

# Study of Household Hazardous Waste Options for North-end Kitsap County Residents

Prepared for Kitsap County  
Public Works

By Sustainable Business  
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# Introduction

## *Purpose*

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Kitsap County currently has a full-scale Household Hazardous Waste (HHW) collection facility in Port Orchard. Some limited waste streams are collected at Recycling and Garbage Facilities (RAGFs) in Silverdale, Hansville, Poulsbo and Bainbridge Island.

Kitsap County recognizes that residents in the north-end of the county drive up to 80 miles round trip to the Port Orchard facility, resulting in a larger time and financial burden on these residents and a significant climate change impact.

In an effort to better serve the residents of Kitsap County and reduce greenhouse gas emissions, Kitsap County Public Works commissioned this study to analyze the financial and climate change impacts of four scenarios to expand the HHW collection services to north-end residents.

## *Project Approach*

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Sustainable Business Consulting (SBC) and OASIS Environmental (OASIS) evaluated costs and climate change impacts directly associated with the handling and disposal of Household Hazardous Waste (HHW) at various locations throughout Kitsap County. The analysis considered the costs of expanded service and the carbon emissions resulting from travel to and from HHW locations by Kitsap County residents and the waste being hauled away by PSC (contractor to Kitsap County).

To conduct the analysis, SBC and OASIS evaluated all major costs associated with disposal of HHW, such as infrastructure, labor, benefits, transportation and waste management. We systematically calculated, then compared and contrasted the various carbon footprints associated with varying scales of HHW collection at select Recycling and Garbage Facilities (RAGF's) at the north-end locales of Kitsap County.

## Executive Summary

The findings of our cost and carbon footprint analysis for 2009 are summarized in the table below. The table outlines the cost and carbon attributes of each scenario. The analysis includes “base case” which is based on current population projections for 2009, “low volume” which assumes a 10% fewer users and “high volume” which assumes 10% more users.

The scenarios are presented from most favorable to least favorable.

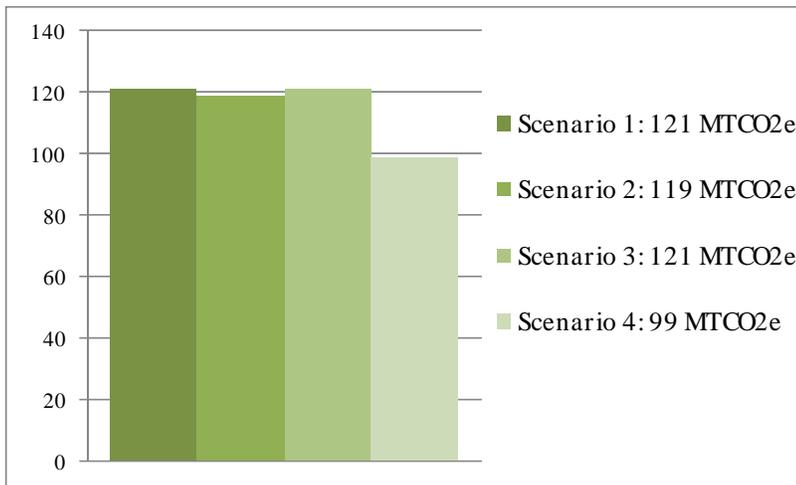
Carbon Emissions (Metric Tons)					
	No Change: Existing Service	Scenario 1: One day/ weekend collection event(s) at Poulsbo	Scenario 2: Small-scale once-a-week collections at Poulsbo, by appointment	Scenario 3: Small-scale collections on a rotating basis at North-end RAGF's	Scenario 4: Permanent Facility at Poulsbo
Base Case	140	121	119	121	99
Low Volume Projection	126	109	107	109	90
High Volume Projection	153	132	130	132	108

% Change in Carbon Emissions from No Change Scenario at same volume					
	No Change	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Base Case	N/A	-14%	-15%	-14%	-29%
Low Volume Projection	N/A	-13%	-15%	-13%	-29%
High Volume Projection	N/A	-14%	-15%	-14%	-29%

Total Estimated Costs					
	No Change	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Estimated Budget	\$950,491	\$39,500	\$274,000	\$304,000	\$1,765,000

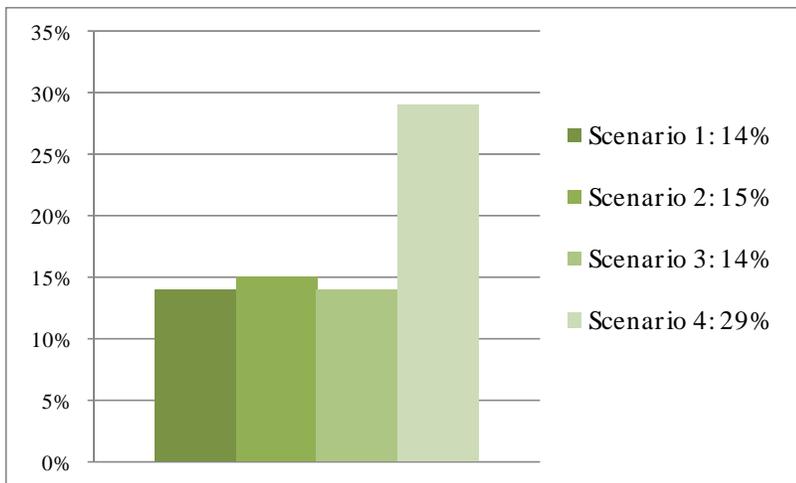
Cost per Metric Ton of Carbon Reduced					
	No Change	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Base Case	N/A	\$2,083	\$13,002	\$15,955	\$43,322
Low Volume Projection	N/A	\$2,325	\$14,724	\$18,105	\$48,611
High Volume Projection	N/A	\$1,887	\$11,645	\$14,267	\$39,082

NOTE: 1 car on the road for 1 year releases 5.3 metric tons of carbon dioxide, on average.



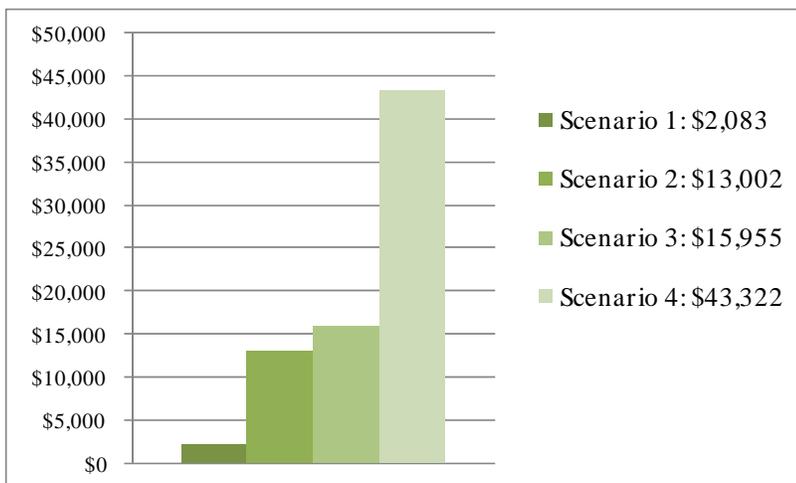
**Figure 1: Projected Carbon Emissions for Each Scenario.**

Figure 1 shows the projected carbon emissions for each scenario, as they relate to each other.



**Figure 2: Reduction in Carbon Emissions Compared to the "No Change" Scenario.**

Figure 2 shows the emissions reduction potential of each scenario, relative to the "No Change" scenario.



**Figure 3: Cost per Metric Ton of Carbon Reduced.**

Figure 3 shows the cost for emissions reduction in terms of dollars per metric ton of avoided emissions for each scenario.

## Recommendations

After detailed analysis from both a carbon and cost perspective, SBC and OASIS make the following recommendations:

- Scenario 1 should be considered because it offers the greatest potential for carbon reduction and is the least costly, and includes no new major infrastructure improvements. It will also require fewer personnel, and with just a little bit of coordination and expanded marketing it is an easy scenario to implement.
- Scenario 2 would provide capacity to significantly expand HHW collection at a reasonable cost and with significant carbon reduction should Kitsap County want to even further expand its service to north-end residents.

### *Scenario Summaries*

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Scenario 1:	Best short- to medium-term solution	Lowest Cost, High Flexibility, High Carbon Reduction
Scenario 2:	Best medium- to long-term solution	Moderate Cost, High Flexibility, High Carbon Reduction
Scenario 3:	Reasonable option for medium- to long-term	Moderate Cost, Moderate Flexibility, High Carbon Reduction
Scenario 4:	Viable as a long-term solution that could be revisited in 10+ years	Highest Cost, Low Flexibility, High Carbon Reduction

We found that all four scenarios offer significant carbon reductions. The main differentiator was then the cost per ton of carbon reduced as well as the “flexibility” of the scenario – in other words the ability for the scenario to adapt to future considerations and variables.

For example, Scenario 1 rated high in flexibility because the option is so low in cost that Kitsap County would still be able to explore other options in the future as demand continues to increase.

Similarly, Scenario 2 is rated high in flexibility because it would result in infrastructure at Poulsbo that could be built out to become a full-scale facility in the future.

Scenario 3 rates medium on flexibility because—while its costs are similar to Scenario 2—the money is not spent on infrastructure.

Scenario 4 rates low on flexibility and costs because it requires a large up-front capital investment in infrastructure.

## Appendix A: Scenario Assumptions, Variables & Costs

Note: All mileage projections assume that customers will drop off HHW at the location closest to their zip code.

### ***Scenario 1: Scenario 1: One day/ weekend collection event(s) at Poulsbo.***

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Pros: 

- Inexpensive. Very low cost per carbon reduction.

Cons: 

- Limited service for north-end residents.

Assumptions: 

- Accept wide-scope waste stream, except for material already accepted at Recycling and Garbage Facilities (RAGF's) (e.g. oil, antifreeze, batteries).
- One-day events, minimum once-a-year in the north end, alternating each other year between Bainbridge Island and another site.
- Allow modest pricing increases for remainder of current contract (two more 1-year extensions allowed, effective April 1, 2009).

Variables: 

- Contract pricing year-to-year (including fuel/transportation surcharges).
- Scope of materials collected (targeted waste streams or "everything").
- Cost-sharing with incorporated cities (e.g. Bainbridge Island).
- Frequency/number of events/number of days.

Estimated Cost: 

- \$39,500 per year (per event)

Location: 

- Alternating between Bainbridge, Poulsbo and Hansville.
- None of the RAGF's is ideally suited to a one-day collection.
- Bainbridge Island Public Works facility has been used several times and works well.

Notes: 

- Line-ups of cars at these events can be long. A lineup of 30+ vehicles in line is not uncommon. Idling and waiting times should be taken into consideration when planning a collection event.
- It is assumed that 80% of customers will make the one weekend event and 20% will still go to Port Orchard.

Scenario 2: Small-scale once-a-week collections at Poulsbo, by appointment.

Pros:

- Moderate costs. Low cost per carbon reduction.
- Flexible. Service could be ramped up as demand increases,
- Poulsbo location affords easy access to many north-end residents and recent improvements have been made to nearby roads.

Cons:

- Would require making a commitment to expanding the Poulsbo RAGF.

Assumptions:

- Open one day a week by appointment, with a volume restriction.
- One staff member.

Variables:

- Days per month per location.
- On-site infrastructure.
- Transportation of waste—either back to HHW Facility by County staff or hauled off by vendor during a milk run.
- Number of staff on hand for hazardous waste collection.
- Volume limits and appointments yes/no; permitting of fixed infrastructure.

Estimated Cost:

- \$274,000

Location:

- Poulsbo Recycle Center, due its centralized North-end location and proximity to a major arterial and State Highway.

Notes:

- Options #1 and #3 are most cost-effective, and by far the easiest to implement, options. They also have the most limits on convenience, however.

***Scenario 3: Small-scale collections on a rotating basis at North-end Recycling and Garbage Facilities (RAGF's).***

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Pros:

- Moderate costs. Low cost per carbon reduction.
- Service could be ramped up as demand increases

Cons:

- Less flexible than Scenario 3. If Kitsap County wanted to build a second full-scale facility in the future there would be less infrastructure in place as compared to Scenario 3, despite their similar costs.

Assumptions:

- One day per month per location.
- Basic infrastructure and allowing for on-site storage of waste.
- Look at both transportation options (county-staffed to HHW or vendor transported/manifested to Treatment, Storage and Disposal Facility (TSDF)).
- Enact both volume limits and make it by appointment.

- Variables:
- Days per month per location.
  - On-site infrastructure, from set up/breakdown and waste removal all the same day (one extreme) to concrete slab/pole-barn style building and on-site storage of waste (other extreme).
  - Transportation of waste—either back to HHW Facility by County staff or hauled off by vendor during a milk run.
  - Number of staff on hand for hazardous waste collection,
  - Volume limits and appointments yes/no; permitting of fixed infrastructure.
- Estimated Cost:
- \$304,000
- Location:
- North-end RAGFs
- Notes:
- RAGF’s might have security/illegal dumping issues if residents know a facility takes hazardous waste and the resident shows up on an unscheduled day or without an appointment. Increased infrastructure might increase the temptation to dump (people dump material at HHW Facility under the building awning, possibly thinking that it’s not “as bad” to dump in an area that’s designed to take the material).
  - Space limitations in Hansville might make temporary collection of HHW there difficult.

***Scenario 4: Full-scale permanent collection facility at Poulsbo.***

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- Pros:
- Would provide a high level of service to north-end residents.
- Cons:
- Very costly. Very high cost per carbon reduction. This option might make sense in the long-term if the population growth projects for the north end of Kitsap County were significantly higher<sup>1</sup>.
  - Requires significant infrastructure investment and ongoing maintenance.
- Assumptions:
- Use existing preliminary study on siting a facility at the Poulsbo Recycle Center (Poulsbo Recycle Center Site Assessment Report).
  - Open 1-2 times per week. Anything less would not make financial sense.
  - Waste will be stored on-site until transportation can be arranged.
  - County-staffed, due to volatility in hazardous waste vendor ownership/bankruptcy issues, contract complications, etc.
- Variables:
- Size and storage capacity of building.
  - Days/hours of operation.
  - Volume limits and scope of waste streams accepted; public feedback on siting.
  - Permitting process.
  - Upgrades needed for location (security, sewage, asphalt/concrete, etc).

<sup>1</sup> By 2030 Kitsap County is expected to grow by 65,560 (from 2010 population levels). Kitsap County Office of Financial Management, 2007.

- County-staffed or vendor-staffed, number of staff.

Estimated  
Cost:

- \$1,765,000

Location:

- Poulsbo Recycle Center

Notes:

- Given the current budget climate, this option poses the most financial challenges. Given the projected growth However, it might be the best long-term option if population growth in the North end expands rapidly. All other collection options can be terminated if a permanent facility in the North end is built.

## Appendix B: Methodology

### *HHW Materials*

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#### **Average Pounds/Customer:**

- We decided to use data from 2005-2007 to make projections of the average total pounds of HHW that are dropped off per customer.
- We did not use data from 2008 because data is incomplete.
- We did not use data from 2004 or before because we want to make projections based on the most recent trends.
- These averages include customers from Mason County and Kitsap County.

#### **Average HHW Customers/Total Population:**

- We also decided to use data from 2005-2007 to make projections of the average number of HHW customers based on total Kitsap County population.
- We did not use data from 2008 because data is incomplete.
- The total number of drop-offs here is for Kitsap County and Mason County. However, future projections will be based off of projected population data for Kitsap County only.
- The average pounds of HHW per customer is based on total HHW customers for Kitsap and Mason Counties.

### *Travel*

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#### **Mileage Travelled by Residents:**

- Mileage was calculated by plugging the address of the drop-off facility into Google Maps and requesting directions to the zip code stated above.
- The specific location of origin of the zip code is determined by Google Maps.

#### **HHW Truck Mileage:**

- HHW Mileage Calculations based on email between Anne DeMelle and Rick Gilbert.

### **2008 HHW Projection**

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- The number of drop-offs for 2008 were estimated based on data from 2005 - 2007.
- The HHW population data that was provided recorded the number of drop-offs per week at the main facility. This data was then analyzed in 4 month periods (Jan-Apr, May-Aug and Sep-Dec) by Kitsap County.
- We then took the data summary for these periods in 2005, 2006 and 2007 and calculated the percentage of total annual drop-offs that occur for a given 4 month period.
- The results of 2005, 2006 and 2007 were averaged to determine what percentage of total drop offs may occur during the 3rd period of 2008.
- Based on data from 2005-2007, 26.3% of the total annual drop-offs occur during the third period. 4347 customers dropped off HHW during the first 2 periods of the year. It was then assumed that 73.7% of the total annual drop-offs that will occur by the end of 2008.

- Given this assumption, we divided 4734/73.7% to arrive at an estimated total number of HHW drop-offs for 2008 at 5897, or 1548 HHW drop-offs during the third period of 2008.

### ***2009 HHW Projection***

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- The mean distribution of HHW drop offs is based off of data from 2005-2008. 2008 data was estimated based on Methods described in sheet '2008 HHW projection'.
- This calculation is simply an average of the percentage of customers from each zip code that have dropped off HHW at the main facility.

### ***Population***

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- 2009 Estimated Population for Kitsap County is the average of 2008 County Data and the projected population for 2010.

### ***Summary***

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- The cost per metric ton of carbon reduced is equal to the total cost of the selected scenario and volume projection, divided by the amount of carbon reduced from the base case scenario assuming no changes for 2009 (which equals total carbon for Base Case No Changes minus the carbon emitted in the selected scenario).
- The % difference in carbon emissions from the No Change Scenario is calculated by dividing the carbon emissions of the selected scenario by the carbon emissions for the No Change Scenario at the same projected volume of HHW drop-offs.
- Costs: All cost data was made using best available budget and cost data provided by Rick Gilbert.

### ***All Scenarios***

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- "Base Case" represents the same % of residents using HHW collection services as the average # residents who made drop-offs from 2005-2007.
- "Love Volume" represents a 10% decrease in # residents using HHW collection services.
- "High Volume" represents a 10% increase in # residents using HHW collection services.
- The "Average Miles to Destination per Customer" is equal to the total miles from a zip code to the chosen drop-off facility multiplied by the estimated percentage of likelihood that the customers are going to drop-off HHW at that facility. The results for all possible drop-off scenarios are summed to give an average distance that HHW customers will drive to drop off HHW.

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SBC and OASIS performed detailed analysis on each scenario in Microsoft Excel, and these spreadsheets are not printer-friendly. For more information about the background calculations and analysis that supports this report, please contact Rick Gilbert, Moderate Risk Waste Program Manager, Kitsap County Public Works at (360) 337-5692.