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Executive Summary

The City of Terrace and the Regional District of Kitimat Stikine have concluded a 4-month Zero Waste Challenge Pilot Project with 130 households in the Greater Terrace Area. We were testing for behaviour changes and resident responses to programming around recycling, composting, green shopping and water conservation. Working with Do Your Part Recycling Company and a Zero Waste residential advisor, this Pilot Project was the first major initiative by the City of Terrace and RDKS to examine enhanced recycling and zero waste education services. Of the 130 residences that agreed to participate in the Pilot Project, 15 requested to receive personalized service from the Zero Waste advisor.

Working with Do Your Part Recycling Company and a Zero Waste residential advisor, this Pilot Project was the first major initiative by the City of Terrace and RDKS to examine enhanced recycling and zero waste education services. Throughout the pilot project, we measured resident receptivity to messages, program participation rates, participant behaviour changes and diversion rates. We tracked these indicators through surveys, interviews and by measuring garbage set-outs and recycling diversion figures. With the information gathered for each of the above indicators, we then evaluated how to best achieve our shared goal of moving toward Zero Waste.

Key Findings

- Initial buy in to the Zero Waste Pilot Project was not as easy to generate or as high (as a percentage of those solicited) as anticipated, despite the project being offered at no direct cost to residents.
- Those participating in the Zero Waste Pilot Project showed significant and positive changes in attitudes toward every aspect of the challenge as observed through survey data gathered over the course of the Pilot Project. Of note, the percentage of people who claimed to "always" recycle everything they can was initially measured at 18.8% and in the final survey this category garnered a 66.7% response rate.
- Actual behaviour changes around backyard composting were difficult to achieve, further work is needed to understand and reduce barriers to organics diversion.
- The participation rate in the recycling component of the Pilot Project, averaged across all four sample areas and the four month period was 52%. Curbside recycling, while generally shown to achieve the highest rate of diversion when compared to depot systems might not be the best system in our community when taking into consideration unique characteristics such as size of community.

One major theme in this pilot project was that a gap exists between what people want to do, what they believe in and how that translates into behaviour changes and action. It was clear from the surveys and interviews conducted that residents of Terrace and area have a strong belief in recycling, organics diversion and decreasing their overall waste footprints. The Pilot project revealed the need to work with residents to provide options that best meet their needs and expectations.

Deriving key recommendations from the information and data collected will be an ongoing and joint effort between staff at the Regional District and the City of Terrace. Initial recommendations are as outlined below:

Key Recommendations

- Develop partnerships including Industry Product Stewards to promote and support development of a centralized recycling depot for the Greater Terrace Area. Given that Packaging and printed paper have now been added to the list of regulated products, staff feel that a depot is a feasible option for significant diversion rates. Ideally, recycling should be less costly and more convenient than garbage collection and options for moving closer to this ideal must be explored simultaneously.

- Design a comprehensive food and yard waste composting pilot project for residential and commercial users. Design work should take place over the summer and fall with a full design and budget report available by October 31st and launching of a program for April 2012. This recommendation requires hiring of a Composting Advisor for 6 months and can be a shared position between the City of Terrace and the RDKS.

This project was not without limitations and constraints, but has provided an incredible amount of information, community feedback and data. Four months is a short time over which to expect behavior changes, but combined with our engagement efforts we were able to gain valuable insights and understandings to guide future Zero Waste directions.

Many of the lessons learned and the value of undertaking this Pilot Project was in the design and coordinated delivery of the project. This was the first shared Pilot Project of this nature and size between the City of Terrace and the Regional District of Kitimat Stikine. There was intangible value in developing this project together and setting the foundation for future collaboration.

1.0 History of Composting and Residential Recycling in the Greater Terrace Area

The communities of Terrace and the Thornhill are located approximately 1500km north of Vancouver along Highway 16, within the Regional District of Kitimat-Stikine. Terrace and District had a population of 18,580 as of 2006 (Statistics Canada 2006), the majority of whom live in single-family dwellings and low density housing. An estimate of one tonne per resident per year is used for calculating total garbage landfilled in the absence of weight or volume tracking at local disposal facilities. Using this estimate of 18,580 tonnes, the residential portion is estimated to be in the range of 50% or 9,000 tonnes.

To date, neither community has had a curbside recycling program delivered through local government. Over the past 20 years there have been varying levels of access to specific material diversion through locally operated depots. The interrupted service provided by the private and non-profit sector is attributed to fluctuations in end market values, transportation costs, business model failure, and a difficult climate for success given landfill policies and waste reduction incentives.

Since June 2006, Do Your Part Recycling Company has offered a private recycling option to residents of both Terrace and Thornhill. Individuals can either drop off their material at the depot in Thornhill or subscribe to a bi-weekly pickup service. Residents also have the option of recycling through a local grocery store, and have access to recycling for an expanding number of products via local Extended Producer Responsibility (EPR) depots.

In Terrace, the municipality provides a weekly curbside garbage collection service to residents, and a curbside yard waste collection program from mid April – mid October. RDKS and the City of Terrace have offered somewhat sporadic incentive and education programs to support backyard composting since the mid 1990s when the Regional Solid Waste Management Plan was adopted.

In 2008, RDKS launched Project Eco-prise (formerly known as Landfill Diversion Credits). This program provides financial and technical support for individuals and organizations that design and deliver services and education programs to keep materials out of the landfill.

The expansion of EPR programs since 2004 has led to a modest improvement in recycling opportunities and efforts are on-going to increase the landfill diversion potential of these industry funded

“This project has really opened our eyes to many new ideas. We have become aware of how much waste we generate in our home. Up until we started the Zero Waste Challenge we really had no reason to take note of the waste our household produces.”

- ZWC Participant

programs. Recent efforts by the City of Terrace and RDKS to coordinate locations and education with Industry stewards have been promising for much improved service.

2.0 Project Overview

Four distinct areas were focused on during the Zero Waste Challenge; composting, water conservation, green shopping, and recycling. Composting and recycling were the key components of the project, and received the most focus and resources.

2.1 Recycling

The September 2009 RDKS waste composition study revealed that approximately 40% of sampled loads (by weight) from City of Terrace and Regional District residential garbage could be diverted through an effective residential recycling program. This translates into a 1800-3600 tonnes per year potential diversion based on 50-100% residential participation rates for a full program roll-out.

Curbside recycling was pursued as it is generally assumed to result in higher collection rates compared to depot collection programs, largely due to the convenience the service. In one estimate, depot programs typically result in 7% to 12% diversion of residential waste, whereas curbside programs result in 15% to 20% diversion (Federation of Canadian Municipalities 2004).

2.1a Contract

The contract for the curbside recycling collection program and related services was awarded to Do Your Part Recycling in Thornhill, BC. An expression of interest was advertised and Do Your Part provided the only submission that fit the criteria. For this reason, the contract was not put out to a full RFP.

2.1b Collection Frequency and Service Types

In our design and delivery of this aspect of the program we aimed to research and investigate curbside recycling collection program design, performance and parameters relevant to the Terrace and area context. Collection frequency refers to the number of times in a month that the collection service is provided to households. Standard options are weekly or bi-weekly (once every two weeks) collection. The decision around collection frequency requires taking into consideration a range of factors including materials to be collected, the type of collection container, collection vehicle as well as the coordination/integration with garbage and, where available, organics collection programs.

“Probably the biggest change for us, as a result of participating in the Zero Waste Challenge, is the way we deal with our organics. Before this project all of our kitchen waste went into the trash. Now we are composting everything we can and almost no organic material goes into the trash. A good portion goes into our vermiculture system and everything else goes into our new backyard bin”

- ZWC participant

Generally speaking weekly collection of recyclables can be expected to result in higher recovery rates, and weekly collection on the same day as garbage collection is typically more effective (Federation of Canadian Municipalities 2004).

The level of sorting of recyclable materials required in the house and at the curb is another key parameter in the design of a curbside recycling program. Among other things, this requirement affects the choice of collection vehicle, and as well the sorting protocol affects, and is affected by, the processing configurations and specifications of the receiving material recovery facility (recycling depot).

To determine the most effective collection model for curbside recycling, 3 recycling collection schedules and systems were put in place:

- **For the Southside of Terrace, and Thornhill**, recycling collection was scheduled for one pick up every 2 weeks (bi-weekly) and the system was co-mingled (all accepted items in one bag);
- **For the Horseshoe area of Terrace**, recycling collection was scheduled for weekly pick-up and the system was co-mingled (all accepted items in one bag);
- **For the Bench area of Terrace**, recycling collection was scheduled for weekly pick-up and the system was 3-sort (items divided by material and placed in a bin and bags);



Related to recycling, we wanted to be able to determine awareness and participation in EPR recycling programs. To achieve this before and after surveys were conducted.

2.1c Processing of Materials Collected

One challenge of recycling in Terrace is the distance our materials have to travel to arrive at the various end markets. The contractor indicated that all materials recycled are baled and sent to the Lower Mainland for further processing. Most of these materials are then sent on to markets throughout North America and increasingly to Asia.

2.1d Exclusion of Glass

Glass was excluded due to high cost of transportation and lack of local end markets. This exclusion was an often mentioned concern for the participants. The advisor suggested to participants they take their glass products to a local retailer where glass is accepted.

2.2 Backyard composting

The 2009 waste composition study indicated that approximately 30% of waste could be diverted through composting or organics diversion. Each of the 130 Pilot Project participants was encouraged to participate in backyard composting. Within the Zero Waste Challenge Guide suggestions were made regarding choosing the correct composting system to suit participants' needs. The fifteen advisor assisted participants were offered the services of the advisor to construct a compost system in their backyard. Vermiculture systems and a community compost location were also made available to the participants in the challenge.

As part of the Pilot Project, we provided a \$25 incentive to all participants to start up or improve on a household composting system. Residents working with our advisor were offered up to \$50. At the end of the project only one of the 130 homeowners had cashed in on the offer. The project team decided to extend the timeline to June 30 and this was communicated in the final correspondence to participants. As of June 15th 7 more incentives had been cashed in bringing the total participation rate up to 8 and the total dollars distributed to \$325.

Overall the uptake on this incentive was lower than expected and the following possible explanations are offered for the low level of participation:

- The Zero Waste Advisor reported that participants did not view winter composting as a desirable activity; perhaps if a composting system was already active, composting through the winter would be more popular.
- Insufficient emphasis on composting over recycling services during outreach.
- Insufficient options for indoor composting other than vermiculture offered during program.
- Vermiculture option not fully developed in Greater Terrace Area - improved bin design and access to worms needed.
- Low levels of organic material in household waste during winter months.
- Insufficient level of incentive.
- Households may be composting and not need a financial incentive.

2.3 Water Conservation

We did not have a measurable challenge component in regard to water conservation as part of the Pilot Project; however, personalized support regarding water conservation was offered by way of the Zero Waste Advisor. The Advisor was available to all participants to answer questions, by phone, email, and in person, regarding treated water conservation. In

“The curbside recycling was an excellent part of this project and we are looking forward to seeing this offered by the city on a regular basis. It was convenient and straightforward and we cut down our garbage output immensely. Thanks to recycling we reduced our garbage from 2 cans a week to half a can, and sometimes less, a week”

- ZWC Participant

addition, strategies and techniques to successfully reduce water usage in the home through the Zero Waste Challenge guide.

2.4 Green Shopping

In the area of reduction of packaging and green shopping we again offered personalized support regarding green shopping by way of the Zero Waste Advisor as well as strategies and techniques for successful green shopping through the Zero Waste Challenge Guide. We also offered a workshop focusing on green shopping techniques, packaging and alternative cleaning products.

3.0 Project Team

During the project design phase, in-house capacity was assessed to deliver the pilot project and determined that additional capacity would be needed for delivery of outreach and curbside recycling services. A part-time Residential Zero Waste Advisor was hired for a four-month contract to deliver all of the outreach components of the program. Hiring the Zero Waste Advisor involved creating a job description and advertising for interested applications. A hiring team consisting of Tara Irwin, Laurie Gallant, and Stew Christensen, Chair of the RDKS Plan Monitoring Advisory Committee was formed. Interview questions were developed and four applicants were selected for interviews. Our top-ranking candidate, Chris Gee, accepted the job offer.

Project management and administrative duties were shared by Laurie Gallant of RDKS and Tara Irwin of the City of Terrace. The City of Terrace administered the Recycling Contract, RDKS hosted the Advisor position and composting voucher program, and other tasks were shared based on available team member resources.

4.0 Participant (Household) Overview

Participants for the Zero Waste Challenge were chosen by random selection of streets in a sampling of neighbourhoods. Neighbourhoods were selected with the goal of providing a balanced representation between areas within both Terrace and Thornhill. The City of Terrace can generally be broken down into 3 distinct areas, the Horseshoe, the Bench and the

Southside. Each neighbourhood shares certain characteristics to some degree but can be considered slightly unique.

Thornhill is often broken into upper and lower Thornhill, and to account for any differences between these two areas we chose streets from both areas. Our final sample areas resulted in a balance of neighbourhood types and accounting for any differences between neighbourhoods that could result in higher or lower participation rates than we might otherwise observe.

Total participants	130
Residents sent invitation letter	200
Accepted through letter	64
Accepted through face to face invitation	66
Declined invitation to participate	46
No response	24
Participants already recycling with DoYourPart	26
Participants already composting	59
Request advisor service	23
Later decline advisor service	8

While the broad mandate of Zero Waste suggests systemic change, on a macro scale, the City of Terrace and Regional District of Kitimat Stikine's Zero Waste Challenge specifically focused on the individual households and encouraged participants to make changes in the micro systems of their homes. 130 residences agreed to participate in the Zero Waste Challenge and of those, 15 residences requested to receive personalized service from the Zero Waste advisor. We offered information, support, and services in each of the four main areas outlined earlier in section 2, while posing the following challenges to the individual participating households:

- *How close can your household come to ZERO Waste?*
- *Can your family reduce the food waste it sends to the landfill to ZERO?*
- *Is your household able to reduce wasted water to ZERO?*
- *Can you reduce the product packaging you bring into your home to ZERO?*
- *Can your household reduce the recyclables sent to the landfill to ZERO?*

5.0 Communication and Engagement

The communication and engagement strategies utilized during this pilot project were rooted in the belief that traditionally accepted means of altering behaviour, like those utilizing the mass media, are ineffective. The communication and engagement model used by this pilot project was based on an approach of community based social marketing. Within this section we will discuss the broad aims of engagement aspects of the pilot project, some of the timelines around communication and engagement, and some of the feedback we received from residents.

The direct engagement techniques used with community members was strength of this pilot project. The rationale behind the utilization of the Zero Waste Advisor rests in the theories of community based social marketing. Working from data gathered by McKenzie-Mohr (2009), we realized that many projects and programs that aim to foster sustainable behaviour depend upon large-scale information campaigns. These campaigns are typically premised on the belief that by increasing public knowledge about an issue, such as decreasing landfill capacity, individuals will change their behaviour.

Many campaigns and programs based on this perspective attempt to alter behaviour by providing information, through media advertising, and the distribution of brochures, flyers and newsletters and online appeals. The notion that change occurs as a result of information only, ignores the myriad of barriers that block many from making desired change, regardless of their level of knowledge on a subject or issue. With this in mind, the Zero Waste Challenge chose to incorporate information building campaigns into a more substantial and comprehensive engagement

strategy.

A variety of barriers can deter individuals from engaging in a sustainable behaviour. Lack of knowledge and unsupportive attitudes are only two of these barriers. One of the hallmarks of the Zero Waste Challenge was our commitment to deliver a project that was effective in changing people's behaviour. Integral to this plan was the utilization of the Zero Waste Advisor to make and maintain relationships with Zero Waste Challenge participants.

The rationale behind the utilization of a "face" for this project stems, again from McKenzie-Mohr's (2000) work. "Personal contact is emphasized because social science research indicates that we are most likely to change our behaviour in response to direct appeals from others." (McKenzie-Mohr, 2000, p.2) From the personal appeal stems a degree of motivation unattainable through information only campaigns and thus the Zero Waste advisor worked in conjunction with a traditional information campaign to achieve results likely unattainable otherwise.



The following range of tools was utilized in order to disseminate information, engage participants and gather opinions:

- Kitchen table talks (advisor assisted participant consultations and interviews);
- Mail out information packages (welcome letters, service reminders);
- Information packages hand delivered (challenge guide delivery, workshop invitations);
- Information disseminated through the media (print, radio, online);
- Information presented through workshops and presentations;
- Door to door engagement (participant recruitment, survey data gathering, interviews)

The following provides a summary of communication and engagement Highlights from the Zero Waste Challenge:

Green Minute on CFNR	Weekly - Sept. to Nov. 2010
Challenge guide completed	Oct. 20th 2010
Challenge guide and program materials Delivered	Oct. 25th 2010
Terrace Standard interview	Oct. 27th 2010
Door to door participant recruitment	Oct. 27th to Nov. 5th
Advisor interviews begin	Nov. 1st 2010
NWCC Zero Waste presentation	Nov. 2nd 2010
Cold weather composting workshop # 1	Nov. 26th 2010
Cold weather composting workshop # 2	Nov. 27th 2010

First survey collected	Nov. 30th 2010
Green shopping workshop	Dec. 22nd 2010
CFNR interview	March 10th 2011
Vermiculture system demonstration	March 12th 2011
Advisor assisted home visits concluded	March 15th 2011

Beyond the direct actions of the Zero Waste Advisor to engage the participants and encourage changes in behaviour, the Zero Waste Challenge Pilot Project supported participants to take an active role in disseminating information regarding the pilot amongst their neighbours and friends. Each of the advisor-assisted participants was directly encouraged to share with others their success and struggles with the Zero Waste Challenge.

In addition, several of the Zero Waste Challenge participants were asked to speak with the Terrace Standard to share their experiences with the pilot project. This sharing of experienced served to disseminate information regarding the challenge and to solidify participants' commitment to the waste reduction aims of the pilot.

6.0 Outcomes

Outcomes of the Zero Waste Challenge can be divided up into 2 general categories: a) the feedback from participant survey results, interviews and participant supplied measuring pages and data and b) the actual participation rates and diversion amounts. Both are important indicators and help us to measure the degree of success we might expect in moving to a community scale roll out.

6.1 Zero Waste Challenge Feedback and Survey Results

Feedback from residents came in several forms: multi-question interviews were undertaken with participants working directly with the Zero Waste advisor, surveys were made available online for all participants, and surveys were gathered through door to door contact and over the phone. The following results show the data wherein respondents rated their agreement with a series of 8 statements, once at the beginning of the pilot project and again at the end:

Pre-Challenge Survey:

	Never	Sometimes	Often	Always	Rating Average	Response Count
I/We take batteries and used electronics to the appropriate depot.	10.4% (5)	31.3% (15)	29.2% (14)	29.2% (14)	2.77	48
I/We take toxic products like used motor oil and paint to the appropriate depot.	6.3% (3)	14.6% (7)	25.0% (12)	54.2% (26)	3.27	48
Our/My household recycles as much as possible.	2.1% (1)	14.6% (7)	16.7% (8)	66.7% (32)	3.48	48
Our/My household composts everything we can.	35.4% (17)	2.1% (1)	14.6% (7)	47.9% (23)	2.75	48
Our/My household make the changes needed to conserve water.	2.1% (1)	39.6% (19)	43.8% (21)	14.6% (7)	2.71	48
I/We buy locally produced or made/grown in BC items when possible.	0.0% (0)	31.3% (15)	37.5% (18)	31.3% (15)	3.00	48
Our household discusses Zero Waste issues.	22.9% (11)	54.2% (26)	8.3% (4)	14.6% (7)	2.15	48
I/We take into account packaging when purchasing products.	8.3% (4)	29.2% (14)	45.8% (22)	16.7% (8)	2.71	48
I/We think about how much household garbage goes to the Landfill.	4.2% (2)	18.8% (9)	37.5% (18)	39.6% (19)	3.13	48
answered question						48
skipped question						0

Post Challenge Survey:

	Never	Sometimes	Often	Always	Rating Average	Response Count
I/We take toxic products like used motor oil and paint to the appropriate depot.	3.1% (1)	25.0% (8)	21.9% (7)	50.0% (16)	3.19	32
Our/My household recycles as much as possible.	6.3% (2)	21.9% (7)	53.1% (17)	18.8% (6)	2.84	32
Our/My household composts everything we can.	21.9% (7)	15.6% (5)	21.9% (7)	40.6% (13)	2.81	32
Our/My household make the changes needed to conserve water.	3.1% (1)	59.4% (19)	31.3% (10)	6.3% (2)	2.41	32
I/We buy locally produced or made/grown in BC items when possible.	0.0% (0)	40.6% (13)	37.5% (12)	21.9% (7)	2.81	32
Our household discusses Zero Waste issues.	15.6% (5)	65.6% (21)	15.6% (5)	3.1% (1)	2.06	32
I/We take into account packaging when purchasing products.	12.5% (4)	50.0% (16)	34.4% (11)	3.1% (1)	2.28	32
I/We think about how much household garbage goes to the landfill.	3.1% (1)	15.6% (5)	50.0% (16)	31.3% (10)	3.09	32
				answered question		32
				skipped question		0

What do the answers suggest?

Apparent, in each category, is a trend towards positive answers as compared to the initial survey. These results are discussed briefly below for each category.

1) Recycling

The statement requesting agreement regarding recycling found that those who claimed to "always" recycle everything they could was initially measured at 18.8%. In our final survey that same category garnered a 66.7% response rate. Those who claimed to "never" recycle everything they can were initially measure at 6.3%. In our final survey that same category garnered a 2.1% response rate.

2) Packaging

The statement requesting agreement regarding taking into account packaging found that those who claimed to "always" engage in this behaviour was initially measured at 3.1%. In our final survey that same category garnered a 16.7% response rate.

3) Discussing Zero Waste

The statement requesting agreement regarding discussion of zero waste issues found that those who claimed to "always" engage in this behaviour was initially measured at 3.1%. In our final survey that same category garnered a 14.6% response rate.

4) Local products

The statement requesting agreement regarding purchasing local products when possible found that the those who claimed to "always" engage in this behaviour was initially measured at 21.9%. In our final survey that same category garnered a 31.3% response rate.

5) Garbage to the Landfill

The statement requesting agreement regarding thinking about garbage being sent to the Landfill found that those who claimed to "always" explore these thoughts was initially measured at 31.3%. In our final survey that same category garnered a 39.6% response rate.

5) Water conservation

The statement requesting agreement regarding making changes to conserve water at home found that those who claimed to "always" engage in this behaviour was initially measured at 6.3%. In our final survey that same category garnered a 14.6% response rate.

6) Composting

The statement requesting agreement regarding composting everything they can find that those who claimed to "always" engage in this behaviour was initially measured at 40.6%. In our final survey that same category garnered a 47.9% response rate.

7) EPR

The statement requesting agreement regarding returning toxic material like motor oil and paint to appropriate depots found that the those who claimed to "always" engage in this behaviour was initially measure at 50%. In our final survey that same category garnered a 54.2% response rate.

In the following charts we display the results to a "yes" or "no" question, ostensibly to gauge change in behaviour.

Pre-Challenge Survey:

Question: In the past 2 months have you changed your behaviour in the areas listed below?

4. In the last 2 months have you changed your behavior in the areas listed below?			
	Yes	No	Response Count
Conserving treated water	34.4% (11)	65.6% (21)	32
Recycling batteries	31.3% (10)	68.8% (22)	32
Returning toxic materials to appropriate depots	28.1% (9)	71.9% (23)	32
Composting	31.3% (10)	68.8% (22)	32
Purchasing cleaning products	31.3% (10)	68.8% (22)	32
Purchasing local products	37.5% (12)	62.5% (20)	32
Buying used items	25.0% (8)	75.0% (24)	32
Recycling electronics	40.6% (13)	59.4% (19)	32
Recycling paper, metal, plastic	37.5% (12)	62.5% (20)	32
		answered question	32
		skipped question	0

Post-Challenge Survey:

Question: In the past 4 months have you changed your behaviour in the areas listed below?

8. In the last 4 months have you changed your behavior in the areas listed below?			
	Yes	No	Response Count
Conserving treated water	43.8% (21)	56.3% (27)	48
Recycling batteries	41.7% (20)	58.3% (28)	48
Returning toxic materials to appropriate depots	41.7% (20)	58.3% (28)	48
Composting	31.3% (15)	68.8% (33)	48
Purchasing cleaning products	50.0% (24)	50.0% (24)	48
Purchasing local products	43.8% (21)	56.3% (27)	48
Buying used items	27.1% (13)	72.9% (35)	48
Recycling electronics	41.7% (20)	58.3% (28)	48
Recycling paper, metal, plastic	79.2% (38)	20.8% (10)	48
		answered question	48
		skipped question	0

What do these answers suggest?

In almost every category an increase in positive responses is evident. In the category of "composting" no change was evident. Again, causation cannot be ascribed to these results. The best we can offer is that amongst many possible factors and influences, the implementation of Zero Waste Challenge may correlate with the observed changes. Given the myriad of biases possibly influencing the results of this survey, ascribing undue credit to only one particular influence would be imprudent. In regards to the final surveys a response rate of 37% (48 of 130) was achieved and for our final interviews with advisor assisted participants we achieved an 87% (13 of 15) response rate. Within our survey we asked 2 distinct groups of questions with the aim being to track change over the course of the pilot. ⁱ

Namely, we asked whether respondents would be in support of a one-container limit for residential garbage pick-up, and whether respondents would support additional resources being allocated towards organics diversion. The results of these survey questions are displayed below:

Implementing a one-container limit:

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	Rating Average	Response Count
The City of Terrace should implement a one-container limit for weekly residential garbage pick-up.	18.8% (9)	39.6% (19)	27.1% (13)	10.4% (5)	4.2% (2)	2.42	48
	answered question						48
	skipped question						0

Reducing organics to landfill:

	strongly agree	agree	neither agree nor disagree	disagree	strongly disagree	Response Count
I value initiatives that examine the best ways to reduce organics to the Landfill.	62.5% (30)	27.1% (13)	10.4% (5)	0.0% (0)	0.0% (0)	48
	answered question					48
	skipped question					0

Closing Interviews (with advisor assisted participants)

Each of the Zero Waste Challenge participants was offered the opportunity to work with the Zero Waste Advisor. 15 households took advantage of this opportunity. Brief interviews with these residents sought to gather closing thoughts, challenges and successes, in regards to the Zero Waste Challenge.

The entirety of the text from the interviews (5000+ words final interview; 10000+ initial interviews) is available upon request. The analysis of the interviews is, again, subjective. Three general questions were asked of the participants:

- Please speak to me about your general impressions of the project and its components.
- Please tell me about the challenges you encountered while participating in the Zero Waste Challenge.
- Please describe what you see as successful with this project.

A sampling of responses from the interviews is provided below. This sample represents a selection and variety of opinions and comments:

“We were thrilled with this project. It is exciting to see how little garbage we send to the curb now. When we first received the letter about the project we thought we wouldn't bother with it but we are sure glad we did. We see very clearly now the impact recycling has and this is coming from a very sceptical point of view. We liked how convenient it was. We just had to put everything in one bag, very simple.”

“Now that we are aware of the amount of trash we are able to put into the recycling bag it is going to be tough to go back to throwing all of that stuff into the garbage. We would certainly love to continue our recycling with but given the cost it is probably not going to happen.”

“In my mind the extra cost is the issue for the recycling. It can really be expensive for people.”

“After keeping track of my garbage output I can show a reduction of my garbage going to the landfill yet there is really no incentive for cutting down on my trash. We are paying the same amount for trash despite cutting down on the waste that we are putting out on to the curb. We are recycling a lot and it is not fair, in some ways, that we are less of a burden on the system and yet we seem to be paying on both ends. We work to put out less trash and we are asked to pay to have our recycling pulled away.”

“What about seniors or young people with families? They can't afford to recycle. If the city included this in the taxes we would be more than pleased to accept that.”




“As a result of this project we have taken a closer look at the items we are bringing into our home. We have learned to shop smarter and to think more about what we are buying. Doing the recycling really makes you aware of packaging. In regards to the rest of the challenge, well, we are really trying to do as much as possible but we just decided that we couldn't do everything in the challenge but we would do as much as we could manage.”

“One of the challenges in this project was the timing. It was really tough to get motivated to do the composting in the middle of the winter. We would have had to dig a path out there and if you take too long to get the stuff out then it starts to smell and just ends up in the garbage. By the end of the project we did manage to set a system up that seemed to work for us. We noticed that as a result of composting we are actually getting more value out of our produce because instead of throwing all our scraps away we put them in the compost. We certainly pay more

attention to the organics that go into the trash now. We try our best.”

“Definitely, the biggest success was that we went from 2 cans of garbage a week to .5 or less cans of garbage a week. Some weeks we didn't even put any garbage out!”

Overall, the feedback from participants that chose to complete the final survey on their Zero Waste Challenge was positive. 45.8% of respondents reported being “very satisfied” with the Pilot Project, while another 45.8% of individuals reported being “satisfied”. A remaining 8.3% reported being neither satisfied nor dissatisfied. These results are shown below:

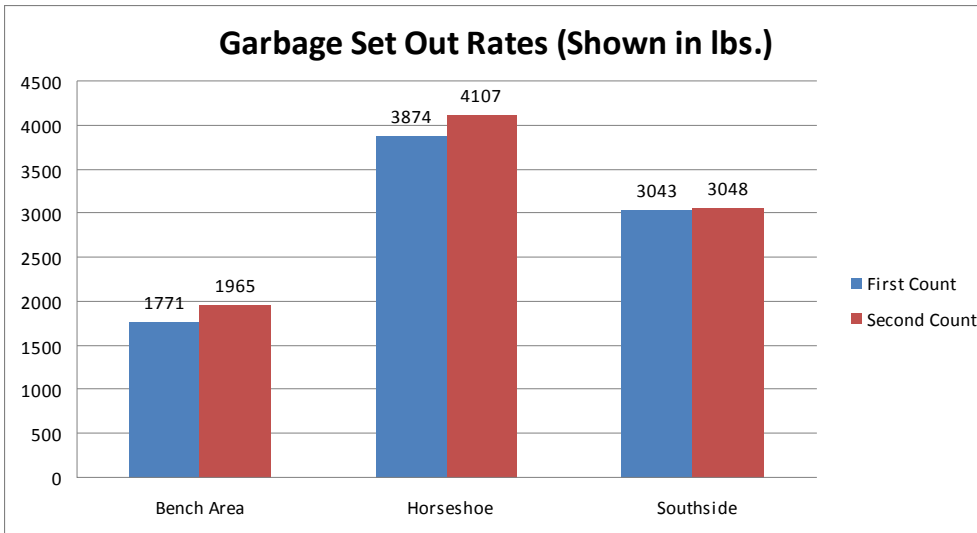
11. Please rate your level of satisfaction with the Zero Waste Challenge pilot project:			
		Response Percent	Response Count
Very satisfied		45.8%	22
Satisfied		45.8%	22
Neither satisfied nor dissatisfied		8.3%	4
Dissatisfied		0.0%	0
Very dissatisfied		0.0%	0
answered question			48
skipped question			0

6.2 Outcomes – Participation and Diversion Data

6.2a Garbage Generation Data

One key objectives of this Pilot Project was to test for impacts of Zero Waste Challenge on garbage generation rates. In order to achieve this we gathered baseline garbage generation data and then conducted mid-point, and end-point audits on garbage generation. This measurement was only possible for sampling areas in Terrace, as Thornhill households do not receive curbside garbage pickup.

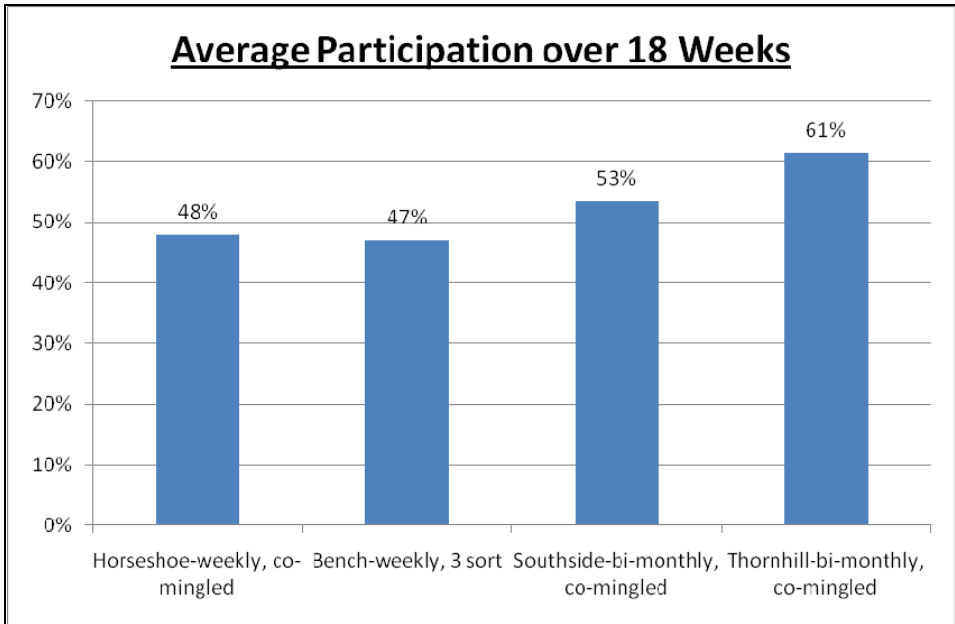
In short we did not observe a significant change in garbage generation over the course of these measurements. The two audits in fact showed an increase in garbage generated. However it is important to point out that this measurement was very susceptible to sources of error. Namely we failed to take into account skewing of the data caused by water and snow getting into residential bins. Garbage generation data is displayed below, and full generation data is available upon request.



6.2b Overall Participation Rates

Participation rates means the number of times residents that signed up to the Zero Waste Challenge (for the recycling component) put out recycling on the curbside. The average participation rates, displayed below, were lower than predicted, at an overall average of 52%.

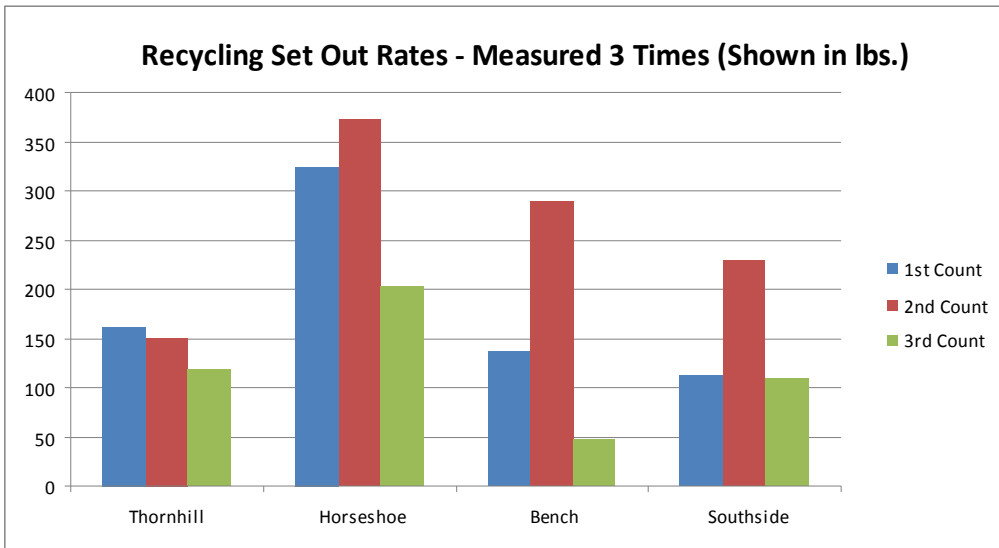
As shown in the following chart on “Average Participation Over 18 weeks” recycling participation was fairly balanced between the four pilot project sampling areas, with the exception of Thornhill which experienced almost 10 per cent higher than the total average participation rate. It was not surprising to see the Bench area have the lowest participation rates as experience in other municipalities indicates that the greater the amount of sorting, the lower the participation in recycling programs. Also, based on feedback from Bench area residents we know that households would save up recycling until bags were full to avoid putting out partially full bags of separated materials, and this may have caused some lower average participation results.



6.2c Overall Recycling Diversion

In order to compare overall rates of recycling for the various neighbourhoods sample, it is not enough to compare total weights diverted, as different neighbourhoods had different number of total households participating. Thus, total recycling tonnage produced must be divided by total participants on route to arrive at fair comparisons.

Based on this exercise, the total diversion numbers, by neighbourhood, are shown below:



6.2d Comparison of Various Recycling Service Levels

The data we collected from the recycling component of the Zero Waste Challenge was valuable but failed to identify clear or significant trends that would allow us to reach conclusions in terms of ideal service levels. The assumption entering into this Pilot Project, based on data from other municipalities and existing research, was that we could expect higher rates of overall averaged diversion from weekly versus bi-weekly service, and that we could expect higher rates of overall average diversion from co-mingled versus sorted systems.

SAMPLING AREA	OVERALL PARTICIPATION AVERAGE OVER 18 WEEKS	OVERALL AVERAGE WEIGHT DIVERTED OVER 18 WEEKS	WEIGHT DIVERTED PER HOUSEHOLD
Horseshoe-weekly, co-mingled	48%	2.7tonnes= 5404lbs	112
Bench-weekly, 3 sort	47%	1.45tonnes=2898lbs	103.5
Southside-bi-weekly, co-mingled	53.40%	1.1tonnes=2205lbs	84.5
Thornhill-bi-weekly, co-mingled	61.40%	1.53tonnes=3054lbs	109

Weekly Versus Bi-weekly

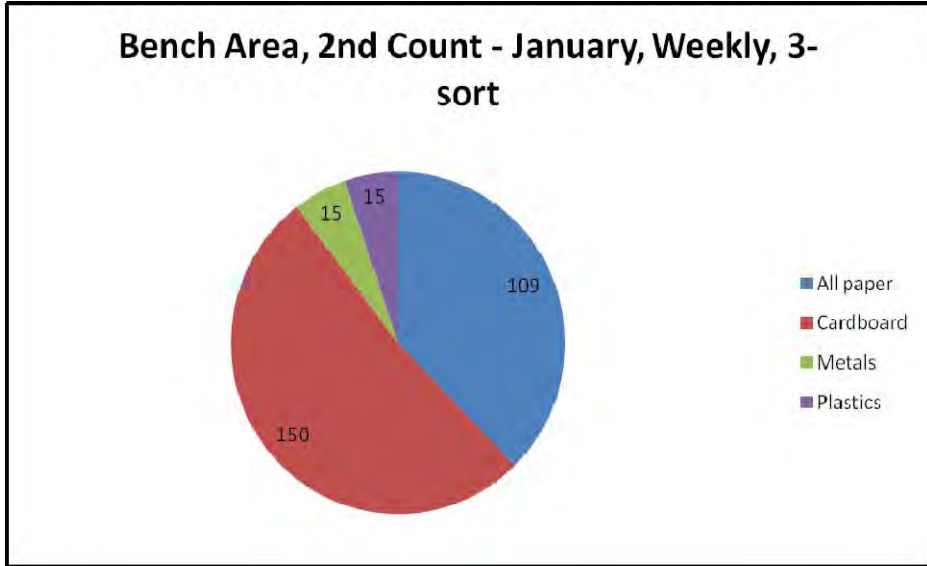
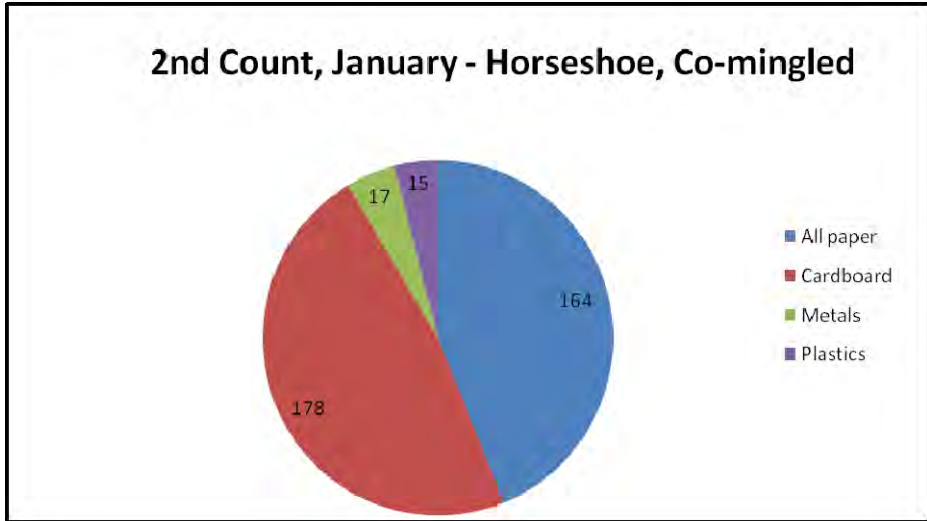
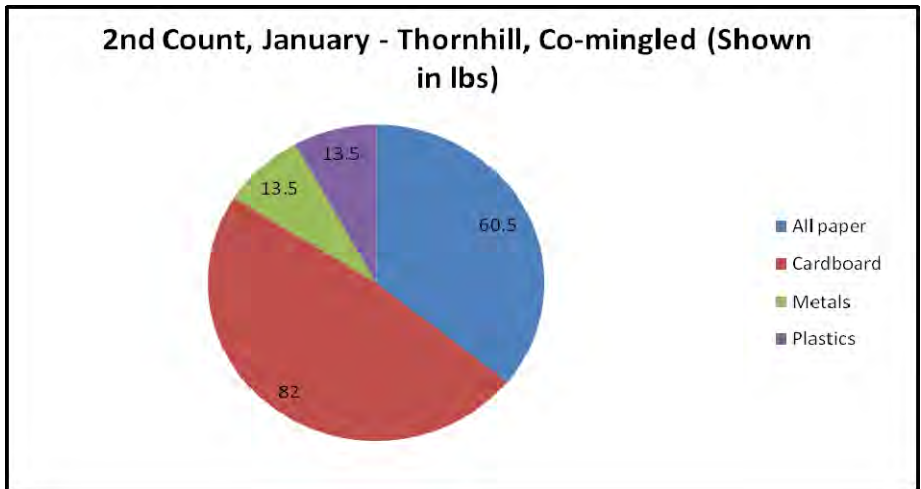
Thornhill and the Southside of Terrace received bi-weekly service, while the Bench Areas (Vesta Ave. and Temple St.) received weekly service. In terms of participation our data indicated that bi-weekly service actually achieved better results in terms of frequency of set out, however this is to be somewhat expected as pick-up was only every two weeks. As shown above, the Southside had slightly lower average recycling weight diverted per household over the Pilot Project when compared to the weekly service areas, while Thornhill had slightly higher weights diverted. Thus, given these inconsistent results it is difficult to draw any conclusions on this comparison.

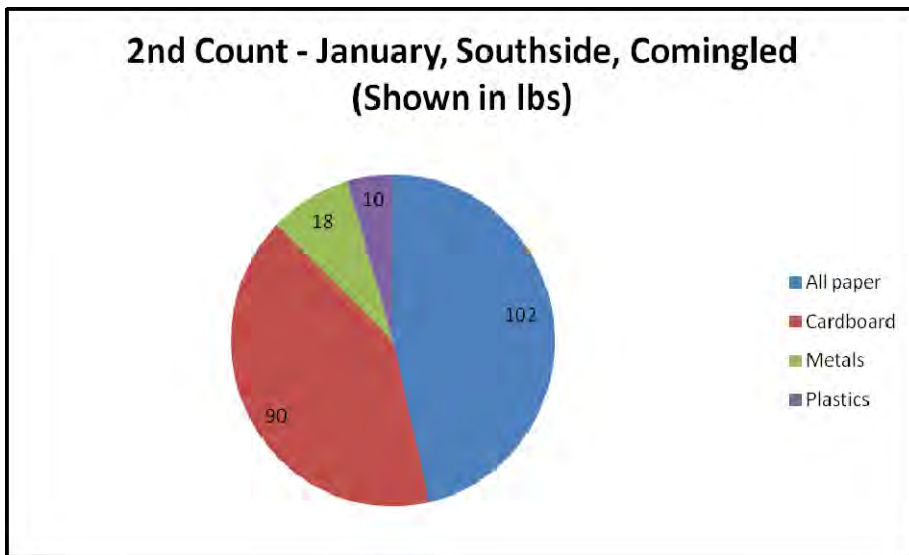
Co-mingled Versus 3-sort - Bench Area (3-sort and Weekly) versus Horseshoe (Co-mingled and Weekly)

Using the co-mingled service diverted more materials on average from their refuse stream than the 3 sort households in the Bench area. Additionally, Do Your Part reported there were a number of occurrences of incorrect sorting for the 3-sort route, which is to be expected any time complexity is added to recycling systems. Do Your Part also reported that the 3- sort system did not save time or money in regard to the collecting or sorting of recyclable material.

In order to demonstrate a typical sampling week, we provide charts of measuring period 2, taken during the month of January. A key trend for

this measuring period is the dominance of paper and cardboard, and this was consistent throughout all measuring periods:





8.0 Budget

The budget allocated for the total pilot project was \$52,421. This included the cost of hiring a Zero waste advisor, bringing on a contractor to collect and process the materials, producing the communications and any materials needed for the Pilot Projects as well as additional capital costs such as recycling containers and bags. A lower number of households participating and undersubscribed compost incentives resulted in this project coming in under budget by a significant amount at \$27,221.15.

9.0 Recommendations and Future Directions

Staff at the City of Terrace and RDKS have been working towards an approach to decision making for solid waste management that is intended to integrate environmental, social and economic objectives. At present there is no official policy at either organization and this approach is used at the discretion of program managers.

Balancing environmental, social and economic factors in decision-making is referred to as a triple bottom line approach. Consideration should be given to adopting a formal policy. Sample wording for such a policy is provided by the City of Calgary (adopted by Council on May 8, 2006).

“The City of Calgary will use the Triple Bottom Line to:

- 1. Incorporate sustainable development principles by considering and addressing the social, economic, environmental and smart growth impacts of all its decisions and actions, with regard to planning, policy, strategies, services, operations, approvals, and all other City business;*
- 2. Protect and enhance the economic, social and environmental well being of present and future generations of Calgarians.*

The City of Calgary is committed to building the necessary capacity within the organization to ensure that the Triple Bottom Line Policy is implemented, and to promoting a Triple Bottom Line approach in the broader community.”

In consideration of the sustainability mandate for both organizations, a TBL assessment can be used to evaluate options generated through the pilot project. A discussion of specific factors to be considered follows.

To help manage the TBL assessment of the options presented, we are proposing six primary factors for the three TBL categories. These factors best represent the elements that influence the decisions on waste diversion programs. Those six primary factors are:

- Diversion Rate (Environmental Factor)
- Net CO₂e benefit (Environmental Factor)
- Convenience (Social Factor)
- Participation Rate (Social Factor)
- Cost per Household per Month (Economic Factor)
- Supports community economic development (Economic Factor)

A very simple qualitative evaluation is presented for the three areas of service: recycling, composting, and education. We are using a scale of 1-3 for High, Med, and Low. A proper triple bottom line assessment would be a follow up recommendation to this report if the RDKS Board and City Council wish to pursue a level of detail involving cost per household.

The Zero Waste Challenge consisted of four components - Recycling (Standard Household and EPR), Composting, Green Shopping, and Water Conservation. The Challenge represented an effort to think about garbage and recycling in a more holistic way while still maintaining a fairly straightforward approach to influencing residential lifestyles. This section will deal with the recycling and composting program individually and then present an education component to take in water conservation, green shopping, and action on climate change.

9.1a Identification of Recycling Options

As shown in the following table, five options (R1-R5) that best represent the spectrum of choices for recycling have been selected. All options will move recycling forward in the Greater Terrace Area, however the impact that each option has will vary. The goal is to select the option that best represents a balanced decision when considering social, economic and environmental factors.

Recycling Options

OPTION	DESCRIPTION
R1	Curbside Recycling for paper, glass, metal and plastic for all homes that have garbage collection service. An RFP would be issued to determine price and we would consult with Smithers Recycling Depot and Prince Rupert Recycling Depot for materials that don't have local end markets. Tin and glass could stay "local" if glass could be crushed and used at landfills. Tin recycled may be an option through Bold Salvage.
R2	Community Recycling Depots (CRDs) at existing waste management facilities (Thornhill and City of Terrace landfills) and in partnership with other established recycling centres (EPR outlets - Bottle Depot, Do Your Part, Safeway, NWCC). Start with one depot the first year, and introduce one more per year until most residents have a depot within a 10-15 km radius or 10-15 minute drive.
R3	Option 1 plus 2 for outlying areas and materials not collected.
R4	Leave system as is - private and EPR only - and work with these agents to improve service and promotions.
R5	R-4 plus community recycling events for special needs recycling e.g. EPR, scrap metal, spring and fall clean up.

TBL Assessment of Recycling Options

1-Pass 2-Borderline 3-Fail

Recycling	Environmental		Social		Economic		Score
	Diversion	Net CO2	Convenience	Participation	Cost/hhld	CED	
R1	1	1	1	1	3	2	9
R2	2	1	2	2	2	1	10
R3	1	2	1	1	3	2	10
R4	2	1	2	2	1	1	9
R5	1	1	2	2	2	2	10

9.1b Identification of Composting Options

OPTION	DESCRIPTION
C1	Curbside Organics collection yard and vegetative food waste for all homes that have garbage collection service. An RFP would be issued to determine price of collection service. A composting system would be established at City of Terrace and Thornhill waste management facilities.
C2	Community Composting Depots at existing waste management facilities (Thornhill and City of Terrace landfills) and in partnership with other established composting centres (NWCC and private initiatives). Start with one depot the first year, and introduce one more per year until most residents have a depot within a 10-15 km radius or 10-15 minute drive.
C3	Neighbourhood composting depots are established and operated by private

	landowners and serve a well-defined area, usually within a 1 or 2 block radius.
C4	Leave system as is - City of Terrace yard and garden collection with expanded collection of raw fruit and vegetable scraps, tea and coffee grinds, and eggshells in a biodegradable bag. Potential to expand to include compostable fibres - paper and cardboard.
C5	C-2 plus C-3 plus Backyard Composting Booster Program.
C6	Hire a Composting Coordinator and share position between City of Terrace and RDKS to implement C-5

TBL Assessment of Composting Options

1-Pass 2-Borderline 3-Fail

Composting	Environmental		Social		Economic		Score
	Diversion	Net CO2	Convenience	Participation	Cost/hhl d	CED	
C1	1	3	1	1	3	2	11
C2	2	2	2	2	2	2	12
C3	2	2	2	2	2	2	12
C4	3	3	2	1	1	2	12
C5	1	1	1	1	2	1	7
C6	1	1	1	1	2	1	7 plus

Neighbourhood composting depots

Neighbourhood composting depots are established and operated by private landowners and serve a well-defined area, usually within a 1 or 2 block radius. They are sometimes attached to a community or neighbourhood garden or greenhouse. Project Eco-Prise is a natural way to encourage and support these types of depots. Priority funding can be established - currently we provide \$50 in capital start-up costs for depots and up to \$5000 for education and marketing over at 12-month period. At present we have one depot as a case study under this program.

A Neighbourhood Depot Start-up Kit is being developed and tested this year. The kit will include:

- A template for an information sheet to give neighbours about the composting project.
- A template for a sign to put on the composting bin identifying it as a neighbourhood composting system and how to use it.
- A fact sheet for the operator on how to design and site the system.
- A fact sheet for the composting system operator on how to maintain the bin.

- A workshop outline for the operator to hold a composting workshop.
- A handout to give out at the workshop for people that will go home and make their own composting system.
- Training session for depot operators based on demand.

A draft of the start up kit will be ready for June 30th, 2011.

Backyard Composting Booster Program

RDKS commissioned a report by Footprint Environmental Strategies on how to boost residential backyard composting in 2006; the following list contains many of those recommendations and a few new ones based on new information and opportunities.

- Provide an overview of the advantages and disadvantages of various composting systems.
- Provide plans for building your own composter.
- Provide or fund workshops for building your own composter.
- Hold a contest for funkiest bin.
- Expand on Garden Tours to focus on composting and organic gardening.
- Provide or fund workshops on composting methods and seasonal considerations.
- Subsidize purchase of a manufactured composter based on green purchasing policy
- Encourage local manufacturing of composter bins.
- Work with neighbourhood and community composting system operators to set up a tour of different systems; a series of demonstration sites will be established.
- Use garbage collection weekly limits to encourage composting and other forms of landfill diversion.
- Increase education on the value of composting and the dangers of sending organics to landfill.
- Have an indoor and small spaces composting program component - worm composting and semi-automatic composters with odour controls can be promoted.

Composting opportunities for Institutions and Business

The new Zero Waste Toolkit for Business is promoting a 5 point action plan for all workplaces within RDKS as follows:

- Provide basic green training and assign responsibility for meeting in-house targets to all staff.
- Collect all organic material for composting and make sure it gets to a compost pile.

- Keep all materials covered under Industry Stewardship Programs out of your garbage bin.
- Adopt a basic green purchasing policy
- Adopt an attitude of continuous improvement: learn from other businesses and share your own stories - good and bad.

Composting options 2, 3, 5 and 6 also provide access for the commercial sector. Capacity of each system versus the supply of materials would have to be monitored for program quality control. Larger generators should be considered as partners in establishing new depots and cost-sharing options explored.

9.1c Identification of Sustainability Education Options

OPTION	DESCRIPTION
E1	Continue and expand on existing efforts: <ul style="list-style-type: none"> • Self-guided education through website and publications - an inventory of existing materials and standardizing of content between RDKS and City of Terrace is needed. • Incorporate information on the environmental co-benefits of each sustainability initiative e.g. reduction of GHG through backyard composting versus curbside collection. • Encourage grassroots, government and private sector initiatives and partnerships. • Expand on the scope and budget of Project Eco-Prise to include additional environmental targets (currently only fund landfill diversion). • Pursue Green Shopping program through the Zero Waste Toolkit and Speakers' Bureau (new in 2011). The City of Terrace and RDKS will need to further develop and promote their in-house Green Purchasing Policies. • Hire a summer or co-op student to help with special projects.
E2	E-1 plus Hire a Community Educator and cost-share with neighbouring local governments to assist with Option 1 and develop new programming (discuss with North Central Municipal Association membership).

TBL Assessment of Education Options

1-Pass 2-Borderline 3-Fail

Education	Environmental		Social		Economic		Score
	Diversion	Net CO2	Convenience	Participation	Cost/hhl d	CED	
E1	1	1	1	1	1	1	6
E2	1	1	1	1	1	1	6 Plus

9.1d Recommendations for Moving Forward

Based on the TBL Assessments it is recommended that RDKS and the City of Terrace move forward with developing partnerships in the community, specifically with Industry Product Stewards to develop a centralized recycling depot for the Greater Terrace Area. Given that packaging and printed paper have now been added to the list of regulated products, staff feel that a depot is a feasible option for significant diversion rates. Ideally, recycling should be less costly and more convenient than garbage collection and options for moving closer to this ideal must be explored simultaneously. Education and programming must support any recycling effort to achieve diversion rates needed to support system development.

In regard to composting, it is recommended that these partners design a food and yard waste composting pilot project for residential and commercial users. Design work should take place over the summer and fall with a full design and budget report available by October 31 and launching of a program for April 2012. This recommendation may require hiring of a Composting Advisor for 6 months which can be a shared position between the City of Terrace and the RDKS.

10.0 Conclusion

This project was not without limitations and constraints, but has provided an incredible amount of information, community feedback and data. The desire of the community to move towards zero waste is clear as is the need to develop diversion systems that are convenient and cost effective.

With this foundation of partnership, supportive provincial regulation and a shared local government commitment to sustainability and zero waste the timing has never been better to embark on bold new directions. This project was an important step in deciding these directions on our way towards Zero Waste.

ⁱ Strictly based on theories of behavioural science, we are unable to claim that the Zero Waste Pilot project was responsible for the changes we have measured. The best we can offer is the notion that perhaps, amongst many other factors, the implementation of the Zero Waste Pilot project correlates with the changes observed.

Appendix: Case Study of a Zero Waste Challenge Pilot Project Participating Household

Case Study of a Zero Waste Challenge Participant Household

This case-study was compiled based on self-reported data tracking from a 2 resident home on Hamer, Ave. Terrace BC.

"I think about my grandmother when I think about recycling because she recycled everything. She lived through the war and the depression. She would save everything, things as inconsequential as string would be put aside for future use. She wouldn't throw anything out. Our community, and our society, need to return to those traditional values. This project helped us move towards traditions and values that my Grandmother would recognize and respect."

Pre - Zero Waste Challenge: Estimated over a Four Month Period

1750 L	Waste to the Landfill
38 L	Recycling
<u>57 L</u>	Compost
1845 L	Total

Post - Zero Waste Challenge: Measured over a Four Month Period

540 L	Waste put to the curb to go to the Landfill
1105 L	Recycling
<u>200 L</u>	Compost
1845 L	Total

	November	December	January	February
Waste to the Landfill	100 L	210 L	100 L	130 L
Recycling	310 L	260 L	350 L	185 L
Compost	50 L	<u>50 L</u>	<u>50 L</u>	<u>50 L</u>
Total	460 L	520 L	500 L	365 L