



**Solid Waste Recycling Management Plan  
for City & Borough of Wrangell, Alaska  
Draft Version # 1 – for Review Only**

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# **Solid Waste Recycling Management Plan for City / Borough of Wrangell, Alaska *Draft Version # 1 – for Review Only***

## **1.0 Background and Introduction**

Development of this Solid Waste Recycling Management Plan (Recycling Plan or Recycling Strategy) is linked to a grant the City / Borough of Wrangell (CBW or Wrangell) was awarded by the Community Coastal Impact Assistance Program as part of the Alaska Coastal Impact Assistance Program funded by the Federal Coastal Impact Assistance Program. The latter program is within the U.S. Department of the Interior / Fish and Wildlife Service. The formal title of the funded project in Wrangell is *Protecting Coastal Areas Through Waste Management Improvement*.

The project scope of work accompanying the grant award talks about examining "...how best to collect and process recycled goods and consideration of equipment." The Recycling Strategy is supposed to address and cover:

- Community characteristics;
- Recycling options, and related equipment and facility requirements for materials collection and processing;
- Recommendation for best approach to recycling based on unique conditions and circumstances in Wrangell and also based on what approach has the best chance of securing the highest level of participation;
- Benefits, costs, and operational issues / challenges related to implementation of preferred option; and,

- Public education / awareness efforts to support implementation.

A Draft Recycling Plan has been reviewed by CBW staff and decision – makers and also presented at a public / stakeholder meeting. Feedback from these sources has been incorporated into the Final Recycling Plan.

It should be noted that this Recycling Plan focuses on how to recover materials from the municipal solid waste (MSW; everyday trash from residential and commercial / institutional sources) now being disposed by the CBW. Wrangell already recycles scrap metals which, for the purpose of the Recycling Plan, is not categorized as MSW per criteria defined by the U.S. Environmental Protection Agency.

### **1.1 2009 Solid Waste Management Plan**

The Department of the Navy prepared a Solid Waste Management Plan (SWMP or Plan) for the CBW dated December, 2009. The Plan focused on thermal destruction (incineration) technologies for the combustible portion of the wastestream. It looked at three different technologies – one strictly for volume reduction, one for heat recovery, and one for electric generation. Cost estimates (in 2009 dollars) for the acquisition, installation, operation, and maintenance were offered, along with facility / building and infrastructure requirements for each technology.

Cost was a major barrier to implementing any of the systems portrayed in the Plan. For example, capital expenses ranged from \$ 1.2 million to \$ 4.4 million. Residual ash would still need to be disposed, and the technologies target combustible or “burnable” materials, not the full wastestream. As well, Wrangell’s total disposed waste is about 3.7 tons per day and the combustible items are included in that figure. The CBW concluded that these circumstances

presented too many obstacles to the practical and cost – effective use in Wrangell of the technologies examined by the SWMP.

## **2.0 Local Characteristics and Conditions**

### **2.1 Location, Geography, Climate**

The CBW is located at the northern tip of Wrangell Island, which is in the center portion of the Southeast Alaska Inside Passage. It is surrounded by the Tongass National Forest. Juneau is to the north and Ketchikan to the south. This is the region of Southeast Alaska, sometimes called “the Panhandle”. It is primarily a marine environment with few roads. The main transport modes are airplane, barge, and ferry. Average temperature in Wrangell is 45 degrees and average annual rainfall can vary between 80 and nearly 100 inches. Measurable rain occurs 156 days out of the year.

### **2.2 Population**

According to *Southeast Alaska by the Numbers 2013* (page 6; Southeast Conference), Wrangell’s population in 2010 was 2,369 and in 2012 was 2,448, an increase of 3 percent. From 2000 to 2010 the population grew 2.6 percent. These population growth rates are much lower than the state average of 13.3 percent and the national average of 9.7 percent. As of January, 2014, the CBW population is reportedly 2, 456 (*Wrangell, Alaska 2014 Community Profile*, CBW Economic Development Department). This most recent population estimate is confirmed by the 2014 Southeast Conference publication, which notes Wrangell’s population grew 4 percent from 2010 to 2013.

### **2.3 Government**

The CBW is a unified home rule municipality with an Assembly – Manager form of government. The Borough Manager and Borough

Clerk report to the Assembly. Department managers report to the Borough Manager, who has final responsibility for daily functions of the CBW. The Assembly consists of seven members, including the Mayor.

## **2.4 Economy**

The Economic Development Department's *2014 Community Profile* highlights four major components of the CBW economy: fishing and fish processing; timber harvesting and preparation of wood products; recreational and cultural tourism and visitor activities; and local, state, and federal governments.

The role of timber harvesting / wood products preparation has diminished over the years, elevating the importance of the other three economic segments in Wrangell. Considerable infrastructure has been built with private and public funding to serve both commercial vessels and recreational boats. This includes a belt freezer, cold storage for seafood, a harbor, and a marine repair yard.

Visitors come to Wrangell on cruise ships and by yacht, airplane, or ferry. They find numerous opportunities for enjoying the natural environment or learning about local historical, cultural, and tribal influences. These opportunities encompass fishing, hunting, hiking, camping, backpacking, cross – country skiing, snowmobiling, sightseeing and flightseeing tours, wildlife viewing, museum displays, and art galleries / stores.

As the *2014 Community Profile* states, “public sector employment is also a significant contributor to the local economy.” This refers to the various departments of the CBW, and state and federal regulatory and service agencies.

## **3.0 Current Solid Waste Management Operation**

### **3.1 Organization, Personnel, Services**

Wrangell has what is called "universal service" meaning the CBW Public Works Department provides refuse collection to all sources of waste in the community and all waste generators are billed for this service.

Two people are dedicated full – time to solid waste operations – one driving the trash truck(s) and one working at the Materials Recovery and Handling Facility (MRHF).

There is no active landfill in Wrangell for municipal solid waste. Outside of the MRHF there is an area for burning of paper products, yard waste, and wood (these are commonly referred to as "burnables").

Disposed waste is placed into 48 foot containers at the MRHF for transport by barge and rail to Republic Services Roosevelt Regional Landfill in Klickitat County, Washington.

### **3.2 Disposed Waste Quantity Data**

The amount of disposed MSW (municipal solid waste) generated from Wrangell and disposed by Republic Services has been relatively consistent the last few years and parallels closely CBW's modest population growth. For the last nine years here are the annual disposed waste tonnages:

- 2005 – 1,258
- 2006 – 1,180
- 2007 – 1,211
- 2008 – 1,197



- 2009 – 1,287
- 2010 – 1,561
- 2011 – 1,538
- 2012 – 1,566
- 2013 – 1,560

Total disposed tons for this period is 12,358 for an annual average of 1,373 tons. Using the 2014 population figure from the CBW Economic Development Department (2,456) and the average annual tonnage, the per capita disposal rate for Wrangell is a little over half a ton per year or 3 pounds / person / day.

The most recent disposal invoices from Republic Services show that for the fourth quarter of 2013 there were 383 tons shipped out in 14 loads for an average of 27 tons per containers. During the first quarter of 2014 there were 329 tons shipped out in 13 loads for an average of 25 tons per container.

### **3.3 Generators / Accounts**

Generators or accounts are typically divided into two broad categories or sectors – residential (single – family homes, duplexes) and commercial / institutional. The latter can include condominiums / apartment buildings with three units or more, wholesale and retail businesses, governmental offices / buildings, and industries.

In Wrangell, examples of commercial / institutional sources are the library, post office, the airport, ferry dock, churches, banks, City Hall, hospital, U.S. Forest Service, Harbor Master's office, the Nolan Civic Center (Visitor Center, Museum, Convention Center) and the Recreational Facility and Community Center at Wrangell High School. Additional examples are other CBW government offices, Wrangell School District offices and facilities (Evergreen Elementary School, Stikine Middle School, Wrangell High School), Wrangell Medical

Center, Chamber of Commerce, Convention and Visitor Bureau, state agencies (Health and Social Services, Fish and Game, Transportation and Public Safety) and other federal agencies (Postal Service, Customs).

There are 845 residential, 113 small commercial / institutional, and 6 large commercial / institutional accounts that receive refuse collection service from the CBW Public Works Department. The large commercial / institutional accounts are Bob's IGA, City Market, Wrangell High School, Sea Level Seafoods, Trident Seafoods, and Wrangell Medical Center. A complete list of all generators is in Appendix X.

In the harbor areas there is no garbage collected from individual boats. Boat owners deposit their garbage into large receptacles ("tubs") located in parking lots. Garbage fees are factored into moorage fees. The Port and Harbors Department pays the Public Works Department for servicing the containers.

### **3.4 Infrastructure, Equipment, Other Assets**

Wrangell has two fully automated, side – loading trucks for trash collection that were purchased in 2009. Each can be operated with a one – person crew. It is expected the trucks won't require replacing until 2024.

The Materials Recovery and Handling Facility (MRHF) is located adjacent to a closed landfill. The main building excluding office space is 100 feet by 60 feet. What occurs here is essentially a transfer operation where trash from the collection trucks is placed into 48 foot containers for barge transport to Seattle. The containers are loaded on a train for the trip to Republic Services Roosevelt Regional Landfill in Klickitat County, Washington.

### 3.5 Rate Structure

Given the relatively stable population of Wrangell over time, the number of residential and commercial / institutional generators that make up the rate base will not expand markedly. “Universal service” assures having the largest rate base possible for the purpose of distributing service costs. This is especially important in equitably allocating capital equipment costs for both waste collection / handling and recycling.

Wrangell has a variable rate structure in effect for both the residential and commercial / institutional sectors. This means that rates vary according to the size of container, the number of containers serviced, and the frequency of service. In other words, the higher the level of service the greater the costs. For the residential sector the monthly rate for weekly collection of one cart is as follows:

- 48 gallon – \$ 27
- 64 gallon – \$ 44.90
- 96 gallon – \$ 53.90

The rates for additional weekly collections are higher.

Similarly, for commercial / institutional generators containers are available in capacities of 1, 1.5, and 2 cubic yards (it should be noted that 2 – cubic yard containers are being eliminated due to their tendency to break). If you have one 1 – cubic yard container collected once each week you will pay less than if you had the same container collected three times per week. The highest rates are for multiple containers serviced two or three times per week.

Appendix X has the complete rate structure, which is in the Wrangell Municipal Code.

### **3.6 Budget and Costs**

Solid waste management is set up to be a self – sustaining fund with revenues from rates, expenses, and reserves separate from other City funds and from other activities in the Public Works Department. In the past it has periodically received some support from the City General Fund but it is believed the rate structure now in place should be sufficient.

The Sanitation Fund for fiscal year 2014 – 2015 is divided into two broad categories – Collection and Landfill. The latter category actually covers operation of the Materials Recovery and Handling Facility and waste disposal through the contract with Republic Services (discussed in more detail below). Total Sanitation expenditures for this FY are \$ 517,850, with \$ 135,810 for Collection and \$ 382,040 for Landfill. By far the largest expense - \$ 180,000 – is under Landfill for “Disposal Costs”, meaning payments to Republic Services.

### **4.0 Contract with Republic Services**

Wrangell was a founding member of the Southeast Alaska Solid Waste Authority (SEASWA or the Authority). As a result of discussions between the SEASWA Board of Directors and Republic Services, Inc., the CBW entered into a new agreement for waste disposal with Republic Services, Inc. (also referred to as Regional Disposal Company) that went into effect July 1, 2013. The agreement is for five years with automatically renewing five – year extensions. The contract contains pricing for both waste disposal and recycling. Disposed waste is transported by barge and rail to Republic’s Roosevelt Regional Landfill in Klickitat County, Washington. Recyclables, if recovered, are processed and marketed through Republic’s materials recovery facility (MRF) in Seattle.

The pricing structures are described below; it is noted that Wrangell uses 48 foot containers for storage / transport of refuse.

#### **4.1 Waste Disposal**

There are three components of the disposal fee:

- Transportation – \$ 43.45 per ton but not less than \$ 1,129.70 for a 40 foot container and not less than \$ 1,216.60 for a 48 foot container.
- Transportation Fuel Surcharge – This is a per – container amount charged to Republic by its transportation subcontractor that is passed through to the CBW. It can be subject to quarterly adjustments. During the period October, 2013 through March, 2014 the fuel surcharge was \$ 214.65 for a 40 foot container and \$ 231.16 for a 48 foot container.
- Disposal – \$ 57.50 per ton or not less than \$ 1, 495 per container. This is the amount for actual disposal of waste at Roosevelt Regional Landfill; also referred to as the “tipping fee”.

#### **4.2 Materials Recycling**

The components for the recycling fee are as follows:

- Transportation – same as listed above for trash disposal.
- Transportation Fuel Surcharge – same as listed above for trash disposal.
- Handling, storage, marketing of recyclables – \$ 51.50 per ton.

- Processing of recyclables, **AS APPLICABLE** – a charge of \$ 30 per ton for separating and upgrading of commingled or mixed recyclables.

It is emphasized that Republic Services is contractually obligated to pass through to the CBW 100 % of the revenues received from the sale of recyclable materials. Revenues can vary moderately to significantly depending on market conditions. Such revenues are typically reflected as a credit against other charges on an invoice.

In summary, the transportation expense and transportation surcharge are applicable to loads of both garbage and recyclables. The disposal fee is applicable only to loads of refuse. The recycling fee is applicable to all loads of recyclables, whether they contain separated or commingled materials. Finally, cost for processing recyclables is applicable to loads of commingled materials that must be separated / upgraded at the Republic MRF.

### **4.3 Revenues for Recyclable Materials**

The CBW contract with Republic Services provides flexibility for the CBW to determine what kind of recycling program it wants to develop and implement. The Republic contract does not stipulate how recycling is to be accomplished in the CBW. The key design variables are recovery method and materials preparation. It is the latter that impacts the prices Republic pays for recyclables.

Over a recent six month period (March to August, 2014), here are the low to high price ranges that Republic was paying for a variety of recyclable commodities on a per ton basis (commingled first, then separated):

- Commingled without glass - \$ 102 to \$ 106
- Commingled with glass - \$ 90 to \$ 94

- Cardboard - \$ 136 to \$ 161
- Newspaper - \$ 103 to \$ 107
- Mixed paper - \$ 97 to \$ 100
- PET plastic bottles (for soda / soft drinks) - \$ 339 to \$ 360
- LDPE pigment (colored film plastic, like grocery bags) - \$ 35 to \$ 76
- HDPE natural (clear containers like milk jugs) - \$ 616 to \$ 986
- Mixed plastic (does not include styrofoam) - \$ 100 to \$ 207
- Tin cans - \$ 110 to \$ 149
- Aluminum cans - \$ 1,377 to \$ 1,625

It is noteworthy that prices for commingled recyclables are more stable and show less fluctuation than prices for separated recyclables. Indeed, over a longer term period (March, 2013 to March 2014) low – high, per ton prices from Republic for commingled without glass were \$ 102 to \$ 116 and for commingled with glass from \$ 91 to \$ 103.

## **5.0 The Petersburg Experience**

Petersburg Borough has a contract with Republic Services that is set up the same way as the CBW agreement. The terms can result in recycling costing the same, or lower, than disposal on a per ton basis as long as sales revenues from recyclables – which are passed through to the jurisdiction – are accounted for in the cost calculations. Based on these incentives, Petersburg initiated a community – wide recycling collection program for residential and commercial / institutional generators in February, 2014. So far, Petersburg is the only member of the Southeast Alaska Solid Waste Authority (SEASWA) with such a program.

Prior to program implementation the Petersburg Public Works Department conducted an assessment of recycling options and prepared a report with the findings in September, 2013. Petersburg

already had in place a curbside pickup recycling service operated by a contractor that collected separated recyclable materials. The report's key conclusions were as follows:

Based on analysis...of the contractual terms and conditions put forth by Republic Services, recycling can be made more convenient and effective for Petersburg residents, businesses, and institutions.

Republic Services has offered a variety of recycling alternatives and associated rate structures to SEASWA members...Under all cases and scenarios the more recycling we do the more we can control our expenses for waste disposal.

After careful analysis...staff is recommending a shift to a program based on collection of commingled recyclables where no separation is required and all materials can be mixed together by residents and businesses. Staff believes this is the answer for stabilizing waste management expenses, increasing customer participation and satisfaction, and thereby increasing the amount of material diverted from disposal.

To fast – track program start – up, Petersburg is temporarily allowing the use of plastic bags for containment of recyclables by participating generators; collection is done by a contractor. Republic Services has also temporarily accepted this approach (the bags are torn apart at the Seattle MRF) but both parties agree it is preferable to use carts and other standardized containers. Petersburg is looking at the operational and financial impacts of this along with two other possibilities:

- Borough crews taking over responsibility for collecting recyclables and,



- Switching to every – other – week collection of trash and recyclables.

Preliminary results from the Petersburg commingled recycling program are encouraging. The Public Works Director reports with the program that involved separation of materials there were approximately 320 residential accounts participating. Now with commingling of recyclables the figure is much higher – out of a total 1,200 customers (residential and commercial / institutional) there are 1,062 participating regularly in the recycling program.

The Petersburg Public Works Director believes this significant increase is influenced partly by the change in rate structure that accompanied program implementation along with the convenience of not having to separate recyclables. Financial incentives for recycling were provided because there is a higher price for the lowest level of garbage service if you do not recycle. As well, many other customers are seeing a positive financial impact because through recycling and other waste reduction practices they have been able to reduce the size of their container and thus their cost.

Petersburg has a high – density, horizontal baler used to compact both trash and commingled recyclables with glass; the bales are placed into 40 foot transport containers.

For refuse, the bales weight between 2,200 and 2,400 pounds (1.1 to 1.2 tons per bale). A container holds about 28 tons, or between 23 and 25 bales (at 2,400 pounds per bale and 2,200 pounds per bale respectively).

For commingled recyclables with glass, Petersburg averages 2,200 to 2,300 pounds per bale and gets around 50,000 pounds into a 40 foot container or say 22 bales or nearly 25 tons per container.

Given the similarity in conditions and circumstances between Petersburg and Wrangell, the recycling approach taken in Petersburg is considered very applicable to Wrangell for the same set of reasons that Petersburg found compelling. This is especially the case since Petersburg has essentially the same contract and rate structure with Republic Services as Wrangell does.

## **6.0 Evaluation and Recommendations**

### **6.1 Recycling Cost Analysis**

Over the last four years Wrangell has shipped out an average of 1,502 tons of solid waste for disposal annually. Recycling some of these materials could reduce the overall cost of waste management. But at what point will the costs of recycling be equal to or less than the cost of solid waste disposal? The contract between Wrangell and Republic Services specifies costs for transporting and processing recyclable materials. However, there are other costs related to recycling that will vary depending on the quantity of materials recovered and the price paid by Republic Services for those materials. Per the contract, the following table details the cost components of solid waste disposal and recycling.

<b>Solid Waste Disposal</b>	<b>Unit Cost</b>	<b>Amount</b>
Transportation	40 foot container	\$ 1,129.70
Transportation	48 foot container	\$ 1,216.60
Fuel surcharge	per container	\$ 231.16
Landfilling of waste	per ton	\$ 57.50
WA State Refuse Tax (3.6 %)	per ton	\$ 1.96
<b>Recycling</b>	<b>Unit Cost</b>	<b>Amount</b>
Transportation	40 foot container	\$ 1,129.70
Transportation	48 foot container	\$ 1,216.60
Fuel surcharge	per container	\$ 231.16
Handling / marketing of materials	per ton	\$ 51.50
Processing of commingled materials	per ton	\$ 30.00
Material value	per ton	Market Value

A direct, straight comparison between the costs for garbage disposal and recycling can't be made due to the impact of two primary variables: container weight and the value of the recyclable materials. Since the weight of containers with trash will vary from those with recyclables, a few assumptions need to be made to compare costs.

From October 2013 to March 2014, the average weight of a 48 foot container of garbage shipped from Wrangell was 26.36 tons. Since a recycling program in Wrangell has not been established, the average container weight of baled recyclables shipped from Sitka during 2013 was used as the basis for this cost analysis. That weight was 20.06 tons, which was rounded to 20 tons.

Based on the approach just described, a comparison of the costs of waste disposal and recycling is detailed in the following table.

		<b>Note</b>						
Average SW Container Weight	26.36	<b>A</b>						
Estimated Rec Container Weight	20.0	<b>B</b>						
<b>Cost Component</b>	<b>Solid Waste</b>	<b>Note</b>	<b>Recycling</b>	<b>Recycling</b>	<b>Recycling</b>	<b>Recycling</b>	<b>Recycling</b>	<b>Recycling</b>
Transportation *	\$ 1,216.60	<b>C</b>	\$ 1,216.60	\$ 1,216.60	\$ 1,216.60	\$ 1,216.60	\$ 1,216.60	\$ 1,216.60
Fuel Surcharge **	\$ 231.16	<b>D</b>	\$ 231.16	\$ 231.16	\$ 231.16	\$ 231.16	\$ 231.16	\$ 231.16
Disposal *	\$ 1,515.42	<b>E</b>						
WA Refuse Tax (3.6%)	\$ 54.56	<b>F</b>						
Recycling Marketing		<b>G</b>	\$ 1,030.00	\$ 1,030.00	\$ 1,030.00	\$ 1,030.00	\$ 1,030.00	\$ 1,030.00
Processing		<b>H</b>	\$ 600.00	\$ 600.00	\$ 600.00	\$ 600.00	\$ 600.00	\$ 600.00
Material Value per Ton		<b>I</b>	\$ 0	\$ 20	\$ 40	\$ 60	\$ 80	\$ 100
Less Material Value		<b>J</b>	\$ -	\$ (400.00)	\$ (800.00)	\$ (1,200.00)	\$ (1,600.00)	\$ (2,000.00)
Total Cost per Container	\$ 3,017.74	<b>K</b>	\$ 3,077.76	\$ 2,677.76	\$ 2,277.76	\$ 1,877.76	\$ 1,477.76	\$ 1,077.76
Per Ton Cost	\$ 114.50	<b>L</b>	\$ 153.89	\$ 133.89	\$ 113.89	\$ 93.89	\$ 73.89	\$ 53.89
Transport Cost per SW Ton	\$ 54.93	<b>M</b>						
Disposal Cost per Ton	\$ 59.57	<b>N</b>						
Transport Cost per Rec Ton	\$ 72.39	<b>O</b>						
Recycling Cost per Ton	\$ 81.50	<b>P</b>						

## Table Notes

- A: The average weight per 48 foot solid waste container from October 2013 to March 2014 was 26.36 tons.
- B: The average weight in Sitka for a 48 foot container of baled recyclables was 20 tons, which is the assumption used for this analysis.
- C: Current contracted cost to ship a 48 foot container is \$1,216.60.
- D: Current fuel surcharge assessed by AML is \$231.16 per container.
- E: Actual landfilling cost per ton is \$57.50 per ton. The average weight per solid waste container was 26.36 tons. Therefore, the average cost to landfill a container of refuse is  $\$57.50 \times 26.36 = \$1,515$ .
- F: Washington State Refuse Tax is 3.6% of the disposal cost ( $3.6\% \times \$1,515.42$ ).
- G: The current contracted cost for marketing recyclables is \$51.50 per ton. The total cost per container is the marketing cost multiplied by the estimated container weight ( $\$51.50 \times 20$  tons).
- H: The current contracted cost for processing commingled recyclable materials is \$30 per ton. The total cost per container is the processing cost multiplied by the estimated container weight ( $\$30.00 \times 20$  tons).
- I: The material value per ton of recyclables will vary. Therefore, the above table provides the cost per ton for material values ranging from \$0 to \$100 per ton.
- J: Total value per container is the Material Value per Ton x 20 tons per container. The value of the material decreases the overall cost per container.
- K: Sum of Items C through F for solid waste and Items C through J for recycling.
- L: Total Cost per Container divided by the average container weight for solid waste or recycling (Item K / Item A) or (Item K / Item B).
- M: Transport cost for solid waste is the sum of Transportation and Fuel Surcharge divided by Average SW Container Weight (Item C + Item D) / Item A).
- N: Disposal Cost per Ton is the sum of Disposal and WA Refuse Tax divided by Average SW Container Weight (Item E + Item F) / Item A).
- O: Transport cost for recycling is the sum of Transportation and Fuel Surcharge divided by Estimated Recycling Container Weight (Item C + Item D) / Item B).
- P: Recycling Cost per Ton is the sum of the Recycling Marketing Cost per Ton (\$51.50) plus the Processing cost per ton (\$30.00).

When the revenue from the sale of the materials is greater than \$39.39 per ton, the cost of recycling is lower than garbage disposal. The amount of incoming material tons will also impact revenues from recycling. The more material that is recycled, and the higher the revenue from that material, the more favorable the economics of recycling become compared to trash disposal, ***based on the terms and conditions of the CBW contract with Republic Services***. The following table portrays this relationship.

Annual Savings / (Loss)	Percentage Recycling Levels						
	5 % 75 tons	10 % 150 tons	15 % 225 tons	20 % 300 tons	25 % 375 tons	30 % 450 tons	35 % 525 tons
Revenue @ \$ 30	\$(704)	\$(1,408)	\$(2,112)	\$(2,816)	\$(3,529)	\$(4,233)	\$(4,937)
Revenue @ \$ 40	\$46	\$92	\$138	\$184	\$231	\$277	\$323
Revenue @ \$ 50	\$796	\$1,592	\$2,388	\$3,184	\$3,991	\$4,787	\$5,583
Revenue @ \$ 60	\$1,546	\$3,092	\$4,638	\$6,184	\$7,751	\$9,297	\$10,843
Revenue @ \$ 70	\$2,296	\$4,592	\$6,888	\$9,184	\$11,511	\$13,807	\$16,103
Revenue @ \$ 80	\$3,046	\$6,092	\$9,138	\$12,184	\$15,271	\$18,317	\$21,363
Revenue @ \$ 90	\$3,796	\$7,592	\$11,388	\$15,184	\$19,031	\$22,827	\$26,623
Revenue @ \$ 100	\$4,546	\$9,092	\$13,638	\$18,184	\$22,791	\$27,337	\$31,883

## 6.2 Impact of Capital Expenditures for Recycling

At a material value for recyclables of \$40 per ton, the cost of transporting and disposing / processing waste and recycling are the same. However, this assumes the cost of capital equipment needed for recycling – a baler and carts / containers – are not included in the calculations. In other words, they are paid for by Sanitation budget reserves, CBW General Fund, grant source(s), or some combination of these.

Republic Services does not have the capability of handling loose recyclables at its materials recovery facility in Seattle. Recyclables must be baled at the point of origin for subsequent transport, handling, and processing. Thus the cost of baling recyclables must be addressed. The approximate cost to purchase and install a horizontal baler is \$ 85,000. Assuming the baler is financed over a 5 year period with a capital cost of 7 %, the annual payment on the baler will be \$ 20,610. The cost of the baler would then be amortized (spread out) over the number of tons baled. The higher the tons recycled, the lower the cost per ton. The following table details the cost per ton at various levels of recycling.

<b>Baler Manufacturer / Model</b>	<b>Excel EX63</b>
Cost	\$ 84,504
Finance Terms	5 years @ 7 %
5 year Annual Cost	\$ 20,610
<b>Recycling % and Annual Tons</b>	<b>Cost per Ton</b>
5 % @ 75 tons	\$ 275
10 % @ 150 tons	\$ 137
15 % @ 225 tons	\$ 92
20 % @ 300 tons	\$ 69
25 % @ 375 tons	\$ 55
30 % @ 450 tons	\$ 46
35 % @ 525 tons	\$ 39

At a 35 % recycling rate, the cost per ton to bale materials drops to \$ 39. Recall that when the value of recyclables is higher than \$40 per ton, recycling costs are the same as garbage disposal. If an additional \$ 39 of cost per ton is added to bale the collected materials, then the break – even value of the materials needs to increase to \$79 per ton ( $\$ 40 + \$ 39$ ). The combination of transport and processing costs plus the cost of baling are combined with the amount of recycled tons to determine the various break – even points for recycling. The following table summarizes the economic impact of these factors.



Annual Savings / (Loss)	Percentage Recycling Levels						
	5 % 75 tons	10 % 150 tons	15 % 225 tons	20 % 300 tons	25 % 375 tons	30 % 450 tons	35 % 525 tons
Material Value / Revenue per Ton							
Revenue @ \$ 30	\$(21,314)	\$(22,018)	\$(22,721)	\$(23,425)	\$(24,139)	\$(24,843)	\$(25,546)
Revenue @ \$ 40	\$(20,564)	\$(20,518)	\$(20,471)	\$(20,425)	\$(20,379)	\$(20,333)	\$(20,286)
Revenue @ \$ 50	\$(19,814)	\$(19,018)	\$(18,221)	\$(17,425)	\$(16,619)	\$(15,823)	\$(15,026)
Revenue @ \$ 60	\$(19,064)	\$(17,518)	\$(15,971)	\$(14,425)	\$(12,859)	\$(11,313)	\$(9,766)
Revenue @ \$ 70	\$(18,314)	\$(16,018)	\$(13,721)	\$(11,425)	\$(9,099)	\$(6,803)	\$(4,506)
Revenue @ \$ 80	\$(17,564)	\$(14,518)	\$(11,471)	\$(8,425)	\$(5,339)	\$(2,293)	\$754
Revenue @ \$ 90	\$(16,814)	\$(13,018)	\$(9,221)	\$(5,425)	\$(1,579)	\$2,217	\$6,014
Revenue @ \$ 100	\$(16,064)	\$(11,518)	\$(6,971)	\$(2,425)	\$2,181	\$6,727	\$11,274

When the baler cost is included as an annual recycling program expense the economic benefits of recycling decrease. In other words the flexibility of the program is narrowed because the material revenue / quantity options favorable to recycling are significantly reduced. For example, the value of recyclables needs to be at or in excess of \$ 100 per ton at the 25 % recycling rate to produce an economic benefit. Similarly, the value can decrease to \$ 80 per ton but correspondingly the recycling rate, that is, the amount of material recycled, needs to increase to yield positive economic results.

Under any set of circumstances the best scenario for recycling in Wrangell is high participation and high materials recovery combined with high revenues paid by Republic Services. ***This is especially the case when the baler cost is factored into the fiscal calculations.***

In addition, carts / containers for storage of recyclables are necessary for efficient utilization of the automated trucks in collecting materials. The cost of a 96 gallon cart is about \$ 75 while a 300 gallon “tub” or container is around \$ 475. It needs to be determined how many carts and other containers should be purchased based on the number Wrangell already has in inventory. However, regardless of how many are bought, if that expense is something the recycling program would have to cover, plus the baler costs, then the program would actually be more expensive than refuse disposal and therefore not economically justifiable.

### **6.3 Preliminary Program Design Conclusions and Recommendations**

- Commingling of all recyclable materials including glass.
- Use 96 gallon carts for materials storage at residences and larger “tubs” / containers at commercial / institutional generators.
- Collection of recyclables by CBW personnel using existing trucks.
- Collection every – other – week at residences and as needed at commercial / institutional sources.
- Designate a Program Coordinator and form a representative support group to assist with additional planning and implementation.

- Purchase baler and carts / containers using Sanitation Fund Reserve, General Fund, grants, or some combination thereof.
- Adjust service rates to offer further financial incentives for recycling and other forms of waste reduction.
- Set recycling rate goals and milestones.
- Implement residential sector first, then commercial / institutional.

#### **6.4 Glass Crusher**

A glass crusher has previously been viewed as a potential equipment need by the CBW Public Works Department, assuming there was a viable local use for crushed glass. While crushed glass could likely be used to sand roads or mix with rock for road work, these possible uses have not been quantified into an estimated amount of glass that would need to be recovered for such uses.

There are complications posed by how much glass would need to be aggregated, and where it would be stored prior to and after crushing. Then there is the question of how glass would be aggregated or collected. A drop – off site would require bars and restaurants, for example, to store and then haul their own glass to the location and might require CBW staff to assist with off – loading. How much land could be made available for such a site and where would it be? Would there be enough room? Alternatively, a pickup service involves expenses and additional allocation of existing personnel and trucks. These considerations should be weighed against the available option of putting glass containers into the commingled recycling mixture accepted by Republic Services under the contract with the CBW. Until a decision is reached regarding implementation of a commingled recycling collection program Wrangell should not consider purchasing a glass crusher.

## **7.0 Promotion / Education / Outreach**

*To be completed based on feedback to the Draft Plan*

## **8.0 Implementation Requirements**

*To be completed based on feedback to the Draft Plan*

Describes actions required for carrying out recycling strategy – tasks / activities, sequencing, timeframe / schedule, responsibilities, milestones

**Appendices** – *to be included with Final Plan*

Detailed Disposal Quantity Data

List of Generators / Accounts

Rate Structure

Sanitation / Solid Waste Operation Budget

Contract with Republic Services

Example of Invoice from Republic Services