

TOWNSHIP OF LANGLEY BACKYARD COMPOSTING COMMUNITY-BASED SOCIAL MARKETING STUDY



November 1, 2010

Final Report

Prepared by Lura Consulting
for the Township of Langley



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This study was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

EXECUTIVE SUMMARY

The Township of Langley has undertaken a study to develop and pilot test strategies to enhance the municipality's current backyard composting program, utilizing Community-Based Social Marketing (CBSM) principles and approaches to effectively foster behavioural change. Based on a waste composition study carried out in 2008, 40% of garbage set out for collection is organic material. The targets for this study were to reduce the amount of organic material being disposed by half (2.2 kg of garbage per household per week).

Following the CBSM process, a literature review of other successful backyard composting programs in North America was conducted. CBSM research to determine the barriers and benefits to backyard composting, specific to the Township of Langley, was carried out, and two different CBSM strategies were developed and piloted over a seven week period. The strategies were developed using proven CBSM tools to minimize the barriers to backyard composting and maximize the perceived benefits through effective messaging, and to reinforce positive composting behaviours to foster a long-term commitment to backyard composting. One strategy used a high intensity approach, including a personal level of coaching and the other strategy used a medium level of intensity without personal coaching.

The intensive strategy was piloted with 101 households and the medium intensity with 100 households across two different neighbourhoods in the Township and compared with a control group to test effectiveness of different CBSM approaches, as well as different levels of resource expenditure. Methods used for evaluation included separately measuring the curbside garbage outputs before, during, and after the pilots. A total of 32 residents also participated in weighing and reporting the quantities of compostable food scraps put into their backyard composters. At the conclusion of the pilot project, each household was visited to determine participation rates by observing how many composters were in use.

The findings for each strategy are summarized in the following table:

Measure	High Intensity Strategy	Medium Intensity Strategy
Participation Rate	51%	45%
Garbage Reduction	31% 3.51 kg/household/week	12 - 18% 1.36 - 2.04 kg/household/week
Food Scraps Composted	5.1 kg/household/week	3.8 kg/household/week

Extrapolating the findings of the pilot project, full-scale implementation of the intensive strategy to all households in the urban area of the Township, 2,360 tonnes of waste could be reduced annually once fully implemented. Considering if the Township established a curbside food scraps program, the intensive backyard composting strategy could still reduce waste output by approximately 1,990 tonnes annually.

Full-scale implementation of the intensive strategy could be achieved through a ten year program administered primarily through two summer students. Annual costs of the implementation program could range from \$35,000 to \$45,000 and result in an average

cost savings over the length of the implementation program of \$173,400 in avoided disposal fees (or \$138,400 with a curbside food scraps program in place).

The medium intensity CBSM strategy has a potential to reduce garbage output by 810 to 1,210 tonnes annually when fully implemented without a curbside food scraps program in place and with a curbside food scraps program in place it could reduce output by 680 - 1,020 tonnes annually.

Implementation of the medium intensity strategy full-scale could be done over 5 years with one summer student partially dedicated to the program. Annual average costs of delivering this program could range from \$13,000 to \$16,000 and save an average of \$55,400 to \$82,600 in avoided disposal fees without a curbside food scraps program and \$44,000 to \$65,900 if a curbside food scraps program was in place.

A summary of the average annual costs and saving for each strategy over the length of implementing the programs are presented in the table below, including with and without a curbside food scraps program in place. Cost estimates are also provided if free compost bins were provided and if bins were sold at the existing rate of subsidy.

Summary of Average Annual Costs and Savings			
		High Intensity Strategy	Medium Intensity Strategy
Program Implementation Costs		\$35,000 - \$45,000	\$13,000 - \$16,000
BYC Bin Options	Cost of Providing Free Bins	\$30,000 - \$35,000	\$45,000 - \$56,000
	Cost of Existing Subsidy Program at \$10/Bin	\$6,500 - \$7,750	\$10,000 - \$12,500
BYC Program Expansion Only	Cost Savings	\$173,400	\$55,400 - \$82,600
	Garbage Reduction	1,298 tonnes	486 - 726 tonnes
	GHG Reductions	1,210 tonnes	460 - 690 tonnes
BYC Program Expansion with Curbside Food Scraps Collection	Cost Savings	\$138,400	\$44,000 - \$65,900
	Garbage Reduction	1,095 tonnes	408 - 612 tonnes
	GHG Reductions	1,045 tonnes	390 - 550 tonnes

* Assumptions and calculations can be found in Section 6.

Complimentary to implementation of either strategy is social norm development around backyard composting. Social norm development for composting is in its infancy in the Township of Langley. Additional mechanisms to assist in developing the social norm could include:

- Network of demonstration gardens;
- Backyard composting in schools and other public areas;
- Commitments by public figures;
- Neighbourhood backyard composting champions.

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I. INTRODUCTION

The Township of Langley has undertaken a study to develop and test strategies to enhance the township's current backyard composting program, utilizing Community-Based Social Marketing (CBSM) principles to effectively foster behavioural change. CBSM is a proven methodology to fostering long-term behavioural change that moves beyond traditional, information-only campaigns to strategies that achieve measurable results. For more information about CBSM, see *An Overview of the Community Based Social Marketing* (opposite) or visit www.cbsm.com.

Study Purpose

The Township's current backyard composting program has been in place since 1995 and in that time the Township has committed themselves to sustainability through a number of initiatives. The Township has committed to the Partners for Climate Protection Program, Metro Vancouver's Integrated Solid Waste and Resource Management Plan, the Climate Action Charter, and adopted their own Sustainability Charter. To support these commitments, the Township has embarked on an initiative to develop and deliver CBSM strategies and pilot projects to determine the most effective approach to encourage residents to adopt backyard composting.

Desired outcomes for the study include:

- Enhance the current backyard composting program
- Increase participation levels in backyard composting
- Foster ongoing participation in backyard composting
- Maximize the diversion of compostable organics
- Support the Township's commitment to sustainability

A waste compositions study found in 2008 that an average of 11 kg of garbage was

An Overview of Community-Based Social Marketing

Step 1: Selecting Desired Behaviour(s)

Developing an effective behaviour change program begins with selecting the right behaviour(s) and right audience to target.

Step 2: Identifying Barriers and Benefits

The identification of barriers and perceived benefits within each community through research is crucial to effectively promoting sustainable behaviour. Once the reasons for every day behaviour(s) are understood, strategies are developed to minimize the barriers and maximize the perceived benefits of each selected behaviour.

Step 3: Selecting Behavioral Change Tools

Once the barriers and benefits of the specific community are identified, tools to change behaviour are selected. Strategies often involve a combination of tools including social norms, vivid communications, commitment, reward and recognition, and social diffusion.

Step 4: Pilot Program Design

Pilot programs test the strategy design with a smaller segment of the community. This allows fine-tuning of the behavioural change strategy to ensure it will be highly effective.

Step 5: Large-Scale Application

Once the pilot has proven successful, the strategy can be implemented on a community-wide scale.

generated per household per week, 40% of which was organic material¹. This backyard composting study was initiated to develop an effective strategy to divert 2.2 kg of garbage per week per household from municipal disposal to backyard composters. This target would result in a total reduction in garbage output of 20%.

The purpose of this report is to summarize the work completed as part of the study and to present the findings of the pilot project, and the associated costs and savings for potential full-scale implementation.

Project Process

The project included a number of steps to develop effective strategies to change resident behaviours, specifically to encourage them to use a backyard composter to dispose of food scraps and yard trimmings. These steps include:

LITERATURE REVIEW

A literature review was conducted of best practices in backyard composting programs in North America that have focused on behavioural change, specifically addressing CBSM and education/outreach strategies. The review identified common barriers and perceived benefits to backyard composting and various program strategies.

BARRIERS AND BENEFITS RESEARCH

The barriers to using a backyard composter and the perceived benefits of using a backyard composter specific to the Township of Langley were determined through CBSM research. The research included the literature review of other programs, review of the findings from a recent City of Vancouver survey on backyard composting, as well as conducting a survey in the areas in the Township where the pilot projects would be taking place. Barriers and benefits were confirmed with a focus group comprised of residents from the pilot areas.

DEVELOP CBSM STRATEGIES

Based on the research, two different CBSM strategies were developed with different levels of intensity. The strategies use CBSM tools to minimize the barriers and maximize the perceived benefits, while also reinforcing and normalizing the behaviours. Elements of the strategies were also tested with the focus group and fine tuned before pilot implementation.

PILOT AND EVALUATE CBSM STRATEGIES

Two different CBSM strategies were implemented in two different pilot areas for a seven week period and evaluated to determine their effectiveness.

¹ Solid Waste Composition Study for the Township of Langley (August 2008). Prepared by Technology Resource Inc. for the Township of Langley.

Report Contents

Section 2 of this report provides an overview of the pilot project methodology and provides an introduction to pilot areas. A summary of the barriers and benefits to backyard composting specific to the Township of Langley is provided in Section 3 and the CBSM strategies used during the study are outlined in Section 4. Section 5 presents the results of the pilot and Section 6 concludes with potential impacts of full-scale implementation, including waste diversion and the financial costs and savings of each strategy.

2. PILOT PROJECT METHODOLOGY

Overview

The pilot project was designed to test three strategy scenarios of different levels of intensity:

- No interaction (control group)
- Medium level of intensity
- High level of intensity

Several measurements were taken to evaluate the effectiveness of each scenario, including separately collecting and weighing each household’s curbside garbage output, recruiting a number of residents to weigh and log the amount of food scraps they put in their composter, and conducting door-to-door evaluations to observe participation. Measuring a number of variables allows evaluation of both the quantity of residents composting as well as the quality of their composting efforts - important elements for developing long-term behavioural change.

The strategies were delivered in July 2010 and data recorded over a seven week period.

Pilot Areas

The pilot project was applied to subsets of three neighbourhoods in the Township of Langley. The test areas included 101 households from Murrayville, 100 households from Willoughby, and an entire collection route area of Walnut Grove as the control group. The test areas in Murrayville and Willoughby were both split in half and one half received the high intensity strategy and the other half received the medium level of intensity. The two neighbourhoods differ considerably in their characteristics, and together offer a cross-section that is generally representative of the Township of Langley as a whole. Defining characteristics of each neighbourhood are highlighted in Table 2.1.

Table 2.1: Characteristics of Murrayville and Willoughby Neighbourhoods	
Murrayville	Willoughby
Mature, established neighbourhood	Newly developed neighbourhood
Large lots	Small lots
Older population (many lone seniors)	Young population (new families with young children)
Many already composting	High new composter potential
Social diffusion mechanism already in place (established relationships)	Social norms can be developed (first time homeowners)
Many residents away portions of the year	Recent Immigrants, language limitations
Pre-existing rat problem	

PILOT AREA 1: MURRAYVILLE

The Murrayville neighbourhood (collection route #406) is located in the central part of the Township of Langley, just east of the City of Langley. The collection route has 866 single family homes. The residential area with homes partaking in the pilot program is bounded by 48 Ave to the North, 224 St to the East, 220 St to the West, and is bisected by Old Yale Rd. It is characterized by single family homes with relatively large lots.

PILOT AREA 2: WILLOUGHBY

The Willoughby neighbourhood (collection route #102) is located just north of the City of Langley boundary. The collection route has 984 single family homes. The neighbourhood of Willoughby is younger and less established than Murrayville and is characterized by high rates of growth, with new homes still being built at the time of the pilot. The residential area is comprised of a mix of detached homes, townhouses, and higher density residences. The pilot program area is bounded by 200 St to the West, 74 Ave to the North, 202B St to the East, and 68 Ave to the South.

PILOT AREA 3: WALNUT GROVE

The control group, the Walnut Grove neighbourhood (collection route #304) is located in the north-end of the Township of Langley. The neighbourhood is bounded by 96 Ave to the North, 213 St to the East, 91 Ave to the South, and 208th St to the West. The collection route has 980 single family homes and is characterized primarily by detached homes on medium to large lot sizes.

Maps of all three areas are provided on the following pages.

Food Scraps Disposed in Backyard Composters

As a subset of each pilot area, a number of residents were recruited while conducting door-to-door surveys in Murrayville and Willoughby to participate in the food scraps weighing component. Each household that agreed to participate was given a scale and a log book (see Appendix C) and asked to measure and record the weight of their food scraps each time they put these into the composter. Space was also provided in the log book for people to submit any comments, impressions and to provide details of any issues and problems that may have occurred (e.g. rodents, odour, etc.). Residents were asked to email or phone in their records to the research office biweekly and were encouraged to do so by an incentive of becoming eligible for a prize draw for each time the submissions were due (a total of three draws). Residents also received encouraging phone calls or emails to remind them when submissions were due.

A total of 54 residents originally expressed interest in participating, however several changed their minds or decided not to submit data. At the conclusion of the pilot, a total of 32 households (19 received the intensive strategy and 13 received the medium intensity strategy) actively submitted data. Due to the commitment involved with weighing and reporting data, household recruitment extended outside of the smaller (100 household) pilot areas, however still remained within the collection route areas of both Murrayville and Willoughby.

Curbside Garbage Tonnage Measurements

In order to measure the effectiveness of the CBSM strategies, baseline garbage output measurements were conducted before the pilot areas received the CBSM strategies, during the pilot, and after the pilot. Baseline waste generation data allows evaluation of the effectiveness of the strategies based on comparison of pre- and post-pilot quantities of garbage set out for disposal.

Garbage from each household in the Murrayville and Willoughby pilot areas was collected separately by the collection contractor using a separate truck and taken to the transfer station for weighing. Within each neighbourhood, the garbage was also collected separately for those households that received the intensive CBSM strategy and those that received the medium level of intensity. This measure established the mean waste output for a household per week according to each study area and each CBSM strategy.

Additionally, for the subset of residents in each neighbourhood that agreed to participate in weighing the food scraps they were composting, curbside garbage output was also collected separately. Township of Langley staff visited each one of these households on the same collection days the garbage in the pilot areas was being weighed and individually weighed the garbage of each participating household.

Garbage tonnages for the entire Walnut Grove (the control group) collection route were collected in the regular fashion and provided by the waste collection contractor. Garbage output data collected in the control area allowed for the calculation of variations in the quantities of garbage set out for disposal over the length of the pilot, taking into account seasonality or any other events

that may affect the quantities of garbage output. Variations found in the control group data were applied to the Murrayville and Willoughby data to provide a consistent basis for evaluation.

Pilot Area Backyard Composting Participation

Post pilot evaluation was conducted through door-to-door visits to all households in the Murrayville and Willoughby pilot areas, whether residents were participating in backyard composting or not, to evaluate participation levels and understand the effectiveness of elements of the different CBSM strategies. A key component of the evaluation was physically checking to see if the composters were in use, rather than relying on self reported results. The checklist used for evaluation can be found in Appendix E.

Household visits were conducted by Lura Consulting staff at varying times of day to ensure as many households as possible could be reached if not home at certain times. Up to three attempts were made to speak with each household. A total of 202 households were evaluated.

3. CBSM RESEARCH: IDENTIFYING BARRIERS AND BENEFITS TO BACKYARD COMPOSTING IN THE TOWNSHIP OF LANGLEY

Overview

The purpose of CBSM research as part of delivering a behavioural change program is to characterize the behaviour and the factors that influence behaviour of the target audience for whom the CBSM pilot strategies will be developed. The characterization includes identifying the barriers and the perceived benefits, or motivators, to specific backyard composting behaviours based on other backyard composting programs in North America, research in the community, and previous project experience. Understanding barriers and benefits surrounding backyard composting allows the tailoring of the CBSM strategies to address and overcome the specific reasons someone would not use a backyard composter. Knowing the motivators to backyard composting allows development of the CBSM strategies to use specific messaging that is most effective for the targeted community (e.g. promotion of certain benefits to composting over others).

Promoting the most significant benefits and breaking down the barriers is accomplished through the use of multiple CBSM tools, to strengthen and reinforce the messaging and behavioural change. Details of the CBSM strategies used during the study can be found in Section 4.

Process to Uncovering Barriers

CBSM research is a vital element of developing a CBSM strategy. While people have a general notion of backyard composting, what the barriers are and how to remove them, the fact is that the reality can vary substantially from one community to the other. Three methods were used to identify the barriers and benefits to backyard composting:

1. A literature review of best practices in other jurisdictions;
2. A review of results from a survey² conducted for the City of Vancouver, providing a regional context from survey work conducted for the Vancouver Backyard Composting and Grasscycling Survey and Market Assessment project; and
3. Community level research through door-to-door surveying and a focus group.

The literature review of twelve case studies identified the most common barriers found in a wide variety of backyard composting programs across North America. These barriers helped inform the research approach specific to the Township of Langley. Findings from a recent survey on backyard composting conducted in the City of Vancouver provided a regional context to the

² Survey and Market Assessment for Backyard Composting and Grasscycling (May 2007) Prepared by Mustel Group Market Research for the City of Vancouver.

attitudes and behaviours surrounding backyard composting. Building on those findings, the survey conducted in the pilot areas in the Township confirmed and refined barriers and target benefits that are very specific to the study area and formed the basis of the CBSM strategies.

The Township of Langley also conducted the same survey in a separate community, known as Yorkson Village. Yorkson Village is a community that was build as “eco-friendly,” including standard installation of the backyard composters. The survey results indicate that despite receiving compost bins with the purchase of their homes, the same barriers and benefits to using the composter exist. Findings from the survey can also be found in Appendix B.

CBSM Research Findings

Full details of the barriers and benefits to backyard composting, including the Township of Langley survey results, can be found in the Barrier & Benefit Research Report in Appendix B.

As a result of the research, it was determined that messaging for the CBSM strategies should target gardeners and emphasize the environmental benefits of backyard composting to reach non-gardeners. The door-to-door survey found a high proportion of residents who considered themselves gardeners, the majority of which did not currently use a composter. The strongest reported benefits of composting were also gardening uses.

The environmental benefits of composting were found to be an important factor in both the literature review and the door-to-door survey, and identified as a key element to be integrated into the CBSM strategies. The messaging used in the strategy developed for the Township, however, did not focus on diverting waste from landfill/incinerator for disposal as a primary benefit. The research found a high prevalence of garbarator use in the community. This could present a substantial barrier to the adoption of backyard composting because garbarators are very convenient and divert waste from landfill/incinerator disposal. If the communications used a primary message of asking people to compost to extend landfill capacity, this might not appeal to the 55% of the population who use garbarators.

Based on the research, it was determined that CBSM efforts should focus on teaching people how and why to compost. Lack of knowledge about proper composting technique leads to some of the other reported barriers such as “it fills up” or “it is difficult to turn”. Teaching people how to compost was integrated into the CBSM strategy through household visits, use of an existing composting hotline, and communication materials to address the specific concerns in the community. The educational component is important to not only educate residents on the importance and benefits of composting, but also on how to operate and maintain their composters. This can potentially prevent other barriers before they arise and foster a long-term commitment to backyard composting.

Positive findings from the survey were also integrated into messaging to use social pressures to break down barriers. For instance, the survey found no reported issues with odour among people who already composted. This fact was communicated to other residents to remove the perceived barriers by reporting the actual experiences of their neighbours.

Testing and Refining CBSM Strategies

An important element of designing effective CBSM strategies is testing and refining with the target audience before full-scale pilot implementation. This helps to confirm messaging and identify and correct any weaknesses in the strategy.

Initial CBSM strategies were developed based on the research findings and fine tuned through the input from a focus group made up of residents from the pilot areas. The purpose of the focus group was to test the key messages to be delivered through the branding concept, images, and slogan, and receive input regarding the communication materials. The focus group was also used to verify and refine the barriers and benefits and test the actual approach to addressing and overcoming each barrier as part of the CBSM strategies.

A summary of the focus group findings can be found in Appendix B. The tested and refined barriers and benefits specific to the Township of Langley are presented in the following table.

Barriers and Benefits Matrix

The barriers & benefits matrix is a tool used in CBSM to identify and analyze barriers and benefits of each specific desired behaviour. The table below presents the barriers and benefits to backyard composting in the Township of Langley, based on the research conducted in the study areas, the case study literature review findings, and previous project experience.

Table 3.1: Township of Langley Backyard Composting Barriers and Benefits Matrix			
Desired Behaviour	Competing Behaviour	Benefits	Barriers
Install a backyard composter	<ul style="list-style-type: none"> Do not install a backyard composter Use municipal waste management services Use garborator 	<ul style="list-style-type: none"> Requires only a small area Can produce compost for garden or lawn (or to give away to friends and neighbours) Environmentally-friendly option Can be used to dispose of food and yard trimmings 	Never considered getting a composter
			Lack of knowledge on how to compost
			Backyard too small
			Do not know where to put a composter
			Cost of purchasing a composter
			Inconvenience of purchasing a composter
			Lack of knowledge on where to get a composter
			Do not need compost
			Do not garden
Remembering to get a bin			
Place food waste in backyard composter	<ul style="list-style-type: none"> Dispose of food waste in garbage Dispose of food waste in 	<ul style="list-style-type: none"> Produces compost for garden or lawn Environmentally-friendly option Composter saves space in indoor garbage cans (less time changing/ taking out garbage) 	Lack of knowledge
			Never considered composting
			Concern that food waste will attract mice and rats

	<p>garbarator</p> <ul style="list-style-type: none"> • Dispose of food waste in curbside organics program 	<ul style="list-style-type: none"> • Reduces strain on municipal sewage systems (garbarator use) • Reduces maintenance/operating costs on municipal sewage systems (garbarator use) • Saves landfill space 	<p>Fear that food waste will smell bad</p> <p>Inconvenient to place food scraps in composter</p> <p>Time consuming to take food scraps out to composter</p>
Place yard trimmings in backyard composter	<ul style="list-style-type: none"> • Dispose of yard trimmings in curbside collection program • Gardener takes yard trimmings away 	<ul style="list-style-type: none"> • Produces compost for garden or lawn • Environmentally-friendly option • Eliminates purchasing kraft bags • Do not have to it out to the curb for collection • May require less collection vehicles • Reduces disposal costs 	<p>Lack of knowledge</p> <p>Never considered composting</p> <p>Easier to put yard trimmings out for curbside collection</p> <p>Fear that yard trimmings will smell bad</p> <p>Concern that yard trimmings will attract mice and rats</p> <p>Never considered composting</p>
Properly use/maintain a backyard composter	<ul style="list-style-type: none"> • Place improper items in the composter • Not layering/mixing greens and browns 	<ul style="list-style-type: none"> • Produces high quality compost • Speeds up the composting process • Eliminates the attraction of mice and rats • Eliminates smells • Can also be used to dispose of other household items that are currently going to landfill (e.g. soiled napkins, coffee filters, shredded paper, etc.) 	<p>Lack of knowledge</p> <p>Perception that composting is hard or takes a lot of work</p> <p>Perception that composting is messy</p> <p>Perception that composters do not work or are too slow</p>

4. CBSM PILOT STRATEGIES

Overview

Two strategies were developed to utilize and test CBSM tools at different levels of intensity. Both strategies were designed to reduce the barriers and maximize the benefits and reinforce the behaviours using CBSM tools. This section describes the CBSM tools that were applied to the pilot project and the strategies that were tested at each level of intensity.

TARGET AUDIENCES

The target audience for the CBSM strategies was specified as residents with single-family homes with their own yard space.

Messaging for the CBSM strategies was designed to promote the benefits of composting that resonate strongest with the target audience. Based on the research findings, these messages include the benefits of compost for gardeners (e.g. good, natural fertilizer for the yard and garden which is free and saves money and time) and that composting is good for the environment (e.g. keep your organics on your own property rather than throwing it away).

REMOVING BARRIERS

CBSM campaigns strive to remove barriers and promote the perceived benefits to adoption of behaviours to make the adoption more likely. Behaviours are more likely to change if the new behaviour is convenient and simple to undertake.

The CBSM strategies outlined below were designed to remove each specific barrier identified through the research.

A major barrier identified was a lack of knowledge of backyard composting. There is, however, no lack of available composting information; many guidebooks, brochures, and websites have been developed as part of traditional existing communication campaigns. A recent City of Vancouver survey found these information intensive communication campaigns to be ineffective in terms of community awareness of the available information. Accordingly, the CBSM strategies developed for this project focused on personalized delivery methods rather than mass print communication. Personal communications is a fundamental element of CBSM.

In order to get the *right* information to people in the most *effective* way, personal visits to households are the cornerstone component of the intensive CBSM strategy. The visits are used to apply a number of CBSM tools to address knowledge and attitudinal barriers and to encourage behavioural change by residents.

CBSM Strategy Scenarios

Three scenarios of varying degrees of intensity in personal communications were tested in the pilot areas. The first scenario was the most intensive, with a large focus on personalized communication through door-to-door visits, both providing a personal level of coaching and applying a number of CBSM tools in their most effective form. The second scenario provided a medium level of assistance; a scaled down version of Scenario #1 which included many of the same CBSM tools, but applied using only the communication materials without the personal visits (the Township of Langley Demonstration garden and online resources were promoted to capitalize on existing personal-level education). It is important to note that the Scenario #2 approach differs from traditional communication campaigns in that it utilized CBSM tools to influence behavioural change, rather than simply involving the passive distribution of informational materials. The third scenario was a control group, where no new interventions were employed; encouragement to backyard compost was provided only through existing Township programs.

Table 4.1 shows the activities associated with each CBSM scenario.

Table 4.1: Overview of CBSM Strategy Scenarios		
Scenario #1 Personal Level of Assistance (Personal Contact)	Scenario #2 Medium Level of Assistance (Non-Contact)	Scenario #3 No Intervention (Control)
<ul style="list-style-type: none"> • Door-to-door visit (barrier break-down discussions) • Provide kitchen prompt/barriers • Seek verbal/written/public commitment • Follow-up visit promise • “We Compost” sticker placed on recycling box • Public recognition • Published newspaper ad and media release • Follow-up visit feedback 	<ul style="list-style-type: none"> • Provide kitchen prompt/barriers • Provide “We Compost” sticker for self application • Provide mail-in commitment option • Published newspaper ad and media release 	<ul style="list-style-type: none"> • No intervention

SCENARIO # 1 - PERSONAL CONTACT

Scenario #1, the most intensive strategy, focused on **personal communication** for support and coaching, while applying a number of CBSM tools to reduce barriers, encourage the benefits, and reinforce the behaviour. A script (see Appendix C) was developed to address each barrier identified in the Barriers & Benefits Matrix. The script provided guidance to the pilot staff to provide responses to each barrier raised by the resident. The responses minimize or remove the barrier and maximize the benefits of backyard composting.

Shortly after compost bins and kitchen catcher bins were delivered to each household in the pilot area, pilot staff went door-to-door to speak with residents about the backyard composter they received. The pilot staff asked if the household received the compost bin and if they would be using it. If the resident indicated that they would not be using the bin, staff asked why (i.e. barriers) they did not plan on using it. The barrier was addressed according to the prepared response. The staff person then asked if there are any other reasons they would not consider using the composter. Each barrier was addressed until all of the resident's barriers were removed and they had no other reason not to use the composter. A kitchen **prompt** card and sticker for the kitchen catcher bin were given to the resident during the conversation to aid in breaking down the barriers.

Once all barriers had been addressed, staff asked “can we count on you using your backyard composter?” When the resident agreed (i.e. **verbal commitment**), staff also asked them to sign the commitment form to get a **written commitment**. The commitment form listed all the other residents who had also committed to backyard compost to provide **social motivation** by acknowledging that many neighbours are also committed to backyard composting. Permission was also sought to publish their name along with all the other participants in a public medium such as the newspaper, newsletter, or website. The staff person let the resident know that they will be conducting a follow-up visit in a few weeks to make sure everything was going well. This awareness of a return visit was meant to **reinforce the commitment**.

Residents were also asked if the staff person could put a “We Compost” sticker on their recycling box or in another highly visible location to inform neighbours that they backyard compost to act as a **public commitment** and a **prompt**, and help develop a **social norm**.



A follow-up visit, three weeks after the initial visit, was conducted to provide feedback to each resident on their composting efforts. The follow-up visit allowed staff to address any other concerns or problems the resident had and provide positive **feedback** on their efforts. If residents who had committed to use the composter were not composting, the follow-up visit applied peer pressure to begin composting, **reinforcing the commitment**. Half of the follow-up visits were conducted in person and the rest via telephone. The purpose was to see which was the most cost-effective approach for the full project roll-out.

Near the end of the pilot a newspaper advertisement and a newspaper story (See Appendix D) was published with a list all of the residents who signed the commitment form (**public commitment, social norm**), thanking them for backyard composting, and for helping to improve the environment in the Township of Langley (**feedback**). Part of the acknowledgment suggested that these residents were making great compost for their gardens. The news story included quotes obtained from residents providing positive comments about their composting experiences, helping to develop a **social norm** to dispel myths about composting. The advertisement also provided information on where interested residents could obtain a composter and gave the opportunity for residents to add their names to the growing list of people in the Township who compost.

SCENARIO # 2 - NON-CONTACT

The Scenario #2 strategy included many of the same CBSM tools, applied without the intensive personal communication approach. During delivery of the compost bins and kitchen catcher bins, an information package was also delivered along with a letter explaining the reason for receiving the package, what to do with the materials, and directing the resident to additional resources about composting (e.g. Township of Langley website composting section and the Composting Hotline - **personalized communication**). Through the letter, the Township asked the resident to compost to help protect the Township of Langley’s environment and also asked the resident to call in and pledge **commitment** to use the composter.

THE INS AND OUTS OF COMPOSTING

WHAT'S OUT

- cheese
- fats and oils
- diseased plants
- grass clippings treated with pesticide
- pet waste
- meat, poultry, fish, bones

QUESTIONS? BACKYARD COMPOSTING HOTLINE 604.736.2250
TOWNSHIP OF LANGLEY WEBSITE TOL.CA/COMPOSTING.

WHAT'S IN

GREEN MATERIALS

- raw fruit and vegetable peelings or leftovers
- coffee grounds, tea leaves, tea bags
- eggshells
- grass clippings
- garden waste (fresh/green)

BROWN MATERIALS

- twigs and small brush
- cardboard egg cartons
- coffee filters, paper towels, napkins
- shredded paper
- wood chips and shavings
- dried leaves, grass
- straw
- clothes dryer lint

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Materials included in the package were:

- The Township of Langley *Guide to Backyard Composting & Grasscycling* explaining the basics of backyard composting and how to do it;
- A quick-reference kitchen card that acts as a **prompt** with important information about which items go in the composter and which do not, as well as useful tips that address common concerns (barriers);
- A sticker to place on the kitchen catcher bin to act as a reminder (**prompt**) to put food scraps in the composter and shows which items go in the composter and which do not;
- A “We Compost” sticker to be placed on the side of the household’s recycling box or another visible area outside the home to show other residents that the household is participating in “nature’s recycling” by using their backyard composter (**social norm, public recognition, commitment**).

The newspaper advertisement and news release was used in the same manner as in Scenario #1. Residents who made a commitment had their names published (**public commitment**) and were thanked for their efforts (**feedback**). The advertisement was used to help develop a **social norm**.

SCENARIO # 3 - CONTROL

The control group received no intervention that was any different than the Township’s existing backyard composting program. The newspaper advertisement and news release came out at the end of the pilot and did not influence the control group.

Communication Materials

The communication materials for the CBSM strategies are communication “tools” rather than a medium for information delivery. These tools include the kitchen prompt card and kitchen catcher sticker, “We Compost” sticker, commitment form, and newspaper advertisement to aid the CBSM techniques. The communication materials are explained above and can be seen in Appendix D.

Existing educational resources were also made available to residents. These resources included the Township of Langley *Guide to Backyard Composting & Grasscycling*, the Township of Langley website page on composting, and the Vancouver Regional Composting Hotline.

Effective messaging and branding are important elements of the CBSM strategies that are geared to the most common/influential benefits. The branding concept developed was that of turning waste into a resource to be used on residents’ own property, capitalizing on the large proportion of gardeners and on the environmental benefits of composting.

An image of a plant growing from a pile of organic material was used along with the slogan “Composting - Nature’s Recycling” and sub-slogan “And it helps your garden grow!”. This concept was tested with and resonated well with the focus group. A number of potential slogans were also tested and ranked by the focus group and the selected slogan was overwhelmingly supported by the residents as the slogan that offered the most motivation to use a backyard composter.

5. PILOT RESULTS

Overview

The CBSM strategies outlined in Section 4 were tested on groups of households evenly split between the Murrayville neighbourhood and the Willoughby neighbourhood. The strategies were delivered by Township of Langley staff and staff from Lura Consulting during July and August of 2010. Scenario #1 - Personal Contact strategy was tested on 120 households (58 in Murrayville and 62 in Willoughby) and Scenario #2 - Non-Contact strategy was tested on 120 households (61 in Murrayville and 59 in Willoughby).

The results in terms of participation levels, curbside garbage reduction, and quantities of food scraps disposed in composters are presented below. Further details can be found in the Data Collection Report in Appendix E.

Backyard Composting Participation

Participation levels were evaluated in the last week of August 2010 by conducting door-to-door visits and observations of backyard composters in use. Households were visited during the day and evening to ensure residents were home. Up to three attempts were made to speak with residents, resulting in a total of 202 households to be evaluated. In addition to observing if the composters were being used, residents were asked about why they are or are not participating, what most motivated them to participate and what they thought of the materials that they were provided as part of the program.

Participation rates overall are quite high and significantly higher than most mature composting programs that typically achieve around 30% participation. The results are presented in Tables 5.1 and 5.2 below, showing that the Personal Contact group (Scenario #1) has resulted in higher participation rates than the Non-Contact group (Scenario #2).

Table 5.1: Scenario #1 - Personal Contact Participation	
# of Weighers	19
# of Houses Evaluated	109
# of Participants	56
Participation Rates	Total: 51% Murrayville: 60% Willoughby: 44%

Table 5.2: Scenario #2 - Non-Contact Participation	
# of Weighers	13
# of Houses evaluated	93
# of Participants	42
Participation Rates	Total: 45% Murrayville: 49% Willoughby: 41%

The maps on the following two pages visually show the levels of participation in each neighbourhood, split into the groups that received the Personal Contact strategy and the groups that received the Non-Contact strategy.

Other Observations from Evaluation

Other findings from the evaluation included the identification of neighbourhood-specific issues. In Murrayville it was determined that many residents were already composting or had composted at some point but stopped because of a rat problem in the neighbourhood. The fear that the composter will attract rats is typically raised as a concern in backyard composting programs, however it is almost always a myth. In this case, rats were actually an ongoing problem and convincing people they would not be attracted to the compost was difficult.

The most common reasons reported for not composting in Murrayville include:

- Rats and fear that composters are contributing to the rat problem;
- Residents away much of the time or seasonal residents;
- Seniors – living alone and producing very little food scraps.

A positive observation in Murrayville was that social diffusion is already working between neighbours. It was observed that neighbours talk amongst themselves and have discussed composting issues, share their insights, and provide support for each other. This situation can be utilized in CBSM strategies.

Willoughby saw a large increase in the number of new composter users; the most common reason for beginning to compost was that people received a compost bin and the correct information. The cost of a bin did not come up as an issue, rather it seemed the accessibility of a bin and information was the key motivator.

The most common barriers reported for not composting in Willoughby include:

- Use of garbarators for food scraps;
- Having small backyards;
- Residents having babies and young children and not having time to dedicate to composting.

Additionally, language barriers prevented some residents from fully understanding backyard composting. An important observation was that children are often the only family members who speak English. When the children were asked to use the backyard composter and explained to their parents how it worked, the children become the champions of composting in the household. The language barrier could be overcome in future programming by targeting responses for children during door-to-door visits where language barriers exist or by providing school-based education on backyard composting.

In both neighbourhoods, the evaluation determined that in addition to the residents already participating, several additional residents (9 in Willoughby and 5 in Murrayville)

were still planning to begin. These residents were either away for the summer or certain specific circumstances prevented them from starting; however they appeared quite keen to backyard compost in the future.

The majority of residents reported that they found the kitchen catcher containers very useful and that they made composting cleaner and more convenient. Several comments were received about the size of the kitchen catcher: a few residents felt it was too big and one resident felt it was too small.

The kitchen prompt card and sticker were well received by most residents, particularly by new participants who still required reminders on which items to place in the composter. Many residents preferred the sticker because it can be placed on the kitchen catcher and is always visible. A recurring comment was that the prompt was not needed since the resident was a seasoned composter and well aware of the acceptable materials.

Evaluation of the “We Compost” sticker was more difficult. Often the person responsible for composting was not the same person responsible for taking out the garbage and recycling and could not confirm that the stickers were placed on the recycling boxes. Obtaining commitments from residents at the door was effective for collecting and publishing names in the newspaper, helping to develop the social norm of backyard composting in the Township. The pilot testing found that asking residents to call or email in a commitment on their own was not effective and should not be pursued in future initiatives.

Commitments were obtained in a number of forms. Approximately 25% of residents provided a written commitment to backyard compost, while numerous other residents provided verbal commitments. As the public list of residents committed to backyard composting grows, it could be expected that obtaining written commitments would become easier and residents will actively contact the Township to add their names upon seeing the list of composters. The technique of asking residents to submit a commitment for the non-contact group was not effective however could become feasible as the social norm develops and the public list of composters grows.

An important finding in terms of delivering the CBSM strategies was that there was no difference in participation levels between those households who received a follow-up visit or a follow-up telephone call. The delivery method for the follow-up visit is not as important as the actual promise to return which reinforces the commitment the resident made to compost, knowing that someone will be checking up on them.

Food Scraps Output

A total of 32 households participated in weighing and reporting their food scraps before putting them in their backyard composters. Data reported by these weighers is available

in Appendix E and summarized in Table 5.3. An average of 5.1 kg of food scraps was disposed of weekly by the weighers who received the Personal Contact strategy and an average of 3.8 kg of food scraps was disposed of weekly by the weighers who received the Non-Contact strategy. The difference between the scenarios indicates a higher quality of composting efforts was achieved through a personal level of coaching and communication as part of the Personal Contact CBSM strategy. Delivering the proper knowledge in the most effective way was a cornerstone of the Personal Contact strategy, and the findings of the food scraps analysis demonstrates that the *right* information was delivered to people in an *effective* manner.

Table 5.3: Weekly Average of Food Scraps Disposed in BYC		
	Personal Contact	Non-Contact
Murrayville (Kg/Household)	5.2	3.6
Willoughby (Kg/Household)	4.9	4.9
Total Average (Kg/Household)	5.1	3.8

Pilot Area Curbside Garbage Reduction

The purpose of collecting curbside garbage data before, during, and after the pilot project was to determine and compare the average amount of garbage being set out for municipal collection by households to help evaluate the effectiveness of the strategies in reducing the waste set out for collection.

Garbage was collected separately by the collection contractor using a separate truck for the 100 contiguous households in each neighbourhood and separated according to each scenario, then taken to the transfer station for weighing. Garbage was also weighed separately at the curbside of the pre-identified pilot test homes (households that have agreed to weigh their compost during the pilot program).

Initial baseline measurements were taken during the first half of June 2010, approximately one month prior to the implementation of the pilot program. Mid-pilot measurements were taken during the first week of August and the post-pilot weights were taken during the last week of August.

Fluctuations in the amount of waste produced due to seasonality that may occur outside of the influence of the backyard composting pilot program can make direct comparison difficult, even over the relatively short seven week length of the pilot project. To account for this variation, the control group (Walnut Grove) was used to determine how garbage output changed over the length of the pilot without influence from the CBSM strategies and this factor was applied to the other pilot area data to factor out fluctuations and create a level playing field for comparison. More details, including the

raw data and adjustment factors can be found in the Data Collection Report in Appendix E.

The change in average curbside garbage tonnage, broken down by CBSM strategy is shown for Murrayville and Willoughby in Tables 5.4 and 5.5. The change in curbside garbage indicates a significant reduction in garbage for the Personal Contact strategy (Scenario #1) in both neighbourhoods: 40% reduction in Willoughby and 20% reduction in Murrayville.

The results of the Non-Contact strategy (Scenario #2) are not as clear. Murrayville indicates a reduction of 13% and Willoughby showed an increase of 27%. Across both neighbourhoods, the Personal Contact results appear consistent and only differ in order of magnitude, whereas the Non-Contact results appear strikingly different, indicating an irregularity in the Willoughby data. Willoughby is a very new neighbourhood with new homes still being built. The irregularity in the data could be from something as simple as several residents moving in or doing home renovations at the time of the pilot. This anomaly is highlighted by the findings of the high participation rates and the data collected from Willoughby residents weighing their food scraps (foods scraps composted and garbage reductions - shown below in Table 5.7), indicating that a reduction in garbage should be expected, although to a lesser degree than Scenario #1. Considering the Scenario #2 participation rates and the quantity of food scraps composted, we would expect to see average waste reductions for Scenario #2 in the range of 12-18%³, not an increase of 11%.

Table 5.4: Summary of Average Weekly Curbside Garbage Tonnage in Murrayville			
Scenario	Pre-Pilot Kg/House	Post-Pilot Kg/House	Change (%)
#1 - Personal Contact	9.71	7.81	-20%
#2 - Non-Contact	9.90	8.58	-13%

³ Scenario #2 having 6% less participation and 25% less food scraps composted is the equivalent of approximately 40-50% less waste reduction than the average Scenario #1 waste reduction of 31%.

Table 5.5: Summary of Average Weekly Curbside Garbage Tonnage in Willoughby			
Scenario	Pre-Pilot Kg/House	Post-Pilot Kg/House	Change (%)
#1 - Personal Contact	13.00	7.85	-40%
#2 - Non-Contact	13.00	16.54	27%

Table 5.6 provides an overview of the average weekly garbage output for each CBSM strategy. The results show that overall, the households in both neighbourhoods who received the Personal Contact strategy had an average reduction of 31% garbage output, a 3.51 kg per household per week reduction in garbage. The Non-Contact households' irregularity in Willoughby affects the total average change for the Non-Contact scenario, showing an increase of 11%; however based on the estimate of 12% to 18% reduction, garbage would be reduced by 1.36 to 2.04 kg per household per week.

Table 5.6: Summary of Average Weekly Curbside Garbage Tonnage Per Scenario			
Scenario	Pre-Pilot Kg/House	Post-Pilot Kg/House	Change (%)
#1 - Personal Contact	11.34	7.83	-31%
#2 - Non-Contact	11.35	12.58	11% (Estimated -12 to -18%)
#3 - Control	10.76	10.76	0%

Changes in curbside garbage tonnage over the length of the pilot project are presented in Table 5.7 for the households who were weighing their compost. The reduction in garbage output for the Non-Contact group is consistent with Murrayville data and further suggests that the Willoughby data is an anomaly.

Table 5.7: Summary of Curbside Garbage Tonnages from Weighers' Households			
Scenario	Pre-Pilot Kg/House	Post-Pilot Kg/House	Change (%)
#1 - Personal Contact	10.19	9.28	-9%
#2 - Non-Contact	11.66	9.44	-19%

6. CONCLUSIONS AND CONSIDERATIONS

Impacts Per CBSM Strategy

Based on the data collected during the pilot project, both CBSM strategies have demonstrated significant results that could be applied to enhance the existing backyard composting program in the Township of Langley. There was also a notable difference between Scenario #1 and Scenario #2 in terms of:

- Participation rates (12%);
- Quantity of garbage reduction (40 - 60%);
- Quantity of food scraps composted (25%).

The Scenario #1 strategy has yielded results well in excess of the targeted 2.2 kg/week/household and 20% of garbage reduction the study intended to divert. As an overall average both scenarios tested combined, exceeded the study targets.

Considering the findings of the pilot project and if these results could be achieved across the entire urban area (25,300 single family homes⁴; 19,700 receiving municipal waste collection services) of the Township of Langley, estimates of the potential impacts have been made. These estimates are summarized in Table 6.1, presenting the results based on two cases: expansion of only the backyard composting program and expansion of the backyard program in conjunction with roll out of curbside food scraps collection to those homes that receive municipal waste collection services.

Pilot results for curbside food scraps collection in the Township have indicated a 20% to 25% participation rate. Long-time backyard composter users may be more likely to participate in further diversion initiatives but also continue to use their backyard composter. Additionally, during evaluation of the backyard composting study, there was an indication that those residents not interested in backyard composting would be interested in curbside food scraps collection as a more convenient alternative. Out of all the households that would participate in backyard composting, a conservative estimate is that 20% of those households would use the curbside food scraps collection program as an alternative to backyard composting and therefore not backyard compost. This 20% estimate has been applied to the case that considers a curbside food scraps collection program to give a conservative picture of what each CBSM strategy could look like in the event that a food scraps collection program were in place.

⁴ Number of single family homes within the urban area, BC Assessment (September 24, 2010). Homes located in rural areas have not been included in the analysis due to the high likelihood that organic materials are already being managed on site.

The estimates are based on the average results from the pilots for each scenario. It should be noted that garbage reductions are less than the quantities of food scraps composted since food scrap quantities include existing backyard composters and waste reductions only consider new backyard composters.

Table 6.1: Potential Annual Township-Wide Impacts for Each Scenario Based on Pilot Results at Full Implementation

Scenario		BYC Program Expansion Only			BYC Program Expansion and Curbside Food Scraps Collection		
		BYC Participation (Homes) ¹	Garbage Reduction by BYC ² (Tonnes)	Food Scraps in BYC ³ (Tonnes)	BYC Participation (Homes) ⁴	Garbage Reduction by BYC ² (Tonnes)	Food Scraps in BYC ³ (Tonnes)
#1 - Personal Contact	All Homes in Urban Area (25,300)	12,900	2,360	3,420	10,900*	1,990	2,890
	Receiving Waste Services (19,700)	10,000	1,830	2,650	8,000	1,460	2,120
#2 - Non-Contact	All Homes in Urban Area (25,300)	11,400	810-1,210	2,250	9,600*	680-1,020	1,900
	Receiving Collection (19,700)	8,900	630-940	1,760	7,100	500-750	1,400

NOTE: Full calculations can be found in Appendix F.

1. Based on Scenario #1 participation rate of 51% and Scenario #2 participation rate of 45%.

2. Garbage reduction based on an average of 3.51 kg/week for Scenario #1 and 1.36 to 2.04 kg/week for Scenario #2 from each participating household.

3. Food scraps composted based on 5.1 kg/week for Scenario #1 and 3.8 kg/week for Scenario #2 for each participating household.

4. Participation rates less an assumed 20% for households that may participate in the curbside food scraps collection program. *Note that the 20% reduction only applies to the 19,700 households that receive municipal waste collection services since they would be receiving the curbside food scraps service, and not to the remaining 5,600 households in the urban area that do not receive municipal waste collection services.

Financial Implications Per CBSM Strategy

Program delivery costs are estimated for a full-scale roll out of an enhanced backyard composting program to all households in the urban area (25,300) of the Township based on the pilot results. Households located in the rural areas of the Township are not anticipated to directly receive elements of the backyard composting program, however they may still benefit from spin-off effects of the program through availability of program materials and publicity, and as backyard composting becomes the social norm in the community. Population growth has not been considered in the estimates.

Potential delivery approaches and costs for each CBSM strategy are described below.

SCENARIO #1 - PERSONAL CONTACT

A reasonable program delivery of the Scenario #1 CBSM strategy to all 25,300 households could include two summer students delivering the door-to-door program over a ten year period. All households that receive municipal waste collection services could receive the door-to-door service over the first eight years on a neighbourhood by neighbourhood basis, and years nine and ten could target the remaining households that do not receive municipal waste collection services but are within the urban area of the Township.

The annual cost estimate for a program of this nature would be \$35,000 to \$45,000⁵, inclusive of labour, program material printing, and resources. Cost estimates are based on a target of delivering the door-to-door program to 2,500 households per summer by two summer students. The target for program delivery assumes delivering the program to approximately 15 households per day based on the experiences from the pilot project and the experience of delivering the Township of Langley multi-year Water Wise program. Follow-up telephone calls could be conducted by the Township's call centre or through existing workloads. Therefore no additional costs are assumed.

Considerations for delivering the Scenario #1 CBSM strategy include:

- Compost bin distribution (free or sales) could be conducted door-to-door as part of the home visit component, by either having bins available on the spot, or signing up to have one delivered afterwards.
- Providing kitchen catcher bins is not necessary.

⁵ Cost estimate assumes each summer student position would be 16 weeks and cost \$15,000 per position. Communication materials estimated at approximately \$5,000. Cost estimates include a \$10,000 margin to take into account resource use, such as Township vehicles, etc, or any additional advertising or promotional costs, and supervision.

- The “We Compost” stickers should be distributed. Although evaluation of the stickers found low use, other project experience has proven these sorts of stickers effective at normalizing a behaviour and should still be pursued. A practical approach to ensure higher use of stickers would be to schedule door-to-door visits around neighbourhoods waste collection days to ensure staff can apply the stickers to recycling boxes on the spot.
- A contact list of residents who backyard compost should be maintained, for monitoring and tracking, follow-up contact, and as part of the public list of backyard composters in the Township.
- Follow-up contact should be done via telephone as a cost-effective method.
- Public recognition of residents that backyard compost should continue on a regular basis. The evolving list of residents should be maintained on the Township website and regular newspaper advertisements should be published. As the list becomes longer, the total number of composters in the Township could be publicized (e.g. in waste management calendars, gardening publications, etc.). Additionally, a space for quotes and accolades could be developed (and assist with future promotion).

Compost Bins

The pilot project provided residents with free compost bins. Although cost of the bin was not determined to be a barrier to composting, the act of going out and getting one, or just getting around to composting was. The Township already provides compost bins at a subsidized rate of \$35 compared to purchase price of \$45; therefore increased sales of composters as a result of the Scenario #1 CBSM strategy would cost the Township \$6,500 to \$7,750* in subsidization. If the Township were to provide free compost bins to residents willing to take up backyard composting and do not already have a bin, annual costs could be expected to range from \$30,000 to \$35,000* per year.

* Based on conservative estimate of 25-30% existing participation, increasing to the expected 51% participation would require providing bins to 26-31% of the annual target of 2,500 homes (650 to 775 bins annually) that do not already have one.. 650 to 775 bins x \$10 = \$6,500 to \$7,750; 650 to 775 bins x \$45 = ~\$30,000 to \$35,000

SCENARIO #2 - NON-CONTACT

The Scenario #2 CBSM strategy requires significantly less labour investment and could potentially be integrated into existing summer student workloads over a number of summers. The majority of program costs would be printing and delivering materials. For a program delivered over five summers, built into an existing summer student’s workload (approximately 20% time dedication) and targeting 5,000 households per summer, the

program could cost approximately \$13,000 to \$16,000 per year⁶. Additional efficiencies could be found if the delivery task were combined with other initiatives requiring neighbourhood level travel.

Considerations for delivering the Scenario #2 CBSM strategy include:

- Compost bin distribution (free or for sale) could be conducted on a neighbourhood level. These could also provide a personal level of contact to address any barriers to composting. Staff should receive training on the CBSM techniques and the barriers and benefits to backyard composting.
- Asking residents to actively contact the Township to provide a commitment would likely become more effective as the social norm develops. Verbal and written (public) commitments and contact information should be collected during neighbourhood level compost bin distribution.
- A contact list of residents who backyard compost should be maintained, for monitoring and tracking, follow-up contact, and as part of the public list of backyard composters in the Township.
- Follow-up contact should be done via telephone as a cost-effective method.
- Public recognition of residents that backyard compost should continue on a regular basis. The evolving list of residents should be maintained on the Township website and regular newspaper advertisements should be published. As the list becomes longer, the total number of composters in the Township could be publicized (e.g. in waste management calendars, gardening publications, etc.).

Compost Bins

The pilot project provided residents with free compost bins. Although cost of the bin was not determined to be a barrier to composting, the act of going out and getting one, or just getting around to composting was. The Township already provides compost bins at a subsidized rate of \$35 compared to purchase price of \$45; therefore increased sales of composters as a result of the Scenario #2 CBSM strategy would cost the Township \$10,000 to \$12,500* in subsidization. If the Township were to provide free compost bins to residents willing to take up backyard composting and do not already have a bin, annual costs could be expected to range from \$45,000 to \$56,000* per year. Since there is no door-to-door component for the Scenario #2 strategy, compost bin giveaways would have to be done on a neighbourhood level and therefore less controlled, which may result in some free bins not being used.

* Based on conservative estimate of 25-30% existing participation, increasing to the expected 45% participation would require providing bins to 20-25% of the annual target of 5000 homes (1,000 to 1,250 bins annually) that do not already have one.. 1,000 to 1,250 bins x \$10 = \$10,000 to \$12,500; 1,000 to 1,250 bins x \$45 = ~\$45,000 to \$56,000

⁶ Assumes labour cost of \$3,000, material printing costs of \$10,000, and additional resources of \$3,000 to \$8,000.

Potential Savings Per CBSM Strategy

Potential savings from implementing either of the CBSM strategies could come from reduced quantities of garbage requiring collection and disposal. The two most direct savings are from avoided tipping fees and less greenhouse gas (GHG) emissions as a result of reduced tonnages of materials for disposal.

Tipping fees for Metro Vancouver are set to increase significantly over the next several years (Table 6.2). Savings from tipping fees and reduced GHG emissions would be on an annual basis and represent a continual savings, whereas the program delivery costs would be a one-time investment with significantly less cost for regular program maintenance once fully implemented. Additional cost savings would be realized in collections as trucks pick up less material allowing longer service routes and associated maintenance, fuel, truck replacement, and GHG savings.

Table 6.2: Metro Vancouver Tipping Fees					
2010	2011	2012	2013	2014	2015
\$82/tonne	\$97/tonne	\$108/tonne	\$121/tonne	\$153/tonne	\$182/tonne

Source: Metro Vancouver's "Financial Projections for 2011 to 2015" dated June 29, 2010.

Potential cost and GHG savings for each CBSM strategy are described below. Savings estimates are provided for both expansion of only the backyard composting program and for the introduction of curbside food scraps collection.

SCENARIO #1 - PERSONAL CONTACT

Cost and GHG savings from implementing the Scenario #1 CBSM strategy is presented in Table 6.3, phased over the ten years of implementation. The estimates assume that each year will see an increase of 1/10th the waste reduction until all households have been reached and full results achieved at the end of the tenth year. Waste reduction and GHG savings are calculated for all 25,300 households envisioned to receive the CBSM strategy. Cost savings are those incurred by the Township of Langley, therefore cost savings estimates only include the 19,700 households that receive municipal waste collection services. No cost savings for the Township are associated with the remaining 5,600 households that do not receive municipal waste collection services; however the residents would see a cost savings in terms of transportation and disposal fees in/on their private contract.

Annual savings once full implementation of the Scenario #1 CBSM backyard composting strategy (without curbside food scraps collection) is complete could be \$333,000 and 2,200 tonnes of GHG emissions. In conjunction with curbside food scraps collection in place, savings from the backyard composting component could be \$265,700 and 1,900 tonnes of GHG emissions annually once the program is fully implemented.

Table 6.3: Potential Savings From Scenario #1 CBSM Strategy

Year	BYC Program Expansion Only			BYC Program Expansion with Curbside Food Scraps Collection		
	Garbage Reduction ¹ (Tonnes)	Cost Savings ² (\$)	GHG Savings ³ (Tonnes)	Garbage Reduction ⁴ (Tonnes)	Cost Savings ⁵ (\$)	GHG Savings ³ (Tonnes)
2011	236	\$17,800	220	199	\$14,200	190
2012	472	\$39,500	440	398	\$31,500	380
2013	708	\$66,400	660	597	\$53,000	570
2014	944	\$112,000	880	796	\$89,400	760
2015	1,180	\$166,500	1,100	995	\$132,900	950
2016	1,416	\$199,800	1,320	1,194	\$159,400	1,140
2017	1,652	\$233,100	1,540	1,393	\$186,000	1,330
2018	1,888	\$266,400	1,760	1,592	\$212,600	1,520
2019	2,124	\$299,800	1,980	1,791	\$239,100	1,710
2020	2,360	\$333,000	2,200	1,990	\$265,700	1,900
Average Annual Savings	1,298	\$173,400	1,210	1,095	\$138,400	1,045

NOTE: Full calculations can be found in Appendix F.

1. Includes all 25,300 households envisioned to receive the CBSM strategy. 2,360 tonnes/year at full implementation/10 years = 236 tonnes/year, compounded annually (see Table 6.1).

2. Cost savings estimates only include the 19,700 households that receive municipal waste collection services (see Table 6.1: 1,830 tonnes/year at full implementation/10 years = 183 tonnes/year). The projected tipping fees from 2011 to 2015 have been used for the first five years of the program and the fifth year tipping rate has been assumed to remain constant for the remaining five years of the program delivery.

3. GHG reduction calculation uses the Greenhouse Gases (GHG) Calculator for Waste Management, Environment Canada. The tool calculates GHG emissions for baseline and alternative waste management practices, including recycling, anaerobic digestion, combustion, composting, and landfilling across a wide range of materials. Compared to the base case characteristics of waste management specific to the Township, the tool calculates that a reduction of 1 tonne of garbage = 0.95 tonnes of GHG savings (10,296 tonnes of GHG / 10,800 tonnes of garbage in 2008 = 0.95 tonnes of GHG emissions per tonne of garbage disposed).

4. Includes all 25,300 households envisioned to receive the CBSM strategy, less 20% of the 19,700 residents that would be expected to participate in the curbside food scraps collection program. 1,990 tonnes/year at full implementation/10 years = 199 tonnes/year (see Table 6.1).

5. Cost savings estimates only include the 19,700 households that receive municipal waste collection services (see Table 6.1: 1,460 tonnes/year at full implementation/10 years = 146 tonnes/year). The projected tipping fees from 2011 to 2015 have been used for the first five years of the program and the fifth year tipping rate has been assumed to remain constant for the remaining five years of the program delivery.

SCENARIO #2 - NON-CONTACT

Savings the Scenario #2 CBSM strategy are estimated in the same manner as Scenario #1, based on avoided tipping fees and GHG savings over five years. Table 6.4 shows the estimated cost savings and GHG savings over the five-year phased implementation.

Annual savings once full implementation of the Scenario #2 CBSM backyard composting strategy (without curbside food scraps collection) is complete could be \$114,700 to \$171,000 and 770 to 1,150 tonnes of GHG emissions. In conjunction with curbside food scraps collection in place, savings from the backyard composting component could be \$91,000 to \$136,500 and 650 to 790 tonnes of GHG emissions annually once the program is fully implemented.

Table 6.4: Potential Savings From Scenario #2 CBSM Strategy

Year	BYC Program Expansion Only			BYC Program Expansion with Curbside Food Scraps Collection		
	Garbage Reduction ¹ (Tonnes)	Cost Savings ² (\$)	GHG Savings ³ (Tonnes)	Garbage Reduction ⁴ (Tonnes)	Cost Savings ⁵ (\$)	GHG Savings ³ (Tonnes)
Year 1	162 - 242	\$12,200 - \$18,200	154 - 230	136 - 204	\$9,700 - \$14,500	130 - 194
Year 2	324 - 484	\$27,200 - \$40,600	308 - 460	272 - 408	\$21,600 - 32,400	260 - 388
Year 3	486 - 726	\$45,700 - \$68,200	462 - 690	408 - 612	\$36,300 - \$54,500	390 - 582
Year 4	648 - 968	\$77,100 - \$115,000	616 - 920	544 - 816	\$61,200 - \$91,800	520 - 776
Year 5	810 - 1,210	\$114,700 - \$171,000	770 - 1,150	680 - 1,020	\$91,000 - \$136,500	650 - 790
Average Annual Savings	486 - 726	\$55,400 - \$82,600	460 - 690	408 - 612	\$44,000 - \$65,900	390 - 550

NOTE: Full calculations can be found in Appendix F.

1. Includes all 25,300 households envisioned to receive the CBSM strategy. 810 - 1,210 tonnes/year at full implementation/5 years = 162 - 242 tonnes/year, compounded annually (see Table 6.1).

2. Cost savings estimates only include the 19,700 households that receive municipal waste collection services (see Table 6.1: 630 - 940 tonnes/year at full implementation/5 years = 126 - 188 tonnes/year). The projected tipping fees from 2011 to 2015 have been used for the first five years of the program and the fifth year tipping rate has been assumed to remain constant for the remaining five years of the program delivery.

3. GHG reduction calculation uses the Greenhouse Gases (GHG) Calculator for Waste Management, Environment Canada. The tool calculates GHG emissions for baseline and alternative waste management practices, including recycling, anaerobic digestion, combustion, composting, and landfilling across a wide range of materials. Compared to the base case characteristics of waste management specific to the Township, the tool calculates that a reduction of 1 tonne of garbage = 0.95 tonnes of GHG savings (10,296 tonnes of GHG / 10,800 tonnes of garbage in 2008 = 0.95 tonnes of GHG emissions per tonne of garbage disposed).

4. Includes all 25,300 households envisioned to receive the CBSM strategy, less 20% of the 19,700 residents that would be expected to participate in the curbside food scraps collection program. 680 - 1,020 tonnes/year at full implementation/5 years = 136 - 204 tonnes/year (see Table 6.1).

5. Cost savings estimates only include the 19,700 households that receive municipal waste collection services (see Table 6.1: 500 - 750 tonnes/year at full implementation/5 years = 100 - 150 tonnes/year). The projected tipping fees from 2011 to 2015 have been used for the first five years of the program and the fifth year tipping rate has been assumed to remain constant for the remaining five years of the program delivery.

Backyard Composting Program Summary

Both CBSM strategies produce more benefit than cost to implement full-scale, even with a curbside food scraps collection program in place. Table 6.5 provides a summary of the average annual implementation costs, reduced garbage tonnages and associated cost savings, and reduced GHG emissions, over the time period of implementing the programs. The costs of delivering the strategy and the cost of providing free compost bins are shown separately, allowing for flexibility in implementing a hybrid approach.

The annual cost of implementing Scenario #1 CBSM strategy over ten years would be \$35,000 to \$45,000 and could result in an average annual savings of over \$173,400 without curbside food scraps collection, or \$138,400 with curbside food scraps collection. Implementation of the Scenario #2 CBSM strategy would cost \$13,000 to \$16,000 annually for five years and could produce an average of approximately \$55,400 to \$82,600 annual cost savings without curbside food scraps collection, and an average of approximately \$44,000 to \$65,900 annual cost savings with curbside food scraps collection.

Two cost options for compost bins for each Scenario are also provided: one for the cost of providing free compost bins and the other for maintaining the existing subsidy.

Table 6.5: Summary of Average Annual Costs and Savings			
		Scenario #1 Personal Contact	Scenario #2 Non-Contact
Program Implementation Cost (\$)		\$35,000 - \$45,000	\$13,000 - \$16,000
Compost Bin Options	Cost of Providing Free Compost Bins (\$)	\$30,000 - \$35,000	\$45,000 - \$56,000
	Cost of Existing Subsidy Program at \$10/Bin (\$)	\$6,500 - \$7,750	\$10,000 - \$12,500
BYC Program Expansion Only	Cost Savings (\$)	\$173,400	\$55,400 - \$82,600
	Garbage Reduction (Tonnes)	1,298	486 - 726
	GHG Reductions (Tonnes)	1,210	460 - 690
BYC Program Expansion with Curbside Food Scraps Collection	Cost Savings (\$)	\$138,400	\$44,000 - \$65,900
	Garbage Reduction (Tonnes)	1,095	408 - 612
	GHG Reductions (Tonnes)	1,045	390 - 550

Additional Considerations for Program Success

During delivery of the pilot projects for each CBSM strategy, a number of points arose that should be considered in delivering either of the CBSM strategies at a larger scale.

Social norm development for composting is in its infancy in the Township of Langley. As backyard composting develops and is seen as the norm, participation rates and the amounts of foods scraps and yard trimmings composted can be expected to increase. Development of the social norm however, requires additional guidance. Initiation of the public list of composting participants and the demonstration garden is a good foundation, but requires continual maintenance and promotion. Additional mechanisms could include:

- Network of demonstration gardens.
- Backyard composting in schools and other public areas.
- Commitments by public figures.
- Neighbourhood backyard composting champions. Social diffusion has already been demonstrated in Murrayville and could be used to further foster backyard composting.

Access to compost bins is very important to getting residents to backyard compost. The pilot project provided compost bins to residents at no cost, a scenario that is not expected to be applied to the entire municipality. The Township currently offers a subsidized backyard composter program, but residents have to travel to one of the Township's facilities to purchase one if they are interested in composting. The cost does not seem to be a barrier as the door-to-door evaluations revealed that residents either were very interested but just never got around to purchasing one or had not considered it before. The barrier appears to be the accessibility to the right information and the right equipment. Possibilities to consider are to provide localized neighbourhood-scale bin sales or offer door-to-door sales as part of the personal home visits (sign up to receive one or available on the spot).

Ongoing monitoring and evaluation is another key element to ensure the effectiveness of a program. Identifying challenges as they arise allows fine-tuning of the program to overcome challenges. For example, if during door-to-door visits the approach to alleviating the perception that a backyard is too small to compost is not working in many cases, communication material (flyer or board to be used during visits) can be developed that incorporates pictures of a family using their composter in a very small yard and includes a quote that they compost in small yard and it works great. If language persists as a barrier, a summer student could be hired that speaks that language allowing the student to have open discussions with those residents. These are the types of challenges

that can be identified and overcome that will ensure the Township is operating an effective and leading-edge backyard composting program.