

E. Appendix

E.1. WASTE MANAGEMENT AND RECYCLING BASELINE ASSESSMENT

The Federal Aviation Administration (FAA) Reauthorization bill (FAA Modernization and Reform Act of 2012) requires airport master plans to address waste management and recycling. This requirement can be met by: evaluating the feasibility of solid waste recycling, minimizing the generation of waste, identifying operations and maintenance requirements, reviewing waste management contracts, and identifying the potential for cost savings or revenue generation from recycling. The key steps to addressing waste management and recycling at ERI include:

- **Conduct Waste Audit:** This includes collection of available baseline information on the Airport's waste management program, such as service contracts, costs, and data related waste and recycling materials produced, collected and hauled. This was conducted on 18 Dec., 2015.
- **Assess Existing Waste Management Program:** Drawing on available data and conversations with key Airport staff, this assessment documents waste collection practices at the Airport.
- **Assess Opportunities for Expansion of Recycling Program:** The result of reviewing existing waste collection practices at the Airport highlights opportunities for improvement and/or expansion.
- **Develop Recommendations:** Recommendations for improvement and/or expansion of waste management and recycling practices and/or programs at the Airport focuses on the pursuit of specific and measurable performance targets.
- **Measure Performance:** A sample spreadsheet is provided, which can be used to enable continuous monitoring of waste and recyclable materials generation at the Airport.

E.2. LOCAL RECYCLING REGULATIONS, MATERIALS, AND SERVICE PROVIDERS

Authorized by Pennsylvania Law Act 101 of 1988, Millcreek Township enacted ordinance Number 2006-11. This requires all residential and commercial establishments to be signed up for trash and recycling service. Commercial establishments include retail, industrial, and institutional agencies. **Table E-1** lists items that must be separated from municipal waste at generation site and recycled.

Table E-1: Materials Required to be Recycled

Paper		Plastic / Glass / Metal	Organic
All Office Paper	Newsprint	Plastic Bottles, Jars, and Containers (#1-#2)	Leaf Waste
Corrugated Cardboard	Magazines	Glass Bottles and Jars (Clear, Green, Brown)	Yard Waste (Shrubbery/Brush/Tree Trimmings/Non-Food Garden Residue Dead Flowers/Christmas Trees)

Source: Millcreek Township

The list of recyclable materials accepted depends upon the hauler selected for service, however commercial haulers are required to provide annual reports to the Township, which list the total weight of materials collected by type. As a commercial establishment, the Airport is permitted to contract with a hauler of their choice. Pro Waste, the Airport's waste and recycling contracted hauler, accepts cardboard, plastic #1-7, paper, metal, and glass.

Waste Management is the contracted hauler for residential properties of four or fewer dwelling units, and accepts plastic bottles and containers, food and beverage cans, paper, flattened cardboard and paperboard, glass, and food and beverage cartons. The Airport does not use Waste Management for any waste or recycling services.

Both Waste Management and Pro Waste offer single-stream recycling service, which is where all recyclable items can be placed together in one container. There are a few other recyclers who may take specific items like shredding, electronics, household hazardous waste, telephone books, newspapers, odd plastics, and concrete. There is no sorting required at the curbside of "normal" recyclables for residents or businesses.

Other providers in Erie County offer commingled and separated recycling. Commingled recycling is where all paper products including magazines, newspaper, and cardboard must be separated and bundled with string, all other items can be placed in one bin. Separated recycling is where all recyclable items must be placed in separate bags or containers as designated by the municipality.

Waste Management operates their own trash facility (Lake View Landfill, Erie) and recycling facility (Neville Island, PA). Pro Waste indicated that recyclable materials hauled to their facility are sorted, processed, bailed, and shipped via a private material broker who purchases these materials from Pro Waste and seeks resale on the commodity market.

Finally, Millcreek Township owns and operates a composting facility; the Millfair Compost and Recycling Center. Erie County oversees a Household Hazardous Waste and Electronic Collection Center, which accepts these items once a month. Erie County expressly does not accept certain materials for recycling, which are listed in **Table E-2**.

Table E-2: Representative List of Materials Not Accepted for Recycling

Material Type	Material Type
Aluminum Foil – Used	Styrofoam Cups and Containers
Electronics and Appliances	Wax Food Containers
Food Waste (Wrappers/Any Container with Food Waste, Including Pizza Boxes)	Window Glass
Hazardous Waste	Yard Waste (Grass Clippings, Branches, Wood, and Shrubbery)
Plastic Bags or Films	
Material Type	Material Type
Aluminum Foil – Used	Styrofoam Cups and Containers
Electronics and Appliances	Wax Food Containers
Food Waste (Wrappers/Any Container with Food Waste, Including Pizza Boxes)	Window Glass
Hazardous Waste	Yard Waste (Grass Clippings, Branches, Wood, and Shrubbery)
Plastic Bags or Films	

Source: Erie County

As described, the ERAA has at a number of options for collection and hauling of waste and recyclable materials generated by the Airport. Millcreek Township offers a wealth of information regarding recycling in the Township and Erie County, which is overseen by a Recycling Coordinator.

E.3. EXISTING WASTE MANAGEMENT AND RECYCLING PROGRAM AT ERI

To identify options for improving waste management and recycling at ERI, a review of the Airport's existing waste management and recycling program was performed. This review relied predominantly upon data available from the Airport and the private company currently contracted to collect and haul waste and recyclables from ERI. Data collected includes limited quantitative information from existing contract documents and invoices pertaining to services provided, as well interviews with Airport leadership and the contractor.

For the purpose of this Plan, the primary sources of waste and recyclable materials at ERI are understood as follows:

- **Terminal Public Area:** Materials generated in the terminal building by passengers.
- **Terminal Operations and Tenants:** Materials generated in the terminal building by staff of ERAA, airlines, rental car agencies, FAA, Transportation Security Agency (TSA), Customs and Border Protection (CBP), and Erie Café.
- **Aircraft:** Materials generated by passengers and crew on arriving aircraft. This is referred to as "deplaned waste."

- **Other Airport Businesses:** Materials generated by other businesses located on the Airport, such as the FBO, aircraft maintenance shop, flight school, and charter operator.
- **Airport Contractors:** Materials generated by contractors performing work on the Airport. These materials are commonly referred to as construction and demolition (C&D) waste.

Today, one service provider (Pro Waste, Inc.) is contracted to provide collection of waste and recyclable materials for ERAA at the Airport. A second, specialty provider is contracted for the disposal of hazardous materials not accepted for recycling or at landfills (Environmental Products and Services of Vermont, Inc., EPS). Additionally, ERAA staff has in the past utilized Great Lakes Disposal and Recycling for disposal of old paint material, and scrap metal such as old auto parts are transported approximately three times annually to Lincoln Recycling which pays by weight for all materials free of hazardous contaminants by weight.

Conversations with ERAA staff indicate the following practices related to waste and recycling:

- **ERAA Staff Practices:** Members of Airport operations staff typically spend approximately three hours each day collecting waste and recyclable materials from the terminal building. This effort includes moving from space to space in the terminal building, cleaning and gathering waste, and depositing waste and recyclables into assigned dumpsters. At this time, corrugated cardboard represents the primary material that is recycled at the Airport, while some plastics are also recycled. Scrap metals and hazardous materials such as light bulbs, batteries, and electronic equipment are stored in the Penn-Brass building until they accumulate to a level that requires transport off-site. Additionally, ERAA staff indicates that the dumpster utilized by ERI Café for grease has not been serviced for some time; however, the restaurant operation does not require significant amounts of frying oil. Food waste is handled as waste and commingled with other terminal building waste.
- **Airport Businesses not in Terminal Building:** ERAA staff reports that North Coast Air FBO/Charter/Flight School and Erie Aviation contract for waste removal and recycling per Millcreek Township ordinance for commercial establishments. There are four dumpster containers in the area occupied by these operators. Facilities occupied by Federal Inspection Service/Customs and Border Patrol, the FAA, the National Weather Service, and the rental car wash facility have waste and recycling included in their lease agreements. ERAA staff cleans these facilities and disposes of waste and recycling materials under the ERAA contract with Pro Waste and EPS. ERAA staff is unsure of how waste and recyclables are handled by private pilot tenants leasing T-hangars; however, it is assumed that these operators utilize FBO containers or transport waste and recyclables off-site independently.
- **Terminal Restaurant:** Erie Café treats food waste materials as general waste, which is disposed in the dumpster dedicated for Airport waste. The Erie Café operator contracts privately for disposal of grease using a dedicated container, which is serviced as needed.

- **Deplaned Waste and Recyclable Practices:** Deplaned waste and recyclable materials are not separated by airline crews. All deplaned materials are deposited as waste in the dumpster dedicated for Airport waste only.
- **Airport Contractor Practices:** As reported by ERAA staff, C&D waste materials are handled by contractors, and hauled off-site as needed under those contracts. Small amounts of waste and recyclable materials are deposited in dumpsters near the terminal building on occasion, as needed. There are currently no requirements in contractor agreements regarding monitoring, tracking, and reporting diversion of C&D waste materials from landfills for reuse and/or recycling.
- **ERAA Training and Education:** There is currently no formal training or education provided to Airport staff related to waste and recycling at ERI. Additionally, there are no signs or placards placed in the terminal building to promote recycling to passengers, or in operations areas to promote recycling with Airport staff. ERAA does circulate a newsletter regularly to staff and tenants, which promotes recycling of materials at the Airport.

Table E-3 summarizes the existing waste management and recycling service provided to the Airport by ERAA. Airport tenants contract for waste and recycling collection privately, and are not included here.

Waste collection at ERI is accomplished via two dumpsters located on-site, which serve Airport operations, terminal tenants, and passengers. These dumpsters are also used for waste from tenants in other buildings. Additionally, two dumpsters are dedicated for recyclable materials. Pro Waste picks up trash three times per week, and recyclables twice per week, and bills ERAA a flat monthly fee based on the number of dumpsters and pick-ups. ERAA pays \$605 per month for waste removal and \$50 per month for recycling at the Airport, and \$85 per month for waste removal at the International Trade Center (ITC) facility.

Table E-3: ERI Contracted Waste Management and Recycling Services

Collection Type	# Containers / Type	Container Size	Pick-Ups/Week
Airport Waste	2 / Dumpster	6 Cubic Yards	3
Airport Recyclables	2 / Dumpster	6 Cubic Yards	2
International Trade Center Waste	1 / Dumpster	2 Cubic Yards	1

Source: ERAA Staff; Pro Waste, Inc.

Note: There is a third dumpster located adjacent the terminal building, which is utilized by the operator of the ERI Café under a separate, private contract.

Hauling for hazardous waste provided by EPS occurs once annually. ERAA began contracting with EPS at the end of 2014, the cost of which was about \$4,400 in 2014 and just over \$4,700 for 2015. EPS spends up to four hours at the Airport packaging hazardous materials for transport, and hauls items away for disposal and possible recycling.

In total, ERAA incurs a cost of approximately \$13,300-\$13,600 annually. Aside from future, nominal rate adjustments by Pro Waste for regular waste and recyclable service, it can be assumed that this component of waste and recycling costs borne by ERAA should remain mostly fixed and predictable. By contrast, the cost of packaging and transport of hazardous waste by EPS can vary based upon the number and volume of materials.

Figure E-1 and **Figure E-2** show the location and types of waste and recycling containers that serve the terminal building. A summary is presented in **Table E-4**.

Table E-4: ERI Contracted Waste Management and Recycling Containers

Container Location/Type	# Containers
Terminal Building/Waste Containers	15 (6 Small/9 Large)
Terminal Area/Dumpsters	4 (2 Waste/2 Recyclables) 1 (Erie Café)
International Trade Center	1
Terminal Area/Recyclable Dumpster	2

Source: McFarland-Johnson, Inc.

As indicated in **Table E-4**, the terminal building has 15 waste containers. Of these, no containers are expressly dedicated for recyclable materials.

Figure E-1: ERI Terminal Waste and Recycling Containers

This page intentionally left blank.

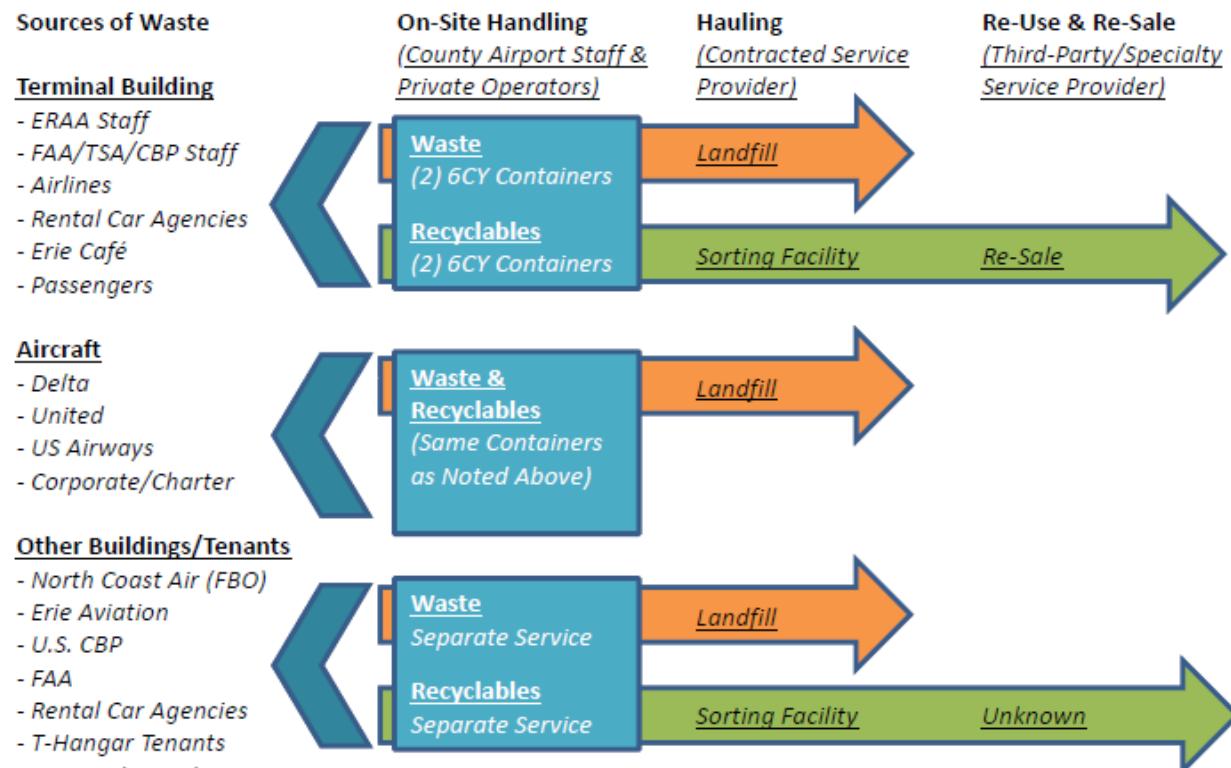
Figure E-2: ERI Terminal Waste and Recycling Container Types



Source: McFarland Johnson, Inc.

Figure E-3 illustrates the flow of waste and recyclable materials from ERI to landfills and recycling centers. As indicated, recyclable materials are handled on-site by Airport staff, and collection and hauling is provided by contracted service providers. Waste is hauled off site to a landfill, while recyclables are transported to facilities where materials are sorted for reuse/resale on the open market.

Figure E-3: ERI Waste and Recycled Materials Streams



Source: McFarland-Johnson, Inc.

E.4. BASELINE ASSESSMENT OF WASTE AND RECYCLABLE MATERIALS GENERATED AT ERI

The Airport's personnel do not incorporate any protocols for measuring or estimating volume or weight. Conversations with ERAA staff indicated that terminal area dumpsters are typically at least 75 percent full, but often are near 90-100 percent full prior to collection by Pro Waste. Therefore, a baseline estimate of annual waste and recyclable materials generated by activity at ERI is determined to be 85 percent of capacity, and is presented in **Table E-5**.

The estimates shown in **Table E-5** provide a benchmark or baseline estimate of the impact recycling at the Airport may have today. Based on this estimate, recyclable materials might represent approximately 23 percent of all waste material volume generated by the Airport.

Table E-5: ERI Baseline Annual Waste and Recycling Volume and Weight Estimates

Type	Container Capacity	Pick-Ups/ Week	Weight/ Volume	Annual Volume	Annual Weight
Airport Waste	(2) 6 CY Total: 12 CY	3	75 LBS/CY	1,591 CY	59.7 Tons
Airport Recyclables	(2) 6 CY Total 12 CY	2	35 LBS/CY	1,061 CY	18.6 Tons
International Trade Center Waste	(1) 2 CY	1	75 LBS/CY	88 CY	3.3 Tons
Totals				2,740 CY	81.6 Tons

Source: McFarland Johnson, Inc. Estimate; Pro Waste, Inc.

Note: Industry standard of 70-80 pounds/cubic yard for waste and 30-40 pounds/cubic yard for recyclable materials provided by Pro Waste.

E.5. OPPORTUNITIES AND RECOMMENDATIONS FOR EXPANSION OF RECYCLING PROGRAM AT ERIE

As described, the type of recycling service in place at Erie International Airport is “single stream” recycling. **Figure E-3** above illustrates the three primary sources of waste and recyclables at ERI, and the flow of those materials from the Airport to off-site locations. As shown, recyclables generated by activities in the terminal building and by other on-Airport businesses are sorted off-site by the service provider, and waste is hauled to the landfill. Deplaned waste generated by passengers in flight is not sorted, and therefore recyclables are not diverted from the landfill.

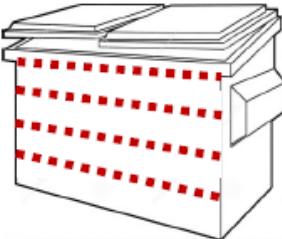
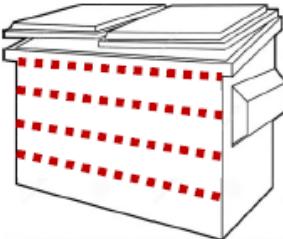
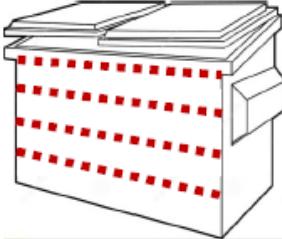
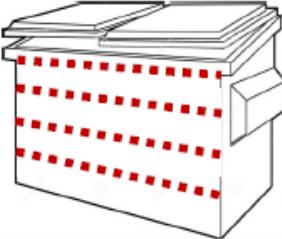
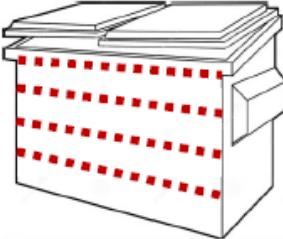
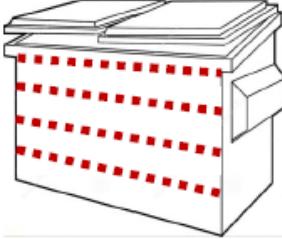
Single stream recycling offers the primary benefit of not requiring Airport staff to sort recyclable materials on-site; rather, recyclables just need be separated from waste. Airport staff already does this for cardboard. Separating other papers, plastics, and glass can be accomplished most effectively by separating these materials from waste at the point of disposal. Recommendations to expand recycling at ERI include the following:

- **Recycle Additional Materials:** Only cardboard is recycled at the Airport today. However, Township regulations require commercial establishments like the Airport to recycle the following additional items: all office paper, newsprint, and magazines; plastic bottles, jars, and containers (#1-#2); glass bottles and jars; and organic waste such as leaves and yard waste (see **Table E-1**). Recycling these items will not only bring the Airport into compliance with local regulations, but increase the volume and weight of materials diverted from local landfills to recycling streams and reuse. It is not anticipated that additional dumpsters would be necessary, as the volume of recyclable materials will simply be diverted from the waste dumpster to recycling dumpster on-site.
- **Purchase Dedicated Recycling Containers for Terminal:** One of the first steps ERAA could take to expand recycling at ERI is to purchase containers dedicated for recycling and

place them next to existing waste receptacles in the terminal building. Such purchases would amount to approximately 10 single/standalone recycling containers (e.g., 24-35 gallon capacity) for the terminal. Alternatively, ERAA could consider the purchase of shared waste and recycling containers, which are single enclosures that accommodate waste and recyclable materials in the same collocated receptacle. In areas where small waste cans are currently located for use by airline and rental car agency staff, smaller 7-10 gallon capacity bins for paper can be placed alongside existing waste bins.

- **Education Program for ERAA Staff, Tenants, and Passengers:** An integral part of increasing use of dedicated recycling containers throughout the terminal building, both in passenger and tenant/staff areas is a communication and education program. Such an effort need not be overly robust, time consuming, or expensive. Rather, thoughtful placement of placards in passenger and staff areas as encouragement to utilize recycle bins, or inclusion in regular staff and tenant communications (e.g., emails, invoices, newsletters) and training sessions may suffice.
- **Record/Track Volume and Weight of Waste and Recyclable Materials:** ERAA might also consider devoting some portion of existing staff time each week to record estimates of volume and weight of waste and recycled materials at the time private hauling contractor comes to collect. As described, there is no record of these measures at the Airport today, and estimates of materials sent to landfill versus those diverted for recycling and reuse is helpful to appreciate the Airport's contribution to sustainability. A sample spreadsheet for monitoring recycling performance at the Airport is shown in **Figure E-4**.
- **Introduce C&D Waste Diversion Plan/Reporting into Contractor Agreements:** As noted, ERAA does not currently have any requirements included in contractor agreements that stipulate monitoring, tracking, and reporting diversion of C&D waste materials from landfills for reuse and/or recycling. Therefore, it is recommended that ERAA explore the inclusion of such requirements for contractors performing work on the Airport. Importantly, such a requirement might be best suited for large capital projects rather than small maintenance and repair type contractors whose work will not generate significant volumes of such materials. A sample C&D waste diversion worksheet is shown in **Figure E-5**.

Figure E-4: Sample Waste and Recyclable Material Volume Monitoring

Waste <i>Percent (%) Full</i>	Pick Up Record <i>Date:</i> _____ <i>Time:</i> _____ <i>Initials:</i> _____ 100% <input type="checkbox"/> 75% <input type="checkbox"/> 50% <input type="checkbox"/> 25% <input type="checkbox"/>	Pick Up Record <i>Date:</i> _____ <i>Time:</i> _____ <i>Initials:</i> _____ 100% <input type="checkbox"/> 75% <input type="checkbox"/> 50% <input type="checkbox"/> 25% <input type="checkbox"/>	Pick Up Record <i>Date:</i> _____ <i>Time:</i> _____ <i>Initials:</i> _____ 100% <input type="checkbox"/> 75% <input type="checkbox"/> 50% <input type="checkbox"/> 25% <input type="checkbox"/>
<i>Terminal Dumpster 1</i> <i>(Capacity: 6 CY)</i>			
Recycling <i>Percent (%) Full</i>	Pick Up Record <i>Date:</i> _____ <i>Time:</i> _____ <i>Initials:</i> _____ 100% <input type="checkbox"/> 75% <input type="checkbox"/> 50% <input type="checkbox"/> 25% <input type="checkbox"/>	Pick Up Record <i>Date:</i> _____ <i>Time:</i> _____ <i>Initials:</i> _____ 100% <input type="checkbox"/> 75% <input type="checkbox"/> 50% <input type="checkbox"/> 25% <input type="checkbox"/>	Pick Up Record <i>Date:</i> _____ <i>Time:</i> _____ <i>Initials:</i> _____ 100% <input type="checkbox"/> 75% <input type="checkbox"/> 50% <input type="checkbox"/> 25% <input type="checkbox"/>
<i>Terminal Dumpster 1</i> <i>(Capacity: 6 CY)</i>			

Source: McFarland Johnson, Inc.

Figure E-5: Sample C&D Material Waste Diversion Worksheet

CONSTRUCTION AND DEMOLITION DEBRIS WASTE DIVERSION WORKSHEET

Pre-Project Waste Diversion Plan (non-shaded portion) Indicate diversion method with an X in appropriate column along with name of vendor/facility. Calculate anticipated diversion and landfill percentage of each material type. List deconstructed items for reuse on-site or off-site (donated or sold) on the next page. Include the approximate weight in the column for reusable items. More detailed instructions on completing this Worksheet begin on page 3.

Post-Project Waste Diversion Report (shaded portion) Enter actual weight in pounds for each category. Calculate weight column totals and diversion rate. Keep all receipts for final report. More detailed instructions on completing this Worksheet begin on page 3.

If applicant is using an online C&D resource tool, such as [Green Halo](#), this Worksheet (including Waste Diversion Plan & Waste Diversion Report) is NOT required.

Waste Diversion Plan (for plan check)							Waste Diversion Report (for final inspection)		
Material	Anticipated						Actual (see weight conversion factors next page)		Diversion Rate
	Diversion			Waste	Diverted Materials all methods		Waste		
	Reuse	Recycle	Compost	Landfill	Diverted lbs	Vendor / Facility	Landfilled lbs	Total Diverted + Landfilled lbs	
Asphalt			NA	100%					100% required
Concrete			NA	100%					100% required
Soil, Rock, Land Clearing Debris			NA	100%					100% required
At least 50% diversion of the following materials. Diversion based on amount of the combined total weight of materials below.					A		B		
Cardboard									
Carpet, Padding/Foam									
Brick, Masonry, and Tile									
Metals									
Sheetrock (not painted)									
Clean Wood									
Ceiling tile									
Painted wood, painted drywall, plywood									
Reusable items							(complete Reuse List next page)		
Roofing									
Other Debris:									
Other Debris:									
Other Debris:									
					Total				

Source: City of Berkeley, California, Department of Planning and Development, Building and Safety.

E.6. AIRCRAFT DEICING FLUID COLLECTION

The Airport completed the construction of a glycol recovery system in 1998, in accordance with Federal Environmental Protection Regulations. The Airport uses a potassium acetate-based deicing agent (Cryotech E-36), which is pumped into an 18,000-gallon above-ground storage tank where it is held and allowed for metered release (20 gallons per hour) into the local sanitary sewer system. The collection system consists of a series of inlets on the aircraft parking apron, which redirects the flow of E-36 from the apron to a below-ground holding tank. Periodically, the E-36 is pumped from the below-ground holding tank to the above-ground tank.

The current deicing operation at ERI is performed on the ramp while airline aircraft are at the terminal gates. The airlines perform the deicing service via trucks using deicing fluid stored in totes on an area of the ramp near the CBP building. North Coast (an FBO) stores their deicing fluid separately, and performs deicing of general aviation aircraft on the ramp by their facility.

Spent deicing fluid from airline aircraft mixes with snow, ice, and salt on the terminal ramp, some of which flows toward runoff drains located near the terminal building. Conversations with

ERAA operations staff indicates that some amount of spent deicing fluid does not make its way to these drains.

It is possible for ERAA to recycle spent deicing fluid at ERI; however, there are a number of operational considerations that come into play. Two primary considerations are:

- Planning, Design, and Installation of Collection and Recycling System: Recycling of deicing fluid will require planning and design for a sophisticated system that can: sufficiently collect spent fluid versus allowing it to runoff or combine with other chemicals; contain, pump, and recycle spent fluid; pump recycled fluid to one containment structure for resale or reuse; and pump runoff and some portion of spent fluid and other chemicals into the existing system for metered discharge into the local sanitary system.
- Changes to the Existing Deicing Operation: Design and construction of a collection and recycling system for spent fluid will require significant excavation of existing terminal ramp area, or as an alternative the location of an adequate space nearby for a deicing pad that is separate from the terminal ramp. The latter scenario is likely preferable, because it offers less disruption to existing operations during construction. Additionally, the design of a separate recovery and recycling facility would include a new drainage system specifically for collection of spent fluid that is separate from the existing terminal ramp area.

Other considerations include protection of stormwater runoff quality and maintaining the separation of clean stormwater runoff from deicing waste stormwater runoff. This will require incorporation into the Airport stormwater management plan. Some airports contract for full-time specialty staff to operate deicing equipment and oversee operation such that application and equipment use maximizes spent fluid recovery.

Finally, there will be cost considerations for planning, design, construction, and operation of a deicing fluid recovery and recycling system. Ultimately, any cost savings or pay-off should be based on the volume of fluid used annually, and the output and value of recycled fluid on the secondary market.