An Evaluation of Oak Bay's Point of Source Composting Pilot Project

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INDIVIDUAL RESEARCHER CONTRIBUTIONS

This project was a collaborative effort that involved both researchers at most stages of the research and writing. While one researcher may have taken the lead on a piece of work, each part was reviewed, edited, and generally received substantive feedback until both researchers were satisfied with the final product. Below is a general breakdown of work:

Parts Cameron took the lead on	Parts Deanna took the lead on	Parts both researchers took the lead on
• Literature review • Conceptual framework • Amendment to ethics application	• Introduction/background • Ethics application • Methodology • Creating the survey tool • Executive summary • Report formatting	• Research proposal • Survey and interview questions • Conducting interviews • Survey/interview data analysis • Discussion • Recommendations • Conclusion • Teleconferences with client/supervisor

EXECUTIVE SUMMARY

INTRODUCTION

This report is the result of an evaluation of the Corporation of the District of Oak Bay's (CDOB) Point of Source Composting Pilot Project (the "Pilot Project"). The Pilot Project was designed by CDOB, the municipal government of Oak Bay, to explore point of source composting (referred to throughout this report as at-home composting or AHC) as an alternative to current curbside organic waste pickup for single family dwellings in Oak Bay. Participants were provided with Joracomposters, stationary composting units, installed at their residences for one year to be used to compost their organic waste to replace or supplement the current curbside pickup of organic waste. CDOB undertook this research to understand the experiences of the Pilot Project participants, specifically with AHC, and to better assess the composting unit and the viability of implementing AHC throughout Oak Bay. This research will be used to inform the discussions and decision-making of the Oak Bay Municipal Council in determining whether AHC should be implemented across Oak Bay.

METHODS

The evaluation of the Pilot Project sought to characterize the experiences of participants in the Pilot Project. The broad research question of this evaluation was "what were the behaviours, perceptions, attitudes, beliefs, and opinions of the participants towards the Oak Bay Point of Source Composting Pilot Project?" More specifically, this research sought to identify:

- strengths and weaknesses of the composting units;
- participant behaviours (including but not limited to use of the units, frequency, ease of use, past composting habits, and expected future use), perceptions, attitudes, beliefs, and opinions;
- strengths and weaknesses of AHC in Oak Bay and in general;
- opportunities to improve the AHC experience; and
- participant demographics.

The research questions were answered using three methodologies: a literature review, an online survey, and telephone interviews. The literature review informed the researchers on AHC and was used to develop the data collection tools. The online survey provided quantitative data on participant experiences, attitudes, behaviours, and demographics, which when analyzed, provided key insights related to the research questions. Finally, the telephone interviews provided in-depth qualitative data on these same issues. Interviewees were a subset of participants who completed the online survey. Using these three methods together created a comprehensive research strategy to satisfy the research objectives.

FINDINGS

There were a total of 26 survey responses and seven interviews. The survey found that, prior to the Pilot Project most respondents were knowledgeable about composting, had positive attitudes towards both composting and the environment, and had prior experience with other pro-environmental behaviours, as well as composting. A majority of respondents

had experienced less waste in both the trash can and green bins as a result of AHC. In addition, a majority were satisfied with the Joracomposter, identifying some key benefits of the units; however, some experienced challenges with the unit.

Survey findings suggest attitudes regarding composting generally improved as a result of participation in the Pilot Project, though a similar trend was not evident with respect to attitudes towards the environment. Knowledge also generally improved as a result of participation in the Pilot Project. Motivations to continue to compost were comparable and consistent with motivations to start composting. Generally, most participants were interested in not only continuing in the Pilot Project, but also continuing to compost at home following the Pilot Project's completion. Overall, a majority of participants would support the implementation of AHC throughout Oak Bay.

In general, the interview findings support the survey findings. While some interviewees expressed some satisfaction with composting unit, there were several concerns including the durability of the unit, usability, size and mobility of the unit, and a concern regarding attracting rodents. Overall, participants participated in the Pilot Project to support their interest in composting, and all agreed that their attitude toward the environment is reflected in their participation in the Pilot Project. In addition, most are using the Joracomposter for their kitchen waste.

The majority of the interviewees plan on continuing in the Pilot Project and to continue to use the Joracompsoter, and indicated a desire to at-home compost following the Pilot Project. Most interviewees could not anticipate what the reaction of Oak Bay residents might be if AHC was implemented throughout the district; however, concerns regarding costs were expressed by some interviewees. In an effort to improve the AHC experience, some interviewees recommended a starter kit, with a sample of compost and educational materials; others identified a desire for more support throughout the Pilot Project.

Despite these findings, self-selection bias is a major limitation of this research that affects the generalizability of the findings. While 65% of the total number of participants in the Pilot Project completed the survey, there are still a large number of participants who did not participate in the survey or interviews, whose views may not be reflected in this research. In addition, participants had to self-select to participate in the Pilot Project. When compared to general demographic data for Oak Bay, the survey respondents do not appear to be a representative sample of the general population of Oak Bay. As such, this research provides insights into the experiences of people who are interested in AHC and volunteered to participate in the Pilot Project, but does not answer questions about the degree of interest in AHC in Oak Bay in general. In addition to this, small sample size results in an inability to tests of hypotheses for cross tabulations. As a result, inferences from this report cannot be made regarding whether Oak Bay should proceed with an AHC program. Generally speaking, some Oak Bay residents are willing to compost at-home and this evaluation speaks to the experiences research participants, but does not speak to whether an AHC program is suitable for all of Oak Bay's single family dwellings or to the willingness of residents to switch from curbside pickup to AHC.

RECOMMENDATIONS

This research resulted in three recommendations. The first is to conduct additional research with a larger, representative sample of single family home dwellers via a random survey of Oak Bay residents. This survey should explore the issues of cost and willingness-to-pay, include a detailed description of AHC, and outline the financial and social costs and benefits of AHC to residents and the CDOB.

The second recommendation is to complete a financial analysis of options available to manage organic waste in Oak Bay. The analysis should consider multiple outcome scenarios, including AHC with the Joracomposter, as well as other approaches to manage organic waste. This will help inform possible future wider consultations with the broader Oak Bay population such as community information sessions and focus groups, and could be supported with a jurisdictional scan.

The third recommendation is to conduct additional research at the end of the Pilot Project using this evaluation as a framework. Several respondents expected their experiences with the composter to be impacted by the changing seasons, and many survey respondents indicated that it is too early to determine how satisfied they are with their compost product. CDOB delivered composters to participants in summer 2016, the pilot runs until August 2017, and data was collected around the midway point, in December 2016, January and early February 2017. Data collection at the end of the Pilot Project, after participants have had additional time with composting (and changing seasons), may offer further insight or a more complete picture of participant behaviours and experiences with the Joracomposter. The data collection tools and recruitment strategy used in this evaluation can be built upon for future research.

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1 INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

This report is the result of an evaluation of the Corporation of the District of Oak Bay's (CDOB) Point of Source Composting Pilot Project (the "Pilot Project"). The Pilot Project was designed by CDOB, the municipal government of Oak Bay, to explore point of source composting (referred to throughout this report as at-home composting) as an alternative or supplement to current curbside organic waste pickup. In order to investigate at-home composting (AHC) for single family dwellings in Oak Bay, participants of the Pilot Project had Joracomposters, stationary composting units, installed at their residences for one year to be used to compost their organic waste.

The evaluation sought to characterize the experiences of Pilot Project participants. The broad research question of this evaluation was "what were the behaviours, perceptions, attitudes, beliefs, and opinions of the participants towards the Oak Bay Point of Source Composting Pilot Project?" More specifically, this research sought to identify:

- strengths and weaknesses of the composting units;
- participant behaviours (including but not limited to use of the units, frequency, ease of use, past composting habits, and expected future use), perceptions, attitudes, beliefs, and opinions;
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- opportunities to improve the AHC experience; and
- participant demographics.

CDOB undertook this research to understand the experiences of the Pilot Project participants, specifically with at-home composting (AHC), in an effort to better assess the composting unit and the viability of implementing AHC throughout Oak Bay. This research will be used to inform the discussions and decision-making of the Oak Bay Municipal Council in determining whether AHC should be implemented across Oak Bay.

1.2 BACKGROUND

This section of the report provides a project overview together with background information on the District of Oak Bay, the client (CDOB), the Pilot Project, the circumstances that gave rise to this research.

1.2.1 An overview of the District of Oak Bay

The District of Oak Bay is a community of approximately 18,000 residents, located on Vancouver Island's southern tip (Corporation of the District of Oak Bay (CDOB), n.d.(a), About, para. 1; Statistics Canada, 2011, para. 1). Oak Bay is a suburban neighbourhood of Greater Victoria, and is one of 13 municipalities that comprise the Capital Regional District (CDOB, n.d.(a), About, para. 1). Oak Bay shares borders with both Victoria and Saanich

(Figure 1.1). This seaside community consists of mostly single-detached houses, comprising 64% of dwellings in Oak Bay (Statistics Canada, 2011, para. 11).

Figure 1.1 – Map of Oak Bay
Note. From Dickson, 2014, Times Columnist, image 1.

According to the 2011 Census, Oak Bay residents tend to be older and wealthier than the average Canadian. In 2011, the median age of Oak Bay residents was 52.4, which is more than 10 years higher than the national median age of 40.6 and British Columbia's median of 41.9 (Statistics Canada, 2011, para. 6). In this same year, 28% of Oak Bay's population were 65 years or older, compared to the national percentage of 15% (Statistics Canada, 2011, para. 5). Oak Bay residents also tend to have a higher median family income than the national average (CDOB, n.d.(d), Statistics and facts, para. 3). In 2006, the median income of Oak Bay residents was almost 50% higher than the Canadian average, with an average income of $95,000 (Statistics Canada, 2007, para. 7; CDOB, n.d (d), Statistics and facts, para. 3). Moreover, in January 2017, the average listing price of properties for sale in Oak Bay was slightly over $1.6 million (Century 21, 2017, para. 1).

1.2.2 The Corporation of the District of Oak Bay

The Corporation of the District of Oak Bay (CDOB) is the municipal government of Oak Bay. CDOB was incorporated in 1906 and operates under the *Local Government Act* (2015) and the *Community Charter* (2003) (CDOB, n.d.(a), About, para. 4). Together, these Acts create the primary legislative framework of local governments in BC and, detail the powers, authorities and functions of a local government (Community Charter, 2003; Local Government Act, 2015). As a local government, CDOB is responsible for general local governance, safety and protection (including police and fire), recreation and culture, water and waste water treatment, garbage/recycling collection and disposal services, and land use

planning (Ministry of Community, Sport and Cultural Development, n.d., para. 8). CDOB is comprised of seven departments, including the Department of Engineering and Public Works, which is the department of the client (CDOB, n.d.(b), Engineering and public works, para. 1).

CDOB is committed to several strategic objectives, including sustainability, as demonstrated by the vision statement of CDOB's Official Community Plan (CDOB, 2014, p. 7). In April 2015, the municipal council and CDOB released a four year strategic plan, which outlines initiatives to advance the community and ensure the character and quality of life Oak Bay residents enjoy is preserved for the future (CDOB, 2015a, para. 1). In the District of Oak Bay Official Community Plan, residents expressed an interest in being a sustainable community, including economic, environmental and social sustainability (CDOB, 2014, p. 7). Addressing climate change and energy use by reducing greenhouse gases and energy consumption is an objective outlined in this plan (CDOB, 2014, p. 8). In addition to CDOB's local sustainability objectives, as a member of the Capital Regional District (CRD), Oak Bay is committed to CRD's sustainability objectives and goals through the Regional Growth Strategy (CRD, 2016, pp. 7-22).

David Brozuk, the Superintendent of the Public Works Department, commissioned this research. The department's responsibilities include water management, firefighting, capital works projects, and waste and recycling collection (CDOB, n.d.(b), Engineering and public works, para. 1). The Public Works Department supports Oak Bay's broad strategic objectives by maintaining CDOB's infrastructure to support "the preservation and enhancement of a safe, livable and attractive community" (CDOB, 2015b, p. 27). Solid waste and recycling management is a key component to sustainability.

1.2.3 Waste management in Oak Bay

In Oak Bay, garbage, recycling, and kitchen waste (i.e. organic waste) is collected bi-weekly for all residences (CDOB, n.d.(c), Recycling and organics, para. 4). In 2006, Oak Bay became the first city to participate in the kitchen scraps Pilot Project sponsored by the Capital Regional District to divert organic waste from landfills (Cleverly, 2014, para. 7; CDOB, n.d. (c), Recycling and organics, para. 2). This program successfully diverted 1500 tons of food waste, from Oak Bay alone, from the local landfill from its inception through to 2014 (Cleverly, 2014, para. 7). As a result, in January 2014, Oak Bay expanded this program, making it mandatory for all Oak Bay residents (CDOB, n.d.(c), Recycling and organics, para. 2).

Currently, CDOB, through a private operator, collects organic waste at the curbside, transports it by barge to the Lower Mainland for processing, and the processed material is then sent back to Oak Bay for resale (van Reeuwyk, 2016, para. 6). For 2016, Oak Bay's budget was approximately $280,000 for the curbside pickup and transportation of organic waste (D. Brozuk, personal communication, June 8, 2016). However, with the contract for organic (compostable waste) curbside pickup expiring at the end of 2017, CDOB is considering alternatives, one being AHC (van Reeuwyk, 2016, para. 2). As a result, CDOB is exploring this alternative through the Oak Bay Point of Source Composting Pilot Project.

1.2.4 Oak Bay's Point of Source Composting Pilot Project

In May of 2016, the Municipal Council of CDOB approved a Pilot Project for AHC, which consists of composing at individual residences using a stationary composting unit kept outside the home. Sixty-three residences were canvassed for participation, 40 agreed to participate, 12 provided no response, 8 did not want to participate, and 3 houses were vacant with renovations occurring. In June, 40 participants were provided a composting unit to use for one year. CDOB installed preassembled units at the residences. Participation in the Pilot Project was voluntary and participants could withdraw at any time. Upon withdrawal from the Pilot Project, CDOB would remove the composting units from the residences within in 48 hours.

CDOB researched various compost units and selected the Joracomposter (Figure 1.2) for the Pilot Project. The Joracomposter is a rotating, heat-generating, insulated composter (JoraForm AB, n.d., p. 2). The Jorcomposter is insulated to ensure that inside the composter the temperature is at least 75 degrees Celsius (JoraForm AB, n.d., p. 2). The compost process takes between 6-8 weeks on average, due to its ability to rotate and to maintain high temperatures (JoraForm AB, n.d., p. 2). The Joracomposter has two separate compartments to make maturing the compost easier and more efficient (JoraForm AB, n.d., p. 2). The Joracomposter is suitable for kitchen waste, including cooked and uncooked meat and fish (JoraForm AB, n.d., p. 2).

Figure 1.2 – Model JK125 Joracomposter
Note. From JoraForm AB, n.d., p. 1

1.2.5 Project relevance

The evaluation of the Pilot Project will allow CDOB to better inform the Oak Bay Municipal Council about how residents responded to AHC using the Joracomposter. The experiences of the Pilot Project participants will help inform whether AHC should be implemented in Oak Bay in a manner similar to the Pilot Project (D. Brozuk, personal communication, June 8, 2016). Evaluation benefits CDOB by providing insight into participants' experiences, including whether the units were used, how participants liked them, if they satisfied composting needs, and so on, which will help inform Municipal Council discussions and decision-making around the future of AHC in Oak Bay. A better-informed Municipal Council benefits Oak Bay residents. The evaluation also supports citizen engagement by asking for opinions and collecting feedback directly from residents.

This project supports Oak Bay's commitment to sustainability, and should council implement AHC across Oak Bay, this project could contribute to making Oak Bay a more environmentally and financially sustainable community. AHC may support financial sustainability by reducing waste management costs if curbside pickup of organic waste ends in exchange for an AHC unit.

1.3 ORGANIZATION OF REPORT

This report is divided into 9 sections, including this introduction and background section. Section 2 identifies the conceptual framework underlying this project. Section 3 outlines the methodology of this research, including the literature review, the survey, and the interviews. Section 4 examines the existing literature as it relates to the key topics for this project. Sections 5 present the findings from the survey and interviews. Section 6 provides a discussion of these findings. Section 7 details recommendations for CDOB, based on this research. Section 8 concludes this report.

2 CONCEPTUAL FRAMEWORK

This section of the report outlines the conceptual framework underpinning this research project. The conceptual framework links the participants' beliefs, attitudes, opinions and perceptions to their AHC behaviours. A causal relationship between the composting unit and participants using inductive reasoning to decide to compost at home is pursued. That is, the foundation of the research approach works on the premise that AHC behaviours are directly related to beliefs, attitudes, opinions, and perceptions that inform decision-making, and have framed the research through the perceptions of the participants. The literature supports that behavioural research can offer insights into why people perform the behaviours that they do, considering individual contexts (Carrus, Passafaro, & Bonnes, 2008; Hargreaves, 2011; Seacat & Northrup, 2010; Smith & Jasim, 2009). Behavioural research is invaluable when exploring why participants make decisions around participation in composting and thus links behavioural research to this evaluation.

The findings of this research support the notion that participant environmental beliefs informed the decision to agree to participate in the Pilot Project, participants' behaviour during the project, and, in many cases, composting behaviour prior to the start of the Pilot Project. This is an important limitation of the research, because participant self-selection into the Pilot Project means that results are not generalizable to the entire Oak Bay population. Instead, the results are generalizable to Oak Bay residents amenable to AHC.

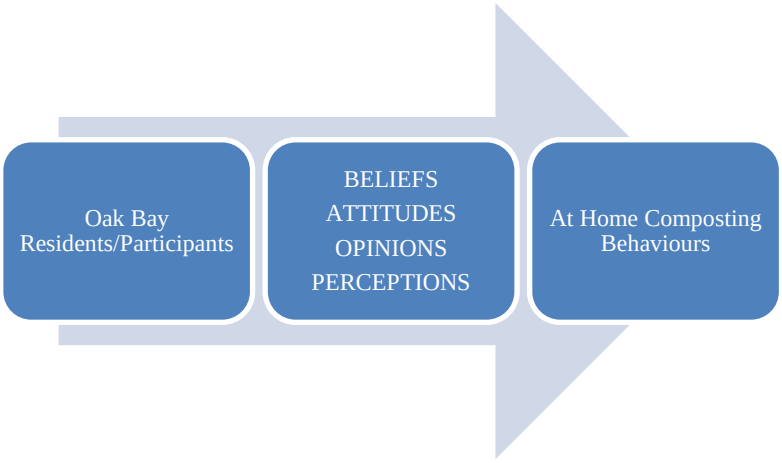

Figure 2.1 – Conceptual Framework

3 METHODOLOGY

The Pilot Project evaluation sought to characterize the experiences of participants in the Pilot Project. The broad research question of this evaluation was "what were the behaviours, perceptions, attitudes, beliefs, and opinions of the participants towards the Oak Bay Point of Source Composting Pilot Project?" More specifically, this research sought to identify:

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- participant demographics.

The research questions were answered using three methodologies: a literature review, an online survey, and telephone interviews. The literature review informed the researchers on AHC and was used to develop the data collection tools. The online survey provided quantitative data on participant experiences, attitudes, behaviours, and demographics, which when analyzed, provided key insights related to the research questions. Finally, the telephone interviews provided in-depth qualitative data on these same issues. Using these three methods together created a comprehensive research strategy to satisfy the research objectives.

3.1 LITERATURE REVIEW

A literature review explores the main findings of existing and relevant research and identifies the salient themes of the literature (Kumar, 2014, p. 48). A literature review requires the researchers to search the existing literature relevant to the area of study and to then synthesize it.

3.1.1 Literature review structure

The literature review focused on several areas including the broader issue of municipal solid waste, an introduction to composting, the impacts of composting from an environmental, economic, and social perspectives, and an exploration of behavioural theories related to composting. These topics allowed researchers to become subject matter experts through their research, providing context to orient this project. The literature review was also integral to framing the research questions, selecting the methodology, and designing and developing the data collection tools.

3.1.2 Literature review process

The literature review was conducted over several months, prior to developing and conducting the survey and interviews. The researchers identified major themes and current ideas regarding AHC and composting in general. To complete the literature search, the researchers accessed sources through the University of Victoria's library collection and

government publications. Using the Summon 2.0 search engine on University of Victoria's library website, the researchers used keywords such as "at home composting", "composting", "point of source composting", "composting and global warming", "composting and greenhouse gases", "composting and sustainability", "composting behaviour", "composting attitudes" and "composting demographics" to gather a breadth of resources. Research related to recycling was also canvassed where compost-related research was not prevalent: this included to a large extent, research regarding behavior and motivations in recycling as well as demographic behavioural determinants. The resources were from various databases including Science Direct, Web of Science, and JSTOR, and journals such as *Environment and Behavior*, *Waste Management*, *Bioresource Technology*, and *Journal of Environmental Psychology*. The resources consisted primarily of academic journal articles in addition to some government publications. Upon gathering a variety of relevant resources, the researchers reviewed them critically and identified the salient themes and matters of relevance to this project as suggested in Kumar (2014, p. 48).

3.1.3 Literature review justification

A literature review serves several purposes in a research study. It informs both the researchers and the readers about what kind of research has previously been completed related to the topic (Creswell, 1994, pp. 20-21). This contextualizes the research problem and findings (Kumar, 2014, p. 59). It provides context to the study by identifying the key themes in dialogue regarding a particular topic (Creswell, 1994, p. 21). This broadens the researchers' and readers' knowledge on the subject matter (Kumar, 2014, pp. 49, 59). In addition, it provides a framework to establish the importance and relevance of the current research project in the broader academic context in which it took place and where it may fit in with existing research and literature (Creswell, 1994, p. 21). For these reasons, a literature review was undertaken by the researchers.

3.2 ONLINE SURVEY

An online survey was used in this evaluation to collect data. Conducting a survey is a multi-step process that includes identifying the research focus, determining the population and selecting the sample, developing and implementing the questionnaire, and conducting data analysis (Rea & Parker, 2005, pp. 23-29). The researchers developed a questionnaire, a list of questions respondents are asked to answer, to examine the behaviours, perceptions, attitudes, beliefs, and opinions of the participants towards the Pilot Project, in addition to demographic data (Kumar, 2014, p. 178). This approach is supported by the literature as "most studies in environmental psychology rely on self-reports in response to questionnaire items" (Steg & Vlek, 2009, p. 310).

3.2.1 Survey structure

Survey questions focused on five areas of interest based on the research questions and literature review, including demographics, previous knowledge and experience with composting, experience in the Pilot Project, experience using the composting unit, and expected future composting behaviours (see Appendix A for survey questions). Demographic data is important to collect as it provides context to the participants, a

possible lens for analysis, and is a well-established practice to include. Demographic data can be used to compare characteristics of the survey population to characteristics of the overall Oak Bay population, to determine whether generalization may be an issue. Previous knowledge and experience with composting gives insights into human participation including their behaviours, perceptions, attitudes, beliefs, and opinions. Experiences with the Pilot Project provide information on the strengths/weaknesses of the composting units and AHC, opportunities for improvement, and participant behaviour, attitudes and opinions.

The questionnaire used only closed-ended questions including dichotomous questions, multiple choice questions, and Likert scale questions, as described by Kumar (2014, pp. 183-184). Closed questions ensure that the information needed is obtained, reduce irrelevant responses, and increase question clarity (Kumar, 2014, pp. 185-186; Rea & Parker, 2005, p. 42). They also lend themselves well to quantitative data analysis, as data is comparable across participants because of uniformity (Rea & Parker, 2005, pp. 42-44). Respondents were given a "don't know" option in most questions to reduce the number of participants leaving questions blank and to offer a reasonable range of responses as suggested by Brace (2004, pp. 68-69). In addition, respondents were also frequently given an "other" option which included a text box so the respondent could specify this further. The Likert scales also included a neutral midpoint where appropriate, as suggested by Brace (2004, p. 74). To ensure participants were not answering irrelevant questions, some questions branched, where, depending on the response selected, a follow-up question would be asked or the participant would move onto a new question.

3.2.2 Survey process

The population of interest for the survey was the 40 residences participating in the Pilot Project. All 40 residences were contacted, either by email or mail, requesting their participation in the survey. The email or mail included a copy of a letter of information outlining the research project, the purpose of data collection, how data would be stored, information about voluntary participation, and other ethics related consideration (see Appendix B). CDOB had previously informed Pilot Project participants when they agreed to participate in the Pilot Project that a survey would be conducted.

The questionnaire was hosted on an online survey website called Survey Monkey. This site was selected for its ease of use and familiarity as a reliable survey host. Because Survey Monkey is hosted in the United States, the letter of information to participants included a note that data would be subject to American laws. All but one of the Pilot Project participants were sent a link to the survey in an email from CDOB. At the beginning of the Pilot Project CDOB collected the email addresses for the participants and CDOB was able to use these email address to distribute the survey. One participant requested that a paper copy of the survey be mailed to their residence. CDOB provided this participant with a paper copy of the survey, along with a pre-addressed envelope containing the address for one of the researchers so the participant could mail it in. The survey was sent out to participants on December 8, 2016 and remained open until February 10, 2017. Three

reminder notices were sent via email to the Pilot Project participants during this timeframe. No reminders were sent to the one participant who requested to be contacted by mail.

3.2.3 Survey justification

An online survey was an appropriate data collection tool for the purpose of this evaluation: the literature review revealed that surveys were commonly used in related research. The researchers chose an online survey for five reasons. First, as noted above, the survey format allowed researchers to gather data that lends itself to quantitative analysis to answer the research questions. Second, an online survey was a practical, convenient and inexpensive way to connect with participants as neither of the researchers live near Oak Bay. Surveys are often used as a cost-effective and convenient data collection tool (Rea & Parker, 2005, p. 12). Third, using an online hosting website has many benefits from a data recording and analysis perspective, as there are multiple functions embedded into online platforms that allow for quick data recording and analysis (Kumar, 2014, p. 180; Rea & Parker, 2005, p. 11). Fourth, given the advancement and popularity of technology, an online survey was also convenient for participants. The survey took approximately 20 minutes to complete, and was accessible both via computer or mobile phone. The online survey format was easy to use, making it a simple and quick way for participants to participate. Lastly, an online survey provides enhanced anonymity over many other data collection tools, as there is no face to face interaction (Kumar, 2014, p. 180; Rea & Parker, 2005, p. 12).

3.2.4 Data analysis

Data was automatically recorded and coded on the online survey hosting website. This data was exported to Excel and the researchers created frequency distributions. The researchers also ran cross tabulations in an effort to identify themes across multiple variables, although given the small sample size, few inferences arising from the cross tabulations could be made.

3.3 TELEPHONE INTERVIEWS

Interviews were also used for this evaluation. An interview is a verbal exchange between an interviewer and participant whereby "the interviewer tries to elicit information, beliefs or opinions from another person" (Burns, 1997, p. 329). Interviews were used to supplement and enhance the survey findings by providing qualitative data. The researchers developed interview questions to further examine the behaviours, perceptions, attitudes, beliefs, and opinions of the participants towards the Pilot Project.

3.3.1 Interview structure

The researchers developed 15 questions to ask participations (see Appendix C). These questions were all open-ended questions with the intent to supplement the information gained through the survey. Open-ended questions do not provide respondent with possible responses and are better suited for getting information on opinions, attitudes and perceptions (Kumar, 2014, pp. 184-186). The interviews were semi-structured interviews, based on Kumar's description of structured and unstructured interviews, as the researchers had a pre-determined set of questions, to be asked in a particular order, but also had the

opportunity to go beyond this set of questions to explore other themes as they arose (2014, p. 192). The researchers asked probing and follow up questions, and provided clarity on the meaning of questions as required. The interview included similar questions to the survey (including previous knowledge and experience with composting, experiences in the Pilot Project, experience using the composting unit, and expected future composting behaviour) but expanded on questions and allowed for follow-up conversation or questions to participant responses for additional details.

3.3.2 Interview process

The researchers conducted seven interviews with participants from the Pilot Project. The target population for the interviews was the 40 residences that participated in the Pilot Project. Interview participants were recruited using the survey and through an email message once the survey was closed. In the survey, participants were asked if they would be interested in participating in an interview, and if so, the survey prompted respondents to provide their contact information. Survey data was in no way linked to participants who agreed to an interview; researchers had no idea what respondents said in the survey to frame or bias interview questions. The researchers received eleven responses to participate in interviews, from which seven were interviewed. The researchers sent an email to all participants interested in an interview that included a letter of consent (see Appendix D) and requested that they select a time and date between January 21st and February 5th, 2017 for the interview. Due to some scheduling difficulties, some interviews were conducted in mid-February. The interviews took approximately 30 minutes to one hour, and were recorded only for the purpose of transcription to support data analysis. The data that was transcribed did not contain any identifying information and participant names were recorded using an acronym.

3.3.3 Interview justification

Telephone interviews were selected as a data collection tool to supplement and enhance quantitative survey findings by providing more in-depth, qualitative data. Researchers could not conduct in-person interviews as neither lives near Oak Bay. Interviews as a data collection tool have several benefits, as they allow the researchers to obtain more in-depth information as conversations are not bound by rigid structure, as a survey tool is (Kumar, 2014, p. 182). Interviews also provide an opportunity for the interviewer to explain questions to participants and probe participants to elaborate on responses (Kumar, 2014, p. 182).

3.3.4 Data analysis

Interviews were recorded, with each interviewee's consent in advance, and following each interview a transcript was created by the respective interviewer. A thematic analysis was then conducted by each researcher on all interviews. Through analysis of recurring words, and ideas, the researchers identified relevant key themes and compared their findings.

3.4 LIMITATIONS AND DELIMITATIONS

This section outlines the scope and limitations of the research strategy. The first limitation of the research strategy relates to the use of a questionnaire and interview as data collection tools. The researchers chose to use both tools in an effort to address some of the disadvantages of relying on survey data alone. Survey data, while easily recorded and analyzed, does not provide in-depth information (Kumar, 2014, p. 182). In an effort to minimize this limitation, the researchers also conducted interviews to explore qualitative understanding. However, interviews also have their limitations. The quality of data collected is dependent on the interaction between the researcher and participant, the researchers' interviewing skills, and the participants' ability to articulate their responses (Kumar, 2014, p. 183). In addition, since there are two researchers, each with their own level of interviewing skills, styles, and approaches, the quality of the data could be impacted and may vary by researcher (Kumar, 2014, p. 183). In order to mitigate these concerns, the researchers discussed the interview process before the interviews started, and had a follow up discussion after the first interview to discuss their experiences. In addition, since the interviews were transcribed excluding verbal emphasis by the interviewee, valuable and important information and cues may have been lost.

The second limitation of this research strategy is the choice to do the survey online and the interviews via the telephone. There was a reliance on technology in this research strategy for many reasons, including time-efficiencies for the researchers and participants, accessibility, convenience, and cost-effectiveness. However, using an online forum to host the survey may have excluded some participants who either don't have access to a computer and/or the internet or who are not technologically savvy or computer literate, as suggested by Rea and Parker (2005, p. 12). With this in mind, the researchers were able to accommodate one request for a hard copy of the survey. However, others may not have been comfortable to make such a request, and may have chosen to not participate. In addition, potential research participants may not have access to a phone (Brace, 2004, p. 34). However, this is unlikely in Oak Bay. Finally, conducting interviews on the phone, rather than in person, means that the researchers may have missed out on important clues visible in person but not over the phone.

The third limitation of the research strategy relates to the reliance on participants to first self-select into the composting program and to then self-select into the study and to provide true and accurate data. Selection and reporting bias occur when participation is voluntary (Kumar, 2014, p. 182; Rea & Parker, 2005, p. 12). Voluntary participation into the survey and interviews was an ethics requirement. There are two types of biases that can occur as a result of this overall design. First, selection into the Pilot Project means that Pilot Project participants are more likely to be supportive of AHC than non-participants. Second, it is possible that Pilot Project participants who elected to participate in the subsequent evaluation had a better experience with the at-home composter than those who did not, although it is also possible that people with especially poor or especially good experiences decided to participate. There may also be a reporting bias. While participants are assumed to be answering and responding to questions truthfully and honestly, this may not be the case (this is explored further in the literature review). Participants may lie on surveys and in

interviews for several reasons, which can have an effect on the quality and validity of the data. Participants also may not remember accurately, resulting in incorrect information being reported (Foddy, 1993, p. 91; Steg & Vlek, 2009, p. 310). That considered, this challenge exists in most data collection methods that do not use observation, and the methodologies of this project are common practices reflected in the literature.

Given the limitations outlined above, the results of this evaluation can only be used to estimate the probable AHC experiences of Oak Bay residents who are willing to engage in such an activity. It cannot be used to estimate the overall Oak Bay population willingness to switch from curbside collection to AHC. Such information would need to be collected via a random survey of Oak Bay residences. And such a survey would have to clearly describe what AHC entails and what potential financial and social benefits Oak Bay residents might derive from a switch. Moreover, an analysis of the financial viability of including the Joracomposter as part of CDOB's composting strategy, or becoming Oak Bay's only composting strategy, was not part of this evaluation. Such an analysis should include various scenarios that depend on the different proportions of the Oak Bay population willing to replace existing arrangements with an AHC program, considering whether such a program could replace or would simply supplement the current arrangement. Detailed financial analyses would be required to evaluate various potential scenarios. In other words, while this study can inform Oak Bay Council on how well Pilot Project participants and similar persons in Oak Bay would fare with AHC, it does not provide Council with sufficient information to decide what to do about composting in Oak Bay.

4 LITERATURE REVIEW

This section of the report explores the composting literature. The review begins with a brief exploration of the context of composting, municipal solid waste, followed by an introduction to "composting" and "compost". The review also explores impacts of composting from three lenses – environmental, economic, and social. In addition, literature on composting motivations and behaviours is explored, including factors such as attitude and personal values, inconvenience, knowledge, past experience, and social influence and social norms. The literature review informed the context in which participant feedback was collected for the evaluation of the CDOB Pilot Project as well the data collection tools used in this evaluation.

4.1.1 Scope of the issue: Waste management and municipal solid waste

Municipal solid waste (MSW) refers to waste material generated at residential, commercial or industrial sources within a localized regional area (Adhikari, Tremier, Martinez, & Barrington, 2010, p. 1040; Giroux, 2014, p. 3). In Canada, the *Environmental Management Act* gives responsibility for waste management to regional/municipal governments, a fairly common practice in many countries, delegated from central government where local municipalities are responsible to "collect, sort, transport, recycle, [and] treat the generalized [MSW]" (Ministry of Environment, 2016a, p. 8; Weng & Fujiwara, 2011, p. 1393). Waste is defined as "any substance or object which the holder discards or intends or is required to discard" (European Commission Waste Framework Directive, 2012, p. 9). Volumes of MSW, which includes compostable organic material, are estimated to grow "exponentially over the next 15 years" due to population and economic expansion (Adhikari et al., 2010, p. 1051). In 2005, a CRD study found organics made up 30% of the MSW for Hartland landfill on Vancouver Island, which alternatively could have been composted (Capital Region District, 2009, p. 1). This finding supported efforts to divert organic waste from the landfill and explore alternative waste management strategies.

There are five common methods to manage waste:

- recycling: the process of recovering materials from various products following consumers use;
- composting: the decomposition of organic material that results in a product that can be reused;
- sewage treatment: a process to treat raw sewage whereby two by-products are produced; a non-toxic liquid that is discharged into various bodies of water and a semi-solid sludge which can be used as a soil, incinerated or sent to the landfill;
- incineration: the process of combusting waste; and
- landfilling: the process of depositing waste in a designated area. (Domingo & Nadal, 2009, p. 382)

A waste management hierarchy approach starts with the most environmentally sound criteria for dealing with waste and progresses to less and less environmentally sound methods (Giusti, 2009, p. 2229; Jamasb & Nepal, 2010, p. 1342). The point of this approach is to minimize waste by first preventing it, and then moving on to re-use,

recycling, and composting strategies (Giusti, 2009, p. 2229). However, the most common methods of managing waste continue to be landfilling and incineration, two methods historically viewed as cost effective and relatively easy to operate (Domingo & Nadal, 2009, p. 382; Giusti, 2009, p. 2229; Lou & Nair, 2009, pp. 3792-3793). With landfills approaching full capacity and increasing public concern, recycling and composting have gained emphasis (Domingo & Nadal, 2009, p. 383).

Regulation requiring source-separation behaviours can be used to combat increasing volumes of MSW in waste streams. Actively planning ahead can reduce the amount of MSW requiring management, supporting sustainability and the "public interest" (Ministry of Environment, 2016a, p. 8). Federally, the Canadian Council of Ministers of Environment (CCME) sets environmental priorities, currently focused on mechanisms to support waste reduction, as well as exploring best practices in waste reduction (Adhikari et al., 2010, p. 1043; CCME, 2014, para. 4). Some have proposed a Canada-wide ban on organics for landfills/waste streams in addition to other tools used in some jurisdictions, like limits on waste bags collected (Giroux, 2014, p. E4). Giroux suggests that Canadian municipalities collaborate to establish best practices and learn from each other, noting that there is no comprehensive Canada-wide waste management review and that an opportunity exists to benefit from shared knowledge (2014, p. E6). Despite positive steps being taken across the world, many countries, including Canada, rarely achieve their governments' waste management objectives (Adhikari et al., 2010, p. 1042). Composting is an important tool to help governments achieve them (Adhikari et al., 2010, p. 1044; Otten, 2001, p. 125). Vining et al. suggest a sustainable future will require population engagement with recycling and composting, as well as "new waste management technology", speaking to the requirement of human participation in waste management, diversion and prevention (1992, p. 785). The general consensus is that composting is a necessary and beneficial alternative to current waste management practices in much of the world as a diversion from traditional landfills (Colon et al., 2010, p. 893). That said, composting is not a perfect solution but rather comes with its own set of challenges to address.

4.1.2 An introduction to compost and composting

4.1.2.1 Composting definition and process

Composting is a process that facilitates the decomposition of organic matter over time, resulting in a new product which can be reused, called compost. Composting is defined, in somewhat technical terms, as:

> [A] process of controlled decomposition of biodegradable materials under managed conditions, which are aerobic and which allow the development of temperatures suitable for the establishment of thermophilic bacteria (above 45C) as a result of biologically produced heat. If high temperatures are maintained for a sufficiently long time (60-70C), pathogenic micro-organisms are killed along with the weed seed, and the material can be considered hygienically safe for land use (Couth & Trois, 2012, p. 2520).

Essentially, composting is "nature's way of recycling", where organic material is broken down into a "nutrient-rich, soil-like product" for reuse (Compost Education Centre, n.d.,

para. 1). Examples of organic waste that can be composted include food scraps, yard waste, agricultural crop residues, paper products, and wood (Statistics Canada, 2012, p. 20). The complete process of composting involves separating organic waste, found in MSW, from non-organic waste, piling the organic waste together to form a compost pile, and allowing time for it to decompose. Periodically, additional new compostable materials can be added to the compost pile and the pile can be mixed. The frequent adding of new material to a pile of compost results in a "heterogeneous and variable environment for microorganisms" where several different decomposition processes can all be occurring on a microbe level at the same time and at different rates, and generally speaking, the more frequent the mixing of the compost, the faster composting occurs (Ermolaev, Sundberg, Pell, & Jonsson, 2014, p. 174; Ministry of Environment, 2016b, p. 5).

Several biological reactions are involved in the composting process. Oxygen supports aerobic digestion of organic material, and while composting can occur without the use of oxygen, called anaerobic digestion, this method is less common (Colon et al., 2010, p. 892; Ministry of Environment, 2016a, p. 5; Otten, 2001, p. 124). AHC may be considered to involve a combination of both aerobic and anaerobic digestion at different times because parts of the compost pile may decompose with oxygen, where others may be buried and decompose without it (Andersen, Boldrin, Christensen, & Scheutz, 2010, p. 2476). In addition, composting requires bacteria and fungus, supported by "biologically produced heat" in the compost, to breakdown the organic materials into simpler substances, which can then be reused (Farrell & Jones, 2009, p. 4301; Smith & Jasim, 2009, p. 942).

There are many different ways to compost; the conditions to support composting such as where composting takes place can vary greatly (Slater & Frederickson, 2001, pp. 360, 363). These range from small scale, do-it-yourself at-home or backyard composters for a household, to large curbside compost collection and complex industrial composters for large communities, all supporting controlled decomposition in a localized area (Slater & Frederickson, 2001, p. 363). Table 1, below, from the BC Ministry of Environment, outlines a number of different compost set ups (Ministry of Environment, 2016b, p. 5). AHC, discussed at length in this report, refers to composting organic material at the point of source where the organic material becomes waste (i.e. a residence), typically involves establishing a composting unit somewhere outside on a residential property and occupants of the residence, who create the waste, put their organic waste into the unit (Tatano, Pagliaro, Giovanni, Floriani, & Mangani, 2014, p. 72).

Table 1 – Typically Successful Composting Process

Passive composting	➢	Essentially just a piling technique, no mechanical turning or aeration.
Turned windrows or piles	➢	Involves mechanical turning of some form.
Passively aerated windrows	➢	No turning, but aeration is provided through convection and open-ended perforated pipes.
Open aerated static piles	➢	No turning, but spaces are left between piles, with forced air aeration.
Aerated static piles with fabric covers	➢	Fabric covers control moisture and odours.
Extended aerated static piles	➢	No turning, no spaces between the piles, with forced air aeration.
Aerated turned extended bed	➢	Similar to extended aerated static piles but with additional periodic mechanical turning of the piles.
In-vessel systems	➢	Totally enclosed systems with forced aeration.
Rectangular agitated beds	➢	Similar to turned windrows except the compost material is in concrete channels. Uses mechanical turning and may also have forced air aeration through the channel floor.

Note. From BC Ministry of Environment, 2016b, p. 5

4.1.2.2 Compost definition and use

Compost, resulting from the decomposition of organic material over time, is a "stable, non-toxic, pathogen-free and plant nutrient-rich product" with a "humus-like" consistency that can be reused (Ermolaev et al., 2014, p. 174; Smith & Jasim, 2009, p. 942; Statistics Canada, 2012, p. 19). Compost can be applied to gardens, landscapes or agriculture to replace (or reduce) fertilizer or soil supports (Barrena, Font, Cabarrell, & Sanchez, 2014, p. 1109; Colon et al., 2010, p. 893; Smith & Jasim, 2009, p. 942; Statistics Canada, 2012, p. 19). Compost has several benefits including improving the physical structure of soil, which protects against erosion, increasing the soil's water retention capabilities, enabling soil to retain nutrients longer, enriching soil with essential nutrients, and suppressing plant diseases (Barrena et al., 2014, p. 1109; Colon et al., 2010, p. 893; Farrell & Jones, 2009, p. 4306; Smith & Jasim, 2009, p. 942; Statistics Canada, 2012, p. 19; The US Composting Council, 2001, pp. 6-10).

4.1.2.3 Composting best practices

No single set of generally accepted composting best practices arose from the literature review. Several variables must be considered to identify best practices, including the hardware or composting unit itself, the physical location of the unit, the climate, the organic materials being composted, and the frequency the compost is mixed/aerated. All of these variables impact the quality of the compost product and the length of the decomposition process (Compost Education Centre, n.d.). Consequently, identifying best practices is challenging (Andersen, Boldrin, Christensen, & Scheutz, 2011, p. 1934).

The amount of time the AHC decomposition process takes and the conditions required for a quality product can vary depending on the unit and the type of organic material added (Andersen et al., 2010, p. 2475; Barrena et al., 2014, p. 1109). For example, Colon et al.

recommend composting with a unit positioned in "open, shady conditions" located "on a paved surface" (2010, p. 894). They note that in such conditions, the decomposition process cycle is 96 days (Colon et al., 2010, p. 894). However, Colon et al. also note that different organics decompose at differing rates, which could affect the composting process and timeline, despite adhering to their ideal conditions (Colon et al., 2010, p. 894). In contrast to the timeframe noted by Colon et al. (2010), Tatano et al. found 12-15 months was an appropriate length of time for the composting process to occur for AHC (2015, p. 84). While Colon et al. suggest composting "mainly green and vegetable waste", others suggest using "equal amounts of brown and green materials" supports more ideal composting conditions (2010, p. 894; Compost Education Centre, n.d., p. 2). In addition, there is disagreement as to whether meat and dairy products should be added to compost (Andersen, Boldrin, Christensen, & Scheutz, 2012, p. 33). Storino, Arizmendiarrieta, Irigoyen, Muro, and Aparicio-Tejo (2016) suggest that meat materials increase the amount of protein found in the compost product and increase temperatures, which impacts the speed of decomposition (pp. 54, 61). However, Storino et al. argue that including meat raises *E. coli* levels of the final product which may have health implications around handling and use of compost (2016, p. 61).

In addition, stability of the compost is important, that is, "the extent to which readily biodegradable organic matter has been decomposed", to ensure safe and quality product (Barrena et al., 2014, p. 1110). While there appears to be overall agreement amongst researchers that stability is an important consideration, there does not appear to be agreement about how best to measure compost stability. The stability of compost is impacted by many factors including the compost material and the duration the material has been decomposing (Barrena et al., 2014, p. 1110). Frequent mixing and "proper handing", to ensure sufficient temperatures reach all the compost material, can help mitigate stability concerns (Storino et al., 2016, p. 61). It is evident from the literature that while some generalizations can be made about composting, critical consideration must be given to the specifics of each individual scenario including the compost technology being used, the external environment, and the organic material being composting including frequency and volumes in order to support successful composting outcomes.

4.1.2.4 Demographic characteristics of composters

Statistics Canada has correlated income, type of dwelling, and education level to composting (Statistics Canada, 2013, pp. 4-6). Data from the 2011 Households and the Environment Survey (HES), reveals a positive correlation between household income and likelihood of composting, (Statistics Canada, 2013, p. 5). For instance, households with an income of $150,000 or more had the highest composting rate at 76%, while households with an income of $20,000 or less had the lowest at 46% (Statistics Canada, 2013, p. 5). A similar relationship was found with education levels, as the highest rates of composting were among households with higher education levels (Statistics Canada, 2013, p. 6). The type of dwelling also appeared to be correlated with composting as those in single and detached houses are much more likely to compost than those in condominiums or apartments (Statistics Canada, 2013, p. 4). While some correlations exist between demographics and composting behaviours, limited research was found on composting

behaviour and demographics. This suggests either a knowledge gap requiring further research, or researchers are generally satisfied that additional study of composting behaviour and demographics will not provide sufficient new findings.
Given the lack of compost-specific research regarding demographics and composting, recycling-related research was also reviewed with respect to demographics. The literature suggests that recyclers tend to be "older, wealthier, and better educated" females (Barr, Ford, & Gilg, 2003, pp. 414-415; Edgerton, McKechnie, & Dunleavy, 2009, p. 153; Seacat & Northrup, 2010, p. 396). These results are consistent with the demographic-composting relationships identified in the 2011 HES with respect to age, income, and education. However, the link between demographics and recycling activity tends to be "generally weak" and not statistically significant, or challenging to generalize (Edgerton et al., 2009, p. 153; Seacat & Northrup, 2010, p. 396). Nonetheless, demographics offer some context to consider in composting research.

4.1.3 Impacts of composting

The literature review revealed that composting has both positive and negative impacts on the environment, the economy, and public health, with some areas benefitting while other losing. The impact of composting on each of these areas is explored below to provide context and insights into the complexity of decision-making for composting on micro and macro scales.

4.1.3.1 Environmental impacts

The decomposition of organic waste results in the production of greenhouse gases (GHG), which are linked to global climate change (Lou & Nair, 2009, p. 3793). Regardless of the form waste management takes, some GHG by-products are impossible to avoid, although some waste management techniques may result in the production of less GHG than others (Lou & Nair, 2009, p. 3796). During the decomposition process, by-products such as carbon dioxide, methane, ammonia, and/or nitrous oxide are released, all of which are GHG, in addition to water and "bioaerosols" (Andersen et al., 2010, p. 2475; Andersen et al., 2012, p. 31; Colon et al., 2010, p. 894; Ermolaev et al., 2014, p. 174; Couth & Trois, 2012, p. 2520). Methane, ammonia and nitrous oxide are of particular concern as they are often considered the worst GHG offenders (Andersen et al., 2010, p. 2475; Andersen et al., 2012, p. 31; Colon et al., 2010, p. 894; Ermolaev et al., 2014, p. 174). However, Amlinger and Peyr note that "composting contributes very little to national GHG inventories generating only 0.01-0.06% of global emissions" (2008, p. 47). Among researchers who have considered emissions in composting, there is disagreement on which emissions to measure and how. For example, some researchers ignore carbon dioxide because of "the general consensus that CO2 from composting is of biogenic origin", that is it comes from living organisms, is not specific to the composting process and therefore should not be considered, whereas others feel it is valuable to include in emission studies (Couth & Trois, 2012, p. 2520; Lou & Nair, 2009, p. 3796).

Differences in composting conditions, including "moisture, temperature and aeration", material put in the compost, as well as "process management issues" related to "aeration, mechanical agitation, moisture control and temperature regime" can all impact

decomposition and related products, making it challenging to identify specific causes and influences of GHG resulting from composting (Andersen et al., 2010, p. 2480; Amlinger & Peyr, 2008, p. 47; Ermalaev et al., 2014, p. 174). Some researchers suggest good composting should not produce methane, however a lack of oxygen during decomposition has been found to lead to its production, highlighting the importance of compost methodology in the context of GHG production (Couth & Trois, 2012, p. 2520). In contrast, Andersen et al. found the more frequently the compost was mixed (thus adding oxygen), the greater the methane levels found (apparently at odds with Ermolaev's findings mentioned above) noting that "less aeration could lead to slower degradation and maturation of the organic material" resulting in different GHG outcomes (Andersen et al., 2010, p. 2481). Meanwhile, a knowledge gap exists around nitrous oxide emissions, with past analysis unable to determine why some nitrous oxide emissions are greater in similar composting circumstances, finding "a combination of multiple factors, varying throughout the process, can cause peaks at different times" (Ermolaev et al., 2014, p. 181).

Despite concerns with GHG emissions, composting is still generally considered a worthwhile alternative to traditional waste management strategies. The BC Ministry of Environment states that GHG's emitted from composting are less than those from traditional waste management practices, particularly landfills with no mechanism to diminish or capture GHG's (although no references are cited to support these statements) (Ministry of Environment, n.d., p. 1). Some findings support that AHC has similar or less environmental impacts as incineration and land filling, concluding that AHC is an appropriate alternative for some organic household waste (Andersen et al., 2013, pp. 33, 39). In contrast, a previous analysis by Andersen et al. in 2010 found that GHG emissions from composting systems (including their management) may be greater than traditional waste management methods and thus not an appropriate alternative (Amlinger & Peyr, 2008, p. 58; Andersen et al., 2010, p. 2476). Other research has found the amount of GHG emissions from decomposing waste is greater from landfills when compared to composting methods, supporting that composting is a "simpler and effective means of reducing GHG emissions" and a more attractive alternative (Lou & Nair, 2009, p. 3797). Also of note, some authors suggest approximations "tend to overestimate" GHG's from composting, partially linked to the lack of studies done, the need for more at times challenged by composters (Lou & Nair, 2009, p. 3797). Further studies into the roles and impacts of GHG are needed to better understand and evaluate differences in release and quantity between various forms of composting as well as other forms of waste management (Andersen et al., 2010, p. 2476). It is evident the study of GHG emissions is nuanced with an evolving understanding.

In addition to GHG produced as a result of the decomposition process, there are indirect GHG concerns related to the resources involved to create, distribute, and maintain composting equipment, and/or collect organic waste at the curbside. GHG are emitted from the vehicles used to collect and transport organic waste to the landfill or central composting station, and during the production and transportation of composting bins (used for curbside pickup or AHC units). The "operating emissions" for industrial or centralized composters vary on individual systems with no standardized measuring or reporting structure, making meaningful comparisons challenging (Lou & Nair, 2009, p. 3796). AHC, specifically, can

eventually help "[reduce] the economic, material and energetic investments in infrastructures" by requiring less processing and disposal resources (i.e. collection, transportation, and disposal in landfills or incinerators) and support individualized investment and control (Colon et al., 2010, p. 893; Otten, 2001, p. 125).

4.1.3.2 Economic impacts

An important consideration in waste management is cost. Generally, "waste is expensive to manage" and is "a missed opportunity" when recycling and composting are not involved (Giroux, 2014, p. E1). Any form of waste management requires resources including technology, infrastructure, and population support and cooperation (Adhikari et al., 2010, p. 1051). These can represent significant financial and practical burdens for local governments. Further, changes from existing, often more traditional waste to incorporate recycling and composting, require upfront investments (Adhikari et al., 2010, p. 1040). Historically, how waste was managed was "mostly a function of economic considerations" of the area and level of government dealing with the waste, further shaped by the kind of waste produced (residential, industrial and so on) (Giusti, 2009, p. 2230). The global waste management situation is a "crisis" as landfills approach full capacity in many communities and there is opposition to the creation of replacement landfills amid growing concern for the environment, necessitating exploration of alternatives while balancing fiscal realities (Ministry of Environment, 2016a, p. 8; Vining, Linn, & Burdge, 1992, p. 785).

Research has shown that increased volumes of waste have been linked to a nation's increasing gross domestic product (GDP), with significant amount coming from urban centres as they develop and grow (Giusti, 2009, pp. 2228-2229). In contrast, periods of economic stagnation may result in the reduction in quality or care given to MSW, motivated by what decision-makers may consider to be higher priorities. For example, Nova Scotia, in 2000, achieved 60% composting of organic waste using regulation to redirect organic waste, but this rate noticeably declined after the economy declined (Adhikari et al., 2010, p. 1043). Jamasb and Nepal suggest the link between GDP and waste be considered when making waste management decisions in order to lower the "waste intensity of GDP by making products and services with fewer resources", resulting in less waste (2010, p. 1342). All of this suggests the possibility that the more economically prosperous an area is, the more likely they will have higher waste management costs, and, when they are less prosperous, the more likely they are to expend less money on waste management and opt for cheaper and perhaps more traditional options.

Economic advantages for local governments from composting organic waste include cost savings from reduced volumes of waste requiring management (Colon et al., 2010, p. 903). Composting, both at the curbside and at-home, can also reduce speeds at which landfills reach capacity, increasing longevity and delaying future costs associated with new landfills (Weng & Fujiwara, 2011, p. 1393). If local governments pursue curbside-pickup composting, there is an opportunity to use compost product as fertilizer for municipal use or sale (Morgan & Hughes, 2006, p. 32). AHC may benefit households by reducing compost costs for their garden (Otten, 2001, p. 125). AHC is less expensive curbside pickup because of lower transportation and management costs (Andersen et al., 2011, p.

1934). However, like any new waste management process, there are upfront and largely one-time costs associated with the implementation of AHC including supply, installation, and education.

Challenges quantifying benefits is a common theme when considering changes to support sustainability. Some argue "true cost accounting" must include costs to the environment resulting from waste in addition to upfront, or more readily quantifiable costs (Otten, 2001, p. 130). For example, having reduced waste end up in landfills means the landfill can be used for a greater length of time and has less associated pollution but begs the question how to appropriately quantify this (Otten, 2001, p. 130). To address the challenges quantifying less tangible benefits of sustainable behaviours, others suggest an "integrated" cost-benefit analysis (CBA) to include both upfront financial and "macro-economic, environmental and social" costs/benefits (Weng & Fujiwara, 2011, p. 1394). Lah found municipal solid waste management is usually examined through a lens of CBA but came across concerns with methodology and thus with conclusions reached (2002, p. 137). In particular, some analysis may not have appropriately considered waste management costs or "overall environmental impact", ultimately boiling down to whether recycling costs are "significantly greater" than an alternative method to manage waste, and whether "social costs and benefits" are given adequate thought and are quantifiable (questions like "what are the benefits of improved public health?" from reduced waste) (2002, p. 138). Lah notes the perspective of analysis in CBA should be identified, that is "whose benefits and costs count" (i.e. local government, residences, international business etc), when considering findings (2002, p. 140). The point of reference of research shapes the identification and measurement of impacts related to economic impacts. For example, composting is a municipal issue, but the GHG impacts cross jurisdictions and should be considered on a global scale, demonstrated in the use of social cost of carbon which considers the environmental impacts of carbon on a global scale and is used to help inform policy decision-making (Lah, 2002, p. 143; van den Bijgaart, Gerlagh, & Liski, 2016. P. 75). A financial exploration which included "life cycle cost (LCC) analysis" in Taiwan supports a link between recycling and reduced waste management costs which should motivate the pursuit of these methods (Weng & Fujiwara, 2011, pp. 1394, 1404). Other authors have found "while no perfect basis exists", life-cycle analysis can help lead to "better judgment" in waste management decision-making (Weng & Fujiwara, 2011, p. 1393). While there is disagreement about how best to quantify intangible benefits from composting, it is clear these future benefits warrant consideration.

4.1.3.3 Public health impacts

Composting affects public health. Landfilling and incineration negatively affect public health. Illness is associated with proximity to waste disposal sites, as residents close to these sites may come into contact with harmful waste, waste by-product, emissions, smells and noises (Giusti, 2009, p. 2230). Significant health risks also exist for those who handle and are regularly directly exposed to waste (Domingo & Nadal, 2009, p. 285; Giusti, 2009, pp. 2230, 2235). Exposure can result in "respiratory and dermal illnesses" from "dust and bacteria, fungi" or "infectious viruses, [and] microorganisms" possibly found in waste (Giusti, 2009, p. 2235). Composting can, in the long term, reduce the number of landfills or

incinerators required, therefore reducing related risk of exposure to residents and the workforce.

Food contamination is another health risk, if food is grown near poorly managed waste disposal sites or grown using contaminated compost (Domingo & Nadal, 2009, p. 383). This may also be a risk factor in AHC if the compost does not breakdown as expected or becomes contaminated by inputs. There also may be health concerns related to GHG emissions and global climate change, or compost "atmospheric dust" carrying harmful substances (Domingo & Nadal, 2009, p. 383; Giusti, 2009, p. 2231). Sophisticated, sealed and filtered composters do not generally prevent "compost-derived compounds" from being released into the air with cash-strapped communities pursuing "less sophisticated facilities" for industrial composting (Domingo & Nadal, 2009, p. 386).

Despite concerns, evidence that directly links waste management to public health is uncommon and nuanced. For example, while sudden onset injuries are easily observable, slower or chronic health issues involving prolonged contact with harmful and dangerous substances are much harder to detect and link back to specific causes (Giusti, 2009, pp. 2228, 2232). It is also difficult to conduct research to establish such links as the research, due to ethical considerations and restrictions, must be observational rather than experimental, and is thus lengthy, time-consuming, and must consider a multitude of other factors (Giusti, 2009, p. 2231). Exposure to hazardous waste may not necessarily have measurable negative impacts on health, and since individuals vary by demographics such as age and gender, and genetic vulnerability, they will likely have differing reactions to such exposure, further challenging researchers to identify links between waste and health (Giusti, 2009, p. 2236), although some demographic factors may be observable and controllable. To protect public health, Giusti recommends investing in "waste management facilities, training and education", waste reduction practices, such as recycling and composting, taxing consumer goods directed towards waste management, involving the public in determining "waste management practices at local and regional levels", and consideration of health related to waste impacts (2009, p. 2237). Waste, both organic and non-organic, whether in a landfill or compost can potentially have negative impacts on human health. Precautions should be taken when managing waste and further research will help better inform safety practices in the future.

4.1.4 Behavioural theories

Understanding why some participate in sustainable behaviours is viewed as an issue of priority in scientific and political spheres around the world, recognizing widespread concerns with waste management and sustainability (Carrus et al., 2008, p. 51). Understanding and influencing human behaviour is a challenging endeavour and there is disagreement in literature around how best to do this, noting "interplay between emotion and reasoned processes in human decision making" (Carrus et al., 2008, p. 51). This part of the review explores behavioural theories in the context of composting noting it requires active participation from individuals in order to happen (Smith & Jasim, 2009, p. 943).

Behavioural models attempt to explain behaviour and provide a framework for analysis, and in the context of pro-environmental behaviour, they may help explain, support, and encourage behaviour that supports the environment, and thus are an important tool to consider within the context of AHC (Seacat & Northrup, 2010, p. 393). Models typically regard an individual's "beliefs, attitudes, and values as predictors of behaviour" and thus it becomes valuable to establish these (Hargreaves, 2011, p. 81). Behavioural theories rest on the premises that "change is within the capacity of individual agents", they have the free will and capacity, and a critical mass of individual change may later support change at the broader social level (Hargreaves, 2011, p. 80). A brief exploration of theories attempting to explain human behaviour, in the context of pro-environmental behaviour and/or composting follows.

One of the commonly used behavioural model to attempt to explain why some people, at some times, undertake pro-environmental behaviour, is Ajzen's theory of planned behaviour (TPB), which is echoed, built upon, or varied by other researchers to provide further insights into environmental behaviour (Blok, Wesselink, Stuynka, & Kemp, 2015, p. 56; Hargreaves, 2011, p. 81; Knussen, Yule, MacKenzie, & Wells, 2004, p. 237; Seacat & Northrup, 2010, p. 394). TPB hypothesizes that "conscious reasoning" on the part of the decision-maker informs action, or intended action (Knussen et al., 2004, p. 237; Seacat & Northrup, 2010, p. 394). It assumes behaviour is rational, can be logically explained considering individual context, and these rationales can be measured. It is known for "its openness to the inclusion of additional variables" to enhance or customize the application of theory, although "predictive capacity" is impacted (Hargreaves, 2011, p. 81). TPB might explain AHC participation as beneficial to participants and/or society in general through reduced MSW and the benefit of compost product. Related to TPB, Stern discusses the "value-belief-norm (VBN) theory" which suggests "values about the self and others" are the major determinant in decision-making, as well as "potential consequences, perceived control, and sense of responsibility" (Seacat & Northrup, 2010, p. 394). Perugini and Bagozzi (cited in Carrus et al., 2008, p. 52) extend TPB into the model of goal-directed behaviour (MGB). MGB considers "past behaviour and anticipated emotions", finding the more often behaviour occurs is "the best predictor of desire and intentions" (Carrus et al., 2008, p. 59).

The "social practice theory", another related behavioural theory, emphasizes the context in which individuals make decisions, considering societal pressures and norms that may identify connections between ideas and institutions never considered (Hargreaves, 2011, p. 95). Hargreaves posits a "middle level between agency and structure" is required and may be the most successful, referring to a combination of structural supports, whether through infrastructure or legislation, and free-will or choice to participate, in order to help facilitate pro-environmental behaviours (2011, p. 82). Underlying this ideology is the notion that traditional ideas and behaviours should be challenged and replaced with "sustainable" practices, with individuals acting as "skilled agents" to choose how to behave (Hargreaves, 2011, p. 83). Various behavioural theories offer different points of focus or explanation around behaviour which can be considered in the context of composting behaviours.

Psychology research related to the environment, often incorporating behavioural theories, involves self-reporting through questionnaires. Steg and Vlek (2009) have shown a disconnect between self-reported and actual or observed behaviours (p. 310). This is a serious challenge when attempting to understand participant behaviour and may be caused by any number of factors including social pressures and beliefs. A possible solution is anonymized data (a common practice). Perhaps the most ideal way to collect data is through observation, although observation comes with its own set of potential biases and practical challenges. Regardless, findings based on behavioural theories and research studies, may provide some valuable insights into pro-environmental behaviour, applicable for AHC.

4.1.5 Factors that affect participation in recycling behaviours

AHC is a fairly new waste management approach and as a result, limited research exists regarding who participates and why (Edgerton et al., 2009, p. 154). Recycling behaviour research may offer insights or opportunities to further understand composting behaviour, as composting can be considered a natural extension of recycling, since in both cases participants must sort their waste (Edgerton et al., 2009, p. 152). While recycling can be a precursor of other pro-environmental behaviours like composting, composting and recycling differ conceptually, with composting referring to "source reduction" whereas recycling to "waste reduction", and research for one may not necessarily inform the other (Berger, 1997, p. 530; Edgerton et al., 2009, p. 165). While research findings vary, behavioural predictors include attitudes and personal values, inconvenience, knowledge, past experience, and social influence/norms. Each of these factors is discussed below.

4.1.5.1 Attitudes & personal values

One would assume that individuals concerned with the environment are more likely to engage in pro-environmental behaviours, including waste management practices such as recycling. While this assumption is consistent with rational behaviour theories, it does not seem to apply to recycling behaviour (Hargreaves, 2011, p. 81). Despite research suggesting that "environmental concern" is often cited as a reason for participating in recycling, this has not been found to be a strong or reliable predictor of recycling behaviour (Barr, 2007, p. 4567; Edgerton et al., 2009, p. 151; Oskamp, Harrington, Edwards, Sherwood, Okuda, & Swanson, 1991, p. 515). That is, recyclers often care about the environment, but caring about the environment does not necessarily mean someone is a recycler and will recycle. Research suggests that recyclers are socially conscious and have a sense of responsibility, believing a social duty or moral obligation to recycle exists (Barr et al., 2003, p. 417; Oom Do Valle et al., 2005, p. 391). Personal values and norms, which can be informed by social norms, can result in an individual experiencing guilt if they do not recycle or protect the environment, or they can provide some perspective resulting in their perceived challenges of recycling as less important (Barr et al., 2003, p. 417; Oom Do Valle et al., 2005, pp. 390, 391). However, personal norms tend to have an impact on intentions, but not on actual behaviours (Barr et al., 2003, p. 417).

In addition to this, the belief that personal action and individual change can make a difference may also be important (Gamba & Oskamp, 1994, p. 601; Oom Do Valle et al.,

2005, p. 389). For example, if the individual believes that the little waste they produce does not make a difference, they may be less likely to engage that behaviour (Tuker & Speirs, 2003, p. 294). It is hypothesized that the incorporation of financial or other incentives into recycling programs may have blunted participation's relationship to altruistic reasons (Edgerton et al., 2009, p. 154). Other researchers have looked into the specific pro-environmental reasons cited by participants, such as resource conservation, waste reduction, and saving landfill space; however, research results are inconsistent and do not demonstrate strong support for these as predictors of recycling behaviour (Gamba & Oskamp, 1994, p. 604).

4.1.5.2 Inconvenience

Research suggests that inconvenience is a stronger determinant of recycling participation than attitudes (Barr et al., 2003, p. 414; Edgerton et al., 2009, p. 153; Vicente & Reis, 2008, p. 144). Inconvenience is often cited as a reason to not participate in recycling and can include the effort and/or time required to engage in the behaviour, lack of storage space, and messiness (Barr et al., 2003, p. 418; Gamba & Oskamp, 1994, p. 600; Howenstine, 1993, p. 97; Steg & Vlek, 2009, p. 310). Dahab, Gentry, and Su found that intentions to recycle were strengthened by a lower perception of effort and costs (1995, p. 253). Consistent with this, Barr et al. found that perceived convenience was positively linked to likeliness to recycle, meaning the more convenient an individual views the recycling behaviour, the more likely they are to engage in it (2003, p. 414). Situational factors also affect inconvenience, both actual and perceived, such as access to and location of recycling centers, proximity, and type and size of collection containers (Barr et al., 2003, p. 414; Howenstine, 1993, p. 97).

4.1.5.3 Knowledge

Individuals who know more about recycling are more likely to participate in recycling (Barr, Ford, & Glig, 2003, p. 414; Gamba & Oskamp, 1994, pp. 601, 604; Oom Do Valle, Rebelo, Reis, & Menezes, 2005, p. 389; Vicente & Reis, 2008, p. 144). Knowledge is a significant predictive factor of not only recycling intention, but also recycling action (Barr et al., 2003, p. 415; Gamba & Oskamp, 1994, p. 601; Vicente & Reis, 2008, p. 144). Knowledge can include information about what materials can be recycled, where they can be recycled, and other program specific information (Barr et al., 2003, p. 415; Barr, 2007, p. 467; Oom Do Valle et al., 2005, p. 389). Participants who are poorly informed and are not knowledgeable are not likely to participate in recycling effectively (Barr et al., 2003, p. 416). Barr (2007) found, with respect to recycling, "abstract knowledge" was less important than "concrete knowledge" (p. 486). Vicente & Reis (2008) also found that providing a household with information about recycling increased levels of participation in recycling programs (p. 144). A challenge with recycling knowledge as a determinant of behaviour is that if someone decides they want to recycle, they first need to learn how to do, and it is unclear which decision comes first (the decision to recycle or the decision to learn how to recycle). These are reasonably simultaneously determined, and someone who recycles is naturally more likely to have knowledge about recycling than someone who does not recycle. In addition, a situation is possible where someone seeks knowledge about recycling but once they have it they may decide they do not want to recycle, making them

knowledgeable about recycling but still choose not to. While recycling knowledge and behaviour are necessarily closely linked, knowledge may be more relevant when considering how effectively someone recycles (someone who is knowledgeable is more likely to correctly separate waste and contribute to various recycling schemes).

4.1.5.4 Past experience

A number of authors link past behaviour to future expected behaviour. In particular, research suggests past experience in waste reduction behaviours plays an important role in informing future related behaviours (Edgerton et al., 2009, p. 155; Vining et al., 1992, p. 789). Dahab et al. found prior past behaviours were a predictor of recycling intent, but not necessarily behaviours (1995, p. 253). Dahab et al. suggest that experience actually performing the behaviour can address misconceptions, for example around time and effort required or overall inconvenience, potentially positively influencing future behaviour (1995, p. 253).

4.1.5.5 Social influence and social norms

Social influence refers to the pressures individuals may feel to behave in a particular way. Research suggests that this is most successful when the visibility of the desired behaviour is high (Barr et al., 2003, p. 414; Oskamp et al., 1991, p. 515; Tucker & Speirs, 2003, p. 294). When most people, particularly neighbours, participate in particular behaviour, those who are not participating may feel increased pressure to participate or feel embarrassed or guilty for their lack of participation (Oom Do Valle et al., 2005, p. 389; Oskamp et al., 1991, p. 515). Vining and Ebreo found that recyclers perceived social pressure to be higher than those who do not recycle (1992, p. 1603). In addition, social norms may also play a role in recycling behaviours, as people are typically concerned with how their behaviours align with the expectations of their friends, family, and neighbours (Barr et al., 2003, p. 414; Oom Do Valle et al., 2005, p. 390). Social norms are most important when an individual is both aware of the norm and accepts it (Barr et al., 2003, p. 414; Barr, 2007, p. 467; Vicente & Reis, 2008, p. 144). However, social norms were ultimately not found to be a significant predictor of recycling behaviour (Edgerton et al., 2009, p. 151).

Overall, waste management behavioural research suggests that a successful waste reduction program, including AHC, would have to be convenient, easy to follow, and well-resourced. A program with these qualities is more likely to have high participation to establish social norms and influence. While much of the research on household waste management behaviour is based on recycling, it nonetheless provides valuable information for program design and promotion to achieve desired behaviour.

4.1.6 Conclusion

This literature review covered topics related to composting in order to help inform the development of research tools, focused on the human participation aspect of the CDOB Point of Source Composting Pilot Project. The review provided background context on composting, waste management, and human participation to enhance the researchers' understanding for the project and how it fits into the existing research landscape. In

completing the review, it is evident that a great deal of additional research opportunity exists within the scope of composting and specifically AHC.

5 SURVEY AND INTERVIEW FINDINGS

This section is divided into two parts: survey findings and interview findings, organized around the research questions. Survey data supports three of the five research questions, identifying demographics, participant behaviours (including past and current attitudes/beliefs, knowledge, habits, and experiences, and future expected use), and the strengths and weakness of the composting units. Interview data supports the research questions by identifying strengths and weakness of the composting units, participant behaviours (including attitudes, beliefs, knowledge, and habits), strengths and weaknesses of AHC in Oak Bay, and opportunities to improve the AHC experience.

5.1 SURVEYS

A total of 26 participants responded to the survey (65% response rate). While the online survey asked 48 questions, some participants may have been asked fewer because of branching, based on their responses to related questions. The online survey provided quantitative data for analysis, as all questions were closed-ended questions. The data is presented using frequency distributions. The survey findings are presented in six sections, in a manner consistent with these research questions, including (1) demographic data, (2) attitudes, knowledge, and experience prior to the Pilot Project, (3) reasons for participation in the Pilot Project, (4) experience in Pilot Project, including habits, impacts, and attitudes, (5) evaluation of composting units, and (6) future composting behaviours.

5.1.1 Demographics

A slight majority of respondents (58%) were 50 years or older, with 42% aged 18-49, 23% aged 50-64, and 35% aged 65 or older. Both the 65+ and 18-49 age categories are overrepresented in this sample, as these age categories tend to each make up 28% of the general Oak Bay population (Statistics Canada, 2007, para. 17). Most respondents (73%) reside in homes with at least three occupants, with the most common structure being a three person household (at 31%). All respondents reside in single detached houses, as may be expected given this type of dwelling was the target of CDOB's canvassing. The majority (84%) of respondents had a university degree. This rate is much higher than university degree achievement reported for Oak Bay in the 2006 Census Community Profile[1], at 56% for individuals 25 to 34 years old, and 55% for individuals 35-64 years old (Statistics Canada, 2011, para. 11). All respondents had average household incomes above $49,999, with 52% having a household income of $100,000, which is consistent with Census data that identifies an average household income in Oak Bay at approximately $95,000 (Statistics Canada, 2007, para. 6).

[1] Results of the 2016 Census are not yet available. In 2011, the long-form questionnaire was voluntary and educational achievement of those who filled out the long form questionnaire were not reported in the Community Profiles.

5.1.2 Knowledge, attitudes, and experiences prior to the Pilot Project

Respondents were asked a series of questions regarding their knowledge of composting, attitudes about the environment and composting, and experience with composting and other pro-environmental behaviours, prior to the Pilot Project. The results of these questions are presented below.

5.1.2.1 Knowledge

Prior to the Pilot Project, the majority of respondents (68%) were "somewhat knowledgeable" about composting, 16% were "very knowledgeable" and another 16% were "not knowledgeable". Related, most respondents (69%) disagreed that composing requires a lot of technical knowledge (see Figure 5.1).

5.1.2.2 Attitude towards composting and the environment

Figure 5.1 portrays agreement or disagreement with general statements about composting. Overall, the majority of respondents disagreed or strongly disagreed that composting requires a lot of effort (62%), that composting was time-consuming (50%), or that composting is not worthwhile unless you produce a lot of waste (81%). On the other hand, 58% agreed or strongly agreed that composting units attract rodents and/or vermin, 35% disagreed that units smell, while 31% agreed. A majority of respondents agreed that composting is an important step towards environmental sustainability, while 4% (or one respondent) disagreed.

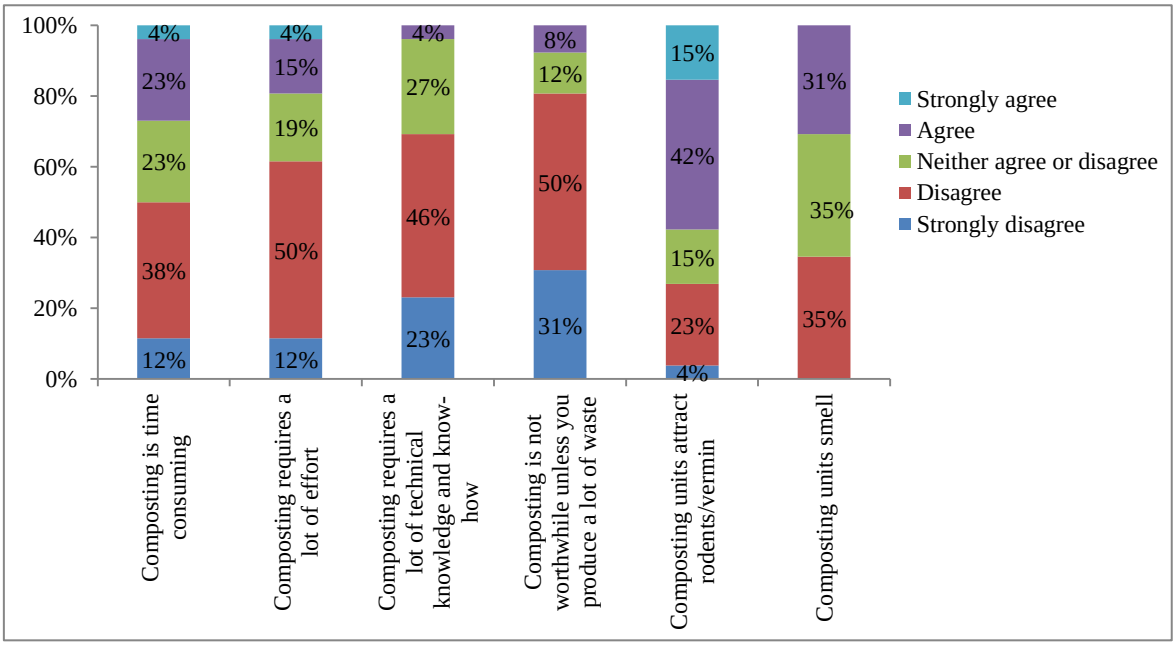

Figure 5.1 – Attitudes/Beliefs regarding Composting (Prior to Pilot Project)

Figure 5.2 shows agreement or disagreement with statements about the environment. A majority (69%) agreed that the balance of nature is very delicate, with 15% of these respondents strongly agreeing. In addition, 92% agreed the earth has limited room and resources. Respondents tended to disagree that people have the right to modify nature (12% strongly disagree and 35% disagree) and that humankind was created to rule over nature (42% strongly disagree and 39% disagree). Most respondents agreed that the activities of one household can make a difference to support sustainability, with only 4% (or one respondent) disagreeing.

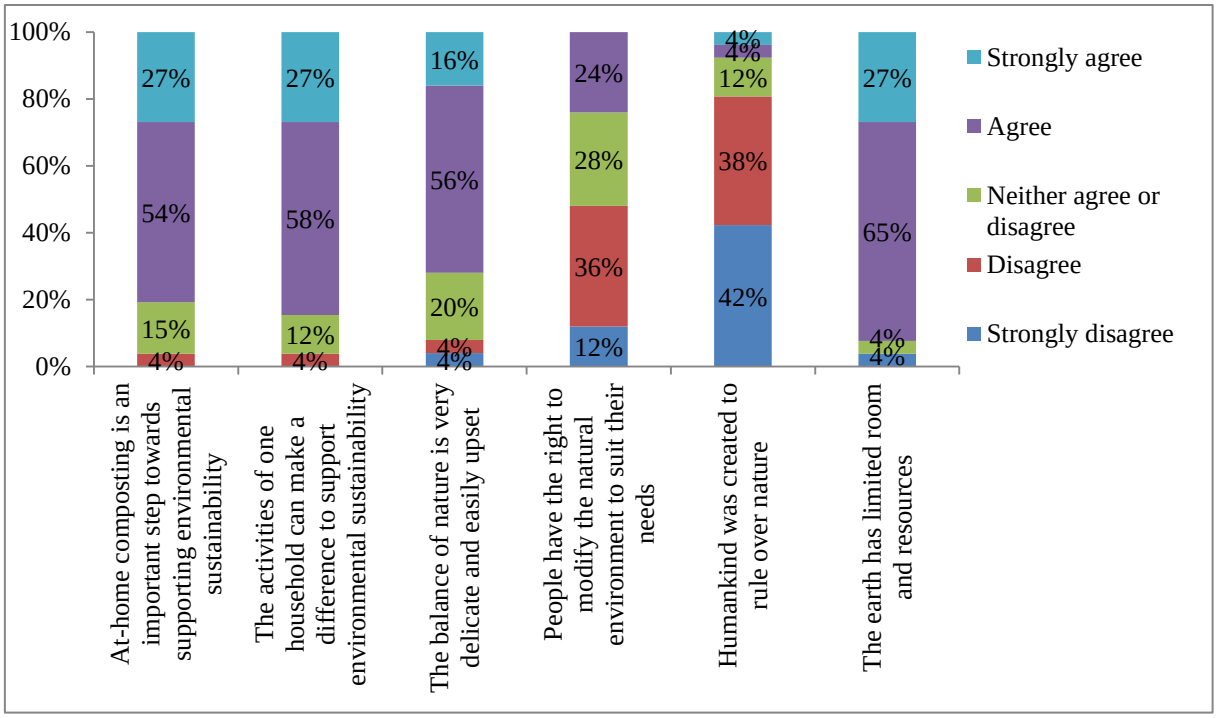

Figure 5.2 – Attitudes/Beliefs regarding the Environment (Prior to Pilot Project)

5.1.2.3 Past experience with composting and other pro-environmental activities

Respondents were asked about their past involvement with other pro-environmental activities, such as recycling, as well as previous experience composting. All reported participating in newspaper, aluminum can, and glass recycling, as well as donating products to charity/thrift shops. A majority also buy recycled products (81%) and reuse materials that would otherwise be thrown out (92%). In addition, 85% grow their own vegetables and/or fruit.

Most respondents composted prior to the Pilot Project, while 15% (or 4 respondents) had not. Of those who had composted previously, all respondents reported at least 2 or more years of experience composting and the majority had composted for more than 10 years (73%). Most had previously composted in the backyard (77%) and 59% also previously used the curbside pickup, 27% composted at work, 14% used a garburator, and 9% used a local community compost. In addition, 73% of respondents indicated they composted throughout the year, while 23% only composted from spring to fall.

Composters with prior experience were asked why they started to compost, with findings presented in Figure 5.3. The top reasons reported, with over 90% indicating these were at least "important", were: "don't like generating waste", "saves landfill space", and "to support sustainability". Social/familial pressures to compost were not significant, as 75% of respondents reported that this was "not important at all". The statement "cheaper than buying compost" was also not important with 36% reporting it was "not at all important" and 36% that it is only "slightly important". Other important reasons included saving room in the garbage bin (73% reported as at least "important"), feeling good (73% reported as at least "important"), and helping the District of Oak Bay (76%reported as at least "important"). Producing a better quality compost also appeared to be a factor in the decision-making as 68% identified this as at least "important".

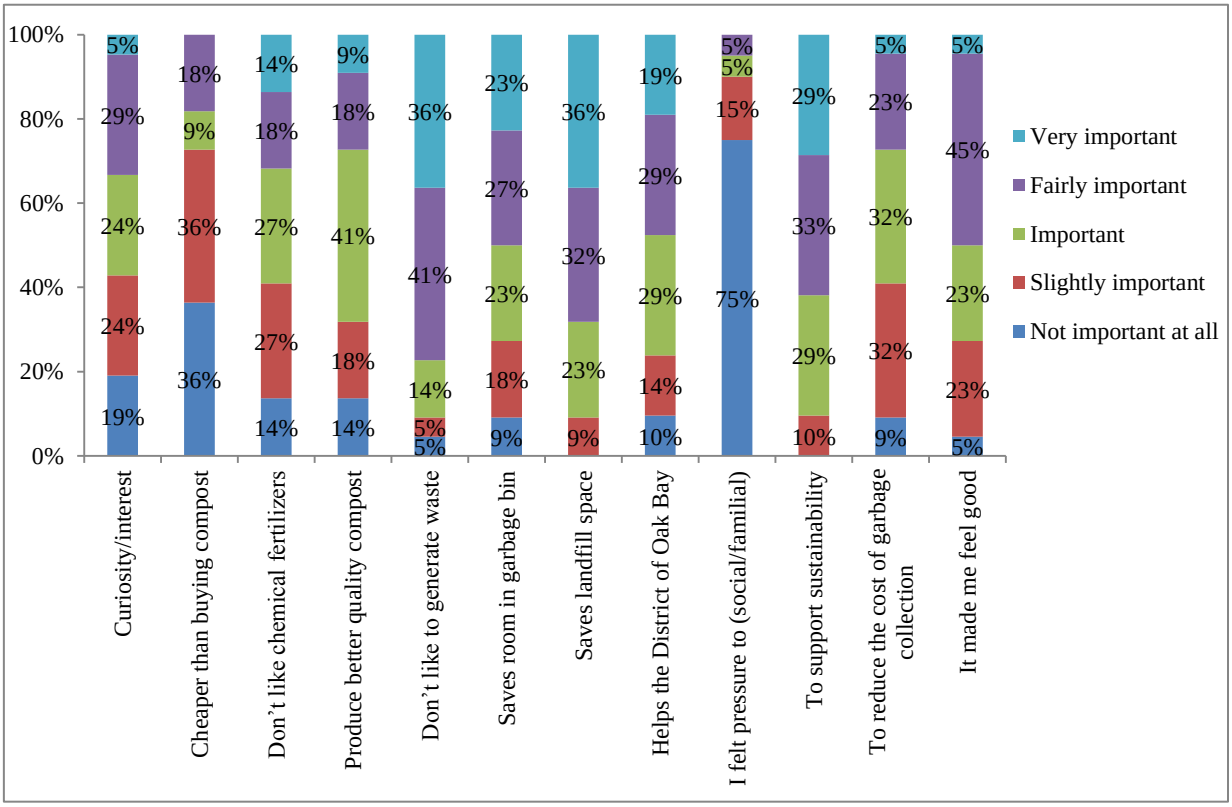

Figure 5.3 – Reasons to Start Composting (Prior to Pilot Project)

5.1.3 Reason for participation in the Pilot Project

Figure 5.4 depicts the reasons respondents' selected for participation in the Pilot Project. The most common reason was to help the District of Oak Bay (28%). Responses in the "other" category included interest in the unit, desire to try a different method, neighbourhood canvass, and limitations of curbside pickup.

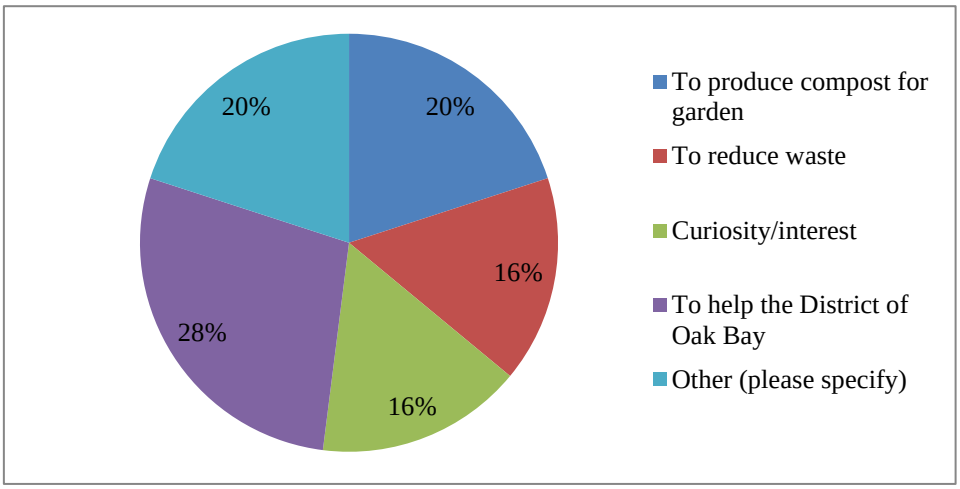

Figure 5.4 – Reasons for Participating in the Pilot Project

All but one of the respondents currently use the Joracomposter provided by Oak Bay. The respondent not using the unit identified a lack of routine and concerns about smell as reasons for not using the unit.

5.1.4 Experience in the Pilot Project

5.1.4.1 Composting habits and use of compost product

Respondents were asked what they are composting. All respondents using the composter are composting vegetables, and a majority are composting fruit (96%), soft plant waste (96%), food scraps (88%), eggs/eggshells (88%), teabags/tealeaves (88%), coffee grounds/filters (84%), and bread/biscuits (80%); 36% are composting meat and bones and 32% are composting shellfish.

Figure 5.5 shows what percentage of garden and kitchen waste respondents are composting at home: 60% of respondents indicated that they were composting 75% or more of their garden and kitchen waste at home.

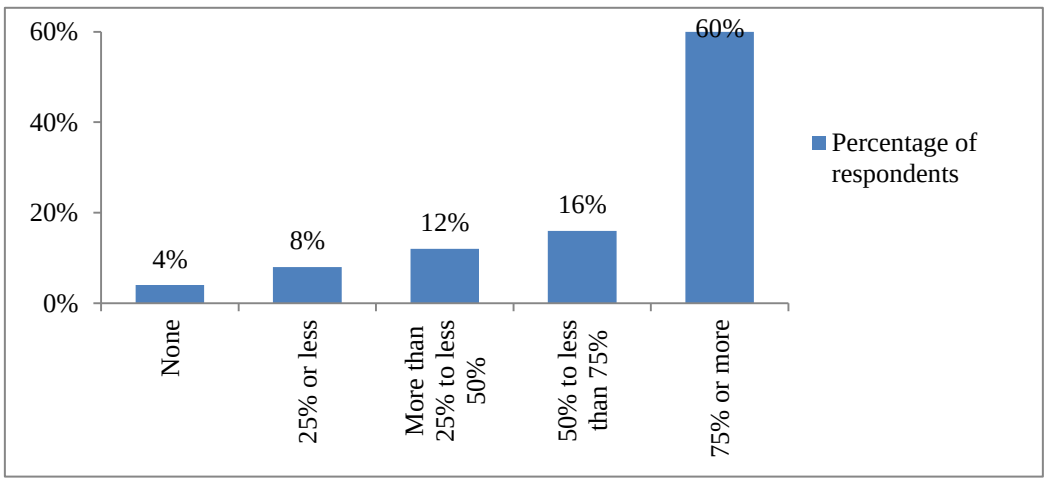

Figure 5.5 – Percentage of Garden and Kitchen Waste Composting at Home

Of those composting less than 75% of their garden or kitchen waste at home, 33% indicated one of the reasons was because some waste is unpleasant to handle. Other rationales included forgetfulness (22%), inconvenience (22%), not worthwhile because of low waste volumes (11%), and lack of knowledge of what should/should not be composted (11%). All respondents have or plan to use the compost product for purposes related to their garden or yard.

5.1.4.2 Experience in and impacts of the Pilot Project

The impacts of using the Joracomposter on trash can and green bin volumes were explored. Figure 5.6 portrays the percentage of waste diverted from the trash can as a result of AHC: 82% experienced less waste, with 41% reporting more than 25% to less than 50% less waste going into the trash.

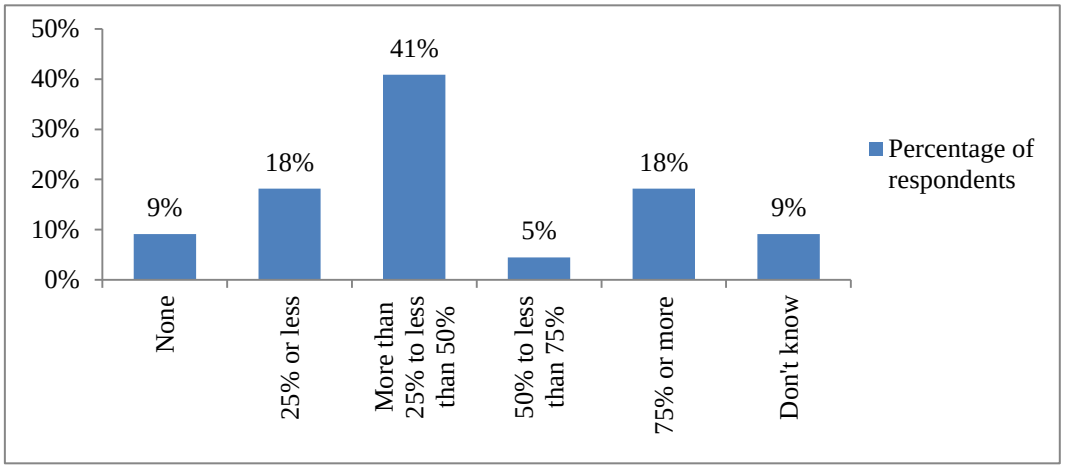

Figure 5.6 – Percentage of Waste Diverted From Trash

Figure 5.7 depicts the percentage of green waste diverted from curbside pickup. All reported experiencing at least some reduction in waste going to the green bin as a result of AHC, with 50% reporting 75% or more of their green waste diverted, while 27% reported a 25% or less difference.

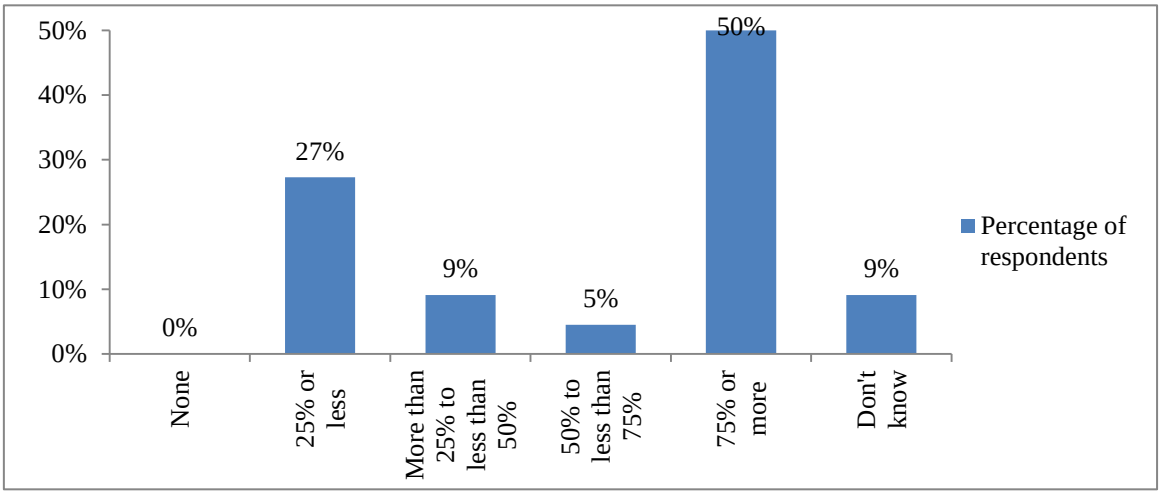

Figure 5.7 – Percentage of Green Waste Diverted from Curbside Pickup

Seventy-two percent of respondents had purchased compost previously; however a majority (82%) were unable to compare their AHC product to purchased compost, and 48% unable to evaluate their satisfaction with the compost product.

Ease to adjust to, and incorporate, composting behaviours are illustrated in Figure 5.8. For each behaviour, most respondents reported it was easy to do. Separating food waste was the easiest behaviour, with over 90% indicating this was at least somewhat easy to do; 54% found taking kitchen waste to the unit was easy and 21% found it somewhat easy. While most respondents found putting yard waste into the unit easy (38%) or somewhat easy (14%), 29% also found it somewhat difficult. Tending the unit was found to be easy or somewhat easy (58%) for some, while others found it difficult (17%).

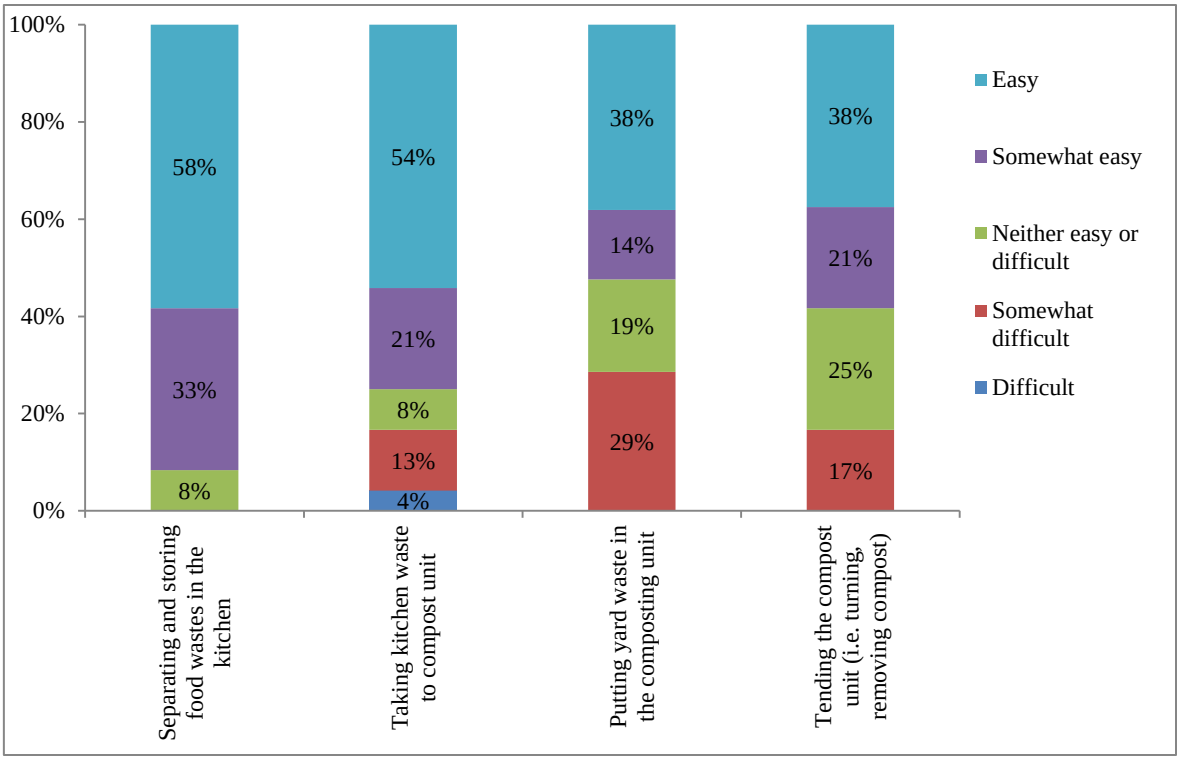

Figure 5.8 – Difficulty with Composting Behaviours

5.1.4.3 JoraComposter

Figure 5.9 portrays respondents' satisfaction with the Joracomposter. A slight majority (56%) were either entirely satisfied or somewhat satisfied with the unit. No respondents reported being entirely dissatisfied with the composting unit.

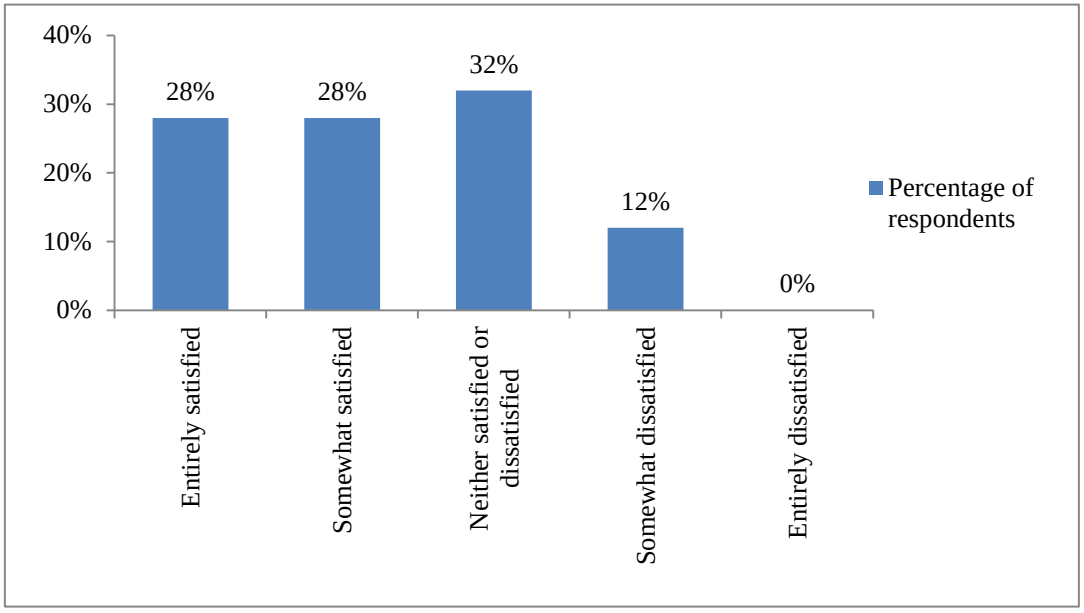

Figure 5.9 – Satisfaction with Joracomposter

Figure 5.10 depicts challenges with the composting units. The most common challenges were difficulty loading the unit (38%), unit not containing the smell (33%), and length of time of composting process (29%). A smaller percentage of respondents reported issues with the unit attracting vermin, the volume capacity of the unit, the location of the unit, and difficulty with unloading or spinning the unit. Fifty-seven percent reported "other" reasons, some of which were already captured by the list of options. Three (or 15% of those who responded to this question) reported that the unit leaks.

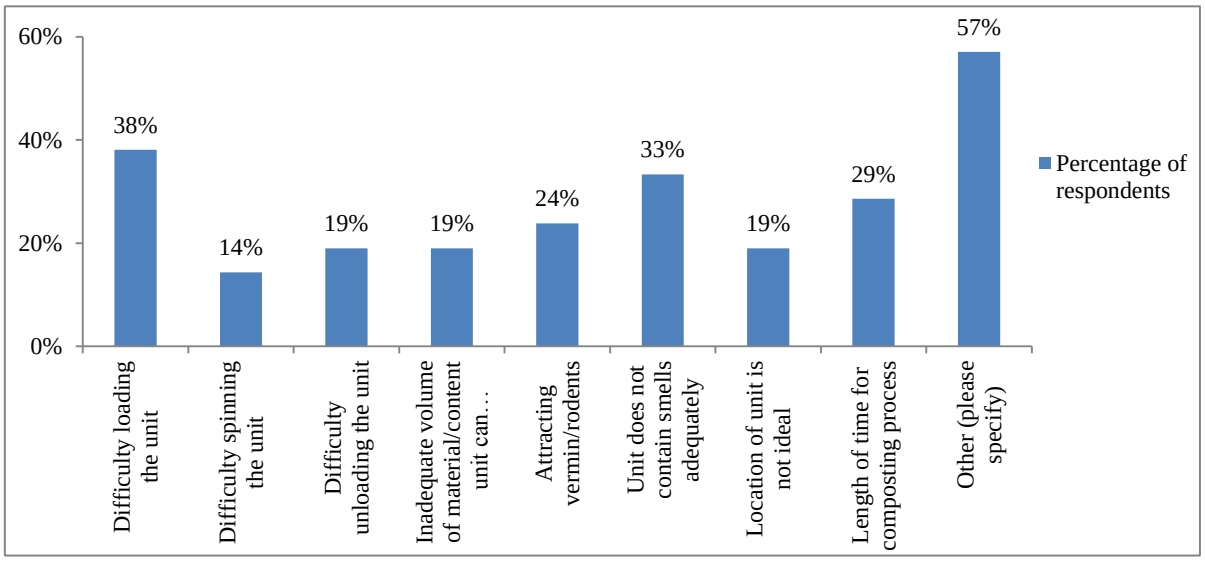

Figure 5.10 – Challenges with the Joracomposter

Respondents were asked about what they like about the Joracompsoter, expressed in Figure 5.11. The most common answers were that the unit is easy to spin (73%), has enough capacity for the household's volume of waste (55%), and is rodent/vermin proof (55%). No respondents indicated that they did not like the unit.

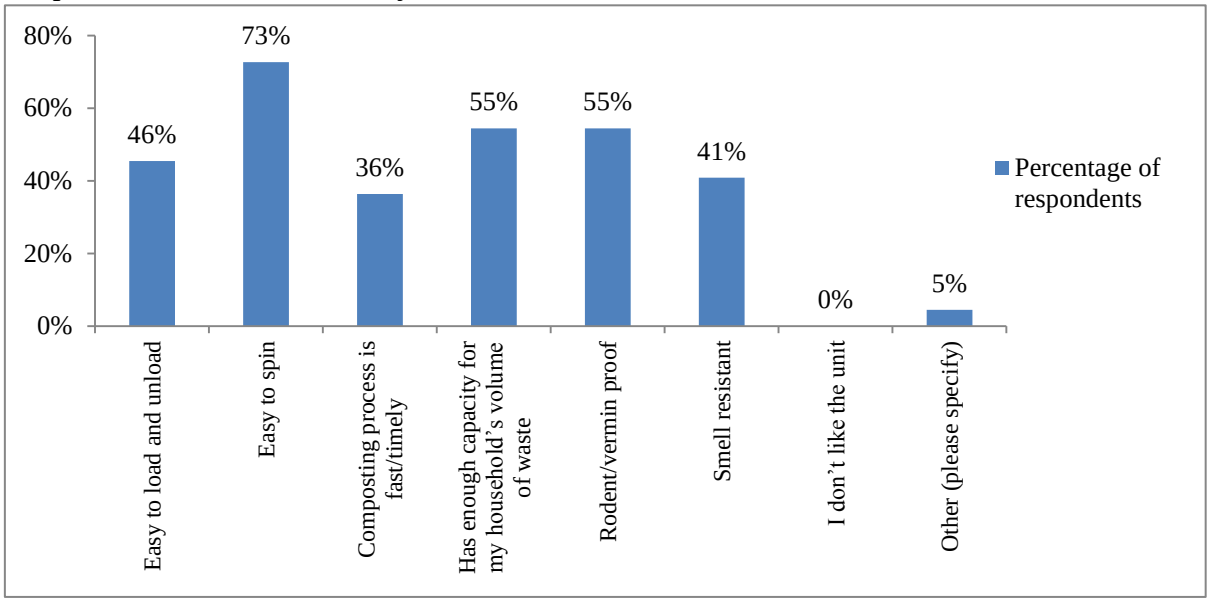

Figure 5.11 – Benefits of the Joracomposter

Volume capacity of the composting unit was explored, with 60% reporting the unit was large enough to accommodate the volume of waste produced by their household; 28% did not know if the unit was large enough, and 12% reported it was not large enough. When these two groups were asked about how much they were exceeding the unit's capacity, the majority did not know.

5.1.4.4 Current attitudes and knowledge

Figure 5.12 portrays current attitudes and beliefs towards composting. A majority of respondents disagreed with the statements that composting requires a lot of technical knowledge (88%), is not worthwhile unless you produce a lot of waste (83%), requires a lot of effort (71%), and is time-consuming (67%). Most also disagreed that composting units attract vermin/rodents (67%) and smell (54%). In addition, a majority of respondents agreed that AHC is an important step toward sustainability (see Figure 5.13). No respondent strongly disagreed or disagreed with this statement.

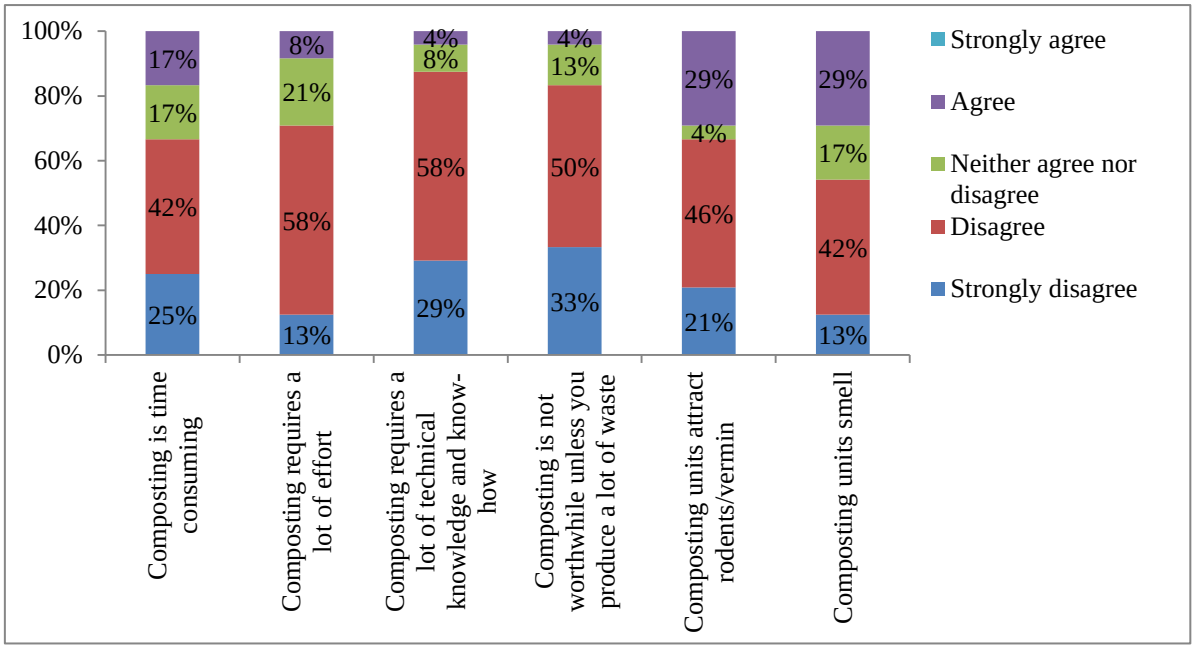

Figure 5.12 – Current Attitudes/Beliefs regarding Composting

When compared to prior attitudes and beliefs regarding composting (see Figure 5.1), there was a decrease in respondents who strongly disagreed with any of these statements regarding challenges of composting. There was a shift between prior attitudes regarding composting units attracting rodents/vermin. Previously 58% agreed with this statement (with 27% disagreed), however, current attitudes indicate a decrease to 30% agreeing with this statement (with 69% disagreed). A similar shift was seen with respect to the statement regarding smell, as 56% currently disagreed with this statement, up from 31%. Overall, respondents' recall about their prior attitudes toward composting and their current attitudes indicated that their attitudes toward composting had improved as a result of participating in the Pilot Project.

Respondents were also asked about their current attitudes and beliefs regarding the environment, as illustrated in Figure 5.13. A majority (87%) disagree that humankind was created to rule over nature. Respondents also tended to disagree that people have the right to modify the natural environment to suit their needs (52%). Eighty-three percent agreed that the earth has limited room and 70% agreed that the balance of nature is very delicate and easily upset. Moreover, 78% agreed or strongly agreed that the activities of one household can make a difference to support sustainability. When compared to reported prior attitudes, there was no noticeable trend or shift between past and current views on these statements.

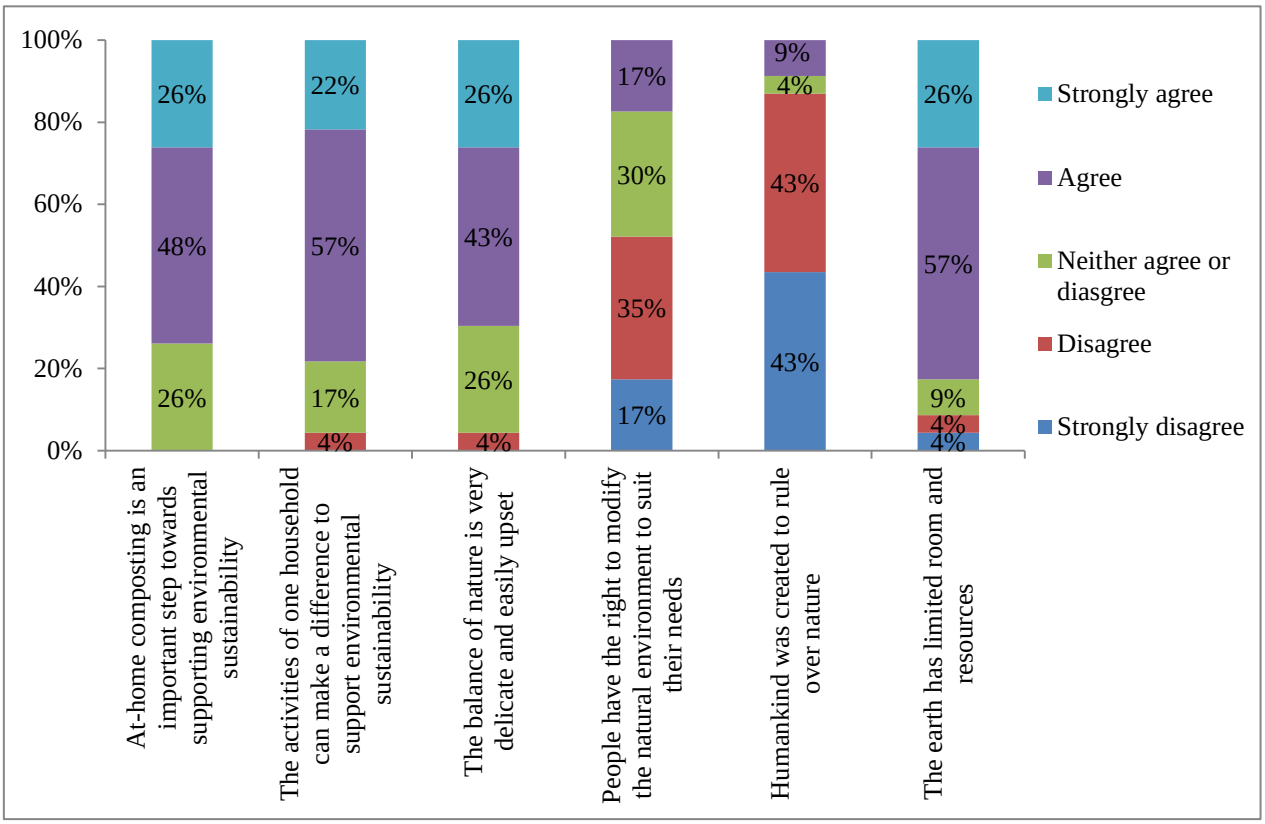

Figure 5.13 – Current Attitudes/Beliefs regarding the Environment

Respondents were also asked about how knowledgeable they are about composting now. Eighty-three percent reported they were somewhat knowledgeable, with 13% reporting to be very knowledgeable and 4% or one respondent indicating they were not knowledgeable. When compared to reported prior knowledge levels, the "somewhat knowledgeable" category increased from a 68% to 83%, with a reduction to the "not very knowledgeable" category from 16% to 4% (a reduction of three respondents). There was also a decrease in the "very knowledgeable" category, from 16% to 13%, a reduction of one respondent.

5.1.5 Future composting behaviours

Respondents were asked about anticipated future behaviours including continuing in the Pilot Project, continuing to at-home compost after the Pilot Project, and motivations to continue to compost. Seventy-six percent of respondents anticipate continuing in the Pilot Project until its completion, 16% are undecided, and 8% do not anticipate continuing. These results are mirrored in the responses regarding continuation of AHC following the Pilot Project. Figure 5.14 illustrates responses about reasons for continuing to compost in the future. Reasons ranked most frequently as fairly or very important included supporting sustainability, saving landfill space, disliking generating waste, and reducing costs of garbage. Social pressure was viewed by a majority as not being important at all in their decisions making, as was curiosity/interest. This is consistent with the motivations reported to start composting.

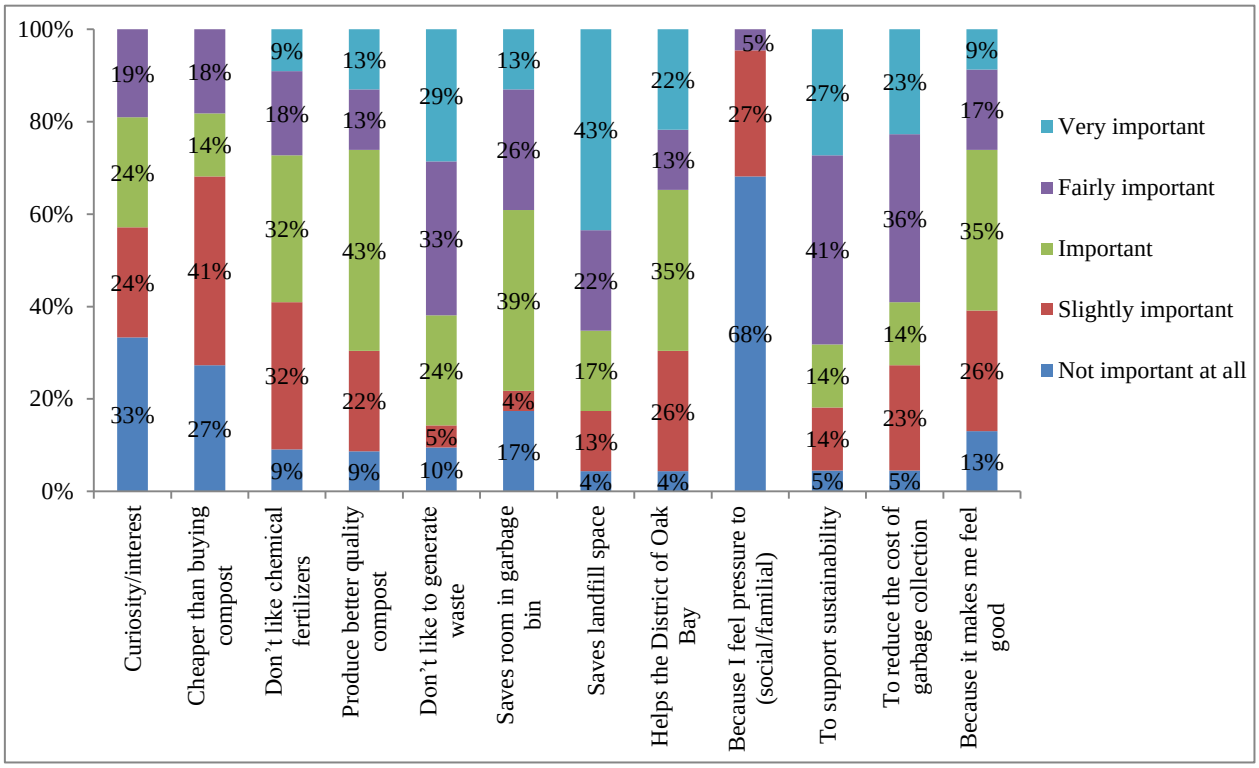

Figure 5.14 – Reasons for Composting in the Future

Questions about implementing AHC thought Oak Bay found 60% would support this while 12% would not. Twenty-eight percent did not know if they would support it or not. The majority of respondents (56%) did not know if they would be willing to pay for a composting unit while 28% reported they would, and 16% would not.

5.1.6 Summary of survey findings

In summary, prior to the Pilot Project most respondents were knowledgeable about composting, had positive attitudes towards both composting and the environment, and had prior experience with other pro-environmental behaviours. A majority also had past experience composting, with motivations to start composting being for environmental reasons. The most common motivation to participate in the Pilot Project was to help the CDOB. During the Pilot Project, a majority of respondents were composting at least 75% of their green waste at home, and had experienced less waste in both the trash can and green bins as a result of AHC. In addition, most found incorporating and adjusting to AHC behaviours easy. A majority were satisfied with the Joracomposter, identifying some key benefits of the units; however, some experienced challenges with the unit.

Attitudes regarding composting generally improved as a result of participating in the Pilot Project, though a similar trend was not evident with respect to attitudes towards the environment. Knowledge also generally improved as a result of participation in the Pilot Project. Motivations to continue to compost were comparable and consistent with

motivations to start composting. Generally, most participants were interested in not only continuing in the Pilot Project, but also continuing to compost at home following the Pilot Project's completion. Overall, a majority of participants would support the implementation of AHC throughout Oak Bay.

5.2 INTERVIEWS

A total of eleven respondents to the survey indicated they were interested in participating in a telephone interview. However, due to participant drop out, seven telephone interviews were conducted. The interview findings are presented in four sections, in a manner consistent with these research questions, including (1) strengths and weaknesses of the composting units, (2) participant behaviours, (3) strengths and weaknesses of AHC in Oak Bay, and (4) opportunities to improve the AHC experience.

5.2.1 Strengths and weaknesses of the composting units

5.2.1.1 Durability

Two interviewees expressed concerns about durability of the unit (one noting signs of rust and chipped paint, while another expecting to soon see signs of wear and tear due to the climate). A handle fell off one of the units - the interviewee was able to use the composter using the other handle, but could not re-attach the handle that fell off.

5.2.1.2 Usability

Three interviewees commented on balancing challenges contributing to the composter, although of these One said it got easier the more they did it. Three found the unit spun easily and liked that it rotates to mix compost. Two commented on how hot the unit is inside; one interviewee commented that the unit composts quickly. Two expressed concern about emptying the unit when the compost was ready, believing that it will be challenging and require some effort. One interviewee found the unit leaked unpleasant liquid. One interviewee found the decomposition process taking longer than expected.

5.2.1.3 Size and mobility

Four interviewees commented that the unit was large and troublesome to originally get into their yards (for CDOB delivering it, not for interviewees) and three commented the actual space for composting was too small or filled up too quickly. One interviewee is planning on moving the composter further away from their house, and one had concerns about the proximity of their neighbour's composter to their house (and subsequent odour). One continues to use other at-home composters due to high volumes of garden waste for composting; another one expects to take yard trimmings to the landfill in spring/summer.

5.2.1.4 Rodent-proof

All interviewees mentioned concern with rodents (one interviewee does not put meat, fat, or cheese in the unit out of concern; one would not compost food waste in the units they

owned prior to the Pilot Project because of concerns with rodents). Three mentioned lots of fruit flies in the compost, two in a negative reference, one in a neutral reference.

5.2.2 Participant behaviours

5.2.2.1 General

Interviewees agreed to participate in the Pilot Project generally related to their support of composting and, in some cases:

- To learn more about composting
- To get a free new or different type of composter
- Because the current green bin curbside pickup or the interviewees' current home composter is not meeting their needs
-

Three interviewees had specific expectations about the project: two expected follow-up from CDOB about how composting was going, and one had seen composters around Oak Bay and expected to receive the same one. Two were unclear what would happen to the units once the pilot was over; two expressed an interest in keeping the unit. One thought they could not use the green bin while the Pilot Project was taking place. Four commented that they expect different seasons to impact their experiences with the composters (some interviewees specifically mentioned volumes of garden waste, fruit fly volumes and odours). All interviewees agreed their concern for the environment is reflected in their behaviours with the composter (i.e. they are concerned about the environment and thus use the composter). Interviewees were generally conscious about the waste their households generate.

5.2.2.2 Past experience and other related activities

Six interviewees had previous experience with composting. One interviewee had never composted but was interested in learning more about it. All respondents participate in recycling, gardening, and have already or intend to use the Joracomposter product for their garden. Two interviewees use a garburator (one as their primary organic waste disposal method followed by composting, one occasionally in the winter when "being a wimp", not wanting to go outside in the cold). Three interviewees commented on habit playing a role in their behaviours, either behaviour became habit or needs to become habit. Three reported they do not always compost (using phrases and words like "sometimes I screw up", "lazy", "I want it to be as convenient as possible", and "habit").

5.2.2.3 Compost material

Respondents put kitchen scraps/waste into the Joracomposter (one for a time, included chicken newspaper waste), however three continued to use the green bin for some kitchen scraps/waste (examples include bones, meat products, or "something rotten or really gross") and two also use a garburator (kitchen scraps that could not go down the garburator were added to the composter). Rationale provided for continuing to use the green bin included protecting a dog from bones in the compost product (as bones would not break down) and concerns about attracting rodents (while also acknowledging the Jora bins are

intended to be rodent proof). Two interviewees also put garden waste and one puts shredded documents into the composter.

5.2.2.4 Waste generation

No interviewee noticed a decrease in the amount of garbage waste generated (one did not answer and suggested asking again at a later time, expected seasonal differences). Four interviewees noticed a decrease in the volume of waste in their green bin; three were not/are not using their green bin during the Pilot Project (one was not using it prior to the Pilot Project and instead belonged to a community compost).

5.2.2.5 Knowledge

All interviewees felt knowledgeable about the composting process and about where to get more information if they needed it. One felt knowledgeable about decomposition, but was not sure why decomposition cannot happen in a landfill instead of a composting unit.

5.2.2.6 Future plans

Six interviewees plan on continuing to use the Joracomposter throughout the Pilot Project, as well as continue to compost once the Pilot Project is over. One does not want to continue to use it because of lack of success in making compost thus far although offered suggestions to ensure participant success. Two were unclear what would happen with the unit at the end of the Pilot Project; three would like to keep the units.

5.2.3 Strengths and weaknesses of AHC in Oak Bay and in general

All interviewees noted costs associated with participating in municipally sponsored AHC, some commenting this would factor into the likelihood of residents agreeing to participate in AHC (one interviewee suggesting a free bin may entice more residents to participate). Five interviewees commented they suspect their neighbours, who have a Joracomposter, are not using it. One believes that this Pilot Project demonstrates that Oak Bay cares about the environment and is a fairly well-educated population. One believes if AHC implemented throughout Oak Bay there would be initial backlash but the behaviour would become normalized like recycling. Four do not want the green bin to be replaced by Joracomposters (but some may be open to having both).

5.2.4 Improving the AHC experience

Three recommended education for residents to support composting (one suggested emphasis rodent proof quality and time/effort involved, two suggested a “starter kit” which may include sample compost and educational materials).

5.2.5 Summary of interview findings

The interview findings support the survey findings. While some interviewees expressed some satisfaction with composting unit, there were several concerns including the durability of the unit, usability, size and mobility of the unit, and a concern regarding attracting rodents. Overall, participants participated in the Pilot Project to support their

interest in composting, and all agreed that their attitude toward the environment is reflected in their participation in the Pilot Project and use of the composter. The majority of interviewees had past experience with composting, as well as recycling and gardening, and most were knowledgeable about composting. In addition, most are using the Joracomposter for their kitchen waste; however, they have not noticed a reduction in the overall waste their households' produce.

The majority of the participants plan on continuing in the Pilot Project and to continue to use the Joracompsoter, and indicated a desire to at-home compost following the Pilot Project. Most interviewees could not anticipate what the reaction of Oak Bay residents might be if AHC was implemented throughout the district, however concerns regarding costs were expressed by some interviewees. In an effort to improve the AHC experience, some interviewees recommended a starter kit, with a sample of compost and educational materials; others identified a desire for more support throughout the Pilot Project.

6 DISCUSSION

The aim of this project was to identify the experiences of participants in the Pilot Project, including the behaviours, perceptions, attitudes, beliefs, and opinions towards the Oak Bay Pilot Project. This section interprets and explores interview and survey findings in the context of the research questions. This section is divided into five parts, one for each research question. It is important to note that given the small sample size and the self-selection bias as result of participants self selecting into the Pilot Project, and again into the survey and interviews, generalizations are difficult to make and hypothesis testing was not possible.

6.1 STRENGTHS AND WEAKNESSES OF COMPOSTING UNITS

Both the survey and interviews explored participant views on and experiences with the Joracomposter. Overall there were conflicting views on the strengths and weaknesses of the units. In general, interview feedback on the unit focused on ease of use (loading, spinning, and emptying), capacity, installation, rodent-proof, and pleasantness (odours and leakage). A clear strength of the unit was easiness to spin, with a majority (73% or 17 respondents) indicating this in the survey. In many cases, where qualities were identified as a strength by some participants, others noted it as a weakness. For example, some survey participants (10) found the units easy to load, while others (8) did not, neither a clear majority. Slightly better, some (12) found the unit had sufficient capacity while others (4) did not, suggesting a strength of the unit is its capacity. A theme that arose from the interviews, but not in the survey, was the issue of the location and size of unit, with some interviewees identifying that the location of the unit was not ideal, with one who had since moved it to an alternate location. Two commented that the unit did not fit easily through the garden gate, since the unit was pre-assembled.

Concern with rodents was a common theme among interviewees and survey participants. Prior composting attitudes indicate general agreement amongst survey respondents that composting units attract rodents/vermin, and this concern was echoed in interviews with all interviewees mentioning a concern about rodents. That said, a small majority of survey respondents (55%) reported rodent/vermin proof as a key benefit of the Joracomposter. Rodent/vermin concern also had an impact on participant behaviour, as one participant, despite knowing the Joracomposter is rodent/vermin proof, would not put meat, fat, or cheese in the unit due to this concern. While many interviewees expressed concerns about rodents/vermin, none had experienced rodents/vermin getting into the compost. However, a concern with attracting rodents/vermin remained consistent throughout most interviews. Overall, the majority of survey participants responded favourably suggesting a general satisfaction with the unit.

Some respondents and interviewees reported that it was too early to determine satisfaction with the final compost product and that they did not know if the Joracomposter was large enough for the volume of compostable waste produced at their household. These are valuable questions to better understand participant experiences with the Joracomposter and AHC. Additional research at the end of the Pilot Project, as discussed further in the

recommendations section of this report, may offer valuable insights into these questions once participants have had additional time with the Joracomposter and AHC.

6.2 PARTICIPANT ATTITUDES/BELIEFS, KNOWLEDGE, AND BEHAVIOURS

Overall participant experiences in the Pilot Project were positive, as reflected in the high percentage of respondents and interviewees who anticipate continuing in the Pilot Project. Had experiences been negative, high participant dropout rates would be expected; however, that is not the case thus far with this Pilot Project. Further to this, a significant majority of participants have also indicated an interest in AHC in the future. This suggests that participant experiences with AHC have been positive overall.

6.2.1 Attitudes/beliefs

Overall the majority of the participants appeared to hold pro-environmental attitudes and positive attitudes towards composting. In general, a majority of participants (76%) would like to continue in the Pilot Project until its completion and 76% would also like to continue AHC after the Pilot Project. Given such high percentages for both questions, it can be inferred that the overall attitudes and beliefs regarding the Pilot Project and AHC are positive, otherwise one would expect more significant drop out rates amongst Pilot Project participants.

More specifically, based on a review of the data (through cross tabulations), current attitudes and beliefs regarding composting may be linked to continued participation in the Pilot Project and future participation in AHC (not necessarily continuing in the Pilot Project). Specifically, strong positive attitudes towards composting related to desire to continue in the Pilot Project and to participate in AHC following the completion of the Pilot Project. A similar trend was apparent between participants with pro-environmental attitudes and continuation in the Pilot Project and future participation in AHC. Similarly, those with positive attitudes towards the environment (in some cases coexisting with negative opinions about composting) were either undecided or interested in continuing AHC in the future. These appear to be reasonable connections as participants with positive views of composting and/or the environment may be more likely to participate in composting and therefore may have a stronger desire to continue with AHC. In contrast, holding negative views or attitudes either about composting or the environment did not appear to impact desire to participate in the Pilot Project or in AHC in the future. This was particularly true with participants who raised concern about odours/attracting rodents, who nonetheless reported an interest in AHC after the Pilot Project.

6.2.2 Knowledge

Most respondents indicated that they were at least somewhat knowledgeable about composting prior to the Pilot Project. Interestingly, the Pilot Project seems to have had some effect on knowledge, as some respondents indicated that they were now more knowledgeable about composting than they were prior to the Pilot Project. However, one participant who reported their prior level of knowledge as “very knowledgeable” reported their current knowledge as “somewhat knowledgeable”, which was an exception to the

overall trend. Overall, Pilot Project participants reported an increase in composting knowledge. In general, interviewees reported that they were knowledgeable about composting, and were able to describe what composting is and the decomposition process in basic terms. Many "knowledgeable" participants reported an interest in continuing both in the Pilot Project and AHC, however, there was one participant who reported they were not knowledgeable, but still had an interest in continuing in the Pilot Project and AHC in the future. Literature links knowledge and participation in recycling behaviour, suggesting that a population generally knowledgeable about composting may be more likely to agree to participate. However, knowledge of, and interest and participation in, composting may be simultaneously determined, so it is difficult to suggest that knowledge is a predictor of intent and future action in AHC.

6.2.3 Past and current behaviours

With respect to past behaviours and experience, the findings support that those with more composting experience (10 or more years) were more likely to be interested in continuing in the Pilot Project and to continue with AHC after the Pilot Project than those with less composting experience. Prior behaviour, as supported by the literature, may be a reliable indicator of future intent, and the findings align with this: someone who composted previously may be likely to compost again in the future than someone who has never composted. Findings support a link between years of composting experience with satisfaction with the composter: the more years of experience, the more likely were participants to be satisfied with the composter.

Most respondents and all interviewees reported using the Joracompsoter. Most interviewees described a weekly, if not daily routine, with respect to managing their kitchen waste, adding to the unit, and tending to it. However, interviewees did also comment on some inconveniences that affect their use of the composting units. While most participants hold generally positive attitudes towards composting and the environment, inconvenience appears to be more influential in decision-making than these positive attitudes. For example, survey results suggest "waste being unpleasant to handle" as the top reason for not composting 75% or more of kitchen waste. Inconvenience was also directly identified as a reason for this by some respondents. This is supported by the interview data where interviewees identified some inconveniences in their composting routines, which included taking the kitchen waste from the kitchen to the unit (particularly in bad weather conditions) and routinely needing to spin the unit. In addition, some participants declined adding particular forms of kitchen waste to their compost out of concern it would attract rodents, instead using their green bin and despite the compost unit being advertised as rodent proof. The theory of planned behaviour supports that a participant may want to compost to support CDOB and the environment, however there may be a more immediate benefit involved with not performing a composting activity/behaviour. It may be worth exploring to what extent such inconvenience factors override a participant's desire to compost and also what mechanisms exist, if any, to make AHC as convenient as possible.

6.2.4 Social awareness

A significant majority of respondents to the survey did not consider social/familial pressures as being an important factor or consideration in their initial decision to compost, or their decision to compost in the future. As such, an unexpected theme arising from interviewees was their focus on and perception of their neighbours. Several commented that they suspect others in their neighbourhood, who have Joracomposters, are not using them. Behavioural theory may explore this with these interviewees as to whether they feel any pressure to use their composter in case their neighbours perceive them in the same way, and if so, how significant this pressure is on their behaviour. While survey questions touched on familial pressures involved with composting decisions, there was no question specific to neighbours, which may have provided additional insight into motivation and behaviours.

6.3 STRENGTHS AND WEAKNESSES OF AHC IN OAK BAY AND IN GENERAL

6.3.1 Strengths

It was evident from the survey results that most respondents were experiencing some decrease in the amount of waste going into the trash and, even more so, with respect to green waste for curbside pickup. This theme was echoed by the interviewees. This is a strength of AHC in general, as this means less waste to be managed by the municipal government, an effect and benefit potentially felt by Oak Bay (keeping in mind sample size). Moreover, given that part of the rationale for this project sprung from organic waste being barged to the mainland for processing, less (or no) green waste for barging is a relevant strength and benefit of AHC to Oak Bay. In addition, AHC was generally viewed as "sustainable" with several interviewees referencing this term in the interviews. This could suggest that, regardless of whether AHC is *actually* environmentally more sustainable than other mechanism of waste management (as there is no agreement in existing literature), AHC is perceived as being more environmentally sustainable. This is another relevant strength for AHC in Oak Bay, given the priorities identified in the Official Community Plan related to sustainability and given that AHC is generally viewed as an important step in environmental sustainability by the respondents (with 69% agreeing that it is an important step). Moreover, given that Oak Bay has a Green Party MLA, Oak Bay may be an ideal location for AHC, though there is no demographic data to support this claim and the sample size of this study is too small and is self-selected to substantiate such a claim. In addition, a strength of AHC for those who participate is the benefit of directly being able to use the compost produced in the garden, an interest expressed in both interviews and the survey.

6.3.2 Weaknesses

Some weaknesses identified by both survey respondents and interviewees related to AHC in general, but also more specifically to Oak Bay are concern of rodents/vermin and weather/seasons. The concern for rodents/vermin was raised consistently throughout the survey and the interviews; however, the Joracomposter may have broken down some misconceptions regarding risk of attracting rodents/vermin. There were also concerns regarding susceptibility to the seasons. Some interviewees raised concerns about the weather impacting the composting process, particularly with respect to the length of

decomposition and smelliness. Weather was also a factor in use of the unit, as one interviewee suggested that due the poor weather conditions, they were not using the composter as much as they should. Another weakness of AHC is the fact that it relies even more heavily on participant involvement than the current curbside composting. One interviewee expressed concerns with people reverting back to throwing green waste in the trash if they are resistant to AHC. As seen in the survey, not all participants are composting all of their compostable waste via AHC and even some participants (who are volunteers in AHC) admitted to not using the composter as much as they should due to inconvenience or other factors. This raises a concern with respect to effective participation from uninterested or unengaged residents in AHC.

In addition, costs for residents to participate in AHC or have AHC in Oak Bay may be viewed as a weakness. While there may be interest to participate in AHC and environmental attitudes to support such participation, cost may prove to be a barrier to participation and acceptance of AHC. Survey data found most respondents do not know if they would be willing to pay for an AHC unit. Interviewees suggested Oak Bay residents are sensitive to costs and any increase in municipal taxes related to AHC may be not be well received, especially if the rationale for the program is to reduce costs. In fairness to respondents, no details about how much a composter might be, if the cost may be offset if green bin pickup was ended, or if it would be a one-time charge or built into regular municipal taxes, and so on, were provided. Related, findings support that satisfaction with the composter is related to willingness to pay for it: if dissatisfied, willingness to pay is low, while if participants are willing to pay, they are more likely to have been at least somewhat satisfied with the unit.[2] At the very least, cost has been identified as a contentious issue. Given some expressed apprehension related to the potential costs of AHC and that the majority of respondents did not know if they would be willing to pay for an AHC unit, additional research and a comprehensive financial analysis should be undertaken by CDOB before making a decision, as discussed in the recommendations section.

6.4 OPPORTUNITIES TO IMPROVE THE AHC EXPERIENCE

This research question was intended to be answered through interviews; however, given that those interviewed tended to be generally satisfied with the Joracomposter and overall experience in the Pilot Project, drawing out opportunities for improvement were limited. One theme that arose was information. Two interviewees suggested that there should have been more information provided to participants, particularly about what the final compost product should look like. It would be challenging for someone with little to no experience or knowledge to know when their compost product is done. It was suggested that a "starter kit" be delivered with each Joracompsoter containing information and some compost. Moreover, one interviewee recommended that CDOB provide the dimensions of the unit in the future, to ensure participants understand how big the unit actually is. In addition, given that some interviewees had issues with respect to unit location, CDOB should either consult

[2] Sample sizes are too small to conduct hypothesis testing.

participants on location in advance of delivering and installing the units or offer to re-locate it should issues arise. There was also a suggestion from an interviewee about promoting the units in the community to highlight the benefits of the units and demonstrate proper use. This interviewee also suggested that this could help build a community of composters within Oak Bay, indicating there may be some draw if there is also a social aspect with respect to the program. Another opportunity for improvement is increasing support, as several interviewees identified this as an area of dissatisfaction with the Pilot Project. CDOB should engage with participants throughout the process and provide support where needed, such as answering questions, acknowledging concerns, and providing additional information.

6.5 PARTICIPANT DEMOGRAPHICS

The majority of participants were university educated, over 50 years old, with incomes above $49,999, residing in single family dwellings with multiple-occupants. Overall this is not representative of the general Oak Bay population with respect to age or education, as discussed below. While there is little literature on the demographics of composters, the demographics of this sample are fairly consistent with recycling literature: Pilot Project participants were older, wealthier, and better educated. That said, there did not appear to be any noticeable trends with respect to demographic impacts or effects on participant experiences in the Pilot Project, satisfaction with the Joracomposter, or interest to continue in the Pilot Project or with AHC following the Pilot Project's completion. This is consistent with the literature that demographics do not appear to be predictors of recycling behaviour, or in this case, composting behaviours. However, due to small sample size hypothesis testing was not possible.

6.6 LIMITATIONS AND DELIMITATIONS OF THIS RESEARCH

Two major limitations of this research affect generalizability of the research findings. The first is small sample size. Due to a small sample size hypothesis testing was not possible. One lesson learned given the difficulties experienced by the researchers to collect data from participants is that, in the future, a condition of participating in a pilot project such as this one should that participants must provide feedback to researchers.

The second limitation of this research is the self-selection bias, given that participants had to self-select to participate in the Pilot Project and then self-select to participate in the survey and interviews. While 65% of the total number of participants in the Pilot Project, because participation was voluntary, there is still a large number of participants who did not participate in the survey or interviews, whose views may not be reflected in this research. In addition, based on a comparison to the general Oak Bay population, participants in the 65+ age category were over represented as were participants in the 18-49 age category. University educated individuals were also overrepresented in this sample. This suggests that those who self-selected into this Pilot Project, and further self-selected into the survey and interviews, may not be representative of the general Oak Bay population. Given that the population of interest of this Pilot Project (and for AHC in Oak Bay in general) is single family home dwellers, an argument may be made that those who reside in these types of dwellings are generally wealthier and more educated than the general Oak Bay population

who may reside in other types of dwellings. However, there is no data to substantiate this claim. This research provides insights into the experiences of people who are interested in AHC and volunteered to participate in the Pilot Project, but does not answer questions about the degree of interest in AHC in Oak Bay in general. The results of this research cannot be used to infer to the general population and as a result, additional research regarding AHC in Oak Bay should be undertaken before making a decision.

7 RECOMMENDATIONS

This section provides recommendations to CDOB based on the findings and analysis of this project. Findings are arranged in descending order of importance.

1. ***Conduct additional research with a larger, representative sample of single family home dwellers***

As noted in the limitations section and discussion, the sample size and self-selection of participants limits the inferences this report can make regarding whether Oak Bay should proceed with an AHC program. Generally speaking, some Oak Bay residents are willing to compost at-home and this evaluation speaks to the experiences of those who volunteered to participate. This evaluation cannot speak to whether an AHC program is suitable for all of Oak Bay's single family housing or to willingness of residents to switch from curbside pickup to AHC. In order for the CDOB to collect such information, a random survey of Oak Bay single family housing residents is required. Such survey should include a detailed description of what AHC is and what it entails and information about the financial and social costs and benefits of AHC to both these residents and the CDOB. This survey should also explore the issue of cost to and willingness of residents to pay, and how much, as the Pilot Project did not adequately explore such issues. Since one of the underlying motivations of this Pilot Project was financial, the CDOB should take into account both the costs and/or savings of AHC for the CDOB and Oak Bay residents, as residents are unlikely to support additional costs to themselves and the additional inconvenience associated with AHC.

2. ***CDOB should conduct financial analysis of options available to manage organic waste in Oak Bay***

The CDOB should conduct a comprehensive financial analysis on the options available to Oak Bay for the management of organic waste. This analysis should consider multiple outcome scenarios, including AHC with the Joracomposter, as well as other approaches to manage of organic waste. The CDOB should consider the financial viability of AHC in replacement of and in addition to the current curbside pickup. Such information will be useful to Oak Bay in anticipation of wider consultations, including a random survey to the broader Oak Bay population, community information sessions and meetings, focus groups, and could be supported by a jurisdictional scan of organic waste management practices.

3. ***Conduct additional research at the end of the Pilot Project***

Several respondents expected their experiences with the composter to be impacted by the changing seasons, and 48% of survey respondents indicated that it is too early to determine how satisfied they are with their compost product. CDOB delivered composters to participants in summer 2016, the pilot runs until August 2017, and data was collected around the midway point, in December 2016, January and early February 2017. Data collection at the end of the Pilot Project, after participants have had additional time with composting (and changing seasons), may offer further insight or a more complete picture of participant behaviours and experiences with the Joracomposter. The evaluation framework used in this project could be applied again in this final evaluation of the Pilot Project. In particular, the survey sections regarding use of the Joracomposter, satisfaction with the Joarcomposter, waste diversion, satisfaction with compost product, and support for AHC in the future and in Oak Bay may provide additional and valuable insights on the Pilot Project and participant experiences. The future evaluation of the Pilot Project could be conducted using a similar process and recruitment strategy as employed in this evaluation.

8 CONCLUSION

This report has outlined the research evaluation to collect and consider participant feedback on the CDOB's Point of Source Composting Pilot Project. Data was collected, informed by existing literature, through online surveys and telephone interviews to better understand participants' experiences and behaviours in the Pilot Project. The data provides insights into participant experiences in the Pilot Project. In general, participants are interested in continuing in the Pilot Project and continuing with AHC following the Pilot Project's completion. Challenges were also identified with respect to AHC in general and in Oak Bay, as well as with the Joracomposters. While this research found that a majority of participants would support the implementation of AHC throughout Oak Bay, there are significant limitations to this research due to small sample size and a self-selection bias. Opportunities for future research exist to better represent Oak Bay residents' preferences regarding alternatives to organic waste management.

9 REFERENCES

Adhikari, B., Tremier, A., Martinez, J., & Barrington, S. (2010). Home and community composting for on-site treatment of urban organic waste: perspective for Europe and Canada. *Waste Management & Research, 28*(11), 1039-1053.

Amlinger, F., & Peyr, S. (2008). Green house gas emissions from composting and mechanical biological treatment. *Waste Management & Research, 26*, 47-60.

Andersen, J.K., Boldrin, A., Christensen, T.H., & Scheutz, C. (2010). Greenhouse gas emissions from home composting of organic household waste. *Waste Management, 30*, 2475-2482.

Andersen, J.K., Boldrin, A., Christensen, T.H., & Scheutz, C. (2011). Mass balances and life cycle inventory of home composting of organic waste. *Waste Management, 31*, 1934-1942.

Andersen, J.K., Boldrin, A., Christensen, T.H., & Scheutz, C. (2012). Home composting as an alternative treatment option for organic household waste in Denmark: An environmental assessment using life cycle assessment-modelling. *Waste Management, 32*, 31-40.

Barr, S. (2007). Factors influencing environmental attitudes and behaviours: A U.K. case study of household waste management. *Environment and Behavior, 39*(4), 435-473.

Barr, S., Ford, N. J., & Gilg, A. W. (2003). Attitudes towards recycling household waste in Exeter, Devon: Quantitative and qualitative approaches. *Local Environment, 8*(4), 407-421.

Barrena, R., Font, X., Cabarrell, X., & Sanchez, A. (2014). Home composting versus industrial composting: Influence of composting system on compost quality with focus on compost stability. *Waste Management, 34*, 1109-1116.

Blok, V., Wesselink, R., Stuynka, O., & Kemp, R. (2015). Encouraging sustainability in the workplace: a survey on the pro-environmental behaviour of university employees. *Journal of Cleaner Production, 106*, 55-67.

Brace, I. (2004). *Questionnaire design: How to plan, structure and write survey material for effective market research.* London, UK: Kogan Page Limited.

Burns, R. B. (1997). *Introduction to research methods (2nd Ed.).* Melbourne. AU: Longman Cheshire.

Canadian Council of Ministers of the Environment (CCME) (2014). Current priories [web page]. Retrieved from http://www.ccme.ca/en/current_priorities/waste/index.html

Capital Regional District (2009). Residential organics collection pilot final report summary [web page]. Retrieved from https://www.crd.bc.ca/docs/default-source/recycling-waste-pdf/two-year-pilot-project.pdf?sfvrsn=0

Capital Regional District. (2016). *Regional growth strategy*. Retrieved from https://www.crd.bc.ca/docs/default-source/regional-planning-pdf/RGS/2016rgsdraft-2016-03-11.pdf?sfvrsn=2

Carrus, G., Passafaro, P., & Bonnes, M. (2008). Emotions, habits and rational choices in ecological behaviours: The case of recycling and use of public transportation. *Journal of Environmental Psychology, 28*, 51-62.

Century 21. (2017). Oak Bay real estate listings and information [Web page]. Retrieved from http://www.century21.ca/CA/BC/Oak_Bay

Cleverly, B. (2014, January 2). Oak Bay expands kitchen scraps pickup, Saanich to follow in spring. *Times Columnist.* Retrieved from http://www.timescolonist.com/news/local/oak-bay-expands-kitchen-scraps-pickup-saanich-to-follow-in-spring-1.777209

Community Charter, SBC 2003, c 26.

Compost Education Centre (n.d.). Factsheet series backyard composting [Web page]. Retrieved from https://www.compost.bc.ca/wp-content/uploads/2015/06/1-Backyard-Composting.pdf

The Corporation of the District of Oak Bay. (2014). *District of Oak Bay official community plan*. Retrieved from https://www.oakbay.ca/sites/default/files/ocp/2014/OakBay-OCP-Final-Website-dec0414.pdf

The Corporation of the District of Oak Bay. (2015a). *2015-2018 Council strategic plan.* Retrieved from https://www.oakbay.ca/municipal-hall/mayor-council/news/2015-2018-council-strategic-plan

The Corporation of the District of Oak Bay. (2015b). *2015 Annual report.* Retrieved from https://www.oakbay.ca/sites/default/files/municipal-hall/Reports/Annual%20report%202015%20-%20web.pdf

The Corporation of the District of Oak Bay. (n.d. a). About. Retrieved from https://www.oakbay.ca/our-community/about

The Corporation of the District of Oak Bay. (n.d. b). Statistics and facts. Retrieved from https://www.oakbay.ca/our-community/about/statistics-facts

The Corporation of the District of Oak Bay. (n.d. c). Engineering & public works. Retrieved from https://www.oakbay.ca/municipal-hall/departments/engineering-public-works

The Corporation of the District of Oak Bay. (n.d. d). Recycling and organics. Retrieved from https://www.oakbay.ca/municipal-services/gargage-recycling/recycling-organics

Couth, R., & Trois, C. (2012). Cost effective waste management through composting in Africa. *Waste Management, 32*, 2518-2525.

Creswell, J. W. (1994). *Research design: Qualitative & quantitative approaches.* Thousand Oaks, CA: SAGE Publications, Inc.

Dahab, D.J., Gentry, J.W., & Su, W. (1995). New ways to reach non-recyclers: An extension of the model of reasoned action to recycling behaviours. *Advances in Consumer Research, 22*, 251-256.

Dickson, L. (2014, November 3). Maintaining character for key candidates. *Times Columnist*. Retrieved from http://www.timescolonist.com/news/local/maintaining-character-key-for-candidates-1.1492860

Domingo, J., & Nadal, M. (2009). Domestic waste composting facilities: a review of human health risks. *Environment Internationa0, 35*, 382-389.

Edgerton, E., McKechnie, J., & Dunleavy, K. (2009). Behavioural determinants of household participation in a home composting scheme. *Environment and Behaviour, 41*(2), 151-169.

Ermolaev, E., Sundberg, C., Pell, M., & Jonsson, H. (2014). Greenhouse gas emissions from home composting in practice. *Bioresource Technology, 151*, 174-182.

European Commission Waste Framework Directive (2012). *Guidance on the interpretation of key provisions of Directive 2008/98/EC on waste.* Retrieved from European Commission Directorate- General Environment website: http://ec.europa.eu/environment/waste/framework/pdf/guidance_doc.pdf

Farrell, M., & Jones, D. L. (2009). Critical evaluation of municipal solid waste composting and potential compost markets. *Bioresource Technology, 100*, 4301-4310.

Foddy, W. (1993). *Constructing questions for interviews and questionnaires: Theory and practice in social research.* UK: Cambridge University Press.

Gamba, R. J., & Oskamp, S. (1994). Factors influencing community residents' participation in commingled curbside recycling programs. *Environment and Behavior, 26*(5), 587-612

Giroux, L. (2014). *State of Waste Management in Canada. Prepared for: Canadian Council of Ministers of Environment.* Retrieved from Canadian Council of Ministers of the Environment website: http://www.ccme.ca/files/Resources/waste/wst_mgmt/State_Waste_Mgmt_in_Canada%20April%202015%20revised.pdf

Giusti, L. (2009). A review of waste management practices and their impact on human health. *Waste Management, 29*, 2227-2239.

Hargreaves, T. (2011). Practice-ing behaviour change: applying social practice theory to pro-environmental behaviour change. *Journal of Consumer Culture, 11*(1), 79-99.

Howenstine, E. (1993). Market segmentation for recycling. *Environment and Behavior, 25*(1), 86-102.

Jamasb, T., & Nepal, R. (2010). Issues and options in waste management: A social cost-benefit analysis of waste-to-energy in the UK. *Resources, Conservation and Recycling, 54*, 1341-1352.

JoraForm AB. (n.d.). The Joracomposter – an ecological revolution of your own: JK125, JK270, JK400. Retrieved from http://www.joraform.com/pdf/JK125-270-400_2016.pdf

Knussen, C., Yule, F., MacKenzie, J., & Wells, M. (2004). An analysis of intentions to recycle household waste: The roles of past behaviour, perceived habit, and perceived lack of facilities. *Journal of Environmental Psychology, 24*, 237-246.

Kumar, R. (2014). *Research Methodology: A step-by-step guide for beginners* (4th ed.). London, UK: SAGE Publications Ltd.

Lah, T. (2002). Critical review of the cost-benefit analysis in the literature on municipal solid waste management. *International review of public administration, 7*(1), 137-145.

Local Government Act, RSBC 2015, c 1.

Lou, X.F., & Nair, J. (2009). The impact of landfilling and composting on greenhouse gas emissions – a review. *Bioresource Technology, 100*, 3792-3798.

Ministry of Community, Sport and Cultural Development. (n.d.). Municipalities [web page]. Retrieved from http://www.cscd.gov.bc.ca/lgd/pathfinder-mun.htm

Ministry of Environment. (2016a). A guide to solid waste management planning version 1.0 draft May 16, 2016. [web page]. Retrieved from http://www2.gov.bc.ca/assets/gov/environment/waste-management/garbage/swmp.pdf

Ministry of Environment. (2016b). Summary of general composting best management practices. [web page]. Retrieved from http://www2.gov.bc.ca/assets/gov/environment/waste-management/recycling/organics/resources/compost-best-practice-info-notice.pdf

Ministry of Environment. (n.d.). Organic matter recycling regulation amendment – backgrounder. [web page]. Retrieved from

http://www2.gov.bc.ca/assets/gov/environment/waste-management/recycling/organics/omrr_amendment_backgrounder.pdf

Morgan, F., & Hughes, M. (2006). Understanding recycling behaviour in Kentucky: Who recycles and why. *The Journal of The Minerals, Metals & Materials Society*, *58*(8), 32-35.

Oom Do Valle, P., Rebelo, E., Reis, E., & Menezes, J. (2005). Combining behavioural theories to predict recycling involvement. *Environment and Behaviour*, *37*(3), 364-396.

Oskamp, S., Harrington, M. J., Edwards, T. C., Sherwood, D. L., Okuda, M., & Swanson, D. C. (1991). Factors influencing household recycling behavior. *Environment and Behavior*, *23*(4), 494-519.

Otten, L. (2001). Wet-dry composting of organic municipal solid waste: current status in Canada. *Canadian Journal of Civil Engineering*, 28(S1), 124-130.

Rea, L. M., & Parker, R. A. (2005). *Designing & conducting survey research: A comprehensive guide* (3rd ed.). San Francisco, CA: Jossey Bass.

Seacat, J.D., & Northrup, D. (2010). An information-motivation-behavioural skills assessment of curbside recycling behaviour. *Journal of Environmental Psychology*, *30*, 393-401.

Slater, R., & Frederickson, J. (2001). Composting municipal waste in the UK: some lessons from Europe. *Resources Conservation & Recycling*, *32*, 359-374.

Smith, S., & Jasim, S. (2009). Small-scale home composting of biodegradable household waste: overview of key results from a 3-year research programme in West London. *Waste Management & Research*, *27*, 941-950.

Statistics Canada. (2007). *Oak Bay, British Columbia (Code5917030)* (table). *2006 Community Profiles*. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Retrieved from http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E

Statistics Canada. (2011). Focus on geography series, 2011 census: Census subdivision of Oak Bay, DM – British Columbia. [webpage] Retired from: https://www12.statcan.gc.ca/census-recensement/2011/as-sa/fogs-spg/Facts-csd-eng.cfm?LANG=Eng&GK=CSD&GC=5917030

Statistics Canada. (2012). Human activity and the environment waste management in Canada. [web page] Retrieved from http://www.statcan.gc.ca/pub/16-201-x/16-201-x2012000-eng.pdf

Statistics Canada. (2013). Composting by households in Canada. [web page] Retrieved from http://www.statcan.gc.ca/pub/16-002-x/2013001/article/11848-eng.htm

Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour; an integrative review and research agenda. *Journal of Environmental Psychology, 29*, 309-317.

Storino, F., Arizmendiarrieta, J., Irigoyen, I., Muro, J., & Aparicio-Tejo, P. (2016). Meat waste as feedstock for home composting: effects on the process and quality of compost. *Waste Management, 56*, 53-62.

Tatano, F., Pagliaro, G., Giovanni, P., Floriani, E., & Mangani, F. (2015). Biowaste home composting: Experimental process monitoring and quality control. *Waste Management*, 38, 72-85.

Tucker, P., & Speirs, D. (2003). Attitudes and behavioural change in household waste management behaviours. *Journal of Environmental Planning and Management, 4*(2), 289-307.

The US Composting Council. (2001). Field guide to compost use. [web page]. Retrieved from http://compostingcouncil.org/admin/wp-content/plugins/wp-pdfupload/pdf/1330/Field_Guide_to_Compost_Use.pdf

van den Bijgaart, I., Gerlagh, R., & Liski, M. (2016). A simple formula for the social cost of carbon. *Journal of Environmental Economics and Management*, *77*, 75-94.

van Reeuwyk, C. (2016, May 5). Oak Bay pilots household compost project. *Oak Bay News*. Retrieved from http://www.oakbaynews.com/news/378314821.html

Vicente, P., & Reis, E. (2008). Factors influencing households ' participation in recycling . *Waste Management & Research*, *26*(2), 140-146.

Vining, J., & Ebreo, A. (1992) Predicting recycling behaviour from global and specific environmental attitudes and changes in recycling opportunities. *Journal of Applied Social Psychology*, *22*(20), 1580-1607.

Vining, J., Linn, N., & Burdge, R. (1992). Why recycle? A comparison of recycling motivations in four communities. *Environmental Management, 16*(6), 785-797.

Weng, Y., & Fujiwara, T. (2011). Examining the effectiveness of municipal solid waste management systems: An integrated cost-benefit analysis perspective with a financial cost modeling in Taiwan. *Waste management*, *31*, 1393-1406.

APPENDIX A – SURVEY QUESTIONS

Eligibility to participate:

1. Are you a participant of the CDOB's Point of Source Composting Pilot Project?
   ☐ Yes ☐ No

2. Are you 18 years of age or older?
   ☐ Yes ☐ No

General Information & Demographics:

3. How many people currently live in your household?
   ☐ One ☐ Two ☐Three ☐ Four ☐ Five or more

4. Please select your age category:
   ☐ 18-34
   ☐ 35-49
   ☐ 50-64
   ☐ 65+

5. For the residence where the Jora composter is located, where you currently reside, please identify the housing tenure:
   ☐ Owner-occupied housing
   ☐ Rental or non-owned co-op housing

6. Type of dwelling:
   ☐ Single detached house
   ☐ Semi-detached house
   ☐ Row/Townhouse
   ☐ Other (please specify): _____

7. What is the highest level of education you have completed?
   ☐ High school diploma or less
   ☐ Some post-secondary education
   ☐ Post-secondary diploma or certificate
   ☐ University degree

8. What is your approximate average household income?
   ☐ $49,999 or less
   ☐ Between $50,000 - $99,999
   ☐ $100,000 or greater

Previous knowledge/views on Composting:

9. **Prior to the Pilot Project** how knowledgeable were you about composting?
   ☐ Very knowledgeable (I could teach others how to compost)
   ☐ Somewhat knowledgeable (I could describe aspects of composting)
   ☐ Not knowledgeable (I knew very little about composting)

10. Prior to the Pilot Project please indicate how much you would have agreed/disagreed with the following statements about at home composting:

Statements	**Strongly disagree**	**Disagree**	**Neither agree or disagree**	**Agree**	**Strongly agree**
Composting is time consuming					
Composting requires a lot of effort					
Composting requires a lot of technical knowledge and know-how					
Composting is not worthwhile unless you produce a lot of waste					
Composting bins attract rodents/vermin					
Composting units smell					

11. Please read the following statements and select the answer that best describes your attitudes/belief ***prior to the Pilot Project***:

Statements	**Strongly disagree**	**Disagree**	**Neither agree or disagree**	**Agree**	**Strongly agree**
At-home composting is an important step towards supporting environmental sustainability					
The activities of one household can make a difference to support environmental sustainability					
The balance of nature is very delicate and easily upset					
People have the right to modify the natural environment to suit their needs					
Humankind was created to rule over nature					
The earth has limited room and resources					

Past Composting Experience:

12. Do you participate or have you participated in any of the following activities: (select all that apply)
    - ☐ Newspaper recycling
    - ☐ Aluminum can recycling
    - ☐ Donating products to charity/thrift shops
    - ☐ Re-using materials that would otherwise be thrown out
    - ☐ Glass recycling
    - ☐ Buy recycled products
    - ☐ Growing own vegetables/fruit

13. Did you compost ***prior*** to the Pilot Project?
    ☐ Yes ☐ No

14. Which of the below scenarios describe your ***past*** composting experiences (select all that apply):
    - ☐ I composted in the backyard
    - ☐ I composted using the curbside organic pickup
    - ☐ I composted using a local community compost
    - ☐ I used a kitchen garburator
    - ☐ I composted at work
    - ☐ Other (please specify):_____

15. Cumulatively, how long have you composted for ***prior*** to the Pilot Project? (select only one category)
    - ☐ Less than one year
    - ☐ Between one and two years
    - ☐ More than two years but less than five
    - ☐ More than five years but less than ten
    - ☐ More than ten years

16. During the course of the year, when did you compost:
    - ☐ Throughout the year
    - ☐ Spring to fall
    - ☐ Other (please specify): _____

17. When you previously composted, please indicate how important the following statements are in your decision to start compost:

	Not at all important	**Slightly important**	**Somewhat important**	**Fairly important**	**Very important**
Curiosity/interest					
Cheaper than buying compost					
Don't like chemical fertilizers					
Produce better quality compost					
Don't like to generate waste					
Saves room in garbage bin					
Saves landfill space					
Helps the CDOB					
Because I felt pressure to (social/familial)					
To support sustainability					
To reduce the cost of garbage collection					
Because it made me feel good					

18. Since you did not compost prior to this Pilot Project, why? (select all that apply)
    - ☐ Tried but was not very successful
    - ☐ Didn't have time
    - ☐ Don't have a garden
    - ☐ Garden is too small
    - ☐ Don't have use for compost produced
    - ☐ Prefer to buy compost
    - ☐ Don't generate enough material
    - ☐ It is too messy and/or smelly
    - ☐ Concerned about attracting vermin
    - ☐ Prefer to use curbside pick up
    - ☐ Ill health/age
    - ☐ No longer gardening
    - ☐ Compost bins are difficult to use
    - ☐ Concerned about children near it
    - ☐ Other (please specify):_____

Participation in the Point of Source Composting Pilot Project

19. What was the main reason for participating in the Pilot Project? (select only one)
    - ☐ To produce compost for garden
    - ☐ To reduce waste
    - ☐ Curiosity/interest
    - ☐ To help the District of Oak Bay
    - ☐ Other (please specify): _____

Pilot Project Experience

20. Are you currently using the Jora composter that was provided by the District of Oak Bay?
    - ☐ Yes ☐No

21. Why are you not currently using the Jora Composter currently? (select all that apply)
    - ☐ It was inconvenient/ time consuming
    - ☐ Attempts at composting were unsuccessful
    - ☐ Product produced was not of good quality
    - ☐ It was too messy
    - ☐ Do not produce enough waste to make it worthwhile
    - ☐ Other (please specify): _____

22. What are you composting? (select all that apply)

    - ☐ Food scraps (raw, cooked, fried, and smoked)
    - ☐ Meat and bones
    - ☐ Soft plant waste
    - ☐ Shellfish
    - ☐ Vegetables (raw and cooked)
    - ☐ Eggs and egg shells
    - ☐ Bread and biscuits
    - ☐ Fruit
    - ☐ Coffee grounds and filters
    - ☐ Teabags and tealeaves
    - ☐ Paper (cross shredded or torn up into small pieces)
    - ☐ Bedding from hamster/guinea pig cages
    - ☐ Wood-pellet cat litter (used or unused)
    - ☐ Other _____

23. How much of your compostable garden and kitchen waste do you compost at home?
    - ☐ None
    - ☐ 25% or less
    - ☐ more than 25% to less 50%
    - ☐ 50% to less than 75%

☐ 75% or more

24. Since you are composting less that 75% of you compostable garden and kitchen waste, which of the following reasons apply? (select all that apply)
☐ You forget
☐ It can be inconvenient
☐ You find some of this waste unpleasant to handle
☐ You do not always produce enough to make composting worthwhile
☐ You are unsure if some of this waste should/should not be composted
☐ Other (please specify): _____

25. Have you used or do you plan to use any compost product from your Jora composter?
☐ Yes
☐ No

26. How do you (or plan to) use your compost? Select all that apply
☐ Garden (to improve soil)
☐ General garden use
☐ Use as potting compost
☐ As fertilizer
☐ On the lawn
☐ As a mulch
☐ Other (please specify): _____

27. Are you experiencing less waste in your trash cans or green waste for curbside pick up as a result of at home composting?
☐ Yes
☐ No
☐ Don't know

28. How much less waste is going into your trash cans as a result of at home composting?
☐ None
☐ 25% or less
☐ More than 25% to less than 50%
☐ 50% to less than 75%
☐ 75% or more
☐ Don't know

29. How much less green waste is going into your curbside pickup as a result of at home composting?
☐ None
☐ 25% or less

☐ More than 25% to less than 50%
☐ 50% to less than 75%
☐ 75% or more
☐ Don't know

30. Prior to the Pilot Project, did you purchase compost?
☐ Yes
☐ No

31. How does the compost you've produced compare to compost you have purchased?
☐ It is better
☐ No noticeable difference
☐ It is worse
☐ Unknown at this time

32. How satisfied are you with your compost product thus far?
☐ Entirely satisfied
☐ Moderately satisfied
☐ Neither satisfied or dissatisfied
☐ Moderately dissatisfied
☐ Entirely dissatisfied
☐ Too early to determine

33. Considering your household's experience with composting, please tell us how easy or difficult it was for you and/or members of your household to incorporate the following composting tasks into your daily routine:

	Difficult	**Somewhat difficult**	**Neither easy or difficult**	**Somewhat easy**	**Easy**
Separating and storing food wastes in the kitchen					
Taking kitchen waste to compost unit					
Putting yard waste in the composting unit					
Tending the compost unit (i.e. turning, removing compost)					

Composting Unit

34. How satisfied are you with the Jora composter (i.e. the composting unit)?
☐ Entirely satisfied
☐ Moderately satisfied
☐ Neither satisfied or dissatisfied
☐ Moderately dissatisfied

☐ Entirely dissatisfied

35. What challenges or concerns do you have with the Jora composter? (select all that apply):
☐ Difficulty loading the unit
☐ Difficulty spinning the unit
☐ Difficulty unloading the unit
☐ Inadequate volume of material/content unit can accommodate
☐ Attracting vermin/rodents
☐ Unit does not contain smells adequately
☐ Location of unit is not ideal
☐ Length of time for composting process
☐ Other (please specify): _____

36. What do you like about the Jora composter (select all that apply)?
☐ Easy to load and unload
☐ Easy to spin
☐ Composting process is fast/timely
☐ Has enough capacity for my household's volume of waste
☐ Rodent/vermin proof
☐ Smell resistant
☐ I don't like the unit
☐ Other (please specify): _____

37. Is the Jora composter large enough to accommodate the volume of compostable waste produced by your household?
☐ Yes
☐ No
☐ Don't know

38. By how much are you exceeding the volume capacity of the Jora composter?
☐ 25% or less in excess
☐ More than 25% to less than 50% in excess
☐ 50% to less than 75% in excess
☐ 75% or more in excess
☐ Don't know

39. Please indicate how much you agree/disagree with the following statements about at home composting based on your experience thus far in the pilot project

Statements	**Strongly disagree**	**Strongly agree**	**Neither agree or disagree**	**Agree**	**Strongly agree**
Composting is time consuming					
Composting requires a lot of effort					
Composting requires a lot of technical knowledge and know-how					
Composting is not worthwhile unless you produce a lot of waste					
Composting bins attract rodents/vermin					
Composting units smell					

40. Please read the following statements and select the answer that best describes your attitudes/belief ***now***:

Statements	Strongly disagree	Disagree	Neither agree or disagree	Agree	Strongly agree
At-home composting is an important step towards supporting environmental sustainability					
The activities of one household can make a difference to support environmental sustainability					
The balance of nature is very delicate and easily upset					
People have the right to modify the natural environment to suit their needs					
Humankind was created to rule over nature					
The earth has limited room and resources					

41. How knowledgeable are you about composting ***now***?
☐ Very knowledgeable (I could teach others how to compost)
☐ Somewhat knowledgeable (I could describe aspects of composting)
☐ Not knowledgeable (I knew very little about composting)

Future Oriented Questions

42. Do you anticipate continuing in the Pilot Project until August 2017?
    ☐ Yes
    ☐ No
    ☐ Undecided

43. Are you interested in continuing at home composting when the pilot project is over (i.e. after August 2017)?
    ☐ Yes
    ☐ No
    ☐ Undecided

44. Would you support at home composting being implemented throughout Oak Bay?
    ☐ Yes
    ☐ No
    ☐ Don't know

45. If the District of Oak Bay was to implement at home composting throughout Oak Bay, would you be willing to pay for the at home composting unit (like the Jora composter) at a subsidized cost?
    ☐ Yes
    ☐ No
    ☐ Don't know

46. Please indicate how important the following statements are in your decision to ***continue to*** compost:

	Not at all important	**Slightly important**	**Somewhat important**	**Fairly important**	**Very important**
Curiosity/interest					
Cheaper than buying compost					
Don't like chemical fertilizers					
Produce better quality compost					
Don't like to generate waste					
Saves room in garbage bin					
Saves landfill space					
Helps the CDOB					
Because I felt pressure to (social/familial)					
To support sustainability					
To reduce the cost of garbage collection					
Because it made me feel good					

Recruitment for Interviews:

47. Would you be interested in participating in a phone interview to discuss your experiences in the Pilot Project?
☐ Yes ☐ No

48. If you give permission to the researchers (a graduate student from the University of Victoria) to contact you about an interview please provide **your name, phone number and email.** You will be contacted to schedule a phone interview. Please note that your personal contact information will only be used for this purpose and will not be distributed to any other person or agency.

Name:
Phone number:
Email:

APPENDIX B – LETTER OF INFORMATION

An Evaluation of Oak Bay's Point of Source Composting Pilot Project

You are invited to participate in a research study called "An Evaluation of Oak Bay's Point of Source Composting Pilot Project". Our client, the Corporation of the District of Oak Bay (CDOB), is interested in your feedback regarding the Oak Bay Point of Source Composting Pilot Project. This study is being conducted by two graduate students from the School of Public Administration at the University of Victoria, Cameron Macdonald and Deanna Mayhew. Please contact either one if you have any questions or concerns: Cameron at macdonal@uvic.ca or by phone at 416-882-3371, or Deanna at dmm8@uvic.ca or by phone at 778-892-6944.

As graduate students, we are required to conduct research for our respective programs (Cameron in Public Administration and Deanna in Dispute Resolution). This project is being conducted under the supervision of Dr. Lynda Gagné, at the University of Victoria. You may contact Dr. Gagné at 1-250-721-8063 or lgagne@uvic.ca.

Purpose and Objectives

This research study is to understand your experiences in the Oak Bay Point of Source Composting Pilot Project. We are seeking to identify behaviours, perceptions, attitudes, beliefs, and opinions towards to Pilot Project. More specifically, our research objectives include:

- Identify strengths and weaknesses of the composting units.
- Identify participant behaviours (including but not limited to use of the units, frequency, ease of use, past composting habits, and expected future use), perceptions, attitudes, beliefs, and opinions.
- Identify strengths and weaknesses of point of source composting in Oak Bay and in general.
- Identify opportunities to improve the point of source composting experience.
- Identify participant demographics, how they relate to behaviours, perceptions, attitudes, beliefs, and opinions, and whether they are representative of the Oak Bay population.

Importance of this Research

Your experience as a participant is valuable in order to understand how the Pilot Project worked. This information will be used to inform decision-making by the CDOB and city council. This research project provides an opportunity for citizen engagement by involving you in information gathering and inviting you to share your thoughts and experiences. This research contributes to society by supporting evidence-based decision-making and to the state of knowledge by adding to the existing body of research on point of source composting.

Participants Selection

You are being asked to participate in this study because you are participating in the Pilot Project.

What is involved

If you consent to voluntarily participate in this research, you will complete an online survey which will ask questions related to your experiences in the Pilot Project. It is anticipated that the survey will take approximately 15 - 20 minutes to complete.

Inconvenience

Participation in this study may cause some inconvenience to you by taking time to complete the survey.

Risks

There are no known or anticipated risks to you by participating in this research.

Benefits

For you the participant, this is an opportunity to be involved in a civic process by providing useful information to your local government. For society, your participation contributes to informed decision-making as to whether Oak Bay should consider implementing point of source composting throughout Oak Bay. In addition, your participation has the potential to contribute to making a more sustainable community.

Voluntary Participation

Your participation in this research must be completely voluntary. If you decide to participate, you may withdraw at any time prior to submission of the survey, without any consequences or any explanation. Please note that once you've submitted the online survey your data cannot be removed from the data, as it is collected anonymously. The specific data provided by you from the survey will remain anonymous and confidential.

Anonymity

The online survey will collect data anonymously, so your identity will not be known and will not be linked to any of the responses you provide.

Confidentiality

Your confidentiality and the confidentiality of the data will be protected. All documents and storage devices (i.e. USBs) involved with the research are password protected. Please be advised that this research study includes data storage in the U.S.A. As such, there is a possibility that information about you that is gathered for this research study may be accessed without your knowledge or consent by the U.S. government in compliance with the *U.S. Patriot Act*.

Dissemination of Results

It is anticipated the results of this study will be shared with others in the following ways:

- University of Victoria: the results of the research will be used to satisfy the University of Victoria graduation requirements for the two researchers. This will include providing a Supervisory Committee with a research report and undergoing an oral defense/examination.
- CDOB: the research report will also be provided to CDOB. The report may be used to help inform decision-making, which means it may also be reviewed by city council and others within the CDOB.
- The research may also be used to develop academic publications on the Oak Bay point of source composting pilot project experience.
- Participants of the Pilot Project: the report may also be provided to the participants of the Pilot Project, at the discretion of CDOB.

Disposal of Data

Data from this study will be disposed of by the researchers 5 years from the completion of the final research report. All copies of the data will be deleted, including the shredding of any paper copies that may exist and erasing all electronic copies.

Contacts

Individuals that may be contacted regarding this study include: Cameron Macdonald, researcher, at macdonal@uvic.ca or by telephoning 1-416-882-3371; and Deanna Mayhew, researcher, at dmm8@uvic.ca or by telephoning 778-892-6944. In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

By completing and submitting the survey, **YOUR FREE AND INFORMED CONSENT IS IMPLIED** and indicates that you understand the above conditions of participation in this study and that you have had the opportunity to have your questions answered by the researchers.

Please retain a copy of this letter for your reference.

APPENDIX C – INTERVIEW QUESTIONS

1) Can you tell me a bit about why you are participating in this pilot project? What were some of your initial expectations when you heard the pilot project was taking place? How have these played out so far?
2) What does composting mean to you?
3) Can you describe your experiences with at-home composting (AHC) and the composting unit? (How are you using it? Was there a process or routine you follow? How often do you contribute to it and spin it it? What do you put in it? If you don't use the unit, why not?)
4) Did you have any challenges or concerns using the unit? (smells, rodents, difficulty using crank, negative impact on esthetics of yard, lack of space etc)
5) Did you notice any difference in the amount of waste generated at your household as a result of the composting unit? (more or less garbage? More or less frequent use of garberator? Curbside green bin use? If there is a change, is it a positive/negative change? Is it worth the effort involved with AHC?)
6) Do you feel knowledgeable about what goes in the composter, how it works, and ways composting supports sustainability? Do you know where you can get more information if you need/want it? Have you sought out any additional information or resources since the pilot project started? Why/why not?
7) What do you expect to do with the compost product? (or what have you done with it?)
8) Can you describe your past experiences with composting (before the pilot project)? Past experiences with recycling?
9) Do you plan on continuing to AHC for the remainder of the pilot project? Why or why not? Any ideas about what could improve the likelihood of participation in AHC?
10) If AHC was implemented in Oak Bay, how do you think residents would respond and why? (positive/negative, likely to use/not)
11) Do you have any other feedback, positive/negative, on the AHC units, the AHC process, or the pilot project? Would you change anything about the pilot project?
12) Did participating in the AHC pilot change your behaviours in any way? (ie you didn't compost before, now you do? You give thought to the amount of waste generated and make waste-conscious decisions when making purchases, etc)
13) What are you taking away from your experiences in the pilot project?
14) What are your future plans for managing organic waste?
15) Would it be fair to say that your attitude towards the environment and sustainability are reflected in your use of the AHC? Can you explain? (ie any contrast between beliefs/thoughts/actions, someone considers themselves environmentally conscious but did not use the composting unit)

APPENDIX D – LETTER OF CONSENT

An Evaluation of Oak Bay's Point of Source Composting Pilot Project

You are invited to participate in a research study called "An Evaluation of Oak Bay's Point of Source Composting Pilot Project". Our client, the Corporation of the District of Oak Bay (CDOB), is interested in your feedback regarding the Oak Bay Point of Source Composting Pilot Project. This is a continuation of the research collected in the online survey, where you indicated an interest to participate in a subsequent interview. This study is being conducted by two graduate students from the School of Public Administration at the University of Victoria, Cameron Macdonald and Deanna Mayhew. Please contact either one if you have any questions or concerns: Cameron at macdonal@uvic.ca or by phone at 416-882-3371, or Deanna at dmm8@uvic.ca or by phone at 778-892-6944.

As graduate students, we are required to conduct research for our respective programs (Cameron in Public Administration and Deanna in Dispute Resolution). This project is being conducted under the supervision of Dr. Lynda Gagné, at the University of Victoria. You may contact Dr. Gagne at 1-250-721-8063 or lgagne@uvic.ca.

Purpose and Objectives

This research study is to understand your experiences in the Oak Bay Point of Source Composting Pilot Project. We are seeking to identify behaviours, perceptions, attitudes, beliefs, and opinions towards to Pilot Project. More specifically, our research objectives include:

- Identify strengths and weaknesses of the composting units.
- Identify participant behaviours (including but not limited to use of the units, frequency, ease of use, past composting habits, and expected future use), perceptions, attitudes, beliefs, and opinions.
- Identify strengths and weaknesses of point of source composting in Oak Bay and in general.
- Identify opportunities to improve the point of source composting experience.
- Identify participant demographics, how they relate to behaviours, perceptions, attitudes, beliefs, and opinions, and whether they are representative of the Oak Bay population.

Importance of this Research

Your experiences as participants are valuable in order to understand how the Pilot Project worked. This information will be used to inform decision-making by the CDOB and city council. This project also supports citizen engagement by involving you in information gathering and allowing you the opportunity to share your thoughts and experiences. This research contributes to society by implementing evidence-based decision-making and to the state of knowledge by adding to the existing body of research on point of source composting.

Participants Selection

You are being asked to participate in this study because:

1) you are part of the Pilot Project; and
2) in the survey distributed by CDOB, you identified that you were interested in participating in an interview.

What is involved

If you consent to voluntarily participate in this research, a telephone interview will be conducted by one of the researchers. The interview will ask you questions related to your experiences in the Pilot Project. It is anticipated that the interview will take approximately 30 minutes to 1 hour.

The researchers will record and transcribe the interview for the purpose of analysis.

Inconvenience

Participation in this study may cause some inconvenience to you by taking time to complete the interview.

Risks

There are no known or anticipated risks to you by participating in this research.

Benefits

For you the participant, this is an opportunity to be involved in a civic process by providing useful information to the local municipal government. This is also an opportunity to provide additional and more in-depth feedback on Oak Bay's Point of Source Composting Pilot Project. For society, your participation contributes to informed decision-making as to whether Oak Bay should consider implementing point of source composting throughout Oak Bay. In addition, your participation has the potential to contribute to making a more sustainable community.

Voluntary Participation

Your participation in this research must be completely voluntary. If you decide to participate, you may withdraw at any time without any consequences or any explanation. You can contact either researcher to withdraw. If you withdraw from the study, any interview data will be excluded from the research and will be destroyed (i.e. all copies of data will be deleted or discarded).

Please note that any data obtained through the online survey cannot be removed from this research, as it is impossible to remove your data from the data set as the data is anonymous. The specific data provided by you from the survey will remain anonymous and confidential.

Anonymity

While the researchers will know your identity by way of interviewing you, the data will be recorded using pseudonyms and any identifiers will be removed from the data. This means any data collected cannot be linked back to you. Survey data will be anonymized by the City before it is shared with the researchers.

Confidentiality

Your confidentiality and the confidentiality of the data will be protected. All documents and storage devices (i.e. USBs) involved with the research are password protected.

Dissemination of Results

It is anticipated the results of this study will be shared with others in the following ways:

- University of Victoria: the results of the research will be used to satisfy the University of Victoria graduation requirements for the two researchers. This will include providing a Supervisory Committee with a research report and undergoing an oral defense/examination.
- CDOB: the research report will also be provided to CDOB. If CDOB requires the data, it will first be stripped of all identifiers. The report may be used to help inform decision-making, which means it may also be reviewed by city council and others within the CDOB.
- The research may also be used to develop academic publications on the Oak Bay point of source composting pilot project experience.
- Participants of the Pilot Project: a summary report may also be provided to the CDOB for distribution to all participants in the Pilot Project, regardless of participation in this research study. CDOB would be responsible for distributing this report to participants.

Disposal of Data

Data from this study will be disposed of by the researchers 5 years from the completion of the final research report. All copies of the data will be deleted, including the shredding of any paper copies that may exist and erasing all electronic copies.

Contacts

Individuals that may be contacted regarding this study:
Cameron Macdonald:
Email: macdonal@uvic.ca
Phone: 1-416-882-3371

Deanna Mayhew:
Email: dmm8@uvic.ca
Phone: 778-892-6944

In addition, you may verify the ethical approval of this study, or raise any concerns you might have, by contacting the Human Research Ethics Office at the University of Victoria (250-472-4545 or ethics@uvic.ca).

Your participation in the interview indicates that you understand the above conditions of participation in this study, that you have had the opportunity to have your questions answered by the researchers, and that you consent to participate in this research project. Your consent to participate will be obtained verbally by the interviewer before the interview begins.

Interviewer confirmation that verbal consent was obtained before the interview started:

Name of Participant	*Interviewer Signature*	*Date*

A copy of this consent was e-mailed to you, and the researcher will sign a printed copy confirming your verbal consent prior to the start of the interview.