30.1001 October 1997).* The state rule was modeled after the federal Universal Waste Rule. These waste materials must qualify as hazardous wastes before considered universal wastes.

Mercury Products

Mercury containing devices including thermostats, manometers (analog or digital instruments to measure pressure), switches, water meters, thermometers and gauges; batteries, nickel cadmium (NiCad) and button batteries. The state has a residential and contractor collection program for mercury containing thermostats paid for by Covanta and Wheelabrator (now WIN Solutions).

Both large and small quantity handlers are limited to a one-year accumulation. Large quantity handlers are defined as a handler accumulating 5,000 kg or more total universal waste on-site at any one time. Small quantity handlers are those that accumulate less than 5,000 kg on-site at any one time.

Fire Extinguishers

Eco-Cycle/CHaRm in Boulder, Colorado assures that the retardant is safely discharged from fire extinguishers, then the metal cylinders are recycled.

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[3] http://bluestarrecyclers.org/
[4] https://e-stewards.org/

Propane Tanks

AmeriGas Propane and Blue Rhino, both of which operate in Massachusetts, offer propane tank exchange programs for tanks at retail store locations; tanks must be acceptable as refillable (no rust).

City of Gloucester, Massachusetts

Gloucester's Department of Public Works (DPW) accepts 20-pound propane tanks at the municipal collection program or at the annual HHW collection event. Gloucester does not have a recycling program for the small 1-liter propane tanks. DPW advises residents to discharge the tanks and dispose in the trash.

5.1.13 Electric Vehicle (EV) Batteries

The International Energy Agency (IEA) reported on the massive industrial shift from "fuel-intensive to a material-intensive energy system" due to the developing electrical vehicle market. New recycling technologies for EV batteries are in development.

Global Tech Environmental (GlobalTech)

GlobalTech in Columbus, Wisconsin recycles hybrid/electronic vehicle batteries, cell-phone batteries, and other household batteries. The company services the business-to-business sector but will accept inquiries from government entities. GlobalTech only manages material quantities over 300 pounds in total accumulated weight. The company is also registered with the USEPA as a Large Quantity Universal Waste Handler.

5.1.14 Lithium-Ion Batteries

Lithium-ion rechargeable batteries are used in automotive, energy storage, consumer electronics, and other household and commercial applications.

Li-Cycle based in Toronto, Canada

Li-Cycle, a recycler of lithium-ion batteries, announced plans to build a series of recycling facilities including the Commercial Spoke 2 at the Eastman Business Park in New York (2020), Commercial Spoke 3 in Arizona (2022), North American Hub in Rochester, New York (2023), in addition to several demonstration facilities. Li-Cycle has proprietary spoke & hub technologies that utilize a technology for mechanical size reduction and hydrometallurgical resource recovery designed for lithium-ion battery recycling.

5.1.15 Compact Fluorescent Light Bulbs (CFLs)

Massachusetts Department of Environmental Protection (MassDEP) prohibits mercury-containing lamps from being discarded in landfills. *(Chapter 190 of the Acts of 2006 as amended by Chapter 196 of the Acts of 2014 and 310 CMR 75.00 – Collection and Recycling of Mercury-Added Products).*

USEPA recommends for consumers to consider local options for recycling Compact Fluorescent Lamps (CFLs), and not dispose CFLs in the waste stream or curbside recycling bins. Local recycling programs include the Home Depot Stores or with qualified recyclers. CFLs typically contains 4 milligrams (mg) of mercury, a household hazardous waste as long as the CFL bulb is intact, and the mercury is safely contained inside the bulb or tube for proper recycling. Mercury (Hg) is a naturally occurring metallic element toxic to people and wildlife.

USEPA recommends consumers utilize local options for recycling CFLs and fluorescent bulbs rather than disposing CFLs in regular household trash. Recycling allows reuse of the glass, metals and other materials.

Terracycle, Trenton, New Jersey

Terracycle offers the EasyPak mail-in program for CFLs and batteries.

5.1.16 Books and Media

The Massachusetts Department of Environmental Protection offers an online resource "Beyond The Bin Recycling Directory" to locate recyclers in Massachusetts. Hardcover and paperback books can be donated to local charities, bookstores and reuse retailers. Local libraries might take newer books. Most town transfer stations provide book collection bins.

Eco-Cycle/CHaRM in Boulder, Colorado collects books for recycling and reuse. Reused books support a community network for children and charities.

5.1.17 Marine Debris

Marine Debris as a waste stream is common on Cape Cod and the Islands and can end up at municipal transfer stations for processing and handling before disposal. Marine debris can be defined as any man-made items including fishing gear, plastic bags, beverage bottles, balloons, and food wrappers found off-shore or on-shore, which become marine debris through dumping and improper waste management. Marine debris is also litter that is blown or washed out to sea through storm drains, or due to natural disaster events including hurricanes and coastal storms.

Derelict Fishing Gear

Fishing for Energy Program (FFE) is a partnership between Covanta and the National Oceanic and Atmospheric Administration (NOAA). The program provides commercial fishermen with no-cost solutions to dispose of derelict and retired fishing gear and offers competitive grants to reduce the impacts of derelict fishing gear on the environment. FFE provides disposal opportunities using collection bins at strategic ports for commercial fishermen to unload all types of fishing-related gear. Recycling bins are provided to source separate materials for recycling. The materials are collected and sent to a waste-to-energy incinerator or the materials might be recycled.

In Provincetown, the Center for Coastal Studies team, led by Laura Ludwig, conducts numerous beach cleanups and an annual Ocean Clean Up event. In early 2021,13 tons of lost and abandoned fishing gear was collected from Cape Cod Bay. Of that 13 tons of marine debris recovered, the team was able to recycle, return or upcycle about three tons. *(Source: WBUR This Year's Haul From Cape Cod Bay".*

Net Your Problem also offers fishing gear recycling programs to the fishing industry including nets, lines and soft buoys. The organization has a Northeast division coordinator. Cape Cod towns have participated in the program.

6.0 DEVELOPMENT SCENARIO FOR BARNSTABLE COUNTY

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

The Cape and Islands town 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 poor candidates on which to expand larger volume, comprehensive solid waste processing operations.

The Town of Yarmouth transfer/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. 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 of this infrastructure.

For the longer-term future plan, Tetra Tech recommends that it is in the best interest of Barnstable County to engage the Joint Base Cape Cod (JBCC) to seek land use instruments/control for land at the JBCC most suited for future development as waste processing/waste diversion infrastructure. This unique opportunity presents the following advantages and flexibility to the County:

1. As stated above, there is limited opportunity to develop larger volume, County-wide solid waste processing infrastructure at existing 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 development areas further removed from development than is available anywhere else in the County.

2. The regulatory climate moving forward is increasingly reluctant to permit new landfill capacity in the Massachusetts region. Moreover, waste-to-energy facilities are under increasing scrutiny from air permitting and greenhouse gas emission perspectives. As a result, it is likely that over the longer-term planning horizon that fewer and fewer final disposal options will be conveniently located and accessible to Cape and Islands communities, which will result in increasingly higher disposal and transportation costs. Having control over suitable land at the JBCC would provide the communities with a measure of control over their solid waste management destiny during this transition period that they do not currently possess.

3. A historical landfill development is already on property controlled by the JBCC. Moreover, development of disposal facilities or waste processing infrastructure has successful precedent at other divested military installations. As an example, former U.S. Army Base Fort Devens in central Massachusetts closed in 1996. The base was redeveloped into a sustainable and mixed-use community including the Devens Eco-Efficiency Center, and the Devens Recycling Center which is a full-service C&D recycling facility (90,000 sq. ft.) on 11 acres. Devens Recycling Center recently merged operations with Republic Services.

   Another example is the Joint Base Elmendorf-Richardson (JBER) in Anchorage, Alaska that is currently in discussions with the Municipality of Anchorage, Solid Waste Services Department (SWS) about several

potential alternatives which would transfer lands adjacent to the current Anchorage Regional Landfill property to SWS for future landfill development. As such, development of land at JBCC into a regional solid waste processing infrastructure represents a compatible use.

4. Development of solid waste processing or diversion infrastructure on the JBCC can be pursued in parallel with continuing operations at the existing municipal transfer station facilities. This is important as longer-term solutions can be pursued without interruption to the existing services provided by communities.

5. The JBCC parcels do not require specific planning or programming at the time of the County engaging base officials regarding potential use of the parcels. Future solid waste infrastructure projects can be cooperatively considered and pursued among the County and member communities to build consensus regarding specific goals and mechanisms for development.

6. In the event Barnstable County or another entity obtains the authority to develop waste management infrastructure at JBCC 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.

7. JBCC parcels can also potentially serve as a County-wide hub for the 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.

8. 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.

   Moreover, it would position Cape Cod as a regional leader in Massachusetts, and in the Northeast, to advance awareness between recycling materials and climate change to achieve Barnstable County's goals.

Barnstable County Goals

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

6.1 SHORT TO MID-TERM PLAN

The County has the resources and existing infrastructure to develop short and long-term planning for the Cape and Island towns. The County should work toward a consensus and help the towns develop a shared vision and bridge to the future plan. The County should develop:

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

To advance toward this future development scenario with the JBCC, it is recommended that an initial step 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 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 toward the longer-term future plan:

6.1.1 Organics Management

An initial step is to collaborate and assist with the Town of Yarmouth. The County can assist, with the cooperation of the Cape and Islands towns, to organize and track organics and C&D materials for aggregating at the Yarmouth transfer station; and pursue grants for equipment or other needs.

- Encourage organics collection at all town transfer stations. Food scraps-filled toters can be transported to Yarmouth as feedstock for the digestor. Provide education to reduce contamination. Education materials can be shared across the County and Islands for a consistent message to reach all stakeholders.

- 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. Yarmouth plans to have a food waste depackaging facility operational in 2022.

- Aggregate all C&D materials from the Lower and Outer Cape town transfer stations at Yarmouth, where there is potential space available for a 40-yard trailer.

- C&D contamination is typically mattresses and bulky plastics. Yarmouth could pre-process the C&D to remove the contamination, and aggregate mattresses and bulky plastics for NER to pick up. NER could take all mattresses to their Taunton facility for transporting to Ace Mattress Recycling in Rhode Island. NER can also take all bulky plastic items to be chipped at their Taunton facility and recycled for reuse to the market.

- Help the Town of Yarmouth to build their model, and then plan to build a larger scale organics infrastructure including anaerobic digestion and composting at the JBCC *(longer-term future plan) that does not compete with Yarmouth's investments and expected operations*.

- Support the Town of Yarmouth to meet their goals and provide examples for other member towns to host regional and subregional opportunities.

- Recommend a pilot program with Kelly Green Products in Connecticut as a potential opportunity to expand the current boat shrink-wrap program across the County and Islands. An expanded program could encourage all boat marinas to participate. Could also include agricultural mulch films, and beverage cartons.

6.1.1.1 Diversion Cooperative

The County can bring together the Cape and Island towns to share resources, establish policies, and best practices. With the seasonal fluctuations of MSW tonnage between the summer and winter seasons, the County should consider the development of a more formal solid waste management plan and infrastructure to manage these waste flow variations.

- 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 intermunicipal agreements for resource sharing and collaboration.

- Aggregating 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, along with all recyclable materials collected within the County and the Islands. Together, the waste generated from multi-community agreements enables the potential for facilities such as a County-wide organics management facility to be financially and environmentally viable.

- Leverage best practices and lessons learned from Massachusetts towns organized as refuse districts: Greater New Bedford Refuse Solid Waste District, Franklin County Solid Waste Management District, and the South Shore Recycling Cooperative.

  Diversion Cooperatives or Refuse Districts can be formed through Inter-Municipal Agreements (IMA) to establish a cooperative agreement as a group and establish common goals and potentially funding mechanisms. This collaborative approach can be a model for the County to leverage best practices for resource sharing, create potential innovation opportunities for better market position and pricing, and consolidating the largest volume for recycling end markets. In the short to mid-term, this type of arrangement may focus first to aggregate some source separated organics for Yarmouth to assist in long-term success of their on-going development efforts.

  Greater New Bedford Regional Refuse Solid Waste District is an example of regional cooperation providing a needed municipal service for solid waste disposal and a wide range of recycling programs. The District was formed through an Inter-Municipal Agreement in1979 to develop a solid waste landfill for the member communities of Acushnet, Dartmouth and Fairhaven with the City of New Bedford. *(Acushnet and Fairhaven dropped out.)* The initial cost sharing formula was based on the member communities' population.

  Since the opening of the Crapo Hill Landfill, the assessment is based on the percentage of MSW tonnage delivered by the member communities. The Town of Dartmouth had land available for the landfill. The City of New Bedford paid for up to 80% of the design, engineering and construction costs to start the 70-acre Crapo Hill Landfill that opened in January 1995. The District is governed by a District Committee, with three members from New Bedford and three members from Dartmouth.

  Franklin County Solid Waste Management District (FCSWMD) in Western Massachusetts represents 21 member towns. Each town pays annual administrative assessment to cover 65% of the District's administrative operating expenses, and 35% of the budgeted common expenses are paid through fees for

service framework and by grants. Located within the district is the Springfield Materials Recovery Facility (MRF). The MRF is a public facility, and the Western Massachusetts Regional Recycling Program is currently operated by Waste Management (WM) under contract with the MassDEP.

South Shore Recycling Cooperative (SSRC) is a regional government entity representing 18 member towns that work together to reduce the costs to residents for solid waste management and recycling programs. The towns work cooperatively to reduce costs, improve recycling, and maximize their purchasing power by joining together for regional procurement.

6.1.2 Longer-Term Future Plan

The longer-term future plan for the County and Islands should be to secure appropriate land assets for an Eco-Park development at the Joint Base Cape Cod (JBCC). Securing land would be the keystone toward developing the County's vision for the towns to collaborate on reuse and recycling efforts, resiliency, and cooperate to mitigate climate change through sustainable materials management.

The future plan of an Eco-Park is to coalesce municipal solid waste materials from all towns, including the Islands to the extent they need. The JBCC presents the opportunity to set aside large potential development areas further removed from development than is available anywhere else in the County.

The Cape Cod Commission (CCC) works to address the impacts of climate change and is advancing the development of regional plans. The idea of an Eco-Park fits in directly with the CCC's planning and organizing of the towns to mitigate the region's contribution to greenhouse gas emissions.

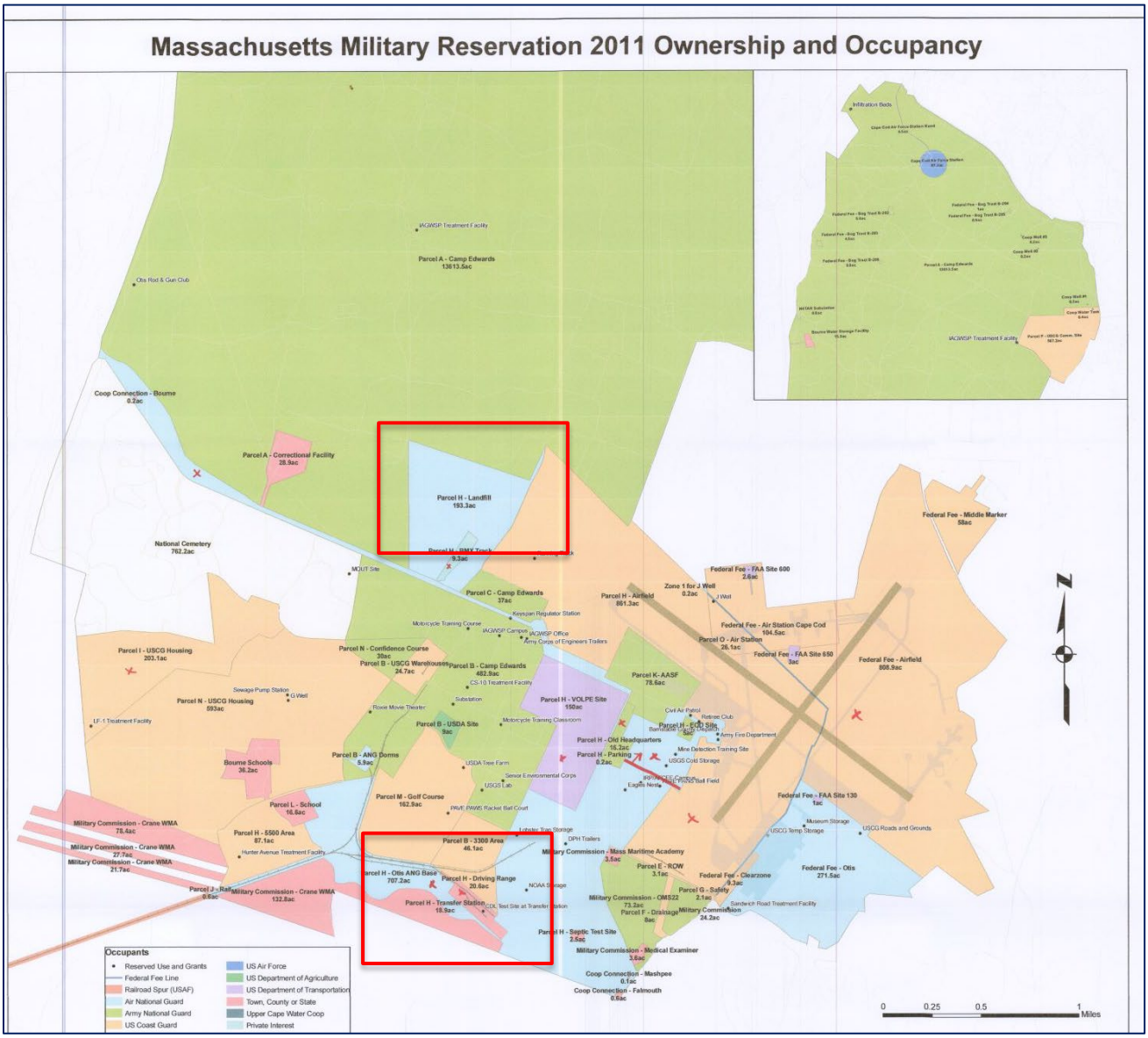
The key objective is to build a cooperative approach through maintaining a cohesive transfer station network that is currently in place and utilize the JBCC as an Eco-Park to serve as the coalescing point for system-wide waste and recycling processing needs. The Eco-Park would serve as a place for proven emerging technologies for waste management and diversion to meet the County's concept of beneficial reuse and recycling, including alternative energy production.

The Project Team identified two areas of interest on the JBCC Map shown in **Figure 6-1**. It is likely that there are other potential sites that may be examined as well. As a high-level analysis, Parcel H 193.3 that is the existing landfill area identified as site for potential longer-term future planning. Parcel H 18.9 is the existing Upper Cape Regional Transfer Station (UCRTS) and surrounding properties including rail.

These two areas of interest were identified for potential consideration as these are established solid waste facilities with access to suitable roadway and rail network, and although Parcel H 193.3ac is within the base security gate, the parcel has a history of solid waste management use. Moreover, it presents a high probability of compatible use. Therefore Parcel H or a similarly sized land parcel could be utilized.

Figure 6-1 shows the two potential areas of interest at JBCC.

Figure 6-1: Two Potential Areas of Interest at the Joint Base Cape Cod



6.1.2.1 Existing Landfill

The landfill located at the JBCC is on state-owned land but is regulated through the 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.

- The JBCC is also located within areas identified as Environmental Justice (EJ) communities.

Potential use for the landfill area could be as a dedicated organics management facility site with anaerobic digestion (AD) (dry, high solids) to manage all types of organic materials including yard debris, woody material, seaweed, fish and cranberry processing waste, and residential and commercial food scraps. Alternative energy in the form of biogas and potential co-generation of heat and power could be the products resulting from the AD operation. A composting facility would be co-located to manage the digestate from the anaerobic digestion process.

6.1.2.2 Upper Cape Regional Transfer Station (UCRTS)

The UCRTS Board of Managers is the body that oversees all operations for the municipally owned regional solid waste transfer station located on Joint Base Cape Cod (JBCC). The site currently includes a transfer station tipping building with tipping floor and office space, a rail spur, a truck scale, and utilities. The UCRTS is located on an approximate 19-acre parcel of land on the JBCC. It would be of interest for the County to expand the transfer station area for an Eco-Park development and services.

Four towns share the transfer station and rail head property. The County could assist to coordinate with Board members.

UCRTS Board of Directors

Town/Entity	Contact
Bourne	Dan Barrett, Phil Goddard
Mashpee	Catherine Laurent
Falmouth	Ray Jack
Sandwich	Paul Tilton
JBCC	Chris Segura

6.1.2.3 Eco-Park Vision

Tetra Tech conducted calls with MassDEP, and they have expressed a favorable attitude toward multi-community collaborative agreements to enhance contract leverage. 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.

Under CMR 16.04, only a general permit is required for the following facilities:

- Recycling operation that receives no more than 250 tons per day of recyclable materials, not including paper.
- Composting facility processing up to 105 tons per week and no more than 30 tons per day; contains less than 5,000 cubic yards of organic materials per acre, and less than 50,000 cubic yards of organic materials on site at any one time.
- Anaerobic digestion (AD) facility receiving up to 100 tons per day of organic material from on or off site, based on a 30-day rolling average.

There is an exemption in CMR 16.04 for towns to establish a recycling center for all recycling, basic commodities, furniture, books, clothing, and more. For larger tonnages over the self-certification limit, then CMR 16.05 requires a written permit from MassDEP for facilities planning to incorporate MRFs, composting operations, and AD.

It should be noted that the MassDEP has revised the state solid waste regulations, including CMR 16.00 Site Assignment for Solid Waste Facilities and CMR 19.00 Solid Waste Facility Regulations. The new solid waste master plan and revised solid waste regulations will be implemented in November 2021 to give stakeholders time to be compliant with the changes.

The Upper Cape Regional Transfer Station (UCRTS) with rail head and surrounding property could be incorporated and developed into an Eco-Park infrastructure. **Table 6-2** shows some of the potential technologies that could be sited at the Eco-Park.

Table 6-2: Potential Technologies for Eco-Park Infrastructure

Technology	Waste Material Stream	End Product or Market
Organics Management Facility: Dry Anaerobic Digestion and Composting Operation	Yard debris, food waste, spent grain from local breweries, seaweed, fish and cranberry processing waste, and potential storm debris management	Biogas, alternative energy, compost products for local/ regional use
Material Recovery Facility	Aggregation and processing recyclable materials	Vendor or end-markets
	Food and beverage cartons from transfer stations and schools	Carton recycling at Kelly Green Products in Connecticut
Secondary MRF	Processing hard to recycle plastics	Chemical recycling facility (i.e. Brightmark)
Rail head	Rail head for moving materials off-Cape	Vendors or end-markets
Disaster Debris Management	All debris materials after major storms	Mitigation plan; provide towns the destination for stockpiling storm debris until materials

		can be transported to markets.
Innovation Area	Pilot programs including proven waste conversion technologies	Develop case studies
Educational Tours and Experience, and Administration		Education
Reuse, Swap Shop/Fixit	Reusable items	Reuse, recycling and zero waste opportunities and develop markets

For the longer-term future plan, the Eco-Park vision could be implemented to create a solid waste facility utilizing the landfill site and UCRTS site with rail as an opportunity to address the JBCC's interest in working with municipalities. A public-military partnership could be discussed for development.

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 to strengthen a cohesive transfer station network, share resources, and identify processing facilities for the waste stream components for beneficial reuse and recycling including organics.

Best practices and concepts can be leveraged from other Eco-Parks. As an example, the Monterey Regional Waste Management District established an Eco-Park to turn waste into resources in the most cost effective and environmentally sound manner to benefit the community.

- The Monterey Regional Waste Management District (MRWMD) in California services an approximate 170,000 population. The District's facilities are located on 475 acres that consists of a landfill (315 acres), buffer area (126 acres), resource recovery facilities (20 acres), community collection facility with administrative offices and maintenance buildings (12 acres). Services include MSW disposal, recycling, composting facility and HHW collection. The organics recycling is key to reducing MSW and GHG emissions, and to comply with California's organic regulations. The Eco-Park includes a reuse and swap shop, and an artist in residence. An anaerobic digestion facility was operating but shut down and moved to another location.

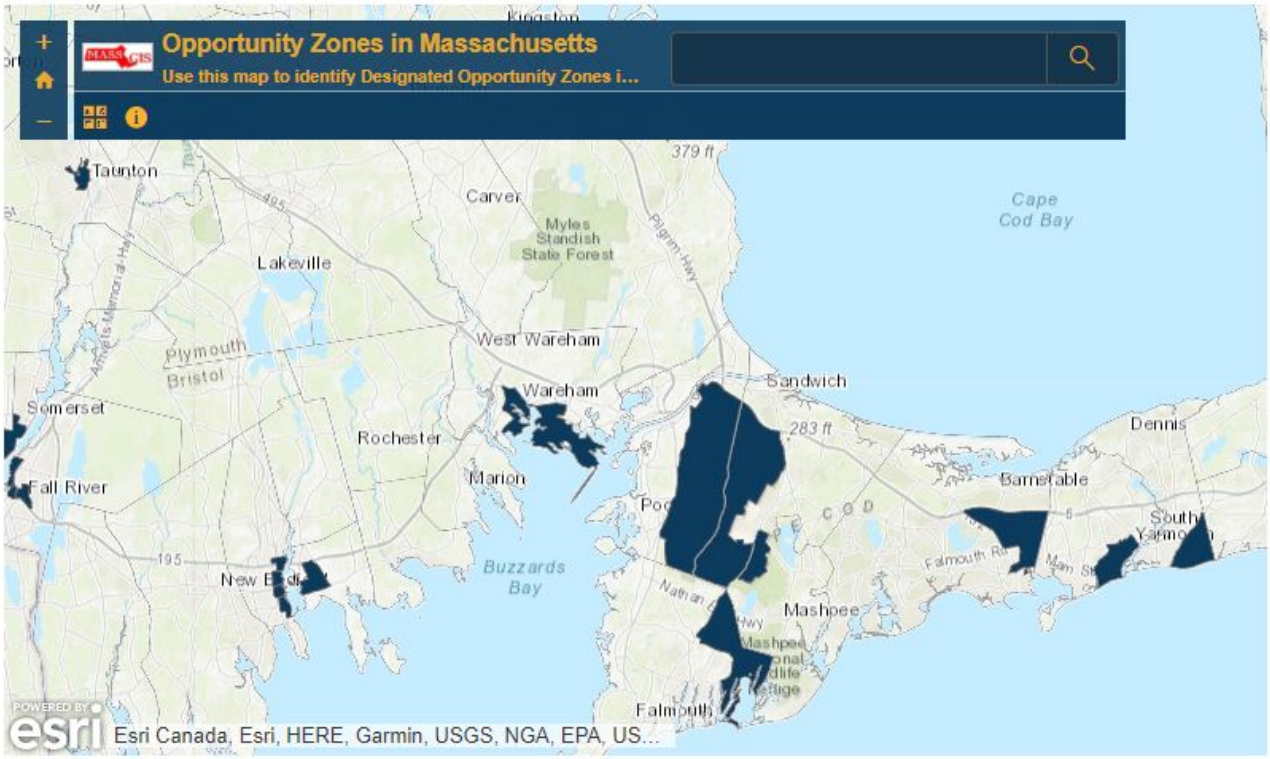
6.1.2.4 Environmental Justice and Opportunity Zone

The JBCC is **mapped as an Environmental Justice (EJ) population, as defined by Massachusetts legislation, based on the criteria "Income"**[5]. As part of the Eco-Park vision and planning effort, the County will need to engage with the four communities of Bourne, Falmouth, Mashpee and Sandwich.

Moreover, the County should engage with the EJ towns all discussions, education and environmental decision-making through expanded and inclusive outreach, Environmental Justice legislation seeks to minimize health risks through targeted environmental enforcement, and to improve environmental quality through initiatives that include reduction of pollutants and emissions, remediation and redevelopment of contaminated land, and investment in urban parks and greenspace. (mass.gov/service-details/objectives-of-environmental-justice)

JBCC is also an Opportunity Zone that could have potential for federally funded tax incentives. The USEPA provides grants to partner with local community development efforts to realize improvements in solid waste operations that may reveal untapped local resources and synergies to fuel solutions to perennial solid waste challenges. **Figure 6-3** shows the Opportunity Zone areas *(Environmental Justice communities)* on the Cape and nearby towns.

Figure 6-3: Opportunity Zones on Cape Cod



[5] This data was obtained from https://www.mass.gov/info-details/massgis-data-2020-us-census-environmental-justice-populations.

7.0 OPPORTUNITIES AND RECOMMENDATIONS

The area of greatest opportunity for the County to increase recycling and reuse is with C&D materials, food materials and yard debris because these represent the highest quantity by weight as material categories in the waste stream. These materials are also a major focus of the revised State Solid Waste Master Plan 2030.

Further efforts should be made to advance what can be done to make suitable tracts of land available at the JBCC, or identify other tracks of land, 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 destiny.

In the event Barnstable County or another entity obtains the authority to develop waste management infrastructure at JBCC 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.

The County and Islands towns should commence a process of understanding and articulating the value placed on lowest cost of service versus materials diverted or recycled to help inform longer term future decision-making.

7.1.1 Solid Waste Master Planning

- There is a need for consistent recycling guidelines published by the individual towns. Comments from the Task 2: Waste Diversion Focus Group indicated the recycling guidelines were often difficult to find on their town's website and not always up to date. A consistent recycling guideline is needed across the County and Islands.
- Emergency storm debris management plan. There is a need to develop a **Regional Entity for Resilience.** The Cape area should seek more system elasticity to manage disaster debris materials when these events occur.
- In addition to the MassDEP list of banned materials, amendments to 310 CMR 19.000 includes mattresses and textiles to the list of materials banned from disposal in Massachusetts and a lower the threshold for commercial food materials to one-half a ton per week. The County might consider supporting state legislation waste reduction efforts such as Extended Producer Responsibility (EPR).
- Many towns already have bans on certain materials including single-use plastics and bags, Styrofoam, and plastic water bottles. It is recommended for the County to develop a list of the Towns' material bans and consider using a survey to collect insights on the successes and effectiveness of these bans.
- From the responses to the Task 2: Barnstable County Waste Diversion pre-meeting survey question, *"How can your town make reuse, recycling and waste prevention more accessible*", several initiatives were identified. These include the following recommendations:

    1. Textiles and food scraps recycling should be a major component of the municipal solid waste management system.
    2. Mandate food scraps recycling (as an example, the Town of Hamilton MA), and advance a County-wide organics management plan.

3. Consistent public space recycling should become a County-wide and Islands program.
4. Institute policies that reduce use of plastics.
5. Consider long-term promotion of sustainability by fostering practices of reduction and reuse.
6. Improve electronic waste (e-waste) recycling. It is recommended to develop a strategy for managing e-waste aggregation, the collection and pick-up with selected vendor(s) and require transparent communications on the end-of-life deposition of the e-waste materials.

The ideas generated during the stakeholder meetings can lay the groundwork for building the vision of an Eco-Park to service the area by adding new services and programs while maintaining existing facilities and level of service currently provided by the town transfer stations.

- The County should consider a broad-based coalition focused on reuse, recycling, and waste prevention. A recommendation is for the County to support a permanent Swap Shop system. The Task 2: Waste Diversion Focus Group participants fully supported the idea of a permanent Swap Shop, indicated by the 100% positive response rate to the pre-meeting survey question, "*Would you utilize a permanent Swap Shop*".

- The County could assist the Town Transfer Stations to develop a permit fee structure to include fees for seasonal or short-term visitors to further promote and fund recycling across Cape Cod and Islands.

7.1.2 Regional Organics Management Plan and Infrastructure

The following are ideas and action items discussed during the Task 2: Waste Diversion Focus Group and Industry Group on Organics Recycling. There was a focus on food scraps collection and infrastructure. Food waste prevention measures should also be included to follow the USEPA food waste management hierarchy.

- One town transfer station maintains three (3) barrels for food scraps collection. It was stated that the bins fill up quickly and are most likely undersized to service the community. It is recommended for the County to evaluate municipal food waste collection systems based on population and potential food waste tonnage. The results of this evaluation could present an opportunity to engage all fifteen member municipalities in the discussion of organics recycling and the need for a local or regional organics management infrastructure. The discussion should include the Islands to gain their insights and best management practices.

- There is potential for developing a regional organics management facility that could be sited within the County, for example at the JBCC. Recommend 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, closing the loop on local organics recycling.

- Recommend for the County to conduct a survey on the number of food stores that are located on the Cape, and then further outreach to the small generators about participation in organics diversion. There is interest in organics diversion from businesses that are not required to source separate food materials from disposal. First the County needs to understand the level of interest with small quantity generators about diverting their food waste material, even though they are below the current Massachusetts Commercial Organics Ban threshold of 1 ton or more per week and potentially below the lower threshold of half-ton per week to be promulgated in November 2022.

- Recommend for the County to conduct a survey with local stores about use of certified compostable prepared food service items. The survey could also include use of reusable and refillable packaging, in line with local Board of Health regulations. There is interest in alternative packaging that could help reduce waste and costs.

- Restaurants and small grocers that sell prepared foods could switch to certified compostable food service packaging and products for takeaway. However, customers would need to divert those compostable items to the composting stream and a composting facility would need to accept the certified compostable packaging. This could present an opportunity for public space recycling to include a composting bin (3-bin system). It also presents an opportunity to increase education about source separation of food waste and compostables from the waste stream to reduce contamination.

- Recommend a County-wide public outreach effort to educate full-time and seasonal residents and visitors on the benefits of compost use and the application of compost on lawns, gardens, and public spaces. This outreach effort can also educate residents on how to source separate food waste at home, or at commercial food service venues, to manage odors, collection, contamination, and more.

- Recommend for Barnstable County to conduct a Food Waste Generation Analysis to determine the potential amount of food waste generated in tonnage and estimate the potential quantity of compostable products needed per food waste generator and cost.

7.1.3 Construction and Demolition Material

New England Recycling Company (NER) currently services the towns of Harwich, Yarmouth, 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 and hard to dispose waste materials.

- One option for towns on the lower Cape towns is to aggregate C&D material at a transfer station that has space for a 40-yard trailer. As an example, aggregating C&D materials at one large transfer facility such as Yarmouth could potentially save the towns on the lower Cape hauling and disposal costs.

- The Project Team contacted New England Recycling (NER) about the potential for transporting C&D material residuals to Lafarge in Ravena, New York. NER believes it would work as the cement kiln is close enough to reach by truck in one day. About 30-tons of material can be hauled per day. NER is working on definitions for the material specifications to send samples to the cement facility for a product that's ready to use without any further processing, sizing, or mixing. No information on transportation cost was available at this time.

- Home improvement projects can also include home clean-outs that lead to contamination in the C&D waste stream. The contamination is typically mattresses and bulky plastics. A recommendation for the County is to look at how these materials can be separated from the C&D material at a local facility in preparation for transportation off the Cape.

  New England Recycling (NER) indicated they could aggregate all mattresses at their Taunton facility for transport to Ace Mattress Recycling in Rhode Island. Bulky plastic items could also be chipped at the NER Taunton facility and recycled for reuse. By having these materials source separated at a town transfer station for NER to transport could potentially be a cost savings/cost avoidance.

- The Town of Yarmouth transfer station could service the Cape, to manage pre-processing to remove the contamination for clean separate waste streams for C&D, mattresses, and bulky plastic items.

7.1.4 Public Outreach

- A challenge to supporting waste reduction is the towns have varying degrees of public engagement pertaining to recycling. There is a County-wide need for a public outreach program targeted for seasonal residents and visitors to adjust their recycling habits to conform to local regulations and recycling opportunities. The County could create standard educational materials for use by towns to customize with town logos and contact information.

- There are several local initiatives that could be scaled up and replicated. Recommend for the County to support and develop recycling programs that are scalable and repeatable across all municipalities and communicate the successes of these efforts. As one example, the Town of Brewster's program "Drink Brewster Tap" in conjunction with the plastic water bottle ban. The Town ran several advertisements with well-known members of the community, including social media ads running twice per week for 6 months. The County might consider this type of public service campaign as part of a water bottle filling station plan.

- Another example is the Massachusetts Beverage Association (MBA), it is currently working with Cape Cod Litter and CARE on an anti-litter campaign, which does not include recycling. There could be an opportunity for Barnstable County and the MBA to collaborate on a consistent recycling education program across the Cape.

- Waste reduction best practices includes consistent messaging on recycling for the various components collected at the Transfer Stations. A county-wide public outreach effort throughout Cape Cod and Islands can build confidence for residents to understand that the recyclables they dropped off at Town Transfer Station recycling centers are properly recycled. Public outreach effort should respond to the need to increase and improve access to the recycling infrastructure in public spaces Cape-wide.

8.0 REFERENCES

- Massachusetts Department of Environmental Protection Solid Waste Policies, Guidance and Fact Sheet
- Massachusetts Department of Environmental Protection Draft Interim Guidance Document for 310 CMR 19.060 Beneficial Use Determination (BUD) Regulations
    - SW 39 BUD Commercial Products
    - SW 42: Use of Secondary Material in Unrestricted Applications (Category 4)
- Massachusetts Environmental Justice Policy, June 2021
- Tufts University Reuse Analysis, No Waste To Spare: An Economic and Spatial Analysis of Massachusetts Reuse Economy 2021 Report
- United States Environmental Protection Agency, Sustainable Materials Management
- ReUse Minnesota, 2020
- Cape Cod Commission Climate Action Plan July 2021