From Paper to Practice:

Exploring Five Canadian Case Studies of Water Efficiency Programs using Community-Based Social Marketing Criteria

by

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Author Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Canadian municipalities are facing increasing pressure on their water infrastructure and are seeking to maximize their water efficiency efforts through managing consumption. Residential water consumption is complex because water-use is deeply intertwined with norms, lifestyles, attitudes, perceptions, and enjoyment of water, making managing and reducing consumption difficult. Some community programs seeking to influence water efficiency behaviour have gravitated towards utilizing community-based social marketing (CBSM) principles in some way.

CBSM offers a pragmatic five-step approach to developing a program that fosters sustainable behaviour. CBSM has a rigid focus on behaviour selection and aims to develop strategies that overcome barriers while maximizing benefits of desired behaviours. However, how the CBSM theoretical framework has been implemented into programs remains largely under-evaluated. To help address this gap, Lynes, Whitney, and Murray (2014) developed twenty-one benchmarks to assess CBSM programs, and then applied them to musician Jack Johnson's *All At Once* campaign. This research builds upon these benchmarks by assessing multiple case studies of programs that have used CBSM principles. The primary objective is to explore how the CBSM theoretical framework has been implemented into practice at the community level. This will be investigated by:

1. Developing a robust and replicable benchmark assessment procedure that allows for assessing multiple programs efficiently and effectively
2. Determining the degree to which selected case study programs have integrated the CBSM benchmarks
3. Making recommendations for better aligning practice with the intended framework.

Five Canadian water efficiency programs that self-identified as using CBSM principles were recruited. Five programs – two programs from British Columbia, and three from Ontario – were selected as case studies. In addition to conducting secondary research, each program provided at least one employee to participate in the primary research element of this study, which included one survey, an in-depth interview, and a follow-up. Information about each case study was consolidated and then assessed using the proposed CBSM Benchmark Assessment tool. This tool, developed from a synthesis of work from CBSM's founder as well as the benchmarks originally developed by Lynes, Whitney and Murray (2014), satisfies the first deliverable of this research and is intended to empower practitioners to assess their programs along qualitative criteria in a reliable and replicable way.

The main outcomes of this research indicate how five water efficiency case studies have employed CBSM principles in their behaviour-change programs, and what successes and challenges they have faced. This paper also discusses how programs can better align with CBSM principles, as well as contributes to the literature around evaluating and assessing the CBSM framework and its effectiveness.

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1 Introduction

1.1. Research Catalyst

The latest reports indicate that the consensus among the scientific community about human-caused climate change has surpassed 99% of scientists worldwide (Watts, 2019). As humans awaken to the current and future effects of climate change, it is increasingly clear that the way humans behave, both individually and as a collective, will need to change dramatically (McKenzie-Mohr, 2000; McKenzie-Mohr, Lee, Kotler, & Schultz, 2012; Stern, 1993). Canadian environmental psychologist Doug McKenzie-Mohr has referred to behaviour change as "the cornerstone of sustainability" due to the role that behaviours play in how individuals view themselves as well as in progressing towards sustainability as a collective group (McKenzie-Mohr, 2011, p. 2). The changes to behaviour required are expansive, influencing how we move, eat, consume products, interact, organize around each other, and more. The United Nations has called climate change the defining issue of our time, with recent reports by the Intergovernmental Panel on Climate Change (IPCC) calling for "rapid, far-reaching, and unprecedented changes in all aspects of society" (United Nations, 2019, para. 1). Despite these calls for immediate action, individuals are slow to adopt pro-environmental behaviours (Gifford, 2014; Kollmuss & Agyeman, 2002; McKenzie-Mohr, 2011). Further, evidence suggests that the slow adoption of environmental behaviours is not due to ignorance about climate change or its impact (McKenzie-Mohr, 2011). Surveys conducted worldwide indicate that large majorities of people favor an equitable relationship with nature, express high levels of concern for the environment, and agree that protecting the environment should be given priority over economic growth and job-creation (Leiserowitz, Kates, & Parris, 2006). In the summer of 2019, Abacus Data conducted a national survey of 2000 Canadians and found that 74% indicate that they often or sometimes think about climate change and worry about its consequences; 81% strongly agree or agree that climate change represents a major threat to the future of our children and grandchildren; and that 42% indicated that they believe that climate change is an emergency right now (Abacus Data, 2019). Despite the apparent proliferation of climate change awareness and concern, unsustainable behaviours persist.

In many ways, an individual's ability to behave environmentally is constrained by factors that are external to the individual and outside of the individuals' control. It is important that broader societal, governance, and economic structures create systems that enable its citizens to reduce their impact on the climate. However, for these large-scale advancements to be effective, people's behaviour must

adapt to support the new advancement (Stern, 1993, 2000b). For example, consider how effective municipal composting facilities or intercity transportation infrastructure would be if folks chose not to compost or take public transit. Influencing behaviour offers a lower-cost and quicker pathway towards carbon reductions compared to resource-intensive and lengthy political and infrastructural changes. Shifts in behaviour can establish a "wedge" towards significant carbon reductions while policies and frameworks are put in place, while also acting as a catalyst for driving social change among peers and leaders (McKenzie-Mohr, 2011).

There have been numerous attempts in practice and in the literature to promote pro-environmental behaviour and understand the barriers, influences, and frameworks that play a role in affecting behaviour change. In practical settings, programs aimed at fostering sustainable behaviour often rely on information-based communication campaigns and economic self-interest approaches, based on a faulty assumption that enhancing knowledge and attitudes are sufficient for changing people's behaviour (Kollmuss & Agyeman, 2002; McKenzie-Mohr, 2011). In the literature, social scientists and academics from a range of disciplines discuss and explore environmental behaviour, including psychology, sociology, anthropology, business, economics, political sciences, and social marketing. As a result, there are numerous useful behaviour change theories, models, and frameworks, many of which are inter-disciplinary due to the emerging complexities of influencing behaviour (Lee & Kotler, 2020). One approach that seeks to promote and nurture sustainable behaviour is Community-based Social Marketing (CBSM), which was first proposed by McKenzie-Mohr (McKenzie-Mohr, 2000). CBSM attempts "to make psychological knowledge visible and relevant to program planners", thus offering a framework that is both grounded in evidence from academia as well as developed for use by program planners in practical settings (McKenzie-Mohr, 2000, p. 544). The CBSM framework offers a pragmatic five-step approach to developing community programs that nurture pro-environmental behaviours within specific communities and target audiences. CBSM has a rigid focus on behaviour selection and creates program strategies that overcome barriers while maximizing benefits of desired behaviours (McKenzie-Mohr, 2011).

Over the past two decades, more than 70,000 program managers have been trained in CBSM (McKenzie-Mohr, 2019a). However, little is known about how these program managers have put this training in action – and to what effect. The CBSM model has strong theoretical evidence from social psychology and adjacent disciplines to support the foundation on which CBSM is based (McKenzie-Mohr, 2000), but there is little evidence demonstrating how the framework has been implemented and

its effectiveness in fostering sustainable behaviour (Lynes et al., 2014). This research seeks to explore how community programs have mobilized the CBSM theoretical model in their programs and practices.

1.2. Research Objectives and Contributions

One critical area in transitioning to a sustainable, resource-efficient future in the face of climate changes concerns how communities and individuals demand and consume water. Records and projections from the IPCC indicate that there is "abundant evidence that freshwater resources are vulnerable and have the potential to be strongly impacted by climate change, with wide-ranging consequences for human societies and ecosystems" (Bates, Kundzewicz, & IPCC, 2008, p. 3). Water issues are considered 'wicked' problems because they are complex; they are influenced by social, political, and environmental factors, and potential solutions may generate "unexpected, unintended, or undesired outcomes" (Wolfe & Brooks, 2017, p. 1). Managing water resources through supply poses many ethical, financial, logistical, and environmental challenges, so it widely believed that reducing demand for water is a more sustainable and effective way to manage water resources long term (Inman & Jeffrey, 2006, p. 127; Pearce, Willis, Mamerow, Jorgensen, & Martin, 2014). Water efficiency, or water demand management, is a set of strategies that aim to increase water efficiency and decrease consumption rates, thereby lessening the demand for water resources (Wolfe, 2008). Increasingly, organizations and municipalities are seeking to maximize water efficiency and sustainability. This has led to the establishment of partnership organizations such as the Alliance for Water Efficiency, a collection of organizations and professionals that are "dedicated to efficient and sustainable use of water"(Alliance for Water Efficiency, 2019, para. 1). Water-use is tied to many everyday behaviours and is deeply engrained in behavioural, social, and cultural norms (Elizondo & Lofthouse, 2010; Jorgensen, Martin, Pearce, & Willis, 2014), making water efficiency efforts good candidates for mobilizing theoretical knowledge about behaviour change into action. Some community programs have begun to investigate behaviour-change models such as CBSM, and implement the knowledge and strategies outlined from these theoretical models into practice. Due to the importance of water issues in the era of climate change and the role that behaviour plays in increasing water efficiency, this research will focus specifically on investigating community programs working towards increasing water efficiency.

The primary objective of this research is to explore how the CBSM theoretical framework has been implemented into practice at the community level with a specific focus on water efficiency. This will be investigated by completing the following sub-objectives:

- Developing a robust and replicable benchmark assessment procedure for CBSM that allows for assessing multiple programs efficiently and effectively
- Determining the degree to which selected case study programs have integrated the CBSM benchmarks
- Making recommendations for better aligning practice with the intended framework

To achieve the primary objective of exploring how CBSM has been implemented into practice, this research will employ a set of benchmarks for CBSM that was developed by Lynes, Whitney, and Murray (2014). The set identifies twenty-one benchmarks for CBSM programs and assesses each benchmark on a qualitative scale of 'integrated', 'partially integrated', or 'not integrated'. The benchmarks have been applied to a case study investigating musician Jack Johnson's *All At Once* tour which integrated various CBSM techniques and principles (Lynes et al., 2014). Outside of that case study, the set of CBSM benchmarks has not been widely adopted or applied by practitioners or academics for assessing their community programs. Further, there have not been any efforts to apply the benchmarks across multiple case studies. Altogether, this results in limited knowledge about how the CBSM model is being applied in practical settings. While there is considerable evidence supporting the CBSM framework (Lynes et al., 2014; McKenzie-Mohr, 2000; McKenzie-Mohr & Smith, 1999), the bulk of what is known about programs who use CBSM comes from anecdotal evidence and experience which suggests a lack of academic investigation into the applications of CBSM. Thus, this research will use the set of benchmarks proposed by Lynes et al. (2014) for exploring how community programs have applied the CBSM theoretical model and its principles into their programs that aim to foster sustainable behaviour.

This research seeks to contribute to the literature and knowledge in this area in several ways. Firstly, there is a paucity of research that has tracked or assessed the ways in which CBSM has been applied in communities seeking to foster sustainable behaviour, as well as what outcomes the programs have achieved. As more is learned about how programs have implemented CBSM, practitioners and academics can better understand how behaviour change theories operate in real-world contexts. Further, increased measurement may also empower investigators to develop an improved understanding of how effective the CBSM model is at fostering sustainable behaviour, and which elements are most critical to the success of creating meaningful behaviour change.

Secondly, while the benchmark criteria have been applied to a single case study (e.g. Lynes et al, 2014), this study is the first to apply the CBSM benchmarks to multiple case studies and further refine

and test the CBSM benchmark assessment tool (to be described fully in a subsequent chapter). The CBSM benchmark assessment tool offers a robust and replicable assessment procedure that enables assessment of multiple programs efficiently and reliably. This tool utilizes and refines Lynes et al.'s (2014) set of benchmark criteria that was developed to "provide increased detail regarding the design and implementation of the CBSM model" (Lynes et al., 2014, p. 115). Lynes et al.'s set of benchmarks employs three qualitative criteria (integrated; partially integrated; or not integrated) that indicate the degree to which a program has integrated each of the twenty-one CBSM benchmarks into the program design and implementation.

1.3. Research Overview

This research investigates its objective through qualitative inquiry and analysis. Participants from five Canadian community water efficiency programs and strategies that utilized CBSM principles were recruited and selected for participation in this research study, creating a total of five 'mini' case studies. The case studies and their respective participants are summarized below (table 1.1). Each community program committed a minimum of one representative to participate in this research by completing a short online survey and a 1-hour interview. Additionally, community programs shared relevant program resources that would aid in the assessment of the program, such as reports, primary and secondary research, grey literature, online material, communication materials, press releases, news articles, and expertise from program authorities when necessary.

Case study	Location of program	Participants Interviewed:
Water Wise Garden Parties (WWGP)	Vancouver, BC	• Program Manager (City of Vancouver) • Program Manager (Consultant)
Make Water Work (MWW)	Okanagan Basin, BC	• Communications Director
Rain Smart Neighbourhoods (RSN)	Kitchener, ON	• Manager of Green Infrastructure Programs
Blue Built Homes (BBH)	Guelph, ON	• Program Coordinator
Fusion Landscaping	Region of Peel, ON	• Specialist, Program Management and Development

Table 1.1- Summary of Case Study Participants

For each case study, information from the primary data (survey and interview) and secondary data (program resources) was triangulated and assessed using the CBSM benchmark assessment tool. Each case study's assessment was confirmed and approved by the participants and their organization. Contextual information was also gathered, including a description of the community and program, the role that CBSM plays in the program, what successes the program has encountered, and what

challenges. Once the assessment was completed for each of the five case studies, overall trends could then be investigated. These trends include explorations of which benchmarks were most and least integrated across the studies, common challenges and successes, and potential areas for future growth and development.

1.4. Thesis Structure

To facilitate a clear understanding of this research, this section will outline the structure of this thesis. The thesis is presented in five chapters:

- **Chapter 1 – Introduction:** provides the context for this research, the problem, and the contributions.
- **Chapter 2 – Literature Review:** summarizes the academic literature in two behaviour-change fields that are most relevant to CBSM (namely, psychology and social marketing), discusses human behaviour in relation to water-use and water-efficiency, and concludes with a detailed introduction to community-based social marketing (CBSM) and the theoretical foundations of CBSM benchmark assessment tool.
- **Chapter 3 – Methods (Research Approach):** describes the research approach utilized in this project, including the data collection methods and assessment tools employed. Finally, the case studies are introduced, and important considerations discussed.
- **Chapters 4 – 8:** presents the results of each of the five case-study programs. Each case study includes a description of the context of the program, the role of CBSM within the program, and a detailed analysis of the programs' integration of each of the twenty-one CBSM benchmarks. Each case study concludes with a discussion of the successes and challenges faced by each program.
- **Chapter 9 – Overall Results:** presents the overall results from all five case studies altogether.
- **Chapter 10 – Discussion:** Overall trends are discussed, specific notable benchmarks are examined and explored, and suggestions for better aligning programs with the intended framework are discussed. The experience of utilizing the CBSM benchmark assessment tool is reflected upon and examined. Finally, implications of the current research and suggestions for the future conclude this thesis.

2 Literature Review: Influencing Residential Water Efficiency Through Behaviour

2.1. Behaviour Change Theories Relevant to CBSM

2.1.1. Introduction to CBSM

McKenzie-Mohr's CBSM framework is a pragmatic, five-step approach to fostering sustainable behaviour, whereby "each step builds on those that precede it" (McKenzie-Mohr, 2011, p. 44). The five steps of CBSM are: 1) selecting behaviours, 2) barrier and benefit research, 3) strategy development, 4) piloting, and 5) broad-scale implementation and evaluation (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014). Of particular note in the CBSM framework is the rigid focus on selecting behaviours, which occurs at the outset of the framework and subsequently informs the steps that follow. CBSM advocates for selecting and investigating narrowly defined behaviours because the barriers and benefits that people perceive often differ dramatically between otherwise similar behaviours. The CBSM framework aims to shift environmental programs away from traditionally broad information-based campaigns that are ineffective in changing behaviour, towards programs that integrate knowledge from the social and behavioural sciences in an effective way (McKenzie-Mohr, 2000; McKenzie-Mohr & Schultz, 2014). Furthermore, the CBSM framework outlines several different "behaviour change tools" – such as the strategic use of commitments, prompts, incentives, and social norming – to address the barriers and benefits of selected environmental behaviours (McKenzie-Mohr & Schultz, 2014).

In *Promoting Sustainable Behavior: An Introduction to Community-Based Social Marketing,* McKenzie-Mohr describes CBSM as "[merging] knowledge from psychology with expertise from social marketing" (McKenzie-Mohr, 2000, p. 546). McKenzie-Mohr argues that knowledge from psychology is relevant to delivering effective environmental programs because of the importance in obtaining public participation in the programs' desired goal. Social marketing, on the other hand, is valuable to environmental programs because it emphasizes effective and strategic program design and delivery, informed by rich understanding of a specific target audience and the barriers they perceive to engaging in a desired behaviour (McKenzie-Mohr, 2000). The following sections will discuss the theoretical underpinnings of the CBSM framework in both psychology and social marketing.

2.1.2. Psychological Theories of Behaviour Change Relevant to CBSM

In order to create meaningful and lasting change towards a sustainable future, there needs to be a shift in human values, attitudes, and behaviours towards the environment (Leiserowitz et al., 2006; McKenzie-Mohr & Oskamp, 1995). Values are the abstract ideals that an individual holds; attitudes are an individual's evaluation of an object; and behaviours are the concrete decisions and actions that the individual takes toward the object, which are often rooted in values and attitudes (Leiserowitz et al., 2006). Many investigations of peoples' values, attitudes, and behaviours have traditionally fallen under the domain of psychological inquiry.

There is evidence of "philosophers' thinking about thinking" as early as Aristotle in 300 BCE, but the "birth of psychology" as a science was not until 1879 when German professor Wilhem Wundt and his graduate students sought to measure "atoms of the mind – the fastest and simplest mental processes" (Myers, 2013, pp. 2–3). Psychology was initially conceptualized as "the science of mental life" until scholars like John B. Watson and B. F. Skinner began to understand psychology in the context of observable behaviours (Myers, 2013, p. 5). Today, the field of psychology has grown into many different perspectives (for example, psychologists may ascribe to a behavioural, evolutionary, cognitive, or one of the several other broad levels of analysis) and sub-fields (such as social, clinical, developmental, cognitive, and many other approaches to explaining human thought and behaviour) (Myers, 2013). However, psychology was not typically seen as an environmental science because, historically, there had not been a dedicated sub-field of study investigating human interaction with the natural environment (Koger & Scott, 2007; Winter & Koger, 2014). Up until just over half a century ago, psychology included almost no exploration about the physical setting of the behaviour (Gifford, 2014). However, the public identification of an environmental crisis in the late 1960's and early 1970's spurred a few psychologists – who came from traditional sub-fields of psychology such as behavioural, social, cognitive, or developmental – to begin theorizing about environmental issues (Canter & Craik, 1981; Koger & Scott, 2007). One domain that psychologists began to explore was pro-environmental behaviour (Canter & Craik, 1981).

The earliest and most simplistic models concerning the uptake of pro-environmental behaviours were the US Linear models, which assumed that educating people about environmental issues would result in the uptake of pro-environmental behaviours. These models were based on a linear progression from environmental knowledge, to environmental awareness and concern (attitude formation), to finally, pro-environmental behaviour (Kollmuss & Agyeman, 2002). However, these linear models were

soon proven false (Chan, 2001; Johnstone & Tan, 2015; Kollmuss & Agyeman, 2002). Further research found a discrepancy between attitude and behaviour, meaning that an increase in education and awareness did not translate into tangible behavioural changes (Kollmuss & Agyeman, 2002). Interestingly, despite having known for many years that providing information is ineffective for facilitating behaviour change, information-intensive programs remain the most common strategy used by those seeking to influence environmental behaviour (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014). Nevertheless, in the realm of psychology, the ineffectiveness of these linear approaches to behaviour change led many researchers to set out to determine the cause of this 'attitude-behaviour gap' (Kollmuss & Agyeman, 2002).

Psychologists came to believe that the effect that attitudes had on behaviour was contingent on other factors (Ajzen, 1989). Ajzen and Fishbein developed their *Theory of Reasoned Action* (1975) and *Theory of Planned Behaviour* (1985) to attempt to address methodological flaws in measuring and understanding attitudes and behaviours (Kollmuss & Agyeman, 2002). Fishbein and Ajzen's model for addressing the attitude-behaviour gap assumes that individuals are rational and make systematic decisions for actions based on the information that they have access to at the time (Kollmuss & Agyeman, 2002). The Theory of Reasoned Action (Fishbein & Ajzen, 1975) and the subsequent Theory of Planned Behaviour (Ajzen, 1985) suggest that behavioural intentions are a direct antecedent to the behaviour. Intentions are assumed to be motivational factors in that impact a behaviour and indicate how much effort an individual is willing to put into performing a behaviour (Ajzen, 1985, p. 250). In the Theory of Reasoned Action (figure 2.1, below), Fishbein and Ajzen describe two determinants of behavioural intentions: attitudes, which is the degree to which an individual has a favorable or unfavourable evaluation of a behaviour, and subjective norms, which are the perceived social pressures to perform or not perform a behaviour (Ajzen, 1991, p. 188). The Theory of Planned Behaviour (1985) expanded to include the influences of 'perceived behavioural control' (see figure 2.2), which became a critical element in the model. Perceived behavioural control has an indirect effect on behaviour performance though intentions; if people perceive that they have limited control over performing a behaviour, their intentions to act will be low even if they experience positive attitudes and norms towards that behaviour. Further, perceived control has a direct effect on the behaviour performance because even if an individual has the intention to act, they may be constrained by an actual lack of control (Madden, Ellen, & Ajzen, 1992). Although not without limitations, Fishbein and Ajzen's model has been "the most influential attitude-behaviour model in social psychology" due to its clarity and simplicity in articulating the factors that precede and influence behaviour (Kollmuss & Agyeman, 2002,

p. 243). It also has remained an important theory to in the field of social marketing, which will be discussed in upcoming sections.

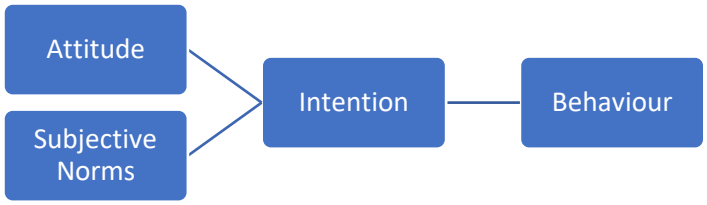

Figure 2.1- Theory of Reasoned Action (1975)

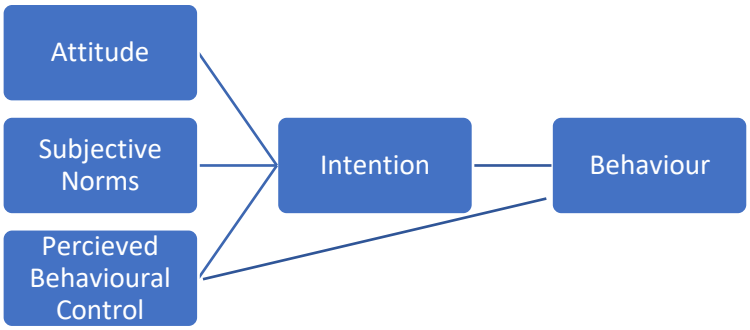

Figure 2.2- Theory of Planned Behaviour (1985)

Blake (1999) reconceptualized the attitude-behaviour gap as the Value-Action Gap. Blake argued that most pro-environmental models are flawed because the models assume that individuals are rational and make systematic use of information available to them, while also failing to consider the impact of individual, social, and institutional constraints. Blake identifies three sets of barriers to pro-environmental action: individuality, responsibility, and practicality (Blake, 1999). Individual barriers are internal to the individual and include factors such as attitudes and beliefs; these barriers are particularly influential for individuals who lack a strong concern for the environment (Kollmuss & Agyeman, 2002). The second set of barriers related to responsibility are concerned with the way that external factors influence people's evaluation of their obligation to act. Finally, the third set of barriers – practicality – defines the real-world social and institutional barriers that constrain action regardless of an individuals' attitudes or intentions (Blake, 1999; Kollmuss & Agyeman, 2002). This model is significant to the development of the CBSM framework because of its articulation of both internal and external factors that influence behaviour.

There are many other noteworthy theories that have shaped modern day psychology's understanding of pro-environmental behaviour. These include Stern and colleagues' Value-Belief-Norm (VBN) theory (Stern, 2000a), Lindberg and Steg's goal-framing theory (Gifford, 2014; Lindenberg & Steg, 2007), theories of altruism and pro-social behaviour (Gifford, 2014; Kollmuss & Agyeman, 2002; Stern, 2000a), sociological theories, and worldview theories (Kollmuss & Agyeman, 2002; Stern, 2000a). However, many of these theories attempting to explain the attitude-behaviour gap operate at a "meso-level" of analysis; while they offer explanatory value about pro-environmental behaviours generally, they fail to account for a wide variety of other individual influences (Gifford, 2014).

As the field of environmental psychology became more mature, research flourished and began to garner attention from across the globe. The number of submissions to the *Journal of Environmental Psychology* quadrupled between 2002 and 2012, at its peak receiving submissions from over 40 countries (Gifford, 2014). Psychologists began to explore the other factors that influence pro-environmental behaviours and elucidate "the hoary mystery surrounding the fabled gap between attitude ("I agree this is the best course of action") and behaviour ("but I am not doing it")" (Gifford, 2011, p. 290). Gifford (2011) arranged 29 "dragons of inaction" into seven general psychological barriers that influence pro-environmental behaviour. The seven broad psychological barriers include limited cognition, ideologies, comparisons with others, sunk costs, discredence, perceived risks, and limited behaviour. Within each of these seven broad psychological barriers are 29 "dragons of inaction" that act as specific barriers to pro-environmental behaviour, including the influence of humans' ancient brains, social norms and networks, worldviews, ignorance, tokenism, system justification, and many more (Gifford, 2011). Recent reports indicate that the number of mental barriers has actually risen from 29 'dragons' to 37 (Davis, 2019). Gifford later went on to describe eleven influences on pro-environmental behaviour, which includes childhood experiences; knowledge and education; personality; values and worldviews; responsibility, moral concern, and commitment; frugality, diversity and empowerment attitudes; place attachment; norms, habits, and defaults; affect; demographic factors; and measures. The roles of affect and emotion are noteworthy within a CBSM context due to their significant influence on an individuals' decision-making process about how to behave within any given context. While many prevailing theories suggest that individuals are able to consciously control their emotions to ensure their rational thinking abilities remain intact, more recent psychological research indicates that these widely-held beliefs are false. In fact, recent research suggests that our thoughts and decisions are deeply influenced by non-rational factors, and that we rely heavily on automatic, emotional, and sub-conscious heuristics when making decisions about how to behave and act (Wolfe & Brooks, 2017).

Clearly, there are countless factors that may act as a barrier to pro-environmental behaviour, which are further influenced by their interaction with each other and the context of the behaviour (Gifford, 2014). In order to influence pro-environmental behaviours, psychologists now suggest investigating specific behaviours at the individual behavioural level to define and influence the barriers specific to each behaviour (Gifford, 2011; McKenzie-Mohr, 2011).

Researchers continue to investigate specific and general pro-environmental behaviours and barriers from many different psychological lenses, exposing more and more information about what influences positive action, and what inhibits it. The aforementioned theories from psychology about fostering positive environmental behaviour contribute to the psychological foundation of CBSM in many ways. Knowledge acquired through psychological inquiry is particularly useful in informing CBSM's approach to selecting of behaviours, its acknowledgement of the impact of external versus internal influences, and its roster of "behaviour-change tools" that seek to address barriers and benefits of selected behaviours (McKenzie-Mohr & Schultz, 2014).

2.1.3. Social Marketing for Behaviour Change

As a developing field, there are many variations of the definition of social marketing. Most broadly, social marketing "seeks to develop and integrate marketing concepts with other approaches to influence behaviours that benefit individuals and communities for the greater social good" (International Social Marketing Association, 2014). Early adoptions of social marketing focussed on tobacco use, HIV/AIDs, and family planning, but the discipline has since expanded to other social, health, and environmental domains (French, Blair-Stevens, McVey, & Merritt, 2010; Lee & Kotler, 2020). According to Lee and Kotler, social marketing has four foundational principles: 1) focus on behaviour change, 2) utilization of systematic planning processes, 3) selection of a priority audience, and 4) the aim to deliver a positive benefit to both the individual and the society (Lee & Kotler, 2020, p. 6). The concept of influencing behaviour for social good has been around for a long time; consider 'Rosie the Riveter', the wartime campaign created to recruit women into the workplace during World War II (Lee & Kotler, 2020). In a seminal article published in *The Public Opinion Quarterly* in 1951, Wiebe asked "why can't you sell brotherhood and rational thinking like you sell soap?" (Wiebe, 1951, p. 679). The social marketing discipline was formally launched in 1971 by Philip Kotler and Gerald Zaltman in their pioneering article titled 'Social Marketing: an approach to planned social change' (Andreasen, 1994; French et al., 2010; Lee & Kotler, 2020). Since its inception, academics and practitioners have

increasingly conceptualized social marketing as deriving from two fields: marketing and social sciences (French et al., 2010). The upcoming paragraphs will discuss each of these origin fields.

Marketing, as it is currently thought of today, emerged over the last half-century as a response to consumerism. Consumerism can be traced as far back as the Industrial Revolution, but Western consumerist culture exploded following World War II. Economies suited to building tanks and bombs could redirect their technology and infrastructure to producing consumer goods, which filled catalogues and storefronts with 'stuff' that embodied freedom and independence (French et al., 2010). With the insurgence of consumerism came the opportunity for marketing to provide a "mechanism through which to persuade consumers to buy a product" (French et al., 2010, p. 20). Around the 1960s and '70s, the field of marketing underwent an important paradigm shift whereby marketers recognized that they could not only satisfy, but create demand for a product or service (French et al., 2010). At this same time researchers from fields outside of business and economics (such as psychologists and other social scientists) entered the marketing discipline, many of them driven by the political unrest, social and global issues of the '60s (Andreasen, 1994; French et al., 2010). Kotler, Levy, Zaltman, and other key scholars of that time began expanding the boundaries of marketing to embrace all forms of human activity related to social exchange and consumer behaviour (French et al., 2010).

Wiebe's seminal article in *The Public Opinion Quarterly* (1951) suggested that it was valuable for marketing efforts to have insight into interactions between individuals and social mechanisms (Wiebe, 1951). Long before marketers were contemplating the application of social mechanisms, social scientists like psychologists, sociologists, anthropologists, and political scientists were asking important questions about the causes, influences, and relationships of human behaviour. Integrating behavioural theories into marketing for social good was recognized as important for addressing contemporary issues, many of which were (and still are) a result of common voluntary behaviours (French et al., 2010). However, the integration of behavioural theories into marketing strategies was contentious. Some worried that the convergence of the fields would result in manipulation and social control, while others believed that the social sciences were "soft" compared to positivist fields and offered limited insights. The United Kingdom resisted the 'marketing' terminology due to associations with commercialism and exploitation, while the United States resisted the 'social' terminology due to mistaken associations with socialism. However, French and colleagues argue that in many ways, these issues are simply a "distraction from the real value of what can be achieved" (French et al., 2010, p. 23). The convergence of social sciences and marketing meant that social marketing became more than simply altruistic or socially responsible

marketing. Integrating social science research and theoretical models allowed traditional marketers to bolster their techniques with knowledge grounded in theories about human behaviour to foster meaningful and positive social change (French et al., 2010; Lee & Kotler, 2020).

Social marketing is an inter-disciplinary and cross-sector approach. It is argued that social marketing "is not a theory in itself; rather, it is a framework or structure that draws from many other bodies of knowledge" (French et al., 2010, p. 2010). As such, there are many behavioural theories that underpin the current social marketing field. French and colleagues provide a selective overview of 16 relevant behavioural theories in 'Social Marketing and Public Health: Theory and practice' (French et al., 2010). Similarily, Lee and Kotler's latest publication, the 6th edition of 'Social Change: Behavior Change for Social Good' (2020), presents a reference guide outlining 19 major theories, models, and frameworks that are useful in social marketing campaign development (Lee & Kotler, 2020). Some of the most influential theories and frameworks for CBSM are highlighted next.

The Diffusion of Innovations theory is one of the most widely-used theories in social marketing. Everett Rogers, who first conceptualized the theory, describes four key elements in the diffusion of innovation; it is a "a process by which an (a) innovation (b) is communicated through certain channels (c) over time (d) among the members of a social system" (French et al., 2010; Lee & Kotler, 2020; Rogers, 2003). An innovation is anything that is new to a particular group but not necessarily to the world, and research suggests that innovations are adopted by different groups of people at different points in time. These "adopters" are categorized into five groups:

1. Innovators – motivated by novelty, risk-takers, opinion leaders, willingness to try new things
2. Early Adopters –drawn by the innovation's intrinsic value, influential with their peers, key to the innovation being adopted by others
3. Early Majority – do not risk being first adopter but perceive the spread of the innovation quickly, "followers" in their social group
4. Late Majority – "bandwagon jumpers" who adopt the innovation because most others are
5. Laggards – the last group to adopt an innovation, often skeptical about innovations and change

Put simply, each category indicates who is likely to adopt an innovation and when. Each of these levels is influenced by the others, with folks in lower levels being unlikely to embrace an innovation until the levels above them have. The diffusion of innovation model illuminates is important for understanding

audience segments and enabling program managers to prioritize in their interventions accordingly (French et al., 2010; Lee & Kotler, 2020).

In a similar domain as the above model is the commonly used transtheoretical (stages of change) model (Prochaska & DiClemente, 1983). The transtheoretical model identifies six stages that people go through when changing or adopting different pro-social and pro-environmental behaviours. In the precontemplation stage (1), individuals are unaware or deny the existence of a problem and have no intention of changing their behaviour. In the contemplation stage (2), individuals have become aware of the problem, and in the preparation stage (3), folks begin actively considering and planning to change or adopt a new behaviour. In the action stage (4), people are overtly modifying their behaviour, and in maintenance (5) and termination (6) stages, individuals are able to sustain their new behaviour and become resistant to temptations and threats from their old behaviour. The transtheoretical model is also useful in understanding and segmenting an audience, which empowers social marketers to effectively tailor their interventions to the needs of each group (French et al., 2010; Lee & Kotler, 2020).

Theories around fostering positive social norms are also very influential in social marketing and in the CBSM framework. Norms are the "rules" or expectations for behaviour that we experience in our social lives. These norms may be descriptive, such that they are perceptions of what people are actually doing; injunctive, such that they indicate what people believe you should (or should not) be doing; or subjective, such that they indicate how an individual believes others will evaluate their behaviour. Norms can be explicitly stated or implicitly understood by the group, and can even occur on a personal level when an individual has expectations for their own behaviour (Lee & Kotler, 2020). Research has shown that individuals tend to conform to the perceived norm in a given situation, making normative strategies a powerful social tool for influencing behaviour (McKenzie-Mohr & Schultz, 2014). In a related vein, social cognitive theory and social learning theory both examine how people learn behaviours. Social cognitive theory provides an understanding of how social, physical, and situational factors within the environment can interact to influence learning and adopting new behaviours. Social learning theory emphasizes that people learn new behaviours through watching and imitating others, thus speaking to the importance of parents, peers, and role models in encouraging positive behaviour (French et al., 2010). These theories inform CBSM's behaviour change tools that seek to foster social norms, the inclusion of "community champions", and the value of reinforcing new behaviours through interacting with others.

There are many other theories that could be discussed within this section. However, the aforementioned theories and models play an important role in shaping the tools and procedures that appear in the CBSM framework. Social marketing is an exciting and expanding field, covering topics from health promotion to environment, and provides critical insights for how theories around influencing behaviour can be operationalized.

2.1.4. Psychology and Social Marketing Mobilized in the CBSM Model

As more is learned about why people behave the way that they do, we learn just how complex influencing behaviour is. The following excerpt from Stern's article in *Science* (1993) captures the complexity of behaviour change:

> "Technology, attitudes, knowledge, money, convenience, attention, and trust are all needed for behaviour change, and attempts to provide any of these will fall short to the extent that others are missing… it will never be possible to write a cookbook for behaviour change. It is absolutely essential to treat interventions as dynamic and to monitor and revise them continually" (Stern, 1993, pp. 1897–1898).

It is clear that simply communicating how people 'should' behave in the era of climate change is not effective in creating meaningful behaviour change (McKenzie-Mohr, 2011). As Stern (1993) points out, interventions that aim to foster environmental behaviours must be dynamic and continually account for the many internal and external factors that influence behaviour. The CBSM framework, having emerged from strong roots in social marketing and psychology, offers practitioners a programmatic approach for developing and delivering environmental programs that are based on scholarly expertise. This approach is dynamic; it can be adapted to many different contexts and encourages ongoing evaluation and revision of the strategy in response to the target audience. Knowledge from psychology informs theories about why people behave the way they do, what factors act as barriers that inhibit actions and which act as catalysts, and what is needed to overcome the gap between environmental knowledge and awareness towards meaningful environmental action; all of which are then mobilized into action by expertise from the social marketing field. The influences from social marketing are clear, given CBSM's pragmatic approach to developing and delivering programs, its targeted selection of behaviours and audiences, and its emphasis on overcoming barriers to behaviour (McKenzie-Mohr, 2000). The upcoming section will dive deeper into the specific mechanics of the CBSM framework and discuss the theoretical underpinnings of the proposed CBSM benchmark assessment tool.

2.2. Theoretical Foundations of the CBSM Benchmark Assessment Tool

2.2.1. The Development of the Assessment Tool

This research utilizes a set of twenty-one benchmarks that were developed by Lynes, Whitney and Murray with the objective of "[providing] increased detail regarding the design and implementation of the CBSM model" (Lynes et al., 2014, p. 115). Each of Lynes et al.'s twenty-one benchmarks are assessed using three qualitative criteria: integrated, partially integrated, or not integrated (2014). Since this research is applying the benchmarks to multiple case studies, the potential for subjectivity in making assessments using only these three qualitative criteria is high; thus, it was important to develop a method for assessment that was replicable and reliable by reducing the impact of subjective assessments. The current research proposes further refinements to the CBSM benchmarks by developing an assessment tool which establishes standards of action required to meet each level of integration. The assessments must be grounded in theoretical knowledge from the CBSM framework to ensure consistent alignment with the intended model. Lynes et al.'s set of benchmarks was developed based on a synthesis of work published between 1999 and 2012 by CBSM's founder, Doug McKenzie-Mohr (Lynes et al., 2014; McKenzie-Mohr, 2011; McKenzie-Mohr et al., 2012; McKenzie-Mohr & Smith, 1999); the current research utilized the same body of work. The following will discuss each of the theoretical foundations of the five steps of CBSM and their associated benchmarks, which then provides the theoretical justifications for the assessment criteria developed in this research. The full assessment tool can be found Chapter 3 (table 3.3).

2.2.2. CBSM Steps, Benchmarks, and Assessment Criteria

Step 1: Selecting Behaviours – In any program dealing with sustainability issues related to consumer behaviour, there are a multitude of behaviours that can be targeted. McKenzie-Mohr argues that it is "important to be able to make informed choices regarding which [behaviours] are most worthwhile to target" (McKenzie-Mohr, 2011, p. 11). McKenzie-Mohr suggests starting broadly with determining the sector it makes most sense to target first (for example, choosing to target either the residential, industrial, agricultural, or other sector) (McKenzie-Mohr, 2000). Once the sector is chosen, it is categorized into areas of the sector that are most important (e.g. narrowing residential energy use into

space heating, water heating, major appliances, etc.), and then narrow down to specific behaviours within that area (within space heating, the specific behaviour may be setting the thermostat too high/low during seasonal temperatures) (McKenzie-Mohr, 2011). The benchmarks in step 1 do not assess the process of moving from sector to specific, which may be a potential limitation given McKenzie-Mohr's most recent emphasis on the importance of selecting and "unpacking" behaviours (McKenzie-Mohr, 2019b). However, the benchmarks do assess key characteristics of the behaviour selection process, such as identifying a target audience and appropriately narrowing, evaluating, and selecting behaviours to target.

Benchmark 1.1 Clearly identifies target audience – Quite broadly within the field of social marketing, practitioners are encouraged to clearly identify their target audience (sometimes also called a priority audience or priority group) (Lee & Kotler, 2011, 2020). However, the CBSM methodology is not explicit about how, when, and why the target audience should be selected, perhaps due to its prioritization of behaviour selection and discussion of sectors. It is possible that the CBSM model assumes that the target audience becomes illuminated once the behaviours have been selected. In any case, there was not sufficient information within the CBSM methodology to determine thresholds for each level of the criteria for this benchmark based on CBSM alone. Thus, the criteria for this benchmark is based off of social marketing's ideas about prioritizing audiences with the greatest marketing opportunity. This means prioritizing audiences that have the greatest need, the greatest readiness for action, are the easiest to reach, and/or are the best match for the organization (Lee & Kotler, 2020).

Benchmark 1.2 Selecting behaviours that are both non-divisible and end-state – McKenzie-Mohr suggests that each targeted behaviour should be "guided by two criteria"; each behaviour should be non-divisible (meaning the behaviour cannot be divided further) and end-state (meaning "the behaviour that actually produces the desired environmental outcome")(McKenzie-Mohr, 2011, pp. 13–15). For example, divisible behaviours (for example, 'reducing water consumption') can be divided further into many different behaviours (shorter showers, updating to water-efficient appliances, reducing lawn watering, etc.). It is important to target each of these non-divisible behaviours separately because each has significantly different barriers associated with action. Furthermore, end-state behaviours actually achieve the desired outcome (in the example of water consumption, these specific behaviours produce a measurable reduction in per capita water consumption). McKenzie-Mohr suggests that this rigid approach to behaviour selection is important for the development of effective strategies that

successfully learn about and create solutions for barriers to desired behaviours (McKenzie-Mohr, 2011). Thus, the criteria developed reflect these two characteristics.

Benchmark 1.3 Evaluating list of selected behaviours for potentially impact, penetration, and probability – Having created a list of end-state and non-divisible behaviours, McKenzie-Mohr then suggests analyzing the following three characteristics of each of the behaviours to determine which are most worthwhile to promote:

- Impact – determining how impactful the specific behaviour is through collecting information related to the associated resource or outcome (e.g. the water consumption of specific behaviour)
- Probability – how likely the target audience is to engage in the desired behaviour. For example, this may be collected through examining past programs for their effectiveness, or perhaps by surveying your target audience by having them rate the probability that they would engage in a variety of behaviours
- Penetration – determining how pervasive a behaviour already is within your target audience. This can be determined through observations or surveying.

The objective in analyzing the above three factors of each specific behaviour is to determine (and subsequently focus your program on) behaviours that are high impact, high probability, and low penetration (McKenzie-Mohr, 2011).

Benchmark 1.4 Limits number of behaviours to target to no more than five or six behaviour – Since there is such specificity in selecting behaviours, McKenzie-Mohr advocates for targeting no more than five or six (end-state, non-divisible) behaviours within a single program or campaign. Limiting the amount of behaviours targets helps to keep the strategy concise, ensures strategic intervention of specific barriers and benefits, and reduces the opportunity for decision fatigue in the target audience due to being overwhelmed by behaviours to change (McKenzie-Mohr, 2018).

Step 2: Identifying Barriers and Benefits – In order to develop effective programs, it is important to first understand what barriers exist to the adoption of the behaviours and how people become motivated to act (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014). Barriers may be internal to an individual (such as lack of knowledge) or external (lack of infrastructure), and differ across behaviours and groups of people (McKenzie-Mohr & Schultz, 2014). McKenzie-Mohr suggests that there are four steps to uncovering barriers and benefits of target behaviours: literature reviews, observations, focus

groups, and surveys. It is valuable to understand both audiences that are engaging in your desired behaviour as well as those engaging in the competing ones, as this elucidates how dissimilar groups differ and what motivates or inhibits them. McKenzie-Mohr also advocates for general research best practices, such as using multiple independent observers, random selection, strategies for countering biases and more (McKenzie-Mohr, 2011). Nonetheless, extensive barrier and benefit research can be resource intensive. It is presumable that the quality and quantity of barrier and benefit research conducted in real-world contexts varies significantly between programs depending on the amount of resources available. Lynes et al.'s benchmarks do not capture information about the methods used to gather barrier and benefit research but do offer a broader view of how the barrier and benefit research was understood in the context of the target audience's motivations and inhibitions.

Benchmark 2.1 Conducts research on barriers and benefits for each of the potential segments in the target group – Barrier and benefit research is most successful when investigation of the desired behaviour is as specific as possible because barriers are considered to be behaviour-specific (McKenzie-Mohr, 2011). As was mentioned earlier, there is less specificity about target group selection and segmentation within the community-based social marketing methodology. However, social marketing more broadly advocates for target group segmentation and selection of a priority group (Lee & Kotler, 2020). Segmentation of the group may occur through the use of many variables or models, including traditional variables like demographics or behavioural factors, as well as more complex variables like stages of change and diffusion of innovation (Lee & Kotler, 2020, pp. 144–158). This benchmark confirms whether or not two things were done: 1) that barrier and benefit research was conducted in some way, and 2) the research conducted investigated potential segments of the target group.

Benchmark 2.2 Identifies and distinguishes between barriers and benefits that are internal versus external to the target segments – This benchmark builds on the previous benchmark with the assumption that to some degree, barrier and benefit research was indeed conducted and target audience segmentation had taken place[1]. The two new insights offered by this benchmark are: 1) whether or not the barriers and benefits were classified as internal (for example, lack of knowledge) versus external (lack of appropriate infrastructure), and 2) whether a "target segment" from the previous benchmark's "potential segments" was identified. Knowing whether a barrier is internal or external to your target audience is important when deciding which strategies you want to employ to address these barriers (McKenzie-Mohr, 2011).

[1] This assumption prompted the need for an option of "Did not complete" in the "Not Integrated criteria.

Step 3: Developing Strategies – Well over half of *Fostering Sustainable Behaviour* (2011) – the textbook provided to those who attend McKenzie-Mohr's introductory workshop in CBSM – is devoted to the discussion of behaviour change tools to incorporate into program strategies. These tools are based the best available knowledge from the social sciences about how to facilitate behaviour change, and should be selected based on the barriers and benefits of the target behaviours that have been identified previously. When developing strategies, practitioners should attempt to maximize the effectiveness of each tool by incorporating as many of the recommended best practices for each tool as possible, as well as by tackling several barriers with a single strategy (for example, a lawn sign that acts as a prompt for efficient water use, is a public commitment, and fosters social diffusion) (McKenzie-Mohr, 2011). McKenzie-Mohr suggests that effective CBSM strategies are "predicated on first having carefully selected an end-state, non-divisible behaviour, and then having identified and prioritized its barriers and benefits" (McKenzie-Mohr, 2011, p. 43). With each step building upon those that precede it, it could be suggested that the successes of the following benchmarks are due, at least partly, to the relative success of the previous benchmarks.

Benchmark 3.1 Creates strategies that are appropriate for the barriers of the behaviour(s) being promoted and reduce the benefits of the behaviour(s) being discouraged – Any community-based social marketing strategy should attempt to address two behaviours simultaneously; the behaviour being encouraged, and the behaviour being discouraged. Programs should aim to reduce the barriers and increase the benefits of the desired behaviour, while doing the converse for the competing behaviour (increasing the barriers, reducing the benefits). McKenzie-Mohr argues that "simultaneously focusing on both behaviours to be encouraged and discouraged" results in a "higher probability of seeing the desired behaviour adopted" (McKenzie-Mohr, 2011, p. 43). This benchmark is a general reflection of how well the strategies used within a program were able to focus on each behaviour (desired and competing).

Benchmark 3.2 Develops commitments tools – Building commitment tools into your program may facilitate a change in your audience's self-perception, whereby they come to view themselves as the type of person that supports the initiative that they have made the commitment to. Having your target audience agree to a small initial request (for example, asking "do you support outdoor water conservation?") makes them much more likely to agree to a subsequent larger request ("would you be interested putting this hose tag on your outdoor nozzle?"). This change in self-perception is due to a strong internal pressure or desire to behave consistently so that one may be viewed as someone who is

honest, has integrity, and whose actions match their words (McKenzie-Mohr, 2011). However, it is important that people do not feel that they were coerced into making the commitment or the change in self-perception is unlikely to occur (McKenzie-Mohr & Schultz, 2014). There are a variety of different ways to facilitate the making of commitments or bolstering their effectiveness, which have been largely captured in guidelines of this benchmark criteria (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014).

Benchmark 3.3 Develops prompts – Prompts are a "visual or auditory aid which reminds us to carry out an activity that we might otherwise forget" (McKenzie-Mohr, 2011, p. 84). Unlike some of the other tools in CBSM, prompts do not aim to change attitudes or increase motivation, but rather are designed to overcome the common barrier of simply forgetting to act in a desired way. While prompts may be useful for behaviours that only occur once, they may be most useful for establishing and maintaining repetitive behaviours, such as composting or managing waste, where forgetting is an especially common barrier. In order for prompts to be most effective, it is suggested that they should be delivered close in space and time to the desired behaviour, should be noticeable, self-explanatory, and encourages the desired behaviour (McKenzie-Mohr, 2011).

Benchmark 3.4 Engages well-known and well-respected people – According to McKenzie-Mohr, "commitment, modeling, norms and social diffusion all have at their core, the interaction of individuals in a community" (McKenzie-Mohr, 2011, p. 104). Audiences are more likely to be influenced to behave differently if they are persuaded by a credible source that they perceive is competent and trustworthy. In some cases, this person may be well-known for their expertise in a specific area, and in other cases they may simply be a community leader. For example, recruiting a resident within the community who already engages in the desired behaviour is an effective method for gaining commitment, as well as having them model or demonstrate the behaviour that you want others to adopt (McKenzie-Mohr, 2011).

Benchmark 3.5 Engages use of norms that are visible and reinforced through personal contact – This benchmark encapsulates ideas around two related behaviour change tools; social diffusion (or diffusion of innovations) and social norming. Social diffusion occurs when we adopt behaviours because our friends, families, or social networks have already adopted the behaviour and subsequently recommended it to us. It is one of the most common reasons for adopting new behaviours and is often underutilized in programs advocating for behaviour change (McKenzie-Mohr & Schultz, 2014). Similarly, the consideration of social norms is often neglected in strategies promoting sustainable behaviours, yet

they exhibit powerful influence on the way that people behave in accordance to the perceived norms they encounter. Norms can be a description of what other people are doing (descriptive norms) or an indication of what others approve of (injunctive norms). If norms are not carefully managed, a program can unintentionally encourage undesirable behaviour by showcasing a normative message that many people are engaging in the behaviour we want to discourage. However, if done correctly, both social norming and social diffusion are likely to be particularly effective in contexts where people are being asked to change their behaviours or adopt different lifestyles (McKenzie-Mohr, 2011).

In order for both social norms and social diffusion to be effective, the strategies must be highly visible in the community as well as reinforced through personal contact. In order for norms to be effective, they must be internalized by people as the way they "should" behave which is most likely to develop through direct contact with others (McKenzie-Mohr, 2011). Furthermore, social diffusions thrives best in behaviours that are highly visible because it sends a perceptible signal to others that people view the desired behaviours as normative and important (McKenzie-Mohr & Schultz, 2014). High visibility may spur conversations among friends, families, neighbours and social networks, where both descriptive and injunctive norms can develop.

Benchmark 3.6 Develops communication tools – In order for communication to be as effective as possible in persuading audiences to change their attitudes or behaviours, CBSM dictates several "critical aspects" for communication best practices (McKenzie-Mohr, 2011, p. 94). To captivate attention, information should be presented in a way that is vivid, concrete, and personal to increase the likelihood that the material is attended to initially, as well as remembered at a later time. Messages should be tailored to communicate with different segments of the community, based on the knowledge gathered through previous barrier and benefit research. Utilizing credible individuals who are well-known for their expertise in the area and have obtained the public's trust can have a dramatic influence on how the audience receives the message. Messages should be also framed strategically; this involves coupling threatening messages with empowering solutions, considering whether or not both sides of an issue should be addressed, or utilizing loss aversion by emphasizing what is lost by the failure to act (as opposed to what is gained or saved by acting) (McKenzie-Mohr, 2011). Finally, the failure "to address the role that memory plays can significantly harm the success of a program", thus messages should clearly articulate the desired actions in a way that is straight-forward and easy for the audience to remember (McKenzie-Mohr, 2011, p. 102).

Benchmark 3.7 Establishing incentives/disincentives – Incentives that reward desired behaviours (for example, rebates on water-efficient appliances), or that increase the cost of the undesired behaviour (increasing costs of water use during the day) "can exert a powerful influence on behaviour" (McKenzie-Mohr & Schultz, 2014, p. 41). Incentives are widely used and are often pointed to as the primary reason for engaging in a desired behaviour (McKenzie-Mohr & Schultz, 2014). McKenzie-Mohr suggests that rewarding people for performing the desired positive behaviour is more effective than disincentives; disincentives simply supress an undesired behaviour but fail to directly encourage the desired one. Incentives should be paired closely with the behaviour such that they are presented at the time that the behaviour occurs, as well as made visible so that people are aware of their existence (McKenzie-Mohr, 2011).

It bears noting that there are negative side effects that may occur from using incentives. Introducing and then removing an incentive can undermine people's intrinsic motivation for behaving a certain way, and the behaviour may revert back or even drop below initial baseline levels (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014). Furthermore, incentives for desired behaviours generally do not "spillover" into other behaviours, are prone to rebound effects, and are susceptible to "diminishing returns" if the size of the incentive is not adequately managed (McKenzie-Mohr, 2011, p. 115; McKenzie-Mohr & Schultz, 2014, p. 41). Therefore, it is suggested that incentives should be used sparingly, and are best employed in instances where cost operates as a significant barrier to action and when motivation to engage is low (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014). These limitations are not reflected in the current benchmarks for CBSM, which may present an opportunity for future refinement.

Benchmark 3.8 Initiates convenience strategies that address external barriers – A key element of the CBSM framework is the strategic attempt to reduce barriers to a desired behaviour (McKenzie-Mohr & Schultz, 2014). No matter how well your program strategy addresses internal barriers, if the desired behaviour is inconvenient or difficult due to external barriers, the program may be rendered ineffective (McKenzie-Mohr, 2011). However, if the barriers can be made low and the desired behaviour made more convenient than the alternative, even those with low motivation may choose to engage in the desired behaviour (McKenzie-Mohr & Schultz, 2014). Using the information gathered from earlier barrier and benefit research, external benefits can be identified, isolated, and solutions brainstormed. In instances where resources for eliminating external barriers are limited, practitioners may also consider making the behaviour they wish to discourage costlier and more inconvenient. External barriers vary significantly

across communities, and thus it is important to tailor convenience strategies for removing barriers based on each case (McKenzie-Mohr, 2011).

Step 4: Piloting – Piloting helps to test a program's proposed strategies to identify and address problems prior to a full-scale implementation, test efficacy of the strategies, and determine the program's cost-effectiveness (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014). Issues that programs may encounter include strategies that are inefficient at overcoming barriers and providing benefits, elements of the promotional strategy failed to "reach and inspire priority audiences", or strategies that are too resource-expensive (Lee & Kotler, 2020). These issues can be expensive and difficult to remedy once a large-scale program has been delivered broadly but are much easier to address and re-test on a smaller scale using pilots. Practitioners (particularly those that are working with smaller audiences) are cautioned against using the same participants for piloting as were involved in barrier and benefit research, as it becomes impossible to determine the true impact of your proposed strategy. In some cases, CBSM advocates for quickly conducting multiple pilots to revise and retest your strategy until it is effective (McKenzie-Mohr, 2011).

Benchmark 4.1 Develops pilot that can be compared with baseline measurements – Gathering baseline measurements is important to understanding the standard habits and general patterns of use in the targeted communities. The baseline behaviour measurement can then be compared to that of the measurements taken during the pilot to determine whether a strategy has successfully altered the desired behaviour. The strategy can then be modified and refined based on the comparison between baseline and pilot measurements, and then tested again. In some cases, practitioners may want to conduct additional research into specific tools, such as on-site surveys and observation (McKenzie-Mohr, 2011). This benchmark captures two key elements of CBSM design: 1) whether a pilot was conducted; and 2) whether the pilot data were compared with baseline measurements.

Benchmark 4.2 Utilizes a control group – In order to be certain that changes in behaviour that occur during the pilot are due to the piloted strategy itself, a control group to which the strategy is not delivered is essential. Control groups help to eliminate the possibility that the behavioural changes observed are due to external events that are simultaneously occurring within the community. Since pilots can make use of small test group sizes, McKenzie-Mohr recommends using a minimum of two groups in your pilot (a strategy group and a control group), however practitioners may wish to have more pilot groups to test and compare different strategies (McKenzie-Mohr, 2011).

Benchmark 4.3 Whenever possible, participants are randomly selected and then randomly assigning to a strategy or control group – When piloting strategies, ideally the control group and pilot group are as identical as possible to be sure of the strategy's effectiveness. This is achieved through random selection and assignment to pilot groups (McKenzie-Mohr, 2011).

Benchmark 4.4 Whenever possible, evaluates strategy through unobtrusive measurements of behaviour change rather than self-report – Unfortunately, although self-report is one of the simplest ways to measure reported behaviour change, it is unreliable (McKenzie-Mohr, 2011). Preferred measurement tools include observation, resource quality or quantity metrics, and other measurements that unobtrusively let you measure the impact of the behaviour change (McKenzie-Mohr, 2011, 2018).

Benchmark 4.5 Focuses only on the strategies that can be implemented on a broad scale – When piloting various strategies, ultimately the strategy that is chosen for broad-scale implementation should be one that is both effective at changing behaviour as well as cost-effective. Failure to pilot strategies that are appropriate for broad-scale may result in costly, ineffective environmental programs. To help determine if a program is effective, McKenzie-Mohr suggests that programs calculate their piloted strategies' return on investment by noting the dollars spent, the number of people who have engaged in the targeted behaviour, the cost per behaviour influence, and the costs avoided (i.e. the benefits) per behaviour. The CBSM framework also suggests to continue to revise and re-test several pilot strategies until it is effective (McKenzie-Mohr, 2011).

Step 5: Broad-scale Implementation and Evaluation – Once a practitioner is satisfied that their pilot has been successful and cost-effective, only then does the CBSM methodology suggest that the strategy is ready for broad-scale implementation. At this time, practitioners may want to bring in additional local media and advertising supports to help raise awareness of the program (McKenzie-Mohr, 2011).

Benchmark 5.1 Measures activity prior to implementation and at several points afterwards – Prior to broad-scale implementation but after the pilot, CBSM advises practitioners to collect baseline data of their entire audience to determine the present level of engagement in the desired behaviour. Once again, practitioners are advised to prioritize reliable measurements such as observations or resource records over self-report baselines. Once the program has been implemented, ongoing data collection which occurs at many different time intervals will help to illuminate the program's short and long-term impact (McKenzie-Mohr, 2011).

Benchmark 5.2 Utilizes evaluation data to retool strategy and/or provide feedback to the community – Outside of using the evaluation data to determine the efficacy of the program, the data can also be used to inform and provide feedback to the target audience. Getting feedback on a behaviour is essential for reaching a goal and helps to reinforce the changes that people have made (McKenzie-Mohr, 2011; McKenzie-Mohr & Schultz, 2014). Evaluation data is also essential in collecting concrete results of your programs, which informs opportunities for improvement as well as justification for continued support from funders and partners (McKenzie-Mohr, 2011).

2.2.3. Limitations and Contributions of the CBSM Benchmark Assessment Tool

In attempting to develop the criteria for these benchmark criteria, there were some limitations that were encountered. Limitations will be discussed in more detail in Chapters 3 and 5 of this report. However, the three major limitations are summarized as follows:

- Lynes et al.'s benchmarks did not always exactly align with McKenzie-Mohr's text;
- Benchmarks and their associated criteria are still flexible; and
- There is still the possibility of subjectivity on the part of the researcher inherent in making these assessments

Despite these limitations, it is the author's position that the current benchmarks and their proposed criteria and thresholds are a step in the right direction towards addressing the "shades of grey" that Lynes et al. identified and acknowledged (2014, p. 115).

2.3. Water Efficiency

2.3.1. Managing Water Resources Through Demand

Water resources all over the world are projected to be heavily impacted by climate change, and "current water management practices may not be robust enough to cope with the impacts" (Bates et al., 2008, p. 4). Threats to water resources include increased risk of droughts and flooding, decreased supply from water stored in glaciers and snow cover, increasing risks to water quality, aggravation of many forms of pollution, and more. These impacts from climate change will impact the function and operation of existing water infrastructure and best management practices (Bates et al., 2008). Water efficiency, or water demand management, has conventionally been understood "as a set of strategies used to increase water use efficiency and reduce consumption rates" (Wolfe, 2012, p. 2996; Wolfe, 2008, p. 42).

Generally speaking, efforts to manage water resources fall into two broad categories: supply-side management and demand-side management (Inman & Jeffrey, 2006). With respect to the former, governments and water companies have employed a variety of tools and policy measures for managing water supply that have achieved mixed success. These efforts include increasing supply through dams and desalination plants, recycling waste water, and retrofitting to address leaks and outdated infrastructure (Graymore & Wallis, 2010; Lowe, Lynch, & Lowe, 2015). However, managing water resources through supply has proven to be contentious, especially when considering large-scale, expensive civil engineering projects. Concerns for resource conservation, protection of the environment, potential risks to public health, questions of public funding, a growing environmental movement, and perceptions of costly initiatives have led to substantial challenges for water supply management (Lowe et al., 2015).

In response to these challenges, there is "a growing consensus that reducing human demand is a more sustainable method of addressing the imbalance between supply and demand"(Inman & Jeffrey, 2006, p. 127; Pearce et al., 2014). It is now common for municipal and private water utilities to adopt an integrated water-resource management approach, which bolsters the traditional supply activities with accompanying demand activities to manage consumption (Inman & Jeffrey, 2006). Demand for water is influenced by macro and meso-level factors, including increasing populations, volume and rate of extraction, seasonality, infrastructure deficits, allocating water for agriculture, uncertainties related to climate change, and climate emergencies (Moore & Baltutis, 2016).

Industries such as thermal power generation, manufacturing, agriculture, and oil and gas withdraw and consume significant amounts of water each year (Environment and Climate Change Canada, 2016). Though the residential sector is not the largest consumer of water resources, household water consumption is directly tied to peoples' everyday behaviours around water, and thus this paper will focus on residential water-use specifically. Residential water use is typically sorted into two broad categories – indoor and outdoor water use. Communities and municipalities employ a wide variety of water efficiency programs to manage residential water demand and consumption in both of these areas. However, traditional demand-side management tools also face some limitations and are difficult to change (Brooks, Maas, Brandes, & Brandes, 2015).

Herein lies an inherent tension between supply and demand management paradigms. While supply-side management is contentious and potentially costly, demand-side management approaches are variable, unpopular, and contradictory as water-supply agencies strive to both conserve water while simultaneously selling water to meet financial obligations (Wolfe & Brooks, 2017). Furthermore,

traditional demand-side approaches focus on quantifiable processes while ignoring the more human elements, like habits and practices, which are much more difficult to quantify. Issues related to why and how we use water, as well as our ability to address challenges between water supply and demand, are more appropriately associated with a water soft path (WSP) approaches. WSP approaches can be used to supplement traditional demand and water efficiency approaches (Brooks et al., 2015). The following section will discuss the water efficiency context in two Canadian provinces, and then describe current residential water-use and residential water efficiency through a behavioural lens. The section will then conclude with a discussion of the limitations of traditional DSM approaches, and the opportunity for behavioural theories to contribute meaningfully water efficiency strategies.

2.3.2. Canadian Context – Water Efficiency in Ontario and British Columbia

Water governance and policy in Canada is remarkably diverse and de-centralized, which has led to fragmentation, governance gaps, poor data collection and sharing, and a lack of inter-governmental coordination (Bakker & Cook, 2011; Hill, Furlong, Bakker, & Cohen, 2008). Federal responsibilities include fisheries, navigation, federal lands, and international waters (Bakker & Cook, 2011). Provinces are almost exclusively responsible for both surface and groundwater resources that are located within the province's boundaries; however, water supply is usually municipally managed (Bakker & Cook, 2011; Wolfe, 2008). The level of decision-making authority around water resources is diverse, ranging from formal government authorities (such as provincial or regional conservation authorities) to voluntary roles taken on by individual communities (such as local "stream keepers" and environmental organizations) (Moore & Baltutis, 2016). The current research utilizes cases from both Ontario and British Columbia, and thus will focus on these two provinces.

Ontario's lakes contain about one-fifth of the world's freshwater supply, with the vast majority of Ontarians receiving their water supply from the surface water of lakes and rivers, or from groundwater (Ontario.ca, 2019). In Ontario, demand and conservation considerations began to be incorporated into supply activities in the late 1980s, and momentum for water efficiency ebbed and flowed in the decade to follow (Kreutzwiser & Feagan, 1989; Wolfe, 2008). However, the Walkerton crisis of 2001 – where seven people died and thousands of others becoming sick after E. coli contaminated the community's water supply – brought provincial water resource issues back into public attention, bolstering focus around both water quality and quantity (Wolfe, 2008). Since Walkerton, the province of Ontario undertook several different measures that addressed both the health and safety concerns of water, as well as concerns about the sustainability of water resources for future

generations. These efforts included the adoption of the *Safe Drinking Water Act (2002),* the *Clean Water Act (2006),* and the *Water Opportunities and Water Conservation Act (2010)* (Abouchar & Vince, n.d.). The *Water Opportunities and Water Conservation Act* in particular aims "to conserve and sustain water resources for present and future generations" ("Water Opportunities and Water Conservation Act, 2010, S.O. 2010, c. 19—Bill 72," 2010).

In the coastal province of British Columbia (BC), water is sourced from both ground and surface water sources from surrounding watersheds (WaterBC.ca, n.d.). Across the province, there are wide variations in patterns of rainfall and availability of water resources, resulting in some areas of BC having rainforest conditions while others experience desert conditions (WaterBC.ca, n.d.). Hydrological cycles – the overall movement of water from oceans and lakes into eventual snowfall or rain – have altered over recent decades which has resulted in significant changes to the landscape, including decreased snowpack, earlier spring melt, decreased summer flows and delayed autumn flows (Moore & Baltutis, 2016; WaterBC.ca, n.d.). This has resulted in an extension of the dry hydrological season, which suggests that many parts of BC may face significant and unknown stressors to freshwater supply (Moore & Baltutis, 2016). These challenges will be further impacted by trends such as climate change, population growth, land-use changes, and summer wildfire seasons (Moore & Baltutis, 2016). In order to deal with the increasing complexity of managing freshwater supply, a *Water Sustainability Act* was created in 2014 to empower watershed organizations to adopt a formal governance role, however the transition into this new model has been slow (Moore & Baltutis, 2016).

2.3.3. Residential Water-use

People's attitudes and behaviours regarding water consumption are influenced by many factors, including economic, social, personal, and technological factors (Elizondo & Lofthouse, 2010; Jorgensen et al., 2014). In many cases, people tend to use water unconsciously and view the use of water as a means to an end as opposed to a distinct activity in and of itself. Residential water activities also often occur in coordination with other activities. For example, people put on a load of laundry and then rush the kids to soccer practice; or fill up the dishwasher and then return to socializing with friends at a social gathering. These activities are typically habitual, have developed routines, and are often performed on auto-pilot (Elizondo & Lofthouse, 2010). In behaviours like choosing the settings of an irrigation system, the behaviour is only performed once (McKenzie-Mohr, 2011), allowing the homeowner to 'set it and forget it' and making the consumption of the water a passive activity (Inman & Jeffrey, 2006). The

habitual nature of water consumption, especially in the Western context, is a significant barrier to efforts aimed at water efficiency.

Outdoor Water Use. Outdoor water use accounts for 50% or more of residential water consumption, in many cases due to excess gardening and lawn watering (Sisser et al., 2016). Studies have shown that in wealthy or prestigious neighbourhoods, gardens are viewed as a "symbol of social distinction" and therefore "the maintenance of property value and the importance of a healthy garden is a symbol of economic status within a neighbourhood is more important to people than conserving water" (Pearce et al., 2014, p. 171). This suggests that outdoor lawn and garden maintenance is tied to both esteem and socio-economic status (Pearce et al., 2014). While factors such as aesthetic, recreation, and maintenance considerations influence lawn and yard management decisions, perhaps the strongest motivators are peer pressure from neighbours and the desire to "fit in". In this way, homeowners ascribe to the social norms set by the neighbourhood and may view their lawn as an extension of their character and work ethic (Sisser et al., 2016). Furthermore, over-consumption of water resources in outdoor settings may simply be due to lack of knowledge about lawn maintenance best practices, or general carelessness

Indoor Water Use. The majority of indoor water-use occurs in the bathroom through showering, bathing, and toilet flushing, which indicates a prioritization of water tied to peoples' health and sanitation (Elizondo & Lofthouse, 2010; Sadalla, Berlin, Neel, & Ledlow, 2014). Campaigns aimed at changing water-use behaviour and attitudes in indoor settings are difficult because these high-priority, high-consumption water uses are unlikely to be sacrificed (Sadalla et al., 2014). Similar to outdoor water use, economic factors also play a role in indoor water consumption. A 2014 study found that factors such as household location, household size, and annual household income have significant predictive qualities for high per capita water use (Pearce et al., 2014). The link between lifestyle and water-use are entangled within cultural norms, habitual enjoyment, and necessity, which means that efforts toward indoor water conservation are often at odds with the pleasure that people derive from how they use water in their everyday lives (Pearce et al., 2014).

2.3.4. Residential Water Efficiency

Outdoor Water Efficiency. Evidence suggests that pricing regulations may be most useful in outdoor settings as outdoor water use is more price elastic than indoor use, meaning consumers are more sensitive to changes in its price (Inman & Jeffrey, 2006). This signals an opportunity for pricing mechanisms to intervene in some manner. As such, regulations that restrict lawn irrigation or time-of-

use pricing schemes are common place to regulate outdoor water use (Sisser et al., 2016). Technological solutions also present an opportunity to manage both quantity and frequency of outdoor water use. That said, research has found that households with automatic sprinkler systems consumed more water externally than households who manually water their lawn. This poses a challenge to the suggestion of installing automatic reticulation systems, as they may lead the consumer to set the timing devices for longer durations or water their lawn more frequently than necessary (Inman & Jeffrey, 2006). Therefore, perhaps combining technological and pricing demand management tools with other tools may prove effective in managing outdoor water consumption.

Stormwater management is an area that is commonly associated with water efficiency programs and efforts, most largely as an effort to help mitigate threats from flooding. Property owners are being advised to adopt property-level flood protection (PLFP) measures, as well as purchase flood insurance (Thistlethwaite, Henstra, Brown, & Scott, 2018). PLFP behaviours range from removing expensive items from basements and choosing water resistant materials up to installing rain barrels or grading the property away from the house (Thistlethwaite et al., 2018). However, despite the growing threat of floods, evidence suggests that individuals do not behave "rationally" by investing in PLFP. Socio-demographic factors such as income, type of house, and number of years at a home influence an individual's willingness to pay for and adopt PLFP's (Thistlethwaite et al., 2018).

Indoor Water Efficiency. Perhaps unsurprisingly, research suggests that people are more likely to resist efforts aimed at reducing indoor water use as opposed to outdoor water use. A study done with 426 participants in Phoenix, Arizona found that residents are more willing to curtail their outdoor water use when facing budget constraints, as opposed to curtailing their indoor water use (Sadalla et al., 2014). In water use closely related to hygiene and sanitation, where consumers are more likely to be resistant to conservation efforts, structural design and technological innovations (such as high pressure-low flow shower fixtures or water-efficient appliances) may be most appropriate for achieving reductions indoors (Bonaiuto et al., 2008; Sadalla et al., 2014). A global study of participants from 29 different countries found that automatic dishwashers are superior to manual dishwashing in both resource consumption and cleanliness performance, thereby maximizing efficiency in water use while also meeting consumer demand for cleanliness and sanitation. There remains a lack of knowledge about the benefits of automatic dishwashing amongst consumers, which presents both a technological, educational and behavioural challenge to overcome (Berkholz, Kobersky, & Stamminger, 2013).

2.3.5. Demand Management Challenges & CBSM's Contribution

As has been exemplified in the previous sections, the most common demand management tools employed by governments and water companies are restrictions and regulations (i.e. legislative and pricing tools), particularly in outdoor settings (Lowe et al., 2015; Wolfe, 2008). Additional DSM tools, such as technological, financial, and educational tools, are also commonplace in programs aimed at reducing resource consumption (Inman & Jeffrey, 2006). The fact that they are common is likely due to the fact that they are relatively easy to implement and measure, albeit with a wide variety of metrics (Brooks et al., 2015; McKenzie-Mohr, 2011). However, there are numerous challenges inherent in many of those traditional DSM tools. For example:

- **Program Evaluation:** There is limited knowledge about water efficiency programs' evaluation and measurement, and thus their overall success, since programs tend to utilize vastly different metrics (Wolfe, 2012).
- **Voluntary v. Regulatory Action:** While mandatory restrictions (which most often occur during water shortages) show significant reductions in water use, voluntary restrictions have achieved mixed results (Graymore & Wallis, 2010).
- **Pricing:** Price elasticity for residential water-use has been shown to be low overall (Barrett, 2004; Garcia-Valiñas, Athukorala, Wilson, Torgler, & Gifford, 2014; Lowe et al., 2015). There is also considerable debate about the use of economic drivers as a means for decreasing water use due to questions of equity and social welfare (Pearce et al., 2014).
- **Limited Effectiveness:** A recent study found that only 10% of respondents reported having participated in a utility rebate program (Silva, Pape, Szoc, Mayer, & Reekie, 2011), which are often used to incentivize the purchase of residential water-efficient appliances and technology. It is also possible that the utilization of tools like incentives and technology alone may result in effects that disappear once the incentive is removed, or worse, actually increase water consumption due to rebound effects (Elizondo & Lofthouse, 2010; Inman & Jeffrey, 2006). Even practitioners of water efficiency programs are divided on how best to manage water resources through demand. Practitioners seem to cluster around two camps, behavioural-driven change and technology-drive change, with the former camp viewing consumers as essential factors in moving a water efficiency program forward, and the latter viewing consumers as "almost counter-productive" to absolute reduction of water demand and consumption (Wolfe, 2012, p. 3001). It is also widely accepted among the social marketing community, who's objective is a systematic approach to behaviour change for

social good, that education and rational communication models are largely ineffective when it comes to actually changing human behaviour (McKenzie-Mohr, 2000).

These challenges suggest that some of the most commonly-used demand management tools may not be effective in addressing challenges related to residential demand for water resources (Lowe et al., 2015). One solution to address the above challenges is the consideration behavioural and psychological factors related to water consumption through the supporting demand approaches, which is considered a water soft path (WSP) approach (Brooks et al., 2015). Water consumption is complex and deeply intertwined into modern life. Failing to address the underlying factors that influence water consumption may not achieve the reduction in consumption needed, because attitudes and beliefs related to habits and patterns of use remain unchanged. Various internal factors – such as lack of knowledge, emotional blocking of new knowledge, and environmental attitudes and beliefs – as well as external factors – such as insufficient feedback, and social and cultural factors – have been identified as important barriers to reducing water consumption (Graymore & Wallis, 2010). In consideration of the challenges that face DSM tools, managing demand by incorporating a behavioural aspect may be an effective way bolster other demand tools (Brooks et al., 2015). For example, a longitudinal study published in 2013 found that while smart-meter technology initially reduced consumption, participants reverted back to their original consumption levels if the technology was not paired with an attempt to modify habits and attitudes (Stewart, Willis, Panuwatwanich, & Sahin, 2012). Failure to address the personal and psychological barriers to water conservation, such as barriers related to health, hygiene, sanitation, and lifestyle, may make demand-management efforts around water conservation ineffective. The need for water efficiency programs and their developers to grapple with the internal barriers and benefits of water consumption is clear. With barriers and benefits at the core of the CBSM framework, this signals an opportunity for CBSM to address some of these long-standing challenges and limitations of traditional demand management approaches.

2.4. Conclusion

The previous chapter discussed the theories that are foundational to CBSM, the underpinnings of the CBSM framework as it is described by its founder, and water efficiency behaviour in a residential context. It is argued that influencing behaviour offers a clear path for creating meaningful, sustainable impact towards climate change, especially in instances when the uptake of an environmental behaviour

is critical to achieving success in broader, system-wide changes (for example, bolstering the impact of municipal composting by increasing residential uptake of composting practices). Understanding the theoretical foundations of the CBSM framework is critical to understanding the power of the CBSM methodology in influencing behaviour, while a rich knowledge of water efficiency behaviour is critical to successfully employing the CBSM framework into a water efficiency context. Altogether, this knowledge can be mobilized to explore how the CBSM theoretical framework has been implemented by community water efficiency programs and discuss ways that these programs may better align their practice with intended framework.

The following chapter will outline the methodologies used to explore how each of the five case studies has implemented the CBSM framework into their activities. In particular, the discussion of the CBSM benchmark assessment tool integrates the knowledge gained from theoretical foundations of CBSM and its use in real-life contexts.

3 Methods

3.1 Overview

This chapter will begin by introducing the general research approach used for this study, and then move on to describe each of the individual research methods that were employed. Initially, a literature search on theories and methods of behaviour change, community-based social marketing, and programs related to water sustainability was conducted. Five programs related to water sustainability that self-identified as utilizing some CBSM principles were then selected as case studies. The overall design of this research is a qualitative, featuring five separate "mini" case studies. However, to extract adequate information from each of the five case studies, it was necessary to employ an exploratory qualitative approach to data collection. This included survey, interview, and secondary data analysis components to determine each program's level of compliance with each of the 21 benchmark criteria, as established by Lynes et al. (2014), in an efficient, and replicable way.

3.2 General Research Method

This project is grounded in a pragmatic philosophical worldview, whereby the researcher is concerned with the application of theory and its approaches to understand what works in social contexts (Creswell, 2014). Preliminary research was conducted to identify relevant secondary data and determine eligible programs for case studies. Nonprobability sampling was utilized for participant selection, as it was necessary to target specific individuals for participation due to their roles in developing water sustainability programs at their organization. After making initial contact with key actors of each the programs to determine whether they believed they had utilized some CBSM in the development of their respective program, five programs and their key actors were eventually selected for case studies of each of their programs. In total 6 participants were recruited, and each completed participation. The data collection for this research utilized a mixed methods approach, meaning that both qualitative and quantitative research data were collected and analyzed; due to the small sample size of this research, the results yielded from this approach are almost exclusively qualitative. An explanatory sequential mixed methods research design was selected because it allows for a more complete understanding of the research question due to its use of two phases.

Prior collecting primary data, secondary data was obtained and analyzed using qualitative data coding. Secondary data included both publicly-available information, obtained from program websites, press releases, online articles, and online reports, as well as internal documents that were provided by

the participants. The internal documents provided additional organizational context, procedural information, research reports, and other information not made available publicly. Data from the secondary sources was coded based on their relevance to one of the five CBSM steps. These broad codes, in addition to the survey data which was collected following this initial scan of the secondary data, were then used to develop a line of questioning for the in-depth interviews.

Quantitative data was collected through online survey responses (Creswell, 2014). The purpose of the surveys was to gauge each participant's perception of whether CBSM principles were integrated into the development of their water program, and roughly to what degree. A copy of the survey questions can be found in Appendix A. The quantitative survey data was then analyzed and used to inform the development of the second phase of the research, the qualitative data collection (Creswell, 2014). Due to the small sample size of this research there were limited statistical inferences that could be made, as any statement of significance would be greatly inflated by the existence of an outlier or an abnormal score.

Following the survey, participants partook in an in-depth interview. The purpose of the in-depth interview was to probe for further elaboration on the survey responses and develop a deeper understanding of how CBSM was integrated into the development of various components of the program. This interview was semi-structured so as to allow for flexibility and spontaneity within the interview while also ensuring that key considerations for addressing the research question are captured. A sample of the semi-structured interview questions can be found in Appendix B. These interviews were then transcribed verbatim and coded alongside the survey responses and secondary literature.

The data collected from the preliminary data search, survey responses, and qualitative interviews was then triangulated, coded, and then synthesized to develop a comprehensive assessment of each campaign's integration of Lynes et al.'s twenty-one CBSM benchmark criteria (2014). For each criterion, the program was given an assessment of either integrated, partially integrated, or not integrated. In order to ensure validity in the assessment, the researcher then engaged in a follow-up discussion with each participant to corroborate her assessment of each criterion and ensure agreement in the stated facts and representation of the program. Once all of the above were completed for each of the case studies, the research was complete with separate assessments of the degree to which CBSM principles were integrated into the development and implementation of five water-related sustainability campaigns.

3.3 Secondary Research and Case Study Selection

In order to decide which programs could be included as case studies, inclusion criteria for case studies had to be determined. At this time, the differentiation between "CBSM programs" and "programs that use CBSM" became an important distinction in how programs described themselves, as the former term implies that the program was developed as a CBSM program from the outset, while the latter suggests more flexibility in how CBSM was integrated into the program. Since the stated objective of this research is to explore how the CBSM theoretical framework has been implemented into practice at the community level, the researcher decided to the select criteria that was flexible enough to capture a realistic snapshot of various community organization's attempts at integrating or including CBSM. The goal was not to select the best examples of CBSM programs, but rather to select case studies of programs who indicated that they had, in some capacity, integrated CBSM principles.

The researcher engaged in purposeful scanning of secondary resources, such as organizational websites, online social marketing forums, textbooks, community or municipal reports, and word-of-mouth, to identify potential case studies. The objective was to curate a list of water-related sustainability campaigns that appeared to utilize CBSM, as well as corresponding program contacts. In the initial stages, any program related to water sustainability that appeared to utilize CBSM principles was included in the list. In order to narrow down the list, the researcher conducted a more thorough and targeted search of each of the programs' websites and publicly available resources in search of indications of CBSM use. In addition, a well-established water conservation industry professional with ample experience in CBSM methodologies was consulted to generate any further leads within the industry, as well as eliminate others that were not applicable. This individual served an invaluable role as a gatekeeper to the industry (Creswell, 2014). The list of prospective programs was eventually reduced down to approximately seven eligible case studies and their respective program practitioners. Practitioners are those that are responsible for implementing the water program, and often come from an engineering or public communications background (Wolfe, 2012). In the current research, practitioners were in a role of "manager", "program director", or "program coordinator", and had backgrounds in communications or environmental fields. These individuals were then contacted for an informal initial introduction.

Informal initial introductions were initiated via email and were conducted over the phone. Due to the nature of qualitative research, the researcher felt it was important to conduct these informal introductions to gain entry to the research setting and to begin to develop a working relationship with the practitioners (Creswell, 2014). During these initial phone calls, the researcher introduced themselves

and gave a brief overview of her research project and interests. The researcher then probed the practitioners to discuss their water sustainability programs, and whether they are familiar with and have employed any CBSM tools. In some cases, these practitioners also suggested other programs that they believed would be applicable to this case study research. Finally, the practitioner's level of interest and availability for participating in this research was gauged during this meeting.

Following these initial meetings and based off the responses given by the practitioners, five programs and their respective employees were selected for case studies. Of the case studies selected, three were from Ontario and two from British Columbia. Each case study is related to residential water efficiency in some way; four cases target outdoor water efficiency, and one case targets indoor water efficiency. The case studies are summarized below (table 3.1):

Case study	Location of program	Participants Interviewed:	Length of interview	Assigned code
Water Wise Garden Parties (WWGP)	Vancouver, BC	• Program Manager (City of Vancouver) • Program Manager (Consultant)	• 44 minutes • 55 minutes	• P01 • P04
Make Water Work (MWW)	Okanagan Basin, BC	• Communications Director	• 1 hour 20 minutes	• P05
Rain Smart Neighbourhoods (RSN)	Kitchener, ON	• Manager of Green Infrastructure Programs	• 1 hour 8 minutes	• P02
Blue Built Homes (BBH)	Guelph, ON	• Program Coordinator	• 48 minutes	• P03
Fusion Landscaping	Region of Peel, ON	• Specialist, Program Management and Development	• 43 minutes	• P06

Table 3.1- Summary of Case Study Participants

3.4 Participant Recruitment

Since an initial informal introduction had already taken place, recruitment for participation was fairly straightforward. Practitioners that had previously been contacted for an introductory conversation were followed up with via email. This email thanked them for taking the time to speak with the researcher and explained that their program had been selected for a case study. Attached to this email was an official invitation to participate, as approved by the University of Waterloo's Office of Research Ethics (see Appendix C for a copy of this invitation). Practitioners were then asked to respond to the email if they were interested in participating.

3.5 Instruments

Once the data collection period (survey + 1-hr interview, explained in more detail in following sections) for each case study was complete, each of the programs was assessed using a scorecard based on previously established benchmark criteria for CBSM campaigns. The benchmark criteria were developed by Lynes et al. and were first employed to assess the musician Jack Johnson's *All At Once* world tour, which occurred in 2008 and 2010 and utilized some CBSM principles (2014). The set of benchmark criteria was designed to "provide increased detail regarding the design and implementation of the CBSM model" (Lynes et al., 2014, p. 115). Each of the twenty-one benchmark criteria are based on crucial elements of CBSM methodology as it is presented by its prominent academic authors and publications, including McKenzie-Mohr and Smith (1999), McKenzie-Mohr (2011), and McKenzie-Mohr, Lee, Kotler & Schultz (2012). Lynes et al.'s benchmark criteria were used when developing the present survey and interview guides to ensure that the appropriate information was gathered.

CBSM Step	Benchmark Criteria	Assessment Criteria		
		Integrated	**Partially Integrated**	**Not Integrated**
Step 1: Selecting Behaviours	1.1 - Clearly Identifies target audience	Target audience clearly identified based on some or all of the following criteria: • Greatest need • Greatest readiness for action • Easiest to reach • Best organizational match	Target audience is clearly identified, however the basis for the prioritization of that particular audience is not clear.	Target audience is not clearly identified.

Table 3.2- Assessment Criteria Example

A qualitative rating scale of 'integrated', 'partially integrated', or 'not integrated' was developed and employed by Lynes et al., and thus will be utilized for the present study as well (2014). While the three qualitative criteria provide the most structured method to date for gauging CBSM principle integration into programs, they are subject to "shades of grey" (Lynes et al., 2014, p. 115). Since this research is applying the benchmarks to multiple case studies, the potential for subjectivity in making benchmark assessments is particularly high. It was important to develop a method for assessment that was replicable and reliable by reducing the impact of subjective assessments. Thus, this research further refines Lynes et al.'s set of CBSM benchmarks by developing criteria that dictate the required components for each level of integration at each CBSM benchmark. For example, table 3.2 below shows the assessment criteria developed for Lynes et al.'s benchmark 1.1 – 'clearly identifies target audience'. The assessment criteria identify which actions are required for the program to meet each level of integration for that benchmark. Similar assessment criteria were identified for each of the remaining twenty benchmarks. Including assessment criteria at each level of integration empowers investigators to

make decisions in a reliable and streamlined manner across many case studies. Thus, the criteria reduce the amount of subjectivity required in making assessment decisions about each benchmark. The full scorecard instrument used to assess each case study's program is shown below (table 3.3).

Benchmark Criteria Assessment Tool				
CBSM Step	**Benchmark Criteria**	**Assessment Criteria**		
		Integrated	**Partially Integrated**	**Not Integrated**
Step 1: Selecting Behaviours	1.1 - Clearly Identifies target audience	Target audience clearly identified based on some or all of the following criteria: • Greatest need • Greatest readiness for action • Easiest to reach • Best organizational match	Target audience is clearly identified, however the basis for the prioritization of that particular audience is not clear.	Target audience is not clearly identified.
	1.2 - Selects behaviours that are both non-divisible and end state. *Non-divisible = the behaviour cannot be divided further* *End-state = the behaviour produces the desired environmental outcome (i.e. achieves reduction in water consumption)*	*If one (1) stated*[2] *target behaviour:* Behaviour is BOTH non-divisible and End-state *If more that one (2+) stated target behaviours:* The majority (i.e. over 50%)[3] of stated behaviours are BOTH non-divisible and end-state.	*If one (1) stated target behaviour:* EITHER Non-divisible or end-state *If more than one (2+) stated target behaviours:* The majority (i.e. over 50%) of stated behaviours are EITHER non-divisible or end-state.	*If one (1) stated target behaviour:* NEITHER Non-divisible nor end-state *If more than one (2+) stated target behaviours:* The majority (i.e. over 50%) of stated behaviours are NEITHER non-divisible nor end-state.
	1.3 - Evaluates list of selected behaviours for potential impact, penetration, and probability	ALL or the majority of stated behaviors were assessed for all three criteria: • Impact • Probability • Penetration	ALL or the majority of stated behaviours were assessed for either: • Impact; and/or • Probability; and/or • Penetration	ALL or the majority of stated behaviours were NOT assessed for: • Impact • Probability • Penetration
	1.4 - Limits number of behaviours to target in any given CBSM campaign (no more than five to six).	Yes, behaviours were limited to no more than 6.		No, behaviours were not limited to no more than 6.
Step 2: Identifying barriers and benefits.	2.1 Conducts research on barriers and benefits for each of the potential segments in the target group	BOTH Barrier and Benefit research AND Research investigated potential segments of the target group	EITHER Barrier and Benefit research OR Research investigated potential segments of the target group	NEITHER barrier and benefit research or investigation of potentially segments of target group occurred
	2.2 Identifies and distinguishes between barriers and benefits that are internal vs. external to the target segments	BOTH Barriers and benefits classified as internal versus external	Barriers and/or benefits classified as EITHER internal or external	NEITHER Barriers and benefits classified as internal versus external OR Did not complete barrier and benefit research or target audience segmentation.
Step 3: Developing a strategy	3.1 Creates strategies that are appropriate for the barriers of the behaviour(s) being promoted and reduce the benefits of behaviour(s) being discouraged	Overall, the strategies employed addressed desired and competing behaviours by doing most of the following: Desired behaviour: • Benefits increased • Barriers decreased Competing behaviour:	Overall, the strategies: Only addressed desired behaviours OR Only addressed competing behaviours	The strategies were not appropriate for addressing the barriers of the behaviour(s) being promoted or the benefits of the behaviour(s) being discourages.

[2] "Stated" behaviours refers to the behaviours that were talked about by the program employees or within the secondary documents they provided. It is possible to suggest that more behaviours were included in a program than what were not explicitly stated, however to maintain reliability in this tool, these behaviours will not be considered.

[3] Determining the majority of behaviours as anything over 50% was done because in some cases, there may have only been two or three stated behaviours, thus the threshold had to be kept relatively low. In any case, this still offers a path to a more robust assessment than current tools.

		• Benefits decreased • Barriers increased		
	3.2 Develops commitment tools that: emphasize written over verbal; seek commitments in groups; actively involve the individual; avoid coercion; help people to view themselves as environmentally-concerned; and are public and durable	Commitment tools are employed, and display 4 or more (i.e. > 50%) of the following: • Emphasize written over verbal • Seek commitment in groups • Actively involve the individual • Avoid coercion • Help people to view themselves as environmentally-concerned • Public and Durable	Commitment tools are employed, and display 3 or less (i.e. < 50%) of the following: • Emphasize written over verbal • Seek commitment in groups • Actively involve the individual • Avoid coercion • Help people to view themselves as environmentally-concerned • Public and Durable	Commitment tools are not employed.
	3.3 Develops prompts that are: noticeable; self-explanatory; presented in close proximity to where the action is taken; and encourage positive behaviors rather than discouraging negative behaviors	Prompts are employed, and display 3 or more (i.e. > 50%) of the following: • Noticeable • Self-explanatory • Close in proximity to where the action is taken • Encourage positive behaviours (rather than discourage negative behaviours)	Prompts are employed, and display 2 or less (i.e. <5 0%) of the following: • Noticeable • Self-explanatory • Close in proximity to where the action is taken • Encourage positive behaviours (rather than discourage negative behaviours)	Prompts were not employed.
	3.4 Engages well-known and well-respected people to be part of the campaign	Yes, well-known or well-respected people were a part of the campaign.		No, well-known or well-respected people were not part of the campaign.
	3.5 Encourages the use of norms that are visible and reinforced through personal contact	Utilizes normative strategies that are both: • Highly visible; and • Reinforced through personal contact	Utilizes normative strategies that are either: • Highly visible; or • Reinforced through personal contact	Does not utilize normative strategies.
	3.6 Develops communication tools that are: captivating; tailored to the target audience; uses credible sources; appropriately frames the message; and makes message easy to remember	Communication tools are employed, and display 3 or more (i.e. > 50%) of the following: • Captivating • Tailored to target audience • Use of credible sources • Appropriately framed message • Message is easy to remember	Communication tools are employed, and display 2 or less (i.e. < 50%) of the following: • Captivating • Tailored to target audience • Use of credible sources • Appropriately framed message • Message is easy to remember	Communication tools were not employed.
	3.7 Establishes incentives/disincentives that: reward positive behavior; are closely paired with behavior; and are visible	Incentives/disincentives were employed, and display 2 or more (i.e. > 50%) of the following: • Rewards positive behaviour • Closely paired with the behaviour • Are visible	Incentives/disincentives were employed, and display 1 (i.e. > 50%) of the following: • Rewards positive behaviour • Closely paired with the behaviour • Are visible	Incentives/disincentives were not employed
	3.8 Initiates convenience strategies that attempt to address external barriers	Convenience strategies are employed that address external barriers.	Some convenience strategies are employed but external barriers are not addressed.	Convenience strategies are not employed.
Step 4: Conducting a pilot	4.1 Develops a pilot that can be compared with baseline measurements	BOTH a pilot was conducted and was compared to baseline measurements.	A pilot was conducted but not compared to baseline measurements OR Baseline measurements are available, but no pilot was conducted.	A pilot was not conducted, and baseline measurements are not available.
	4.2 Utilizes a control group	Yes, a control group was utilized.		No, a control group was not utilized.
	4.3 Whenever possible, participants are randomly selected and then randomly assigned to strategy or control groups	BOTH random selection AND random assignment utilized in pilot.	Random selection OR random assignment utilized in pilot.	Neither random selection nor random assignment utilized in pilot.
	4.4 Whenever possible, evaluates strategy effectiveness through unobtrusive measurements of	In evaluating effectiveness of pilot, unobtrusive measurements of the desired behaviour were collected.	In evaluating effectiveness of pilot, only self-report measurements of the desired behaviour were collected.	Measurements of the behaviour were not collected.

	behavior change rather than through self-report			
	4.5 Focuses only on the strategies that can be implemented at a broad scale	Strategy lends itself easily to a broad-scale implementation.	Strategy lends itself to broad-scale implementation with some challenges.	Strategy does not lend itself to a broad-scale implementation.
Step 5: Evaluating broad scale implementation	5.1 Measures activity prior to implementation and at several points afterwards	Activity is measured before program implementation AND measured at several points afterward.	Activity is measured before program implementation OR measured at several points afterward.	Activity is not measured.
	5.2 Utilizes evaluation data to retool strategy and/or provide feedback to community	Evaluation data is used to do both: • Retool strategy; and • Provide feedback to the community	Evaluation data is used to do either: • Retool strategy; or • Provide feedback to the community	Evaluation data does not influence strategy or provide feedback. OR Evaluation data is not collected.

Table 3.3- CBSM Benchmark Assessment Tool

3.6 Surveys

The survey was developed and administered using Qualtrics. It consisted of 32 questions and included both multiple-choice and written responses. The purpose of the survey was to discern a baseline understanding of which elements of CBSM were integrated into a program, and roughly to what degree. Initially, the survey was designed to mimic Lynes et al.'s (2014) twenty-one benchmark criteria as closely as possible; each of the criteria were listed, and the participant was instructed to indicate whether they believed that they either fully, partially, or did not integrate each element into their program. However, it became clear that structuring the survey in this manner was not appropriate for the practitioner audience. Unless the participant was sufficiently familiar with the literature and jargon related to the CBSM methodology, the survey's language may have been confusing, unclear or misleading. For this reason, as well as to strive for validity and utility of the data gathered, the survey was restructured to be more appropriate for target audience.

The survey began with five questions that gathered information about the program and the participant. The participant was asked about their role within the program, where and when the program took place, and finally how familiar the participant considered themselves with the CBSM methodology on a scale of 1- 'not familiar at all' to 5- 'extremely familiar'. The remaining questions in the survey were broken down into five sections. Each section was made up of questions pertaining to one of the five steps of the CBSM model (McKenzie-Mohr, 2011). Thus, the five sections were: selecting behaviours, identifying barriers and benefits, developing a strategy, conducting a pilot study, and evaluation.

The majority of questions were multiple choice. All of the multiple-choice questions were written and answered using a similar structure. This was done to both mimic Lynes et al.'s qualitative

criteria of 'integrated', 'partially integrated', and 'not integrated', as well as to ensure maximum simplicity in understanding and responding to the survey. Multiple choice questions would ask participants whether an element of CBSM methodology design was employed or implemented, and participants were given a choice of 'yes', 'partially', 'no', 'unsure'. For example:

"Q22: Was a pilot of the program strategy conducted before a full-scale implementation?"

- *Yes*
- *Partially*
- *No*
- *Unsure*

Written response questions were used when the multiple-choice format was not useful in obtaining the desired information. This information was typically qualitative and was not related to the degree that a certain element had been integrated into a program. Participants could respond in brief sentences or short form, where appropriate. Here are a few examples of questions that prompted written responses from the participants:

"Q9: What was the behaviour that your program targeted? If more than one behaviour was targeted, please list all that apply."

"Q32: In a couple of brief sentences (short form is acceptable), please describe what you believe to be the main outcome(s) of the program."

In addition, participants were given the opportunity to provide feedback or additional thoughts at multiple points throughout the survey. At the end of each of the five sections, participants had the option of providing any additional information that they felt was related to that particular section. Participants were also prompted to provide more general feedback at the very end of the survey if they wished to do so. These questions were optional, and thus it was clearly stated that participants could skip these feedback questions if they chose to.

A final point of clarification: in making the decision to move away from structuring a survey that rigidly mimics Lynes et al.'s (2014) benchmark criteria, as a result some of the criteria are not explicitly included in the survey. These criteria were omitted because they could be easily assessed by the researcher without having to explicitly ask the participant about them. For example, one of Lynes et al.'s benchmark criteria in Step One: Selecting Behaviours is "selects behaviours that are both non-divisible and end-state" (2014, p. 116). This criterion does not explicitly arise within the survey. However, in asking about what the target behaviours of a given program are, the researcher was empowered to

make this assessment based on the literature around end-state and non-divisible behaviours (McKenzie-Mohr, 2011). Allowing for these types of assessments also reduces the risk of self-report bias within the survey, albeit only for certain criteria.

For the full survey and list of questions used, see Appendix A.

3.7 Interviews

Interviews took place following each participant's completion of the online survey. Interviews were held over the phone and recorded using a call recorder as well as a computer recorder. Six interviews were conducted, and interviews ranged from 40 minutes up to 80 minutes long. The overall purpose of the interview is to review the participants' survey responses and probe for more information and context about each of the benchmark criteria elements. Interviews were semi-structured in nature which allowed for flexibility in each interview, as each was dependant on the participant's survey responses. Furthermore, semi-structured interviews allowed participants to elaborate freely while also empowering the researcher to discern the required information from the participant. The interview aimed to develop a clear understanding of the following:

- How the program was developed
- Which elements of the CBSM model were integrated; why and how those elements were or were not utilized
- How these elements were ultimately implemented in the program

Additional themes and information that were integrated into the interview questions included:

- Information about the development of the intervention
- Information about the target audience
- Information about the behaviour(s) selected
- The type of evaluation tools used to track outcomes
- The role of partners and stakeholders
- Evidence of intervention success

For an example of the semi-structured interview script and the types of questions asked, see Appendix B. Upon completion of each interview, the recording was converted into an .mp3 file and uploaded onto the researcher's computer for transcription.

3.8 Follow-up

Once the secondary data, survey data, and interview (transcript) data for each of the programs has been consolidated, the researcher assessed the program using the CBSM Benchmark Criteria Assessment Scorecard (table 3.3). A brief report was prepared for each program, and the follow-up discussions with the participants were scheduled. Participants were contacted via email and were provided with their program's report. The report mirrored the case studies presented in chapters 4 through 8 of this chapter. For an example of the report cover prepared for each program, see Appendix D.

The objective of following up was to corroborate the researcher's assessment of the program. More specifically, the follow-up was to ensure agreement between the researcher and the program participants about the researcher's assessment of the level that each of the twenty-one CBSM benchmark criteria was integrated into the program. As a predominantly qualitative study, this step is important in establishing validity of results. Furthermore, the report included any information about the program and participants that the researcher might have been interested in including in the final thesis for this project. This included potential quotes, program descriptions, secondary data information, or any other relevant information within which the program or practitioner will be represented in the report. Any disagreements in the assessment between researcher and participant were discussed. This provided the participant with the opportunity to provide information that may have been missed or misinterpreted, as well as gave the researcher opportunity to discuss their justifications for assessment based on the CBSM methodology. Ultimately, decisions about any disagreement related to a specific benchmark were based off the data collected, the CBSM methodology, and the performance of the other four case studies in that specific benchmark. At the end of these follow-up discussions, these decisions were relayed to the participants and all areas of disagreement were addressed.

3.9 Procedures

The survey was first piloted by an external auditor who had similar experience as this research's participants to provide an objective assessment of the survey (Creswell, 2014). The external auditor for this survey pilot was selected based on their involvement in developing a CBSM program; however, the program was related to waste (i.e. not water efficiency), making them ineligible for full participation in this study. Once the survey had been validated, interested participants were sent a personal link (i.e. unique to them) to the research survey and instructed to complete the survey within the next week. This

began the data collection process. Accommodations could be made for participants that required more than a week to complete the survey. Personal links were possible due to the small sample size of this research and allowed for greater accuracy in data tracking.

One week after providing the survey link, the researcher downloaded the participant's individual responses from Qualtrics and stored the Qualtrics reports on a password-protected computer. Qualtrics reports were also generated for each program (i.e. a single report for each program that included data from all of that case study's participants), as well as a report comparing all participant survey responses overall.

Each individual participant's survey responses were then analysed, and an initial rough estimation of the program's performance on the CBSM Benchmark Criteria Assessment Scorecard was made. This helped to inform the direction of questioning for the next interview. The interview portion of the data collection was scheduled with the participant shortly after the completing the survey, which gave the researcher a chance to review the survey materials and adapt the interview guide accordingly.

Interviews took place over the phone and were audio recorded using a secure laptop computer. Verbal consent was first obtained from each participant. The semi-structured interview then began, typically discussing the survey responses in a chronological fashion (i.e. beginning with the questions beginning at the survey and working to the end). The researcher did not share their initial rough assessment of each benchmark criterion to minimize any potential for swaying or biasing the participant. The semi-structured interview allowed for the participants to elaborate on important elements or provide context around decisions.

Once interviews were completed, the recordings of the interviews were then downloaded onto the researcher's computer as an .mp3 file. The audio files were then transcribed using speech to text software from www.temi.com, which then allowed the researcher to systematically code and analyze the qualitative data using NVivo. Interview data was coded according to the CBSM benchmark criterion it was most related to. This created a qualitative context to accompany each of the twenty-one benchmark criteria.

With all surveys and interviews completed and each data set analyzed, the next step was to consolidate and triangulate the survey data, interview data, and secondary data for each of the case study programs. The objective was to develop a comprehensive assessment of each of the five programs using the CBSM Benchmark Criteria Assessment Scorecard. For each case study program, data related to the twenty-one benchmark criteria was triangulated and coded using qualitative codes relating to each of the benchmarks. Based on the information triangulated within each code, the researcher gave an

assessment of either 'integrated', 'partially integrated', or 'not integrated' for each benchmark. Relevant qualitative notes, such as contextual features or background information, was also recorded in accompaniment with each benchmark criterion. Furthermore, peer debriefing with a colleague in a related research using anonymized data also occurred to help bolster validity (Creswell, 2014).

Once a CBSM benchmark criteria assessment was complete for each case study, the researcher developed a brief report outlining the assessment and scheduled a follow-up discussion with the participants. This follow-up was used as a member-checking tool that helped to ensure validity of the results (Creswell, 2014). The objective of the follow-up was to corroborate the researcher's assessment and obtain approval from the participants for quotations and representation.

3.10 Limitations

The following were identified as potential limitations within this research approach:

- **Heavily reliant on self-reported data:** The surveys and interviews are highly based on the self-reported perceptions of the key actors involved in the development of each program. This results in "indirect information filtered through the views of" participants (Creswell, 2014, p. 241). Efforts were made to reduce the impact and potential bias of self-report data, including recruitment of more than participant per case study, data triangulation, and external assessment. However, it is not possible to completely eliminate the potential for bias in the assessment of each case study, as the assessment is based largely off internal actors' recollection of the development of the program. It was not feasible to consult external stakeholders for the purposes of this research.
- **Limited possible statistical inferences:** The only potentially quantitative design element of this research, the survey, yielded limited statistical inferences due to the small sample size of participants. Furthermore, both the survey and scorecard utilized a qualitative rating scale with no associated quantitative values. It would be inappropriate to make any statements of significance or non-significance using this data set, as any individual response could have a substantial impact on the data and normal distribution could not occur.
- **Limited generalizability:** Given that this research featured specific case studies and utilized predominantly qualitative research methods, the generalizability of the results may be limited. However, the intent of qualitative inquiry is "not to generalize findings to individuals, sites, or places of those under study" (Creswell, 2014, p. 253). That said, there is the potential that this

study's results can be generalized to some broader theories, including theories about CBSM and the applications of social marketing (Creswell, 2014).

- **Assessment of program success is outside of the scope:** This research is concerned with investigating and assessing which CBSM elements are integrated during the development process of a water-related sustainability program. While some qualitative information was collected about the outcome and full-scale implementation of the program, the program's overall success or failure was outside the scope of this research. This represents an important avenue for future research. For example, further research endeavours could empirically investigate how the integration of CBSM benchmark criteria impacts the overall success of the program, both in the short and long term.
- **Researcher self-reflexivity:** Reflecting on the researcher's role in the study and their personal background, culture, and experiences is an important step in qualitative research (Creswell, 2014). These elements hold the potential for shaping the researcher's selection of case studies, interpretation of data, and overall assessment of the programs. As a white Canadian woman, it was important to critically acknowledge how the researchers' understanding of water issues in Canada may have influenced the interpretation of these case studies.

3.11 Introduction to the Case Studies

The following chapters of this research will describe the assessment of each of the five case studies (table 3.4 below). Two case studies were located in British Columbia, and the remaining three case studies were located in Ontario. A minimum of one current program employee per case study participated in the research. In some cases, other program employees played an advisory role by offering feedback and context about the case study but did not participate formally in this research project; instances when this occurred are noted. Four of the five case studies feature programs that target outdoor water efficiency, and one features a program that targets indoor water efficiency.

For each of the following chapters, introductory background and context of the case study is first discussed, as well as the role that CBSM played in the program development and implementation. Then, evidence related to each benchmark will be presented and discussed, along with the justification for the assessment of that benchmark. Finally, program successes and challenges will be discussed.

Case study	Location of program	Participants Interviewed:
Water Wise Garden Parties (WWGP)	Vancouver, BC	• Program Manager (City of Vancouver) • Program Manager (Consultant)

Make Water Work (MWW)	Okanagan Basin, BC	• Communications Director
Rain Smart Neighbourhoods (RSN)	Kitchener, ON	• Manager of Green Infrastructure Programs
Blue Built Homes (BBH)	Guelph, ON	• Program Coordinator
Fusion Landscaping	Region of Peel, ON	• Specialist, Program Management and Development

Table 3.4- Summary of Case Study Participants (duplicate of Table 1.1)

Before interpreting these results, the following should be explicitly noted about the assessment process. When inevitable tensions arose between the CBSM theoretical model, the assessment tool, and what that program had done in practice, the researcher made assessments that favoured the program. For example, if a program conducted barrier and benefit research (step 2 of CBSM) but the research did not occur until after the program was widely-implemented (step 5), the barrier and benefit research was still considered in the assessment of the barrier and benefit benchmarks. This decision could be argued as counter to the CBSM theoretical model, as McKenzie-Mohr states that each step in the CBSM model builds off of the ones that precede it and thus, the steps should be taken in consecutive order. As another example, oftentimes programs did not explicitly gather impact, penetration, and probability information as rigorously as it is described in the CBSM framework; however, they did collect (or gain access to) information that spoke to those factors, and thus they were given credit. The decision to make assessments in favor of the program when tensions arose was made for a couple of reasons.

Firstly, the CBSM methodology was developed for practitioners and program planners. Those who design and deliver environmental programs are the target audience of the CBSM framework, and thus their utilization of the framework is a critical component to its success. In *Promoting Sustainable Behavior: An Introduction to Community-based Social Marketing* (2000), McKenzie-Mohr describes concern that psychological literature is not making its way to environmental program planners, and calls to psychologists to share knowledge and "ensure [their] efforts are well integrated with [program planners'] needs" (McKenzie-Mohr, 2000, p. 552). In attempting to develop a framework that is well-integrated with planners' needs, it is also important to acknowledge the various barriers, constraints, and contexts that programs encounter that are simply not accounted for within the CBSM framework. Programs may have to 'make do' with the resources that are available to them and work within constraints that their program is operating within. Planners may be attempting to integrate the CBSM methodology into an existing program or may be working under strict funding or timing restrictions. It is argued that if the CBSM framework is intended for the needs of program planners', then it should offer enough flexibility to account for the wide and varying capabilities of these programs in implementing

CBSM. Ideally, programs should be incentivized to use the CBSM framework and benchmark assessment, rather than daunted by the constraints of implementing a 'perfect' CBSM campaign.

Beyond the above consideration, it was also necessary to develop a rule for dealing with tensions between the programs and benchmarks because there were many instances where the activities of programs did not quite 'fit' within the CBSM benchmarks. These instances occurred throughout several of the twenty-one benchmarks and in each of the five case studies. Furthermore, tensions between the benchmarks and the programs arose in nuanced and varying ways, which made assessing them in a fair and consistent manner across cases a challenge. Thus, a rule was developed in an effort to streamline decision-making in the assessment process and ensure consistency across case studies.

In any case, this decision may be viewed as contentious. Those wishing to evaluate the CBSM theoretical model as it is presented in the literature may argue that offering too much flexibility in favour of the programs' implementation may take away from the integrity of the CBSM framework. Furthermore, it is difficult to evaluate the true effectiveness of the framework with so many variations. However, the primary objective of this particular study is to explore how the CBSM theoretical model has been applied into practice at the community-level. To reiterate, the purpose is not to explore how programs *should* be applying the CBSM model, but rather, how they are *actually* applying it. These tensions between theory and practice will be discussed in greater detail in the final chapter of this paper.

4 Water Wise Garden Parties: Vancouver (2012 – 2014)

4.1. Background

The City of Vancouver is located on the Pacific coast of Canada, nestled within the Coast Mountain range and along the province's largest river, the Fraser. Vancouver and the surrounding region get drinking water from three protected freshwater lakes, two in the North Shore and one in Coquitlam. Factors such as population growth result in increases to demand for freshwater supply, while climate change makes the supply of these resources susceptible to increasing uncertainty (City of Vancouver, 2012). Within its Greenest City 2020 initiative, the City of Vancouver has set Clean Water targets to achieve the goal of having "the best drinking water of any major city in the world" (City of Vancouver, 2012, p. 52), which including a target to reduce per capita water consumption by 33% by 2020. One of the "highest priority actions" stated to achieve 2020 Clean Water targets was to "develop and implement enhanced water education, incentive, and conservation programs… [which includes] increased education and enforcement of lawn sprinkling regulations (City of Vancouver, 2012, p. 54). The City commissioned a consulting firm as well as a market research company and a local non-profit to deliver the Water Wise Garden Parties to address this action item.

Under this program, trained professional garden consultants visited homes across Vancouver to deliver a tailored water conservation education workshop "using established community-based social marketing methods" (Econics & Metroline Research Group Inc., 2013, p. iii). Each workshop was an interactive format and was held in people's backyards, which provided homeowners with an opportunity for demonstration as well as information about water-efficient landscape management practices specific to their own landscape. Key topics of discussion included efficient irrigation practices, garden design, mulching, and composting. Based on the idea of a "Tupperware party," the Water Wise Garden Parties encouraged homeowner hosts to invite friends, family, and neighbours to participate in the workshop (Econics & Metroline Research Group Inc., 2013). Other features included recruitment material, host incentives, and pledges.

The Water Wise Garden Parties program was first piloted in the summer of 2012, the same year as the Greenest City 2020 Action Plan was published. The program continued for two additional summers, with the summer of 2014 being the last year that it was active. Over its three seasons of operations, the Water Wise Garden Party program hosted over 125 workshops and engaged over 500 Vancouver residents in water education (Econics, 2014; Econics & Metroline Research Group Inc., 2013;

Econnics, Metroline Research Group Inc., & Environmental Youth Alliance, 2012). The City has since moved into other programs, most currently a Water Ambassadors program and a Leak Brigade (P01, 2019).

4.2. The Role of CBSM

Two program managers that were directly involved in the design and implementation of the Water Wise Garden Parties (WWGP) participated in the current research. On their surveys, the participants reported that they were 'very' (scored 4 out of 5) and 'extremely' (5 out of 5) familiar with the CBSM theoretical model. During their respective interviews, both participants indicated that they had attended Doug McKenzie-Mohr's CBSM introductory and advanced workshops and had also been involved in other community programs that have attempted to use CBSM principles as well.

According to both participants, the WWGP was developed using CBSM from the outset. One participant noted:

> *"…[] the whole design of this program was very much CBSM driven, much more so than pretty much anything else I've ever worked on really… I've worked on a lot of them... But this one was, in my mind, really very much on the money of what, say, Doug McKenzie-Mohr would describe as a CBSM program" (P04, 2019).*

When asked why the City elected to develop the WWGP using established community-based social marketing methods, one participant responded:

> *"Because what we're looking at is entirely behaviour change, and there's no other incentives… In Vancouver, single-family homes are not metered, so we don't have exact financials incentives for people to conserve their water" (P01, 2019).*

Without a meter, homeowners were charged a flat rate for water use, meaning they were not motivated to reduce their water use due to cost. Without this external influence, the WWGP focused instead on addressing internal barriers to influence consumption, such as attitudes and behaviours around water use.

4.3. Assessment

The following section will present an overview of each step of the CBSM theoretical model and then breakdown the assessment of each benchmark. Table 4.1 depicts an overview of the benchmark assessment for the WWGP.

Benchmark Assessment for Water Wise Garden Parties (Vancouver)				
CBSM Step **(McKenzie-Mohr, 2011)**	**CBSM Benchmark** (Lynes et al. 2014)	**Integrated**	**Partially Integrated**	**Not Integrated**
Step 1: Selecting Behaviours	1.1 Clearly identifies target audience	✓		
	1.2 Selects non-divisible/end-state behaviours		✓	
	1.3 Evaluates potential behaviours for impact, probability and penetration		✓	
	1.4 Limits number of targeted behaviours to no more than 6[4]		✓	
Step 2: Barrier & Benefit Research	2.1 Conducts research on barriers and benefits for each potential segment in the target group	✓		
	2.2 Identifies/distinguishes barriers and benefits that are internal vs. external			✓
Step 3: Developing Strategies	3.1 Creates strategies that address barriers of the behaviour(s) being promoted and reduce the benefits of behaviour(s) being discouraged	✓		
	3.2 Develops **commitment** tools using best practices	✓		
	3.3 Develops **prompts** using best practices	✓		
	3.4 Engages well-known and well-respected people to be part of the campaign	✓		
	3.5 Encourages **norms** that are visible and reinforced through personal contact		✓	
	3.6 Develops **communication** tools using best practices	✓		
	3.7 Establishes **(dis)incentives** using best practices	✓		
	3.8 Initiates **convenience** strategy to address external barriers			✓
Step 4: Piloting	4.1 Develops a pilot that can be compared with baseline measurements		✓	
	4.2 Utilizes a control group			✓
	4.3 Participants are randomly selected and then randomly assigned to strategy or control groups		✓	
	4.4 Evaluates strategy effectiveness through unobtrusive measurements of behavior change rather than through self-report		✓	
	4.5 Focuses only on the strategies that can be implemented at a broad-scale		✓	
Step 5: Evaluation & Broad-scale Implementation	5.1 Measures activity prior to implementation and at several points afterwards	✓		
	5.2 Utilizes evaluation data to retool strategy and/or provide feedback to community		✓	

[4] Six non-divisible, end-state behaviours

Summary		**9**	**9**	**3**

Table 4.1- Benchmark Assessment for Water Wise Garden Parties

Step 1: Selecting Behaviours – CBSM programs should clearly identify a target audience and develop a shortlist of non-divisible, end-state behaviours. Potential behaviours should be evaluated based on impact, probability, and penetration, to decide which to prioritize. No more than six non-divisible, end-state behaviours should be targeted.

Benchmark 1.1 – Clearly identifies the target audience (Integrated): The WWGP clearly identified their target audience as single-family homeowners with lawns, and a secondary audience of these homeowners' neighbours (P01, 2019; P04, 2019). These audiences have the greatest need for behaviour change, greatest readiness for action, are easiest to reach and provide the best match for the organization.

Benchmark 1.2 – Selects non-divisible/end-state behaviours (Partially Integrated): The WWGP focused on lawn watering, water-efficient gardening, water-wise outdoor practices, and composting, with the greatest priority being lawn watering (Econnics et al., 2012). These behaviours are end-state such that they bring about the desired environmental change (i.e. reduced lawn watering) but are divisible, such that they can be divided further.

Benchmark 1.3 – Evaluates potential behaviour (Partially Integrated): Both participants noted that the absence of residential metering was a significant barrier in measuring this information (P01, 2019; P04, 2019). The WWGP investigated the current penetration of the targeted behaviours, which informed the prioritization of lawn watering. This was done through a city-wide surveying which determined how people were watering their lawn and then stratified these differences amongst different demographic groups (P01, 2019). However, it is not clear that a more specific investigation of the targeted behaviours was conducted or was possible. It is also not clear to what degree this survey investigated or made conclusions about probability or impact. Therefore, this benchmark is partially integrated.

Benchmark 1.4 – Limits to no more than 6 (Partially Integrated): There were four stated behaviours; however, they are divisible and therefore result in more than six targeted behaviours.

Step 2: Barrier & Benefit Research – Understanding the barriers and benefits of each behaviour, how they differ across groups of the audience, and whether they are internal or external to the audience is important for developing CBSM strategies.

Benchmark 2.1 – Barrier & benefit research conducted for each potential audience segment (Integrated): The WWGP conducted barrier and benefit research with the objective of developing "a clearer understanding of habits, demographics, motivations, and barriers to outdoor water efficiency" in their target audience (Econics & Metroline Research Group Inc., 2012, p. 2). Focus groups were stratified by age and watering habits, while telephone surveys investigated demographics, habits, household size and characteristics, and more. These focus groups illuminated insights such as how attitudes and behaviours vary across age groups, the level of knowledge folks had about water efficiency and maintaining a healthy lawn, barriers to water efficiency, and areas for increased education and communication (Econics & Metroline Research Group Inc., 2012). These reports indicate that people are often concerned about the appearance of their landscape. Additionally, historical reports from the City's water enforcement staff indicated that a common reason provided by residents for their infractions was ignorance (P01, 2019).

Benchmark 2.2 – Identifies barriers & benefits as either internal or external (Not Integrated): As discussed, focus groups and surveys identified many key insights including significant differences in attitudes and interests among age groups, the need for education on water conservation, and that the concept of water-efficient lawns and gardens were poorly understood (Econics & Metroline Research Group Inc., 2012). However, these barriers and benefits were not classified as either internal or external to the audience. Therefore, this benchmark was not integrated.

Step 3: Developing Strategies – Overall, CBSM strategies should be developed to address the barriers and benefits of both the desired behaviour and competing behaviour. There are a variety of CBSM tools that can be employed, each with a variety of best practices to bolster the influence on behaviour.

Benchmark 3.1 – Strategies are appropriate for both barriers & benefits of desired and competing behaviours (Integrated): The overall strategy of the program addressed both desired behaviours and competing behaviours through the strategic use of several different tools. Benefits of the desired behaviour (i.e. water-efficient lawn and gardening practices) were communicated through the interaction workshop, where homeowners were empowered to employ what they've learned. The barriers of not understanding what a water-efficient lawn and garden, as well as the lack of rationale in watering patterns, were overcome (Econics & Metroline Research Group Inc., 2013). Furthermore, the barriers of the competing behaviour (i.e. using water inefficiently) were increased through the City's

simultaneous increase in bylaw enforcement alongside the workshop program, which disincentivized improper and inefficient outdoor water use (P01, 2019).

Benchmark 3.2 – Develops commitment tools using best practices (Integrated): Workshop participants were issued a pledge at the end of each workshop which contained three modest commitments to continue water-efficient behaviour (Econics & Metroline Research Group Inc., 2013). Workshop participants filled out their contact information, and the participant kept a tear-away portion of the pledge while the consultant retained the other piece (P04, 2019). One of the reports noted that "contact information collected through this pledge can be used to provide information about other ways to save water and reduce waste through the management of supplies to those who are interested" (Econics & Metroline Research Group Inc., 2013, p. 9). However, when asked about follow-up with the pledge, one participant indicated that participants were not followed-up with about the pledge itself, but rather were contacted for input through other market research (P04, 2019). The pledge sheet provided commitments that were written, sought in a group setting, actively involved the individual, avoided coercion, and helped to foster an environmentally-conscious self-perceptions.

Benchmark 3.3 – Develops prompts using best practices (Integrated): Prompts were used mainly within water-saving kits that were distributed to hosts, and occasionally to the workshop participants as well, depending on the size of the workshop. These prompts included a hose tag, which is placed around the outdoor water spigot to remind homeowners when their watering day was, as well as a rain gauge to help homeowners to know when they've reached the 1 inch of water per week (Econics & Metroline Research Group Inc., 2013; P01, 2019; P04, 2019). These prompts were noticeable, self-explanatory, presented close to the desired behaviour, and actively encourage the desired behaviour.

Benchmark 3.4 – Engages well-known and respected people (Integrated): Local horticultural experts delivered the workshops. To establish both authority and safety, the experts arrived in the City of Vancouver gear, branding and safety protocols (Econics & Metroline Research Group Inc., 2013). This helped to foster trust and safety between the residents and consultant, which was important because these consultants were entering people's home (P04, 2019).

Benchmark 3.5 – Encourages norms that are visible and reinforced through personal contact (Partially Integrated): Incorporating normative strategies was a crucial part of the WWGP, hence the idea of a "Tupperware" party where neighbours can get together and learn something new together in a fun group setting (Econnics et al., 2012; P01, 2019). This helps to foster both social norms and social diffusion among workshop attendees, and strongly reinforces the importance of personal connection.

However, the parties were typically held in backyards and in smaller numbers, so the activity did not have a high degree of visibility. Some suggestions for water-wise plants were made at these workshops and perhaps subsequently planted in people's yards, which may foster some social norming and diffusion, but it is unclear if this occurred. Furthermore, the garden parties often focused their material on lawn watering because they knew that lawn irrigation was a major factor in outdoor water consumption (P04, 2019). However, reducing lawn watering is not a highly visible behaviour. Therefore, although normative strategies were used and reinforced through personal contact, they were not highly visible, which is essential for diffusion.

Benchmark 3.6 – Develops communication tools using best practices (Integrated): The bulk of the communication occurred through the workshop, delivered by a professional lawn and garden consultant. A flexible curriculum allowed the consultant to tailor each of their workshops to the different groups and landscapes they encountered. The interactive workshop provided personalized advice on how to have a beautiful and efficient lawn and garden, and the host's home could be used as a demonstration field where appropriate. Additional communication tools were also used, including print material for recruitment, graphically designed workshop invites given to hosts to send to their neighbours, and posters for various community buildings and garden centres. These messages framed the workshop as providing education for "beautiful, healthy, efficient" lawns and gardens, thereby framing the message to address barriers and benefits of lawn efficiency. Overall, these communication tools encapsulated several best practices (Econics & Metroline Research Group Inc., 2013; Econnics et al., 2012). Overall, these tools were captivating, tailored, delivered by credible sources, appropriately framed, and easy to remember.

Benchmark 3.7 – Establishes (dis)incentives using best practices (Integrated): The City of Vancouver had a "carrot and stick" approach to incentivizing reduced residential outdoor water use. The ‘carrot’, or incentive, of the garden parties was providing expert garden advise and host support at no cost to homeowner. Host support included water-saving kits, invitations, and a gift certificate, which incentivized hosting a garden party. The ‘stick’, or disincentive, of the WWGP program was the threat of receiving a fine from a bylaw infraction. When the WWGP was first delivered in 2012, the City increased the capacity of their bylaw officers to enforce outdoor water use regulations (P01, 2019). Therefore, the combination of these incentives and disincentives both rewards the positive behaviour and are closely paired to it.

Benchmark 3.8 – Initiates convenience strategies that address external barriers (Not Integrated): While it was made as convenient as possible to participate in a workshop, the WWGP did not directly address external barriers of the target behaviour of reducing lawn watering through making it more convenient (or making the competing behaviour more inconvenient).

Step 4: Piloting – CBSM suggests piloting various strategies using test and control groups, random selection and assignment, and unobtrusive measurements. Piloting also helps to determine if a program is appropriate for broad-scale implementation by considering cost-effectiveness as well as behavioural changes that have occurred as a result of the pilot.

Benchmark 4.1 – Develops a pilot that can be compared with baseline measurements (Partially Integrated): A pilot of the WWGP program occurred in the summer of 2012, whereby 50 homeowners were recruited to participate in hosting a garden party (Econnics et al., 2012). However, baseline measurements were not explicitly collected for the pilot area; the city-wide baseline was already known, but more specific baselines of the pilot participants were unavailable as metering for single-family homes that participated in the pilot (P01, 2019). Therefore, this benchmark was partially integrated. It is also worth noting that the pilot also occurred before the barrier and benefit research (Step 3), which is divergent from the "pragmatic" approach of CBSM whereby "each step builds on those that precede it" (McKenzie-Mohr, 2011, p. 44).

Benchmark 4.2 – Utilizes a control group (Not Integrated): Another meaningful way in which the WWGP pilot diverted from the CBSM theoretical model is that the pilot was offered city-wide, and thus there were no specified treatment and control areas. No information regarding water-use was collected from residents who did not participate in a garden party (P01, 2019).

Benchmark 4.3 – Participants are randomly selected, then randomly assigned to strategy and control group (Partially Integrated): To recruit participants for the WWGP pilot, random telephone selection through a call centre was used, which allowed for gathering demographic info and screening. There was also some non-random sampling that occurred through recruitment via newsletters and other existing communication channels (Econnics et al., 2012; P01, 2019; P04, 2019). Therefore, random selection occurred, however participants self-selected to participate in a water wise garden party, and there were no control or test areas; thus, participants were not randomly assigned.

Benchmark 4.4 - Evaluates strategy effectiveness through unobtrusive measurements of behaviour change rather than through self-report (Partially Integrated): The pilot results were measured through four avenues: an on-site questionnaire, field notes from the consultant, an online post-workshop survey, and an end-of-year program debrief (Econnics et al., 2012). The on-site questionnaire and the online post-workshop survey were the only tools that measured the effectiveness of the program specifically concerning the desired behaviour change (i.e. whether or not their watering behaviours have changed since the workshop). The other measurements (field notes from the consultant and the end-of-year program debrief) did not pertain to watering behaviours; these measurements were more focussed on collecting information about the workshops. Therefore, self-report measures were used for measuring the desired behaviour, whereby the CBSM theoretical model states that unobtrusive measurements are preferred. While some observational (unobtrusive) data was collected from the field consultants, it did not measure the desired behaviour change.

Benchmark 4.5 Focuses only on strategies that can be implemented at a broad-scale (Partially Integrated): The pilot was offered city-wide from the beginning, so a focus on piloting a strategy that could be applied broadly is evident. However, it was noted in the pilot that there was a significant amount of administration required to recruit, schedule and deliver the WWGP workshops. This presents some challenges to broad-scale implementation.

Step 5: Evaluation & Broad-scale Implementation – Measurements should be taken before the broad-scale implementation of your program as well as at several points after, which can then be used to retool the strategies and provide feedback to the audience.

Benchmark 5.1 – Measures activity prior to implementation and at several points afterward (Integrated): City-wide baseline measurements were already known (P01, 2019). Measurement continued at several points after deployment as well, through on-site questionnaires, consultant field notes, online post-workshop survey, and the program debrief continued in each year that the program was run (Econics, 2014; Econics & Metroline Research Group Inc., 2013).

Benchmark 5.2 – Utilizes evaluation data to retool strategy and/or provide feedback to the community (Partially Integrated): The evaluation data collected each year was used to retool the strategy and refine it (P01, 2019; P04, 2019). However, the bulk of the feedback occurred during the workshop; therefore, no follow-up feedback about the behaviour was given.

4.4. Successes

Well-received – Each season that the WWGPs were offered, participants consistently indicated on their post-workshop surveys and consultations that they were highly satisfied with their participation in the workshop. In 2013, the WWGP's second year of operation, participants' mean satisfaction score was 4.66 out of 5, with 73% of respondents scoring their satisfaction 5 out of 5 and translating into a 93% satisfaction level overall. Furthermore, the majority of post-workshops respondents indicated that they would recommend participating in this program to friends and family. When asked to state reasons for their satisfaction, participants responded that they enjoyed the format, found the consultants to be knowledgeable, and had an easy and convenient experience booking. Many participants also indicated that they would use water differently after the workshop (3.9 mean score out of 5) and know how to improve their backyard composting practices after the workshop (Econics & Metroline Research Group Inc., 2013). In its final season of operation, the WWGPs continued to receive positive feedback about the garden consultant's teaching and knowledge from participants (Econics, 2014).

An explicit attempt at fostering social norms – Both participants and the WWGP final reports each season explicitly mention an attempt at promoting social norms. Modelling the WWGP program after popular Tupperware parties was strategic to create shared experiences among neighbours which environmental psychological theory suggests should lead social diffusion and the creation of new social norms (Econics & Metroline Research Group Inc., 2013) Each of the participants noted the following:

> *"Social norms were a big focus for this program through using groups of neighbours to participate in the garden parties. At least that was what we attempted to do, though not with perfect success" (P04, 2019).*

And:

> *"…how to address the norming… so the Tupperware party idea where people are learning together and are more interested in experimenting together. That was the thought process behind that…" (P01, 2019).*

According to the CBSM benchmark assessment tool presented in this report, the WWGP program only "partially integrated" social norming tools because the parties (and subsequent norms that were created) were not highly visible. Visibility is a crucial element in allowing social diffusion to spread

(McKenzie-Mohr, 2011). Both participants and the reports acknowledge that the WWGPs perhaps did not employ normative strategies with complete success. However, they still advocate for developing a strategy around delivering a workshop in peer-learning approach in an attempt to foster social norms:

> *"I think the concept that we had here was really solid, and it does fit with the community-based social marketing process and social norms… It's a really important behaviour to look at, because most people, their intention is to have a good looking landscape, they want to keep it healthy, they want it to look nice, and so how to get there was what we were trying to address, and doing it in a way that was also compatible with being water-efficient and having… a conservation mindset as well… I think the concept is good. It does need some tweaks to bring down the cost and to measure the impact" (P01, 2019).*

In order to overcome this challenge of visibility, programs could consider strategically including highly visible prompts or signage that draw attention to beautiful, water-efficient lawns and gardens.

4.5. Challenges

Metering – When the WWGP program was first piloted in the summer of 2012, Vancouver residents paid a single annual flat rate for water regardless of how much they consumed. Starting in January of that year, all newly built single and dual-family homes had water meters installed which began the slow transition to a volume-based water pricing model for residents (City of Vancouver, 2012, p. 54). However, retrofitting homes built before 2012 is costly and time-intensive. In June of 2019, Vancouver still had 75,000 homes without meters (Britten, 2019).

The lack of individual water metering proved to be a significant challenge in the design and implementation of the WWGP. In the initial CBSM stages of selecting behaviours and conducting barrier and benefit research, the lack of individual water-use data meant that any indication of whether someone was a high or low water user was based on self-reported watering habits and knowledge. This is unreliable because people are unlikely to report how much water they use accurately, also likely a result of their homes are not being individually metered. The WWGP had other proxy measurements for water consumption that were collected, including city-wide residential baselines as well as focus groups and surveys investigating watering demographics, habits, motivations and barriers. Nonetheless, when asked if the lack of metering was a significant barrier, one participant responded:

> *"Absolutely. Like… how can we measure success of this program?" (P04, 2019)*

Additionally, when asked about advice that they may give to another practitioner interested in implementing a similar program, one piece of advice that this participant offered was:

> *"…If you are a metered community, you'd have a better way of tracking your impact, and so in some ways, it might be advisable to try this out in that context" (P01, 2019).*

Logistics – To deliver tailored WWGP workshops in the backyards of homes all across the City of Vancouver, there was a considerable amount of administrative work required. A consultant was hired to orchestrate the delivery of the program, and a call centre was employed for recruitment; both are useful for handling the logistics of this program but inevitably raise the cost of the program significantly. Some of the administrative tasks required included putting together a team of stakeholders, scheduling and managing workshops, route planning for the consultants, material development, safety procedures and protocols, and more. It was noted in interviews and surveys that recruiting hosts was a consistent struggle, as well as reported by the consulting firm that "booking logistics proved to be a major challenge and resulted in significant unforeseen extra labour" (Econnics et al., 2012, p. ii). Cancellation and rescheduling were frequent, especially when the program was delivered primarily on summer weekends. Concerning logistical challenges, one participant had the following to say:

> *"Yeah, the business case wasn't strong for it to continue. I think that's the primary reason. And the recruitment was always going to be an issue. So, the amount of administration required, and that type of business case… I'm sure there's ways to work around it, but the design that we're speaking about required a lot of admin. And we had a consultant do that for us, which of course makes it more expensive" (P01, 2019).*

Cost – Related to the logistical challenges is the challenge of cost. As was mentioned above, bringing in a consultant as well as other external partners, such as professional garden consultants and a market research group, increased the cost of delivering the WWGP. In addition to that, there are many other costs associated with providing the program, including program materials, transportation, giving host incentives, and more. In 2014 (the final season that the WWGP program ran), the average cost per workshop was reported as about $350, which was noted in the season-end meeting as the "biggest dilemma for the project" and suggested consideration of whether the workshops would run again (Econics, 2014). When asked why the program did not continue after 2014, one participant stated:

"No, the economics weren't right for it to continue" (P01, 2019).

The other participant also discussed the economics of the program, and expanded on the topic by considering how the program would be difficult and costly to administer at a large scale:

> *"The problem with this program at the end of the day, the reason it didn't continue, is because it was too expensive. We were able to reach 50 households with this program, with a ton of work. 50. Right? To scale that would cost a fortune… A program like this very difficult to administer it at scale, and that's what Vancouver figured out… by the time we got to the third year, [we discussed how] our costs were going up and… we couldn't support them at the budget level that they had for this" (P04, 2019).*

The previous quote succinctly touches on both logistical and economic challenges within the WWGP program.

5 Make Water Work: Okanagan Basin (2011 – Present)

5.1. Background

The Okanagan basin, home to 12 municipalities, four First Nation bands, and three Regional Districts, is a narrow watershed that stretches nearly 200 km from Armstrong, British Columbia to the border of the United States ("Okanagan," 2019; Okanagan Basin Water Board, n.d.).The basin covers an area of almost 8000 km^2, including six major lakes and the surrounding mountains and land that feed into the lakes (Okanagan Basin Water Board, n.d.). While the supply of water within the Okanagan basin comes from a few different sources, the majority (67%) of the water used in the basin comes from surface sources, like lakes and streams. Additional sources include groundwater (22%), importing water from adjacent areas (8%), and recycling wastewater (3%) ("Groundwater » Okanagan Water Supply & Demand Project," n.d.). Most of the surface water sources have been fully allocated, meaning users are now more heavily reliant on groundwater sources in the face of population growth and potential impacts of climate change (Okanagan Basin Water Board, n.d.).

The Okanagan Basin Water Board (herein OBWB) is a local government agency that provides leadership on water issues that span the basin. Starting the first phase in 2005, the OBWB began a Water Supply & Demand project within the Okanagan basin. The project was an update to the last comprehensive water assessment done in 1974 and sought to investigate concerns that the basin's water resources had been over-allocated (Okanagan Basin Water Board, n.d.). The Water Supply & Demand project found that while the Okanagan basin has the lowest supply of water per person in the country, the average Okanagan resident used 675 litres of water per day, more than double the Canadian average of daily use. The majority of residential water consumption occurs through outdoor landscaping, with Okanagan residents' average daily consumption of water raising to 1000 litres per day during the hot, dry summer ("Residents » Okanagan Water Supply & Demand Project," n.d.). For the OBWB, this signalled a clear opportunity for behavioural intervention, and in 2011, the Make Water Work campaign was developed to address outdoor water consumption across the Okanagan basin.

The Make Water Work (MWW) campaign is delivered by Okanagan WaterWise, the public outreach and education program of the OBWB (P05, 2019). The MWW program is largely a communication and education campaign that promotes water-efficient outdoor watering and landscaping behaviours through a variety of yearly communication campaign techniques and tools. Key messages include concrete behaviours for saving water, such as "Put water on the night shift - Water

between dusk and dawn" and "Put water where it's needed – Water plants, not pavement," along with the overarching message to "Make Water Work!". The messaging also includes a simple and recognizable logo that resembles a 'men at work' sign and consists of a water droplet character (See figure 5.1) (Okanagan Basin Water Board, 2012). By remaining consistent in messaging and visuals throughout its entirety, the MWW program has developed a coherent and recognizable campaign that spans across multiple communities within the basin.

Figure 5.1- Make Water Work poster

5.2. Role of CBSM

The participant for the MWW case study is the communication director for the MWW campaign and indicated in their survey responses that their overall familiarity with the CBSM theoretical model was "moderate" (ranked as a score of 3 out of 5). The participant was introduced to CBSM when they first took their role and were investigating other community environmental campaigns; at that time, the participant was not aware of anyone else within their community that was using the CBSM model. The participant noted that while they were aware of the CBSM model during the development of the MWW campaign, the inclusion of CBSM principles occurred over time. In 2014, the participant attended Doug McKenzie-Mohr's introductory workshop for CBSM and began integrating the model into the MWW campaign more heavily at that time (P05, 2019). For example, a telephone survey done initially in 2009 was updated and re-administered in 2014 to include questions related to barriers and benefits of outdoor water use (Discovery Research, 2014).

Since its' inception, the MWW campaign has implemented several different strategies using the principles of CBSM to communicate efficient outdoor watering behaviours. When recalling the five steps of the CBSM model, the participant noted that one area of CBSM that they'd wished they'd been able to complete more fully was Step 4: Piloting. While they recognized the importance of piloting a program and evaluating its effectiveness in a fulsome way, the participant described how there was external pressure to move forward quickly with a campaign. Factors such as the basin's exorbitant per capita outdoor water use, growing population, fully allocated surface water supply, and the threat of climate change contributed to this sense of urgency (P05, 2019).

5.3. Assessment

The following section will present an overview of each step of the CBSM theoretical model and then breakdown the assessment of each benchmark. Table 5.1 depicts an overview of the benchmark assessment.

Benchmark Assessment for Make Water Work campaign (Okanagan Basin)

CBSM Step **(McKenzie-Mohr, 2011)**	**CBSM Benchmark** (Lynes et al. 2014)	**Integrated**	**Partially Integrated**	**Not Integrated**
Step 1: Selecting Behaviours	1.1 Clearly identifies target audience	✓		
	1.2 Selects non-divisible/end-state behaviours	✓		
	1.3 Evaluates potential behaviours for impact, probability and penetration	✓		
	1.4 Limits number of targeted behaviours to no more than 6[5]	✓		
Step 2: Barrier & Benefit Research	2.1 Conducts research on barriers and benefits for each potential segment in the target group	✓		
	2.2 Identifies/distinguishes barriers and benefits that are internal vs. external			✓
Step 3: Developing Strategies	3.1 Creates strategies that address barriers of the behaviour(s) being promoted and reduce the benefits of behaviour(s) being discouraged		✓	
	3.2 Develops **commitment** tools using best practices	✓		
	3.3 Develops **prompts** using best practices	✓		
	3.4 Engages well-known and well-respected people to be part of the campaign	✓		
	3.5 Encourages **norms** that are visible and reinforced through personal contact	✓		

[5] Six non-divisible, end-state behaviours

	3.6 Develops **communication** tools using best practices	✓		
	3.7 Establishes **(dis)incentives** using best practices	✓		
	3.8 Initiates **convenience** strategy to address external barriers	✓		
Step 4: Piloting	4.1 Develops a pilot that can be compared with baseline measurements		✓	
	4.2 Utilizes a control group			✓
	4.3 Participants are randomly selected and then randomly assigned to strategy or control groups			✓
	4.4 Evaluates strategy effectiveness through unobtrusive measurements of behavior change rather than through self-report			✓
	4.5 Focuses only on the strategies that can be implemented at a broad-scale	✓		
Step 5: Evaluation & Broad-scale Implementation	5.1 Measures activity prior to implementation and at several points afterwards	✓		
	5.2 Utilizes evaluation data to retool strategy and/or provide feedback to community		✓	
Summary		**14**	**3**	**4**

Table 5.1- Benchmark Assessment for Make Water Work

Step 1: Selecting Behaviours – CBSM programs should identify a clear target audience and develop a shortlist of non-divisible, end-state behaviours. Potential behaviours should be evaluated based on impact, probability, and penetration to decide which to prioritize. No more than six non-divisible, end-state behaviours should be targeted.

Benchmark 1.1 – Clearly identifies a target audience (Integrated): The participant stated in the survey that the MWW program primarily targets single-family detached homeowners, ages 25-55, located within the Okanagan Basin. Attempts to further breakdown the audience are also evident. The MWW program participant identified women as being more receptive to environmental issues and conservation than men and are important for communicating the message to the rest of the family. However, the MWW also wanted to create a campaign that was still inclusive of men, as they are likely also to be involved in outdoor water activities. Another important element of the MWW target audience is knowing that many towns within the Okanagan Basin are "bedroom communities," whereby the residents work and live in two different cities; therefore, it was important to have consistent communication across the basin (P05, 2019). The fact that all the bodies of water in the valley are connected also made a basin-wide campaign important. The target audience has been selected based on greatest need, greatest readiness for action, and easiest to reach (within the Okanagan Basin).

Benchmark 1.2 – Selects non-divisible/end-state behaviours (Integrated): The participant indicated that the overall target behaviour to influence was reducing outdoor water waste. More specifically, the bulk of the communications by the MWW program targets the following behaviours: leaving grass 2-3 inches tall, watering between dusk and dawn, ensuring water is put where it's needed, choosing plants that are suitable for the dry climate, leaving grass clippings as mulch, and aerating lawn and top-dressing with compost (Okanagan Basin Water Board, 2018). However, other more general best practices for lawn and garden efficiency and care are encapsulated within this campaign as well, although not explicitly promoted in communications (P05, 2019). Of the above-stated behaviours, all are end-state, such that they reduce water waste. The majority are also non-divisible, such that they cannot be divided further (with the exception of choosing suitable plants and aerating/composting your lawn). Thus, this benchmark was integrated.

Benchmark 1.3 – Evaluates potential behaviour (Integrated): As previously mentioned, the OBWB conducted a Water Supply and Demand study and found that outdoor water use was the second largest area of consumption in the basin, thus informing which water consumption behaviours had the most potential for impact (Okanagan Basin Water Board, n.d.). Probability of adoption was not explicitly researched, however, the program developers selected behaviours that were simple, easy to communicate, and "low hanging fruit" to increase the probability of adoption (P05, 2019). Research investigating the current penetration of these target behaviours also did not occur until after the campaign was launched. However, in the first year that the program was launched, OBWB reviewed the MWW program through tools such as Google Analytics, which allowed them to see the level of engagement with the campaign that was reached in its first year of operation. These analyses did not measure the penetration of the target behaviours specifically, instead measuring the penetration of the campaign. In 2014, research investigating what water conservation behaviours residents were currently engaged in was collected, which was an appropriate measurement of penetration of the target behaviour (Discovery Research, 2014). Thus, considerations of probability, penetration, and impact were evident.

Benchmark 1.4 – Limits to no more than 6 (Integrated): Six behaviours are explicitly stated and communicated through the MWW campaign, each of which is mostly end-state and non-divisible. It should be noted that additional behaviours are also implicit or encapsulated within the MWW program, however, this benchmark refers only to stated behaviours.

Step 2: Barrier & Benefit Research – Understanding the barriers and benefits of each behaviour, how they differ across groups of the audience, and whether they are internal or external to the audience is essential for developing CBSM strategies.

Benchmark 2.1 – Barrier & benefit research conducted for each potential audience segment (Integrated): The OBWB surveyed 400 Okanagan residents in 2009 during their Water Supply and Demand study. The key findings of the survey illuminated where there were problem areas and how the water was being used, but do not discuss barriers and benefits specifically (OBWB, 2015). In 2014, barrier and benefit research were conducted through a telephone survey conducted using a random sample of 500 residents within the Okanagan Basin. The 2014 survey was similar to the 2009 study but included questions such as "why do/don't you conserve water?". In each study, demographics including age, location and gender were collected, and data stratified as such (Discovery Research, 2014). It may be noteworthy that an explicit look at barriers and benefits did not occur until after the program had been widely implemented, which is not following CBSM's sequential approach. Nonetheless, it is argued that barrier and benefit research for each potential audience segment was conducted during the MWW campaign.

Benchmark 2.2 – Identifies barriers & benefits as either internal or external (Not Integrated): Though extensive knowledge can be gathered from the 2009 and 2014 reports about what motivates Okanagan residents' water use and what the barriers they experience to conserving water, it does not appear that the barriers and benefits were classified as either internal or external (Discovery Research, 2014).

Step 3: Developing Strategies – Overall, CBSM strategies should be developed to address the barriers and benefits of both the desired behaviour and competing behaviour. There are a variety of CBSM tools that can be employed, each with a variety of best practices to bolster the influence on behaviour.

Benchmark 3.1 – Strategies are appropriate for both barriers & benefits of desired and competing behaviours (Partially Integrated): The MMW is largely a communications campaign; however, it also includes other strategic elements such as public outreach, events, promotional materials, and more. The messaging and communication of the MWW program educates people on how exactly to achieve the desired behaviour (for example, the "Water plants, not pavement" slogan directly states the desired behaviour) (Okanagan Basin Water Board, 2018). Using communication to educate Okanagan residents

on how to use their water-efficiently outside overcomes the common barriers of not knowing why water efficiency is important or how to use water-efficiently outdoors. The MWW program also advocates the benefits of a healthy, water-efficient lawn and garden. Therefore, the MWW campaign does directly deal with the barriers and benefits of the desired behaviour. However, though the MWW program acknowledges competing behaviours that lead to inefficient outdoor water use, the campaign does not directly tackle the benefits of inefficient water use, nor does it increase the barriers for using water inefficiently. In other words, the MWW campaign communicates that the behaviour is undesired, but does not address the barriers or benefits of the undesired behaviour. Individual communities within the Okanagan basin have varying seasonal water-use restrictions that may increase the barriers of inefficient water use through increasing the price; however, these restrictions vary across the basin. Therefore, the strategies employed only address the barriers and benefits of the desired behaviours.

Benchmark 3.2 – Develops commitment tools using best practices (Integrated): On the MWW website, residents are encouraged to take a pledge and commit to at least one of the six target behaviours. Residents can then fill in their name, email address, and community, as well as have the option to share the pledge with their friends and families. Once the pledge is signed, the residents' name is posted on the pledge sheet on the MWW website alongside others in their community that have committed ("Make Your Pledge! Make Water Work | Okanagan WaterWise," n.d.). In a study published in 2016, 215 pledge-takers from 2015 also agreed to participate in an online survey to determine which water-saving actions they have taken since the signing the pledge (Discovery Research, 2016). The pledges provide commitments that are written, actively involve the individual, avoid coercion, help people to view themselves as environmentally concerned, and are public and durable.

Benchmark 3.3 – Develops prompts using best practices (Integrated): The MWW campaign utilized a few different promotional materials as prompts. Firstly, during the 2014 to 2016 seasons, the MWW campaign developed yard signs featuring the orange MWW logo and slogan to "Make Water Work!". On the backside of the yard signs was a list of the six commitments or target behaviours. These yard signs were placed such that they signaled landscapes that used water-efficiently, as well as reminded people on how to use water-efficiently. The signs were given to local governments, utility partners, and contest partners to be placed in "water-wise" landscapes (Okanagan Basin Water Board, 2014, 2015, 2016). The yard signs are no longer being created; the participant noted that they were cost-prohibitive (P05, 2019). The other promotional items that operate as a prompt were MWW frisbees, given to those who make a MWW pledge, as well as at various outreach events. The frisbees are also available at garden centre partners and handed out by local government and utility partners

during water "patrols". The frisbees are fun and functional, as they not only a popular outdoor activity, but also can be used as a water-saving tool and to refer people to the MWW website (P05, 2019). Each frisbee is approximately 1 inch deep, which is how much water a healthy lawn requires each week. The MWW frisbees include a prompt that says, "place me upside down under your sprinkler, when I'm full turn off the water!", as well as depicts the MWW slogan and logo. Finally, the posters, advertisements, bus shelter communications, and other marketing materials are direct prompts for the desired behaviour, as they typically state what the desired behaviour is and how to do it (for example, "Put water on the night shift; water between dusk and dawn" (Okanagan Basin Water Board, 2017). In 2019, the messaging for the bus shelter campaign was updated to include the prompt to pledge; for example, "I pledge to put water on the night shift" (P05, 2019). These prompts are noticeable, self-explanatory, and presented close in proximity to the action (except for the advertisements, which are placed in high-visibility areas around the city).

Benchmark 3.4 – Engages well-known and respected people (Integrated): In 2014, the MWW campaign began to hold friendly competitions between the communities in the basin. Each year, each participating community's mayor takes the MWW pledge and encourages their community to do the same. At the OBWB's annual general meeting that occurs each year at the end of the season, the MWW Community Champion is then announced (P05, 2019). This friendly competition between mayors allows the MWW campaign to involve well-known and respected figures in the community and position them as community champions to communicate and encourage the campaign's target behaviours. Additionally, the MWW campaign has many local, recognizable partners, including local utilities, radio stations and DJs, garden centres and nurseries, and non-profits.

Benchmark 3.5 – Encourages norms that are visible and reinforced through personal contact (Integrated): One key objective from the outset of the MWW campaign was to develop a campaign that was spanned the entire basin in keeping with the fact that Okanagan residents are part of "one valley, one water." The participant noted: "…we have these bedroom communities that people were travelling between. For example, for a while, I lived in Lake Country, but travelled into Kelowna for work. So we wanted to make sure that people who were travelling through the valley were getting the same message" (P05, 2019). Uniformity across communities throughout the valley was important in creating social diffusion and social norming of the MWW campaign and target behaviours. The friendly competition between mayors is also a norming tool, such that it uses a well-respected community champion to deliver the message that using water-efficiently outside is the norm and is accepted. Additionally, when the yard signs were in use, they served as a tool for creating social diffusion and

social norming such that Okanagan residents could drive throughout the basin and see various water-efficient landscapes. Each of these social norming tools is highly visible throughout the communities and the Okanagan basin as a whole, and the competition between mayors creates opportunities for personal contact. For example, on several occasions, mayors have organized events within their communities and collected water pledges at various local booths, events, and gardening centres (P05, 2019). Therefore, these norming tools are both highly visible as well as reinforced through personal contact.

Benchmark 3.6 – Develops communication tools using best practices (Integrated): The MWW campaign has utilized many different communication avenues. Most recently in 2018, the following advertisements and communication avenues were used: bus shelter creative posters, local radio ads (30-second commercials) and contests, Facebook ads and how-to videos, educational outreach at community events, website communication, and banners within local garden centres. All visual communication features the MWW logo, which is highly recognizable. Posters and advertisements highlighted each of the target behaviours, as well as encouraged residents to take the MWW pledge (Okanagan Basin Water Board, 2018). These messages are framed appropriately and have been validated through campaign testing as being easy to remember (McAllister Opinion Research, 2012).

Benchmark 3.7 – Establishes (dis)incentives using best practices (Integrated): Each community within the Okanagan has their own seasonal watering restrictions which may incentivize efficient water use through pricing mechanisms, however, these are not specific to the MWW campaign. Incentives that are specific to the MWW campaign are the annual radio contest and the opportunity for communities to earn the title of "Make Water Work Champion Community". The radio contests encourage Okanagan residents to take the MWW pledge to be entered to win various Water Wise yard prizes, such as money towards receiving a "Water Wise yard upgrade" for their home. The MWW Community Champion is determined based on pledges made in each community on a per capita basis. The Champion is then announced at the Annual Meeting, which includes mayors, public, and media from across the valley (P05, 2019). These incentives reward the positive behaviour, are highly visible, and are closely tied to the desired behaviour of making a pledge.

Benchmark 3.8 – Initiates convenience strategies that address external barriers (Integrated): The MWW campaign recognizes that a common barrier to water efficient lawns and gardens is a lack of knowledge about which plants to include in an outdoor space. To increase the convenience of selecting Water Wise plants, the MWW campaign has developed the MWW Plant Collection, a printable list of appropriate plants which is available online and at local garden centre partners. There is also marketing material that is provided to the garden centres to promote the MWW Plant Collection (P05, 2019).

Step 4: Piloting – CBSM suggests piloting various strategies using test and control groups, random selection and assignment, and unobtrusive measurements. Piloting also helps to determine whether a program is appropriate for broad-scale implementation by considering both cost-effectiveness and any behavioural changes that have occurred as a result of the pilot.

Benchmark 4.1 – Develops a pilot that can be compared with baseline measurements (Partial Integrated): In 2011, a pilot was conducted in the community of Vernon. Early-stage communication tools were delivered, including radio ads, posters, promotional items, and a webpage for MWW on the www.OkWaterWise.ca website. Baseline measurements of outdoor water use were not collected specifically for the pilot community (P05, 2019).

Benchmark 4.2 – Utilizes a control group (Not Integrated): The MWW pilot campaign was delivered to throughout the entire community of Vernon, so neither a control group within Vernon nor another nearby community was used.

Benchmark 4.3 – Participants are randomly selected, then randomly assigned to strategy and control group (Not Integrated): Vernon was chosen as a pilot community due to funding availability. The entire community received the MWW campaign; thus, no random sampling or selection occurred (P05, 2019).

Benchmark 4.4 - Evaluates strategy effectiveness through unobtrusive measurements of behaviour change rather than through self-report (Not Integrated): Following the pilot, the OBWB-OkWaterWise staff met with Vernon and other local government partners to discuss their thoughts on the MWW pilot, collect feedback, and determine interest in continuing the MWW campaign valley-wide (P05, 2019). Though this is useful in evaluating proof of concept, it does not measure the overall effectiveness of the pilot in influencing the target behaviours.

Benchmark 4.5 Focuses only on strategies that can be implemented at a broad-scale (Integrated): The pilot acted as a proof of concept and was validated by the local governments throughout the Okanagan (P05, 2019). Following the pilot, the MWW campaign began to be delivered across the Okanagan Basin. Thus, the MWW pilot focused on strategies that could be implemented broad-scale.

Step 5: Evaluation & Broad-scale Implementation – Measurements should be taken before the broad-scale implementation of your program as well as at several points after, which can then be used to retool the strategies and provide feedback to the audience

Benchmark 5.1 – Measures activity prior to implementation and at several points afterward (Integrated): In 2012 (following the pilot), focus groups were conducted in Kelowna to test the MWW advertising concept. The campaign had not yet been delivered broadly and had not run in Kelowna at all. The focus groups validated the framing of the MWW campaign, evaluated the calls-to-action for each target behaviour, and approved the campaign visuals (McAllister Opinion Research, 2012). Each year that the program is offered, a "Make Water Work Campaign Wrap Up Report" is developed outlining each campaign tool used, the overall costs of the campaign for both OBWB and their partners, and the in-kind donations (Okanagan Basin Water Board, 2012, 2013, 2014, 2015, 2016, 2017, 2018).

Benchmark 5.2 – Utilizes evaluation data to retool strategy and/or provide feedback to the community (Partially Integrated): The program has evolved and adapted throughout the years based on costs and input from the MWW partners. In 2016, the OBWB conducted an online survey with residents who made one or more of the MWW pledges online in 2015 (Discovery Research, 2016). Presumably, these residents were motivated by the MWW campaign to make these pledges. Information regarding any water-saving actions taken, influences of action and inaction, awareness of drought conditions, water-related issues, and priorities were gathered, then subsequently used to retool the strategy. Most recently, in 2019, the OBWB commissioned focus groups to evaluate and improve upon the MWW campaign and materials (Return On Insight, 2019). Many efforts have been made to retool the strategy. However, feedback is not provided to the audience based on this information.

5.4. Successes

Partnerships – The MWW campaign has many different partners, including local utilities, local governments, radio stations, garden centres, and other local businesses across the Okanagan basin. The MWW campaign (as well as the other Okanagan WaterWise programs) use partnerships strategically to leverage funding for the program, which has been a successful strategy:

> *"…basically, we provide matching funds for Make Water Work. So for folks that are interested in joining the Make Water Work campaign, if you invest, depending on the size of your customer base… we will match that… and then what we get, as you probably saw with our final reports for each year, is substantial in-kind, for example with billboards and radio. With radio ads, we buy-one and get-one, and we've developed a really good rapport with them"* (P05, 2019).

The participant emphasized the importance of these partnerships by saying:

> *"I think the only thing I would add is how important it's been to have those partners. I couldn't do it alone from our office. Cost-wise, it would be very difficult. Being able to leverage a $25,000 campaign into 50,000, we are able to do a lot more. And it means that I also get more free advertising… Plus just the amplification of the message by having those partners is huge"* (P05, 2019).

Increased Awareness – Since the campaign's inception, the participant perceives that the overall awareness of the MWW campaign, water issues in the Okanagan, and the OBWB have increased. The participant referred to survey feedback, observational changes in behaviour, media coverage, and anecdotal information from program partners to support their perception of heightened awareness:

> *"I mean, I would love to know if in fact it's as a result of our campaign. Awareness seems to be very, very high in the Okanagan. This, even though our population keeps changing and expanding as one of the fastest growing regions in the country… As part of my job, I track media coverage of water issues and the Okanagan Basin Water Board and its work, and there has been a definite increase in coverage. Awareness around water issues in the Okanagan seems to be up a lot"* (P05, 2019).

It is worth noting that the participant acknowledges that increased awareness may not be due to the MWW campaign specifically. The OBWB's Okanagan WaterWise program also delivers the "Don't Move a Mussel" campaign which is widely recognized by Okanagan residents, and the OBWB provides leadership and support more generally on several other water-related issues within the basin. Also, increasing attention by others due to more severe flooding and drought events may helped drive awareness. Thus, the increase in awareness around the MWW campaign and water issues in the Okanagan may be due to several factors. Nevertheless, awareness around water issues and water conservation have increased, which is an essential factor in achieving success in reducing water consumption within the Okanagan.

5.5. Challenges

Data Access & Measurement of Effectiveness – Data access and the OBWB's ability to measure effectiveness remain challenges for the MWW campaign. It is difficult to collect the required data,

ensure that the data is measuring the desired behavioural metric, as well as control for external influences. The participant described this challenge in detail:

> *"I've given up asking for it now, but for several years I was asking the partners, 'okay, well that's great that you want to be part of this campaign, but can you provide data in terms of water use'? Is this having any effect on the amount of water that's being used on the landscape? One of the first barriers initially was the fact that there were some communities that were not metered, but there's been a lot more metering done since... At the same time, although I want to see the data on what water use looks like when we launch these campaigns, I also recognize that takes effort by partners to provide and that it's really hard to know if it's the campaign that is creating that level of awareness and water savings or is it [something else]… So for example, in 2015, we had a severe drought here in the Okanagan, so the province was also pushing for there to be a curbing of outdoor water use. And there was a lot of media attention to the drought. So was it that that was potentially causing people to use less water? … It's hard to know what's really driving people to reduce water use or change their landscape to be Water Wise"* (P05, 2019).

Resources – As the communications director for OBWB, the participant is responsible for delivering multiple communication and outreach programs each year. Funding for resources, particularly resources related to hiring and maintaining personnel, is a significant challenge for the MWW program. When asked about any challenges or barriers that stick out in particular, the participant responded:

> *"Funding, big time. And time. And they're related. Normally we have hired someone to help us with outreach in the summer… but when you're hiring someone new each year, that takes time away from my other projects to train them. And MWW isn't my only responsibility... If I had more money, I would be hiring an outside consultant to come in and really look at this program and really look at taking a step back and really delving super deep into it, seeing where we can improve, collect and analyze the data, see 'are we having an impact?' I want to know that too, and then move forward from there. But I just do what I can. And especially, with community-based social marketing, it can be a fairly involved process, and it's not my expertise by the way, it's not my training. My training and experience is in journalism for 10 years and then 16 in communications"* (P05, 2019).

It is important to note that not only does the participant acknowledge that additional resources are required for evaluating and delivering effective programs, but that these resources are particularly important in programs that use CBSM. The participant observes that CBSM is an "involved process," which can be particularly challenging when the participant does not come from a marketing or CBSM training background.

Related to the challenge of resources is the additional problem of employee turnover among long-term programs like the MWW campaign, which has been in operation since 2011:

> *"We are in the process, the third year it seems, of redoing that Water Supply and Demand study looking at water use in our valley… There's been staff turnover on that project, which is really unfortunate. We hire really awesome people and then they end up being hired on by [someone else]. They're young people who are upwardly mobile, so we're losing our second person on that project in a couple of weeks. So, we'll have to be hiring for that position again, trying to finish this study. The study is important to determine our water issues, communication needs and messages, including for MWW "* (P05, 2019).

6 Rain Smart Neighbourhoods: Kitchener-Waterloo (2016 – 2018)

6.1. Background

Kitchener and Waterloo (KW) are two neighbouring cities located within the Region of Waterloo. The Region of Waterloo is responsible for supplying water to the Tri-Cities (KW and Cambridge), the towns of Elmira and St. Jacobs, and several small communities located in nearby townships using an integrated urban system (IUS). The IUS sources water from a complex system of both groundwater supplies throughout the Region as well as surface water supply from the Grand River (Stantec Consulting Ltd., 2015). It is important for the Region to improve flood-resiliency to postpone costly future investments to the IUS and the Region's stormwater infrastructure as well as improve the quality of the water supply to residents (Econics & Lura, 2014). This signals areas for improvement in increasing the uptake of residential stormwater best management practices in an effort to improve water quality and decrease flood risk.

Reep Green Solutions (Reep) is an environmental charity based in KW that delivers programs to encourage the adoption of green infrastructure and best management practices to residents (Smith, 2017). Specific to stormwater management, Reep offers the RAIN program, which is an urban stormwater education program developed by Green Communities Canada to safeguard communities' groundwater and surface water resources ("RAIN Program," n.d.). Reep offers the RAIN program through a collaboration between Green Communities Canada and the Region's municipalities. Reep's RAIN program obtained a grant from the Ontario Trillium Foundation which empowered them to deliver the RAIN Smart Neighbourhood pilot project beginning in the spring of 2016 and concluding in the fall of 2018 (P02, 2019).

The Rain Smart Neighbourhoods (RSN) pilot allowed Reep to build on what they considered the "gold standard" of various strategies that they had tried to implement or explore but didn't necessarily have the resources to support en masse (P02, 2019). Within the RSN pilot, two Kitchener communities received technical support, financial support, and community engagement initiatives to facilitate the adoption and installation of residential green stormwater infrastructure (GSI). Specific lot-level GSIs that were promoted through the RSN pilot included rain gardens, infiltration galleries, permeable paving, rain barrels and cisterns. The RSN pilot project was supported by Partners for Action, Green Communities Canada, the City of Kitchener, and the Ontario Trillium Foundation (Reep Green Solutions & Partners For Action, 2018).

6.2. Role of CBSM

Reep's manager of programs involving green infrastructure participated in the current research; this participant was directly involved throughout the entirety of the RSN pilot project. This participant indicated that they are moderately familiar with the CBSM theoretical model (rated as 3 out of 5 in their survey responses). Reep and the participant were first introduced to CBSM around the time that the City of Kitchener introduced their Stormwater Utility Fee in 2011 and Stormwater Credit Policy in 2012 (P02, 2019; Reep Green Solutions & Partners For Action, 2018). At that time, the City of Kitchener brought Reep on as a partner to help encourage and facilitate applying for the stormwater credit through the installation of various GSIs. This prompted Reep to investigate CBSM techniques and principles to aid the encouragement of GSI adoption (P02, 2019).

In the years before conducting the RSN pilot project, Reep used some CBSM principles within their RAIN program. These principles were integrated into Reep's RAIN Home Visits, whereby a guide helped homeowners assess their stormwater infrastructure, as well as in other community outreach events and engagement strategies. The participant noted that before the RSN pilot, it was a challenge to implement more than one CBSM strategy or principle at a time. With the opportunity for additional resources afforded through a grant, the RSN project was able to implement a number of CBSM principles (P02, 2019).

6.3. Assessment

The following section will present an overview of each step of the CBSM theoretical model and then breakdown the assessment of each benchmark. Table 6.1 depicts an overview of the benchmark assessment.

Benchmark Assessment for the Rain Smart Neighbourhood project (KW)				
CBSM Step **(McKenzie-Mohr, 2011)**	**CBSM Benchmark** (Lynes et al. 2014)	**Integrated**	**Partially Integrated**	**Not Integrated**
Step 1: Selecting Behaviours	1.1 Clearly identifies target audience	✓		
	1.2 Selects non-divisible/end-state behaviours		✓	
	1.3 Evaluates potential behaviours for impact, probability and penetration	✓		
	1.4 Limits number of targeted behaviours to no more than 66		✓	
Step 2: Barrier & Benefit Research	2.1 Conducts research on barriers and benefits for each potential segment in the target group	✓		
	2.2 Identifies/distinguishes barriers and benefits that are internal vs. external			✓
Step 3: Developing Strategies	3.1 Creates strategies that address barriers of the behaviour(s) being promoted and reduce the benefits of behaviour(s) being discouraged	✓		
	3.2 Develops **commitment** tools using best practices		✓	
	3.3 Develops **prompts** using best practices	✓		
	3.4 Engages well-known and well-respected people to be part of the campaign	✓		
	3.5 Encourages **norms** that are visible and reinforced through personal contact	✓		
	3.6 Develops **communication** tools using best practices	✓		
	3.7 Establishes **(dis)incentives** using best practices	✓		
	3.8 Initiates **convenience** strategy to address external barriers	✓		
Step 4: Piloting	4.1 Develops a pilot that can be compared with baseline measurements	✓		
	4.2 Utilizes a control group			✓
	4.3 Participants are randomly selected and then randomly assigned to strategy or control groups			✓
	4.4 Evaluates strategy effectiveness through unobtrusive measurements of behavior change rather than through self-report		✓	
	4.5 Focuses only on the strategies that can be implemented at a broad-scale		✓	
Step 5: Evaluation & Broad-scale Implementation	5.1 Measures activity prior to implementation and at several points afterwards			✓
	5.2 Utilizes evaluation data to retool strategy and/or provide feedback to community		✓	
Summary		**11**	**6**	**4**

Table 6.1- Benchmark Assessment for Rain Smart Neighbourhoods Project

Step 1: Selecting Behaviours – CBSM programs should clearly identify a target audience and develop a shortlist of non-divisible, end-state behaviours. Potential behaviours should be evaluated based on impact, probability, and penetration to decide which to prioritize. No more than six non-divisible, end-state behaviours should be targeted.

Benchmark 1.1 – Clearly identifies a target audience (Integrated): Reep's RAIN program targets residential homeowners in KW and focuses primarily on those who reside in single-family detached homes. Therefore, the RSN pilot project selected a smaller sub-population of the RAIN program's target audience to maximize resources and to demonstrate the potential impact of the RSN pilot. Five neighbourhoods within Kitchener were evaluated using a Neighbourhood Selection Matrix to compare potential neighbourhoods and select participants based on a set of criteria. Neighbourhoods were evaluated and selected based on their level of engagement, demographics, environmental features, and the practicality of the neighbourhood meeting the goals of the project. Neighbourhoods with homes built before 1990 were also preferred because they were in greater need of improve GSI; after 1990, stormwater ponds were more commonly employed to manage rainfall and surface water run-off. Ultimately, two neighbourhoods in Kitchener were selected for the RSN pilot project (Reep Green Solutions & Partners For Action, 2018). The aforementioned demonstrates that the target audience was clearly defined and selected based on the greatest need, readiness for action, reachability, and organizational match.

Benchmark 1.2 – Selects non-divisible/end-state behaviours (Partially Integrated): The survey indicated that the overarching goal of the RSN pilot was promoting the installation of GSIs, with the following specific GSIs noted: rain gardens, rainwater harvesting, permeable pavement, and infiltration galleries (Reep Green Solutions & Partners For Action, 2018). The RSN pilot project allowed Reep to attempt to target and influence the behaviours required to carry out the installation of each of these GSIs (P02, 2019). These behaviours are end-state, such that they elicit the desired outcome of increasing residential stormwater management; however, they are not non-divisible, such that they can be divided into many more behaviours.

Benchmark 1.3 – Evaluates potential behaviour (Integrated): Reep had access to data from the City of Kitchener based on their Stormwater Credit program, which roughly indicated each GSI's current level of penetration within Kitchener. This data is not an exact measurement as people may have

[6] Six non-divisible, end-state behaviours

installed GSIs without applying for the credit; however, it offers a reasonably robust indication (P02, 2019). The program also completed the Stormwater Scorecard from Green Communities Canada which helps to "determine the current state of green stormwater infrastructure programs, policies and plans in your community" (Reep Green Solutions & Partners For Action, 2018, p. 12). The scorecard evaluates communities based on its policies and plans, capacity, current implementation of stormwater infrastructure in various community areas, new development and redevelopments projects, and overall community engagement in stormwater-related issues (Blakelock & Maynes, 2017). The results of the scorecard give an indication of priority action items based on the community's characteristics. While the results of the data do not explicitly measure the probability and impact of adopting the target behaviours, they determined the strategies of the program through strategically considering which action items are likely to be adopted within the community and their potential for impact. Thus, this benchmark was integrated based on the useful information collected which informed the impact, probability, and penetration of the target behaviours.

Benchmark 1.4 – Limits to no more than 6 (Partially Integrated): There are four stated behaviours, however they are each divisible, resulting in many more behaviours.

Step 2: Barrier & Benefit Research – Understanding the barriers and benefits of each behaviour, how they differ across groups of the audience, and whether they are internal or external to the audience is essential for developing CBSM strategies.

Benchmark 2.1 – Barrier & benefit research conducted for each potential audience segment (Integrated): According to the participant, "the first year [of the RSN pilot project] was really dedicated to understanding those neighbourhoods and coming up with strategies to motivate them to install green infrastructure" (P02, 2019). For example, a door-to-door campaign to discuss the opportunities and challenges of stormwater management was employed in the early stages of the RSN project (Reep Green Solutions & Partners For Action, 2018). While time, cost, lack of knowledge, and concern for a lack of "curb appeal" were commonly understood as the major barriers to residential GSI installation, the RSN pilot project conducted a survey in 2017 to investigate the perceived barriers and benefits of GSIs within the pilot communities specifically. The results of this survey substantiated the major common barriers within the RSN pilot project communities (Bernasconi, 2019; Reep Green Solutions & Partners For Action, 2018). Since the RSN project was a pilot project, there was the opportunity to learn about the audience as the project occurred, and thus, barrier and benefit research was conducted

during (not before) project implementation. That participants of the barrier and benefit research were the neighbourhoods that were to receive the RSN pilot interventions, therefore the research was conducted with the target audience segment

Benchmark 2.2 – Identifies barriers & benefits as either internal or external (Not Integrated): While there appears to be an indication of internal and external influences that are at play when installing stormwater management infrastructure, these barriers and benefits were not explicitly classified or sorted as such.

Step 3: Developing Strategies – Overall, CBSM strategies should be developed to address the barriers and benefits of both the desired behaviour and competing behaviour. There are a variety of CBSM tools that can be employed, each with a variety of best practices to bolster the influence on behaviour.

Benchmark 3.1 – Strategies are appropriate for both barriers & benefits of desired and competing behaviours (Integrated): The RSN project strategy was suitable for addressing both the barriers (cost, knowledge, and time) and benefits (rebates, beautiful rain gardens, delaying need for costly infrastructure) of implemented lot-level GSIs. Since Reep worked with the City of Kitchener to deliver the RSN project, Kitchener's Stormwater Utility Fee operated as a barrier to the undesired behaviour, thus increasing the barriers for the competing behaviour. The Stormwater Utility fee provided the City of Kitchener with a reliable revenue source dedicated to stormwater infrastructure. The fee appears on monthly utility bills and is calculated based on property type and size of the impervious areas, thus making it more costly for residents with a lot of pavement and poor GSI (Reep Green Solutions & Partners For Action, 2018). The RSN project's strategies were also appropriate for the barriers and benefits of the desired behaviour, through providing financial and technical support for the installation of GSIs. Therefore, this benchmark was integrated.

Benchmark 3.2 – Develops commitment tools using best practices (Partially Integrated): For homes within the pilot neighbourhoods, financial and technical support was available to aid in the installation of GSIs. To help overcome the barriers of time and apathy, the application process for financial support included a 60-day timeline as a commitment tool to incentivize applicants to complete their project promptly. Once an application for the installation of a GSI was submitted and approved, applicants had only 60 days to complete the project to guarantee that they would get the money; funds were withheld until the project was completed. Check-in emails were sent at the 30-day interval to ensure installation was underway, and some homeowners dropped out at this time. It should be noted

that some homeowner feedback indicated that 60 days was too short of a time frame, which may have negatively impacted the usefulness of this commitment tool (Reep Green Solutions & Partners For Action, 2018). Additionally, RAIN Coaches had the responsibility of helping people complete their RSN projects by providing technical advice and verifying that the projects were completed to specification once the project was done. This commitment tool was tied to the participant's ability to receive the incentive which may be seen as coercive. The tool was not sought in a group, public, or durable. However, committing to installing a GSI promptly involves the individual in the process and may help to foster a self-perception of being environmentally concerned through prioritizing completing the project. Thus, this benchmark was partially integrated.

Benchmark 3.3 – Develops prompts using best practices (Integrated): Reep's RAIN program has experimented with the use of prompts during the RSN project and has achieved mixed success. RAIN themed stickers and yard signs were developed for both the RAIN Home Visits and the RAIN Garden Coach in previous years. However, the RAIN Home Visits predominantly focus on indoor drainage issues, while the Garden Coach focuses on developing water-efficient and beautiful gardens. Reep has found that Home Visit participants are much less likely to want to display the RAIN themed prompts because "people don't want to advertise that they have wet basements… Whereas with the Rain Coach, people are advertising that they have a beautiful garden" (P02, 2019). In addition to the RAIN prompts, larger signs were also installed at demo project homes (P02, 2019). These prompts were noticeable, self-explanatory, presented in close proximity to the installed GSIs, and encourage the positive behaviour.

Benchmark 3.4 – Engages well-known and respected people (Integrated): Well-known and respected people were incorporated throughout the RSN pilot project. Firstly, neighbourhood champions were identified to provide localized knowledge, experience and connections to the RSN project. These champions were identified as having a keen interest or passion for stormwater management or water-quality issues, well-connected through work or volunteering, likely to attend community and municipal events, and highly engaged. Well-known and respected people were also integrated into the RSN pilot through the homeowner consultations, whereby an experienced professional provided homeowners with suggestions for GSI installations specific to each home's features, characteristics and priorities. These consultations were offered free of charge in the RSN pilot project. The recommendations were primarily focused on the development of rain gardens because they are effective, contribute positively to yard beautification and can be installed by homeowners themselves, thus tackling some of the common barriers to GSI adoption (Reep Green Solutions & Partners For Action, 2018).

Benchmark 3.5 – Encourages norms that are visible and reinforced through personal contact (Integrated): The RSN pilot project included two strategies, 'Work Parties' and neighbourhood tours, to foster social norming and social diffusion. The idea of a Work Party came from the concept of Tupperware parties, whereby a Work Party host invited their friends and family over to take part in an activity, such as building a rain garden in their home's front yard. Several Work Parties were held at properties in each of the targeted neighbourhoods. Furthermore, the RSN pilot project held neighbourhood tours that showcased the beauty and accomplishments of the homeowners that installed GSIs. Signage for the tours and promotion along the tour route helped to increase the visibility of the RSN project as well as gave tour participants relevant information about the GSI. It could also be argued that the participatory design workshops, which offered hands-on design considerations of GSIs and were offered in groups of up to 20 people, were a tool that fostered social diffusion and norming. (Reep Green Solutions & Partners For Action, 2018). In the cases of the RSN's Work Parties and neighbourhood tours, norms were reinforced through personal contact, and the focus on installing rain gardens made the norms highly visible throughout the community.

Benchmark 3.6 – Develops communication tools using best practices (Integrated): The RSN project engaged in a variety of different communication avenues. Communication efforts focused on promoting the incentives that were available through the RSN project, as well as educating residents about GSIs and how to implement them. Flyers and promotional material were distributed throughout the pilot communities which advertised the incentives that were available for GSI installations. Since the pilot neighbourhoods were selected partly based on their level of community engagement, the RSN pilot project also used pop-up booths at various neighbourhood events to communicate their messages (P02, 2019). Additionally, many of the RSN pilot project strategies, including the participatory design workshops and the home consultations, incorporated an education component that communicated to homeowners how and why GSIs were important (Reep Green Solutions & Partners For Action, 2018). The variety of communication tools employed were captivating, tailored to the target audience, came from a credible source, and were appropriately framed.

Benchmark 3.7 – Establishes (dis)incentives using best practices (Integrated): A crucial element of the RSN pilot project was their ability to set aside funding that was allocated specifically towards providing financial incentives to residents for installing lot-level GSIs. The funding was obtained from grants and the City of Kitchener's stormwater department budget (P02, 2019; Reep Green Solutions & Partners For Action, 2018). The RSN pilot project found that providing financial incentives for medium and large projects was a positive catalyst for residents to undertake a GSI project, but smaller incentives

were not as effective in motivating action. Beyond the RSN pilot project's financial incentives, the City of Kitchener also offered a Stormwater Credit Program as an incentive to install GSIs, and a Stormwater Utility Fee as a disincentive for having large impervious areas on a property (Reep Green Solutions & Partners For Action, 2018).

Benchmark 3.8 – Initiates convenience strategies that address external barriers (Integrated): The RSN pilot initiated several strategies that addressed external barriers and subsequently made the installation of GSIs more convenient. The cost was a main external barrier that the RSN pilot addressed directly through incentives. Furthermore, the RSN pilot project made it more convenient to install GSIs by offering the home consultations which identified areas for improvement as well as provided a trusted service provider list that compiled qualified service providers and material suppliers specializing in the recommended GSI products and services.

Step 4: Piloting – CBSM suggests piloting various strategies using test and control groups, random selection and assignment, and unobtrusive measurements. Piloting helps to determine whether a program is appropriate for broad-scale implementation by considering cost-effectiveness and any behavioural changes that have occurred as a result of the pilot.

Benchmark 4.1 – Develops a pilot that can be compared with baseline measurements (Integrated): The RSN project was a pilot in and of itself. Reep had access to data from the City of Kitchener's Stormwater Credit program which showed how many applications for a GSI credit were filed each year, as well as which proportion of these applications came from the two RSN project neighbourhoods (P02, 2019). This information served as a baseline for understanding the level of GSI adoption within the pilot community.

Benchmark 4.2 – Utilizes a control group (Not Integrated): A control group was not used in the RSN pilot project. The pilot community was a subset of the RAIN program's overall target audience.

Benchmark 4.3 – Participants are randomly selected, then randomly assigned to strategy and control group (Not Integrated): The two neighbourhoods were selected purposefully based on the Neighbourhood Selection Matrix, the community engagement activities were delivered throughout the entirety of each area. Homeowner participants that installed GSIs due to the RSN pilot project self-selected to do so.

Benchmark 4.4 - Evaluates strategy effectiveness through unobtrusive measurements of behaviour change rather than through self-report (Partially Integrated): According to a report by Bernasconi (2019) the RSN project was measured at two separate occasions. Firstly, participants who

received a home consultation completed a survey immediately after receiving their consultation. Additionally, participants who had installed a RAIN smart GSI through the RSN pilot program were also surveyed. These measurements are crucial to understanding the effectiveness of the program; however, they rely exclusively on self-report data and do not utilize unobtrusive measures.

Benchmark 4.5 Focuses only on strategies that can be implemented at a broad-scale (Partially Integrated): The strategies employed through the RSN pilot project were made possible through the funding that they had obtained. Once the funding was fully allocated, the project did not continue and was not implemented on a broad scale. Obtaining and maintaining funding for these projects presents a challenge to broad-scale implementation. Elements of the RSN pilot project have been integrated into Reep's existing programs, as well as shared with other municipalities through the RAIN Smart Framework for Municipalities (Reep Green Solutions & Partners For Action, 2018). Thus, this benchmark was partially integrated.

Step 5: Evaluation & Broad-scale Implementation – Measurements should be taken before the broad-scale implementation of your program as well as at several points after, which can then be used to retool the strategies and provide feedback to the audience

Benchmark 5.1 – Measures activity prior to implementation and at several points afterward (Not Integrated): The pilot concluded when the funding was fully allocated. No ongoing measurement continued after the pilot completion.

Benchmark 5.2 – Utilizes evaluation data to retool strategy and/or provide feedback to the community (Partially Integrated): Outside of the home consultations, additional feedback was not provided to pilot communities. The pilot project helped Reep's RAIN program to reaffirm some of their programming while making "course corrections" in other areas. Since the pilot completion, neighbouring cities have also sampled from and built upon various aspects of the program (P02, 2019).

6.4. Successes

*Moving beyond rain barrels –*Before the RSN project, the Region of Waterloo offered a rain barrel program which provided residents with subsidies, which Reep then promoted to residents of KW. As well, Reep facilitated other community engagement and education efforts around stormwater

management. The RSN project allowed Reep and their RAIN program to target meaningful stormwater management behaviours that they could not target prior:

> *"I like to say we really wanted to move beyond the rain barrels because most of the credits were for rain barrels, and they were much easier to do. They're subsidized by the Region, but with Rain Smart Neighbourhoods, we wanted to actually try and get people to do the harder stuff like rain gardens and some of the other green infrastructure techniques. And I think we were successful in that regard" (P02, 2019).*

The RSN project also offered Reep the opportunity to measure and calculate their successes in a more direct and quantifiable way. In the beginning, Reep relied on information from the City of Kitchener's Stormwater Credit program that showed how many people had received the credit, but this was not an entirely accurate picture of GSI within the Kitchener area. Through the RSN project, Reep could target more challenging behaviours and measure their influence in the pilot neighbourhood more robustly:

> *"Prior to Rain Smart Neighbourhoods project, we would measure success based on people applying for stormwater credits and then we could say, 'oh, this many people did this,' but I don't think we can really take a lot of credit for influencing the behaviour of those people. Either they were going to do it anyway, or there's a small percentage of people who learned stuff from us, and maybe made a slightly more ambitious project, but they were a minority, basically" (P02, 2019).*

Survey information was collected after participants received a RAIN Coach, as well as after they had completed the installation of a GSI. Findings from those that had installed a lot-level GSI indicate that the majority of homeowner respondents either agree or strongly agree that their experience with the Rain Coach consultation was educational, informative, and individualized (Bernasconi, 2019).

6.5. Challenges

Time – On average, homeowners spent approximately 17 hours installing a GSI; however, this figure varies widely depending on which feature is installed. Final surveys indicate that the barrier of time investment required on the part of the homeowner remained a primary concern, sometimes even eclipsing budget concerns (Bernasconi, 2019). Furthermore, participants noted that the 60-day time period for completing a project to receive the credit was too short of a time frame. Some homeowners dropped out after receiving their 30-day reminder check-in, and others explicitly noted that they waited to apply until they were sure that they could meet the 60-day deadline (Reep Green Solutions &

Partners For Action, 2018). While keeping a short timeframe was intended to help overcome time-concerns and apathy on the part of the homeowner (P02, 2019), it may have negatively impacted homeowners' willingness or ability to install a GSI. An evaluation of the survey data collected suggests that timeframe explanations are a key area to improve in consultations to assuage homeowner concerns of time commitment and perceived complexity of the project (Bernasconi, 2019).

Cost – The RSN project obtained funding through grants and the City of Kitchener's stormwater department budget. Follow-up surveys indicated that the financial incentives were a significant factor for homeowners and provided them with a return on investment (Bernasconi, 2019). However, the RAIN Smart Framework for Municipalities indicated that financial incentives were some of the costliest engagement strategies used. The cost of RSN strategies were rated using a three-tiered cost range rating system; unsurprisingly, financial incentives were rated in the top tier of cost requiring budget of $15,001 and up (Reep Green Solutions & Partners For Action, 2018). The high cost of providing financial incentives is far from unique to the RSN pilot project. However, once the funding had been fully allocated, participation in the pilot community largely halted:

> *"…when the incentives were gone, you know, people stopped calling, or at least the people who knew that the incentives were not available anymore [laughs]" (P02, 2019).*

Providing financial incentives was a key factor in overcoming significant homeowner barriers to installing lot-level GSIs. Those involved in developing and implementing the RSN pilot project recognized the value of providing the incentives to homeowners, but also acknowledged the cost of doing so may not be sustainable in the long-term:

> *"Well, I think the longer term is, right now, like I said the Rain Smart Neighbourhoods is kind of our gold standard, but we still have to make a living" (P02, 2019).*

7 Blue Built Home: Guelph (2011 – Present)

7.1. Background

Guelph, a city in southwestern Ontario, is located about 100 kilometres west of Toronto and just east of Kitchener-Waterloo and is one of the largest cities in Canada to rely exclusively on a limited groundwater supply ("Water Efficiency Strategy Update," 2016). As a growing city within a stable economic region of the country, Guelph residents, businesses, and the City must maximize water conservation and efficiency to protect their limited groundwater supply from being overused (City of Guelph, 2011). In 1998, the City of Guelph initiated a Water Conservation & Efficiency Study, which subsequently resulted in a 1999 Water Conservation & Efficiency Strategy. The City then endeavoured to update this strategy in 2008 and released the Water Conservation & Efficiency Strategy Update in 2009. Within the 2009 Update, the City outlined reduction targets of per capita water consumption for the years 2010, 2017 and 2025. The Update also included recommended programs and policies targeted at reducing single-family detached residential water use. Within these recommendations, several different rebate programs for water fixtures and technologies were suggested, as well as programs related to public and youth education, programs targeting new versus existing homes, and programs that initiate retrofits and buy-backs ("Water Conservation and Efficiency Strategy Update," 2009).

In June of 2011, the City of Guelph officially launched its Blue Built Home (BBH) program with its pilot community, 28 condominiums located at the Enclave at Waterford, as well as the 2011 Rotary Dream home and a model home. Under the BBH program, water-efficiency standards and rebates for newly built homes were established in accordance with the recommendations of the 2009 Water Conservation and Efficiency Strategy. To deliver the program initially, the City worked with three local builders who committed to building the first BBH community and homes. The BBH program assessed the products and technologies that garnered the greatest impact for water savings, and made recommendations for the required product certifications, such as EnergyStar and WaterSense. The BBH program also evaluated the accessibility of each of these products in the market for contractors who built new residential homes. The BBH program then offered rebates based on how many of those fixtures were integrated into the construction of the new home. Depending on how many water-efficient fixtures the new home included, the home could reduce water consumption by as much as 54%, making the homeowner eligible for a rebate of up to $2460 from the City of Guelph (City of Guelph, 2011).

Initially, the BBH program established three levels of water efficiency (bronze, silver, and gold), with BBH bronze being the minimum certification which achieved a 24% reduction in water use compared to the Ontario Building Code standard for new homes at the time (City of Guelph, 2011). The program has undergone a few updates since its inception to account for updates to the Ontario Building Code, the City of Guelph's 2015 update to the Water Efficiency & Conservation Strategy, and feedback received from key stakeholders. The latest iteration of the BBH program launched in 2018, has done away with the three levels of certification to simplify the program as well as has expanded the program's target audience. The BBH program has moved away from exclusively focusing on the owners and builders of newly-built single-family homes towards also including existing single-family homes, as well as builders and owners of new and existing multi-residential buildings (P03, 2019).

7.2. Role of CBSM

The participant from the City of Guelph (P03) is a program coordinator for the BBH program and has been in the role for two years. This participant took this role over from the City of Guelph staff member who initially launched the program in 2011 and currently works in contact with this member. The participant indicated that they are very familiar with the CBSM theoretical model (familiarity ranked as 4 out of 5), having gained knowledge through their undergraduate research thesis and subsequent graduate research. The participant has taken Doug McKenzie-Mohr's CBSM training workshops and read his textbook *Fostering sustainable behaviour: An introduction to community-based social marketing* (2011); they also indicated that they reference the CBSM textbook in their work for the City of Guelph (P03, 2019). This participant played a leading role in the launch of the 2018 BBH program update.

For the BBH program specifically, as well as the City of Guelph's overall water efficiency strategy more generally, the integration of CBSM principles occurred gradually over time. The participant noted that her predecessor recognized the value of integrating behaviour change principles and tactics into their strategy to achieve measurable changes in water consumption (P03, 2019). In 2015, the City of Guelph commissioned market research to understand attitudes and behaviours around the indoor water use of several different target demographics (i.e. students, renters, homeowners, etc.). This research explicitly states its utilization of CBSM methods due to "its emphasis on understanding and addressing barriers to change, then designing programs that will address these barriers" (Metroline Research Group Inc., Econics, & Lura, 2015). That said, while the staff member who launched the program was aware of CBSM methods at the time the BBH program was developed, the participant noted that the BBH program wasn't developed explicitly based on the framework from the outset (P03, 2019).

7.3. Assessment

The following section will present an overview of each step of the CBSM theoretical model and then breakdown the assessment of each benchmark. Table 7.1 depicts an overview of the benchmark assessment.

Benchmark Assessment for Blue Built Home (Guelph)				
CBSM Step **(McKenzie-Mohr, 2011)**	**CBSM Benchmark** (Lynes et al. 2014)	**Integrated**	**Partially Integrated**	**Not Integrated**
Step 1: Selecting Behaviours	1.1 Clearly identifies target audience	✓		
	1.2 Selects non-divisible/end-state behaviours		✓	
	1.3 Evaluates potential behaviours for impact, probability and penetration		✓	
	1.4 Limits number of targeted behaviours to no more than 6[7]			✓
Step 2: Barrier & Benefit Research	2.1 Conducts research on barriers and benefits for each potential segment in the target group	✓		
	2.2 Identifies/distinguishes barriers and benefits that are internal vs. external	✓		
Step 3: Developing Strategies	3.1 Creates strategies that address barriers of the behaviour(s) being promoted and reduce the benefits of behaviour(s) being discouraged		✓	
	3.2 Develops **commitment** tools using best practices		✓	
	3.3 Develops **prompts** using best practices			✓
	3.4 Engages well-known and well-respected people to be part of the campaign			✓
	3.5 Encourages **norms** that are visible and reinforced through personal contact	✓		
	3.6 Develops **communication** tools using best practices	✓		
	3.7 Establishes **(dis)incentives** using best practices	✓		
	3.8 Initiates **convenience** strategy to address external barriers	✓		
Step 4: Piloting	4.1 Develops a pilot that can be compared with baseline measurements	✓		
	4.2 Utilizes a control group			✓
	4.3 Participants are randomly selected and then randomly assigned to strategy or control groups			✓

[7] Six non-divisible, end-state behaviours

	4.4 Evaluates strategy effectiveness through unobtrusive measurements of behavior change rather than through self-report	✓		
	4.5 Focuses only on the strategies that can be implemented at a broad-scale	✓		
Step 5: Evaluation & Broad-scale Implementation	5.1 Measures activity prior to implementation and at several points afterwards	✓		
	5.2 Utilizes evaluation data to retool strategy and/or provide feedback to community		✓	
Summary		**11**	**5**	**5**

Table 7.1- Benchmark Assessment for Blue Built Home

Step 1: Selecting Behaviours – CBSM programs should identify a clear target audience and develop a shortlist of non-divisible, end-state behaviours. Potential behaviours should be evaluated based on impact, probability, and penetration to decide which to prioritize. No more than six non-divisible, end-state behaviours should be targeted.

Benchmark 1.1 – Clearly identifies target audience (Integrated): When the program first launched in 2011, the target audience was newly-built, single-family homeowners. The BBH program also targeted the home builders of new single-family homes to work with them to build BBH homes. At that time, targeting newly built residential homes made sense for the City because that audience has the greatest readiness for action – they would require new water fixtures and technology for the new house. However, since they were targeting audiences for new homes, the City was often communicating with people moving to Guelph (but not Guelph residents) which presented a challenge initially. In 2014, changes to the Ontario Building Code necessitated that new builds include more water-efficient fixtures, which narrowed the gap in water savings potential between BBH homes and built-to-code new homes (P03, 2019). In a 2018 program update, the BBH program opened the audience up to also include both new and retrofitted single-family homes and multi-residential units (City of Guelph, 2018). Opening up the target audience to existing buildings allowed the City of Guelph to incorporate older homes that would have still have higher water-using fixtures, thus furthering the City's water savings goals. Once the BBH program was established, opening the program up to the broader community also allowed the City of Guelph to begin to target audiences that had a greater need and were easier to reach.

Benchmark 1.2 – Selects non-divisible/end-state behaviours (Partially Integrated): The overarching behaviour that the BBH program promotes is to conserve water by installing water-efficient fixtures within the home. Some of the more specific behaviours are promoted, including the installation of low flow toilets, showerheads, and bathroom faucets/aerators; Energy Star dishwashers and washing

machines; efficient hot-water distribution systems; sub-water meters; rainwater harvesting system; and more. To become BBH certified, each home has to do some, but not all, of the installation behaviours. Some behaviours are considered higher priority than others and require a loftier capital investment, thus have more substantial rebates or other incentives attached. These priority behaviours reflect a desire to make the home as efficient as possible; in this way, the BBH attempts to target behaviours with the highest potential for water savings (P03, 2019). Promoting the installation of water-efficient fixtures in one's home is end-state such that it brings about the desired environmental outcome (i.e. reduced water consumption); however, it is not non-divisible. Each act of installing a new water-efficient fixture or technology can be further broken down into multiple behaviours.

Benchmark 1.3 – Evaluates potential behaviour for Impact, Penetration and Probability (Partially Integrated): The impact of each desired behaviour was explicitly measured through conducting research to determine the potential for water savings of each fixture or technology. This helped to inform which behaviours were the highest impact in terms of water efficiency. The City did not collect data measuring the probability of installing each fixture or the current market penetration of each fixture. However, in both cases, they did collect market research about the water efficiency technology which ultimately helped to inform which specific installation behaviours (and the corresponding fixtures or technology) would be promoted (P03, 2019). Therefore, impact was explicitly measured, and while penetration and probability were not, the City did collect useful information regarding the specific water-efficiency technologies promoted through the BBH program. Thus, this benchmark was partially integrated.

Benchmark 1.4 – Limits to no more than 6 (Not Integrated): There are at least nine divisible behaviours that are promoted through the BBH program.

Step 2: Barrier & Benefit Research – Understanding the barriers and benefits of each behaviour, how they differ across groups of the audience, and whether they are internal or external to the audience is important for developing CBSM strategies.

Benchmark 2.1 – Barrier & benefit research conducted for each potential audience segment (Integrated): When the City of Guelph undertook the Water Conservation and Efficiency Strategy Update in 2009, focus groups and a customer surveys were used to capture community input about context around water efficiency, local issues and concerns, and explore communication channels for project development and delivery (Resource Management Strategies Inc., 2009). In 2015, the City of Guelph, alongside two consultants and a research group, conducted focus groups and a literature review with the objective of understanding attitudes and behaviours regarding indoor water use among different

groups. The various groups investigated included renters, students, youths, multi-residential property owners, and condo boards. The research clearly states that a CBSM approach was used due to its emphasis on understanding and addressing barriers. As well, there are apparent attempts to stratify the groups of the audience to understand their unique perspectives (Metroline, Econics & Lura, 2015). According to the participant, any additional barrier and benefit research following 2015 was conducted informally and partially through other parameters (such as surveys with builders). This additional knowledge was not specific to barriers and benefits but did help to inform updates to the program (P03, 2019).

Benchmark 2.2 – Identifies barriers & benefits as either internal or external (Integrated): In the report summarizing the results from the 2015 market research, barriers and benefits are not explicitly stated as "internal" and "external," however the findings appear to be categorized as such. For example, when discussing barriers to conservation for renters and post-secondary students, the results discuss internal aspects such as apathy and lack of awareness separately from external aspects such as challenges related to communication and indifference on the part of their landlords (Metroline Research Group Inc. et al., 2015).

Step 3: Developing Strategies – Overall, CBSM strategies should be developed to address the barriers and benefits of both the desired behaviour and competing behaviour. There are a variety of CBSM tools that can be employed, each with a variety of best practices to bolster the influence on behaviour.

Benchmark 3.1 – Strategies are appropriate for both barriers & benefits of desired and competing behaviours (Partially Integrated): The competing behaviours of the BBH program are that people will fail to install water-efficient fixtures. This competing behaviour is likely to occur for a variety of reasons, not least of which is that people often do not buy new fixtures unless they need them. Furthermore, indoor water use is highly discretionary, private, tied to health and sanitation, and deeply ingrained in everyday life, making people more resistant to any efforts related to indoor water efficiency (Sadalla et al., 2014). In any case, the BBH program does not decrease the benefits of failing to install water-efficient fixtures, nor does it increase the barriers of doing so; therefore, competing behaviours are not addressed. The BBH programs strategy of incentivizing the installation of water-efficient fixtures through rebates is an effective method for addressing inherent challenges associated with the desired behaviour, reducing indoor water consumption. The BBH program's rebates decrease barriers related to cost and knowledge

of installing water-efficient fixtures, while also increasing benefits by highlighting the cost savings to the homeowner. Literature suggests that installing technologies such as the ones promoted within the BBH program are an appropriate tool for efficiency when the motivation to decrease consumption is low (Bonaiuto et al., 2008; Sadalla et al., 2014). Overall, the BBH program only addresses desired behaviours.

Benchmark 3.2 – Develops commitment tools using best practices (Partially Integrated): In the latest BBH program update (2018), the application form for the BBH certification and rebates includes the following required commitment: "I pledge to be water wise and uphold the values of the Blue Built Home program." In order to become a BBH home and receive rebate money, each property or homeowner must commit to being water wise. According to the participant: "…that's part of my goal for the BBH program. I want the Blue Built Home owners to see themselves as a community of people who care about water and use it wisely" (P03, 2019). It could be argued that the audience is coerced into the commitment because they have to commit in to receive their financial rebate, which could undermine the impact of self-perception. However, it could also be argued that since the audience has already purchased the water-efficient fixture, they may already perceive themselves as water wise and this pledge commitment may reinforce this self-perception. This commitment is written and actively involves the individual. The potential tension between having to pledge to receive the rebate for a purchased product, and how that impacts a person's self-perception, remains to be seen. In any case, the commitment is not public, durable, or sought in a group setting. Therefore, commitment tools are partially integrated.

Benchmark 3.3 – Develops prompts using best practices (Not Integrated): Prompts are not employed in the BBH program. Since the target behaviours are the installation of water-efficient fixtures and technology, which is a behaviour that typically only occurs once, prompts may not be the most appropriate tool for the BBH to utilize.

Benchmark 3.4 – Engages well-known and respected people (Not Integrated): Well-known or well-respected people were not used to convey the message.

Benchmark 3.5 – Encourages norms that are visible and reinforced through personal contact (Integrated): The BBH program includes a few social norming tools. Firstly, BBH window and door stickers are used to identify homes that are BBH certified, which helps to foster social diffusion and norming throughout neighbourhoods as more homes become or are built as BBH certified (P03, 2019). Secondly, creating a BBH neighbourhood within the 2011 pilot help to establish norms for that specific neighbourhood, as well as perhaps any subsequent residential developments surrounding them. Finally,

due to the 2018 expansion of the BBH program to include multi-residential buildings, several units within a single building become BBH certified which helps to foster norms and diffusion around water efficiency within that building and its tenants (P03, 2019). Through creating neighbourhoods and multi-residential buildings that are visibly BBH certified by identifying them with BBH window and door stickers, social norming is both highly visible as well as reinforced through personal contact between BBH neighbours.

Benchmark 3.6 – Develops communication tools using best practices (Integrated):

Communication materials developed for the BBH program highlight two critical aspects about having a BBH home: firstly, that it saves homeowners money, and secondly, that it also saves water (City of Guelph, n.d.). Communications occur through standard channels of advertising, such as radio ads, advertisements in home magazines, and other promotional material (P03, 2019). Some of the communication material highlights the BBH program's use of credible environmental specifications that are internationally-recognized as standards for efficiency fixtures and appliances (WaterSense and ENERGY STAR). Communications are very clear about financial savings by highlighting how much each homeowner can save per year on their water bill, the amount of money that can be received through rebates, and the overall water savings of BBH homes (City of Guelph, n.d.). Another avenue of communication occurs through free 1-hour residential water audits, which are a new element of the BBH program since its 2018 update. The water audits are offered through the City of Guelph working with a local non-profit organization's Home Tune-Up program, which audits single-family and low-density multi-residential homes for water and energy efficiency and makes recommendations to improve performance and save money on utility bills. In existing homes that express desire in being retrofitted for BBH certifications, an home advisor will come to a house and discuss how a homeowner can save money, water and energy in their home, as well as what requirements are needed to reach a BBH certification ("Home Tune-up," 2014). The home advisor will also do in-home retrofits for showerheads and aerators, so that homeowners may come out of the Home Tune-Up with two requirements for the BBH certification (P03, 2019). In summary, the BBH program utilizes captivating communication that is tailored to the target audience, includes credible sources, and appropriately frames the message.

Benchmark 3.7 – Establishes (dis)incentives using best practices (Integrated): The incentives, or rebates, for installing the water-efficient fixtures within a new or existing home are the key aspect of this program. Rebates ranged from $10 for a kitchen faucet aerator up to $2000 for a rainwater harvesting system. If a homeowner takes advantage of all available rebates, they are eligible for a refund

of $2460. These rebates directly reward the positive behaviour and are closely tied to it, in that the installation of these fixtures directly results in 24 to 54% increased water efficiency in the home (City of Guelph, 2011).

Benchmark 3.8 – Initiates convenience strategies that address external barriers (Integrated): At the core of the BBH program, homeowners and builders are being encouraged to install water-efficient fixtures to receive a certification and rebates. In order to make installing these fixtures more convenient, the BBH program identifies fixtures and technologies that are BBH certified so that the consumer knows what products qualify for the program. The BBH program also offers rebates to reduce the cost of their selected fixtures (City of Guelph, n.d.). If a homeowner proposes a fixture that has not been identified by the BBH program but meets certain water efficiency criteria, the City of Guelph has allowed for some flexibility to enable contractors to find solutions that work for all demographics (P03, 2019). Additionally, during Home Tune-Ups, home advisors can complete two in-home retrofits to start existing homeowners on their way to becoming BBH certified ("Home Tune-up," 2014). Finally, the BBH program has taken strides to simplify the sign-up form and rebate claim application to make it quick and easy for homeowners and builders to apply for their BBH certification (P03, 2019). These convenience strategies address barriers both internal to the homeowner, such as lack of information or confusion, as well as address the major external barrier of cost.

Step 4: Piloting – CBSM suggests piloting various strategies using test and control groups, random selection and assignment, and unobtrusive measurements. Piloting helps to determine whether a program is appropriate for broad-scale implementation by considering cost-effectiveness as well as any behavioural changes that have occurred as a result of the pilot.

Benchmark 4.1 – Develops a pilot that can be compared with baseline measurements (Integrated): The pilot area was the first BBH community, consisting of 28 bungalow-style condominiums within the Enclave at Waterford. The City of Guelph worked with three local home builders to ensure that each home within the pilot community met the minimum BBH standards, with the opportunity to upgrade (City of Guelph, 2011). The City of Guelph also initiated a monitoring and demand analysis of the first BBH home to develop a clear understanding of the water demands and patterns. A water demand monitoring system was implemented into each of the first BBH homes, which then captured the average hourly consumption of each home within the pilot area. A survey was also employed to establish the number of people per household. Not all homes began monitoring at the same time; the

pilot launched with the earliest homes in 2011 and continued until each home within the community was occupied. Baseline data for the pilot area was not available because the homes were newly built. However, baseline measurements for the City of Guelph were used, which indicate how the BBH homes were performing relative to other Guelph homes (Veritec Consulting Inc., 2014).

Benchmark 4.2 – Utilizes a control group (Not Integrated): The monitoring and demand analysis study of the first BBH homes only measured the pilot area. Residents of the first BBH homes were the participants, and a control group was not identified.

Benchmark 4.3 – Participants are randomly selected, then randomly assigned to strategy and control group (Not Integrated): Random selection and random assignment were not used; the residents within the first BBH homes were the participants.

Benchmark 4.4 - Evaluates strategy effectiveness through unobtrusive measurements of behaviour change rather than through self-report (Integrated): The survey component established how many people were within each household. Through the watering demand monitoring system of each home, information such as each BBH home's average daily demand, average per capita consumption, and peak hour demand was collected (Veritec Consulting Inc., 2014). The water demand monitoring system allowed the City to unobtrusively measured the impact of the water-efficient fixtures within each BBH home.

Benchmark 4.5 Focuses only on strategies that can be implemented at a broad-scale (Integrated): Through delivering rebates and partnering with local home builders to include water-efficient fixtures in the first BBH community, the piloted BBH program strategy proved to be successful (P03, 2019; Veritec Consulting Inc., 2014). Because the core of the program's approach is centred around delivering rebates, the BBH program strategy is easily scalable for broad-scale implementation so long as the funding and resources are allocated towards the program from the City of Guelph. Furthermore, through working with local single and multi-residential home builders, the program can be efficiently delivered on a widescale through utilizing the builders as a promotional and communication channel. Thus, this benchmark was integrated.

Step 5: Evaluation & Broad-scale Implementation – Measurements should be taken before the broad-scale implementation of the program as well as at several points after, which can then be used to retool the strategies and provide feedback to the audience.

Benchmark 5.1 – Measures activity prior to implementation and at several points afterward (Integrated): The City of Guelph monitors the overall per capita daily water demand of single-family and

multi-family buildings each year. Additionally, from June 2016 to October 2018, the City of Guelph conducted an analysis of water-use in four single-family homes built by a local building company. These homes were part of a net zero home program and were consequently also certified as BBH homes. Monthly monitoring of these four homes was conducted such that data was collected for each home for a two-year period. The annual water savings in these four BBH ranges from 0.5 and 107 m3 when compared to a home of equal size built to the Ontario Building Code standard (P03, 2019).

Benchmark 5.2 – Utilizes evaluation data to retool strategy and/or provide feedback to the community (Partially Integrated): Throughout the BBH program's lifespan, surveys have been administered to some of the key stakeholders including the builders associated with the program, who play an essential role of linking the City of Guelph to the construction industry. These surveys have been used to assess how the BBH program is working, what areas can be improved, and what the builders would like to see included. Additional informal feedback has also been considered. In 2018, the BBH program re-launched according to some of this feedback as well as following updated technology demands (P03, 2019). Feedback is not given to the target audience based on their BBH home's water efficiency performance, although the reduction in water consumption and cost could be argued as sufficient feedback about the home's performance.

7.4. Successes

Tackling Indoor Water Use – While outdoor water use makes up the majority of residential water consumption overall (Sisser et al., 2016), there are still significant opportunities for achieving water consumption reduction indoors. However, the literature on water consumption and conservation behaviours indicate that indoor water use is harder to influence due to its private, discretionary nature and its ties to habitual, health, sanitation, and lifestyle norms (Bonaiuto et al., 2008; Sadalla et al., 2014). While the case studies discussed in this research are nowhere near representative of the entire water efficiency field, it is worth noting that only one of the five case studies highlighted by this research dealt explicitly with indoor water consumption. Research has also suggested that technological products and future innovations, such as the ones promoted through the BBH program, maybe the most effective way to curtail indoor water consumption (Bonaiuto et al., 2008; Sadalla et al., 2014).

Through participation in the BBH program, indoor water consumption of a single home can be reduced up to 54% (City of Guelph, 2011). Since ongoing measurement of each BBH homes is difficult and resource-intensive to obtain, it is not known precisely what the BBH program's impact has been on

the City of Guelph's overall residential water consumption. However, it is clear that Guelph's residential per capita daily water consumption rate has decreased since the 2009 Water Conservation & Efficiency Strategy. Residential single-family water demand has decreased from 230 litres per day in 2007 to 167 litres per day by 2014 ("Water Efficiency Strategy Update," 2016). This decrease shows that the residents of Guelph have substantially decreased their per capita water consumption over a relatively short period. It could be presumed that the City of Guelph's Water Efficiency Strategy, which includes the BBH program, is at least partly responsible for this substantial decrease.

Partnerships – Working with the local builders and builders association within the Guelph area has been a critical strategic element of the BBH program. A dedicated pilot community of BBHs within a new development in Guelph was invaluable to both evaluating the BBH program effectiveness as well as launching the program to the broader community (City of Guelph, 2011). The builders also played a crucial role in mediating and communicating between the City of Guelph and Guelph residents, ensuring the City of Guelph remains up to date with latest building trends and regulations, and communicating the value of the BBH program to Guelph residents and newcomers seeking a home in the area (P03, 2019).

Expansion to Existing Properties – Related to BBH's successful and strategic use of working relationships is their recently updated programming which now includes the Home Tune-up. The Home Tune-up program has always been offered by a Guelph non-profit organization committed to combating Climate Change. In 2018, when the BHH program updated, the City of Guelph began working with the non-profit to embed BBH qualification assessment into the Home Tune-Up process and make tailored. Recommendations on how a home can achieve BBH certification. The working relationship between the non-profit and the City of Guelph enabled the non-profit to continue to offer the Home Tune-ups as a free service to residents, while also allowing the City of Guelph's BBH program to widen its scope substantially. Previous to this, the BBH program was focused exclusively on newly built homes. The update to the program in 2018 enhanced the scope of the BBH program to include existing homes and multi-residential buildings in its programming, thus substantially growing the members of the community who are eligible for the program (City of Guelph, 2018).

7.5. Challenges

Program Complexity versus Flexibility– In promoting installing various water-efficient fixtures and technology and then having builders or homeowners apply for rebates based on the fixtures installed, the BBH program is inherently complex:

> *"It's a program that is more complex because there's more steps involved and it targets multiple specific behaviours, with different barriers and benefits, all at once" (P03, 2019)*.

The 2018 update to the program which now encompasses both new and existing single-family and multi-residential homes further adds to the complexity of the program, as each of these audiences and building-types has vastly different requirements. Being able to communicate the complexity of the BBH programs and how residents can get involved has been an ongoing challenge:

> *"I would say communicating clearly. Like I said, this is definitely one of the more complex programs to try to clearly communicate to residents what it is that they have to do and why it's important, it's really challenging... So trying to communicate why the program is valuable through different lenses and through different perspectives, I think is challenging, but very important" (P03, 2019).*

The City of Guelph has made some efforts to simplify the program. For example, when the program was conceived, it had three levels of certification. However, the City found that most homeowners were mostly achieving the bronze certification, as the fixtures required for silver or gold certification were significantly more resource prohibitive (greywater reuse or rainwater harvesting systems, respectively). Within the 2018 update, the BBH program eliminated the three-tiered certification. Now, a home can become BBH certified by meeting one of three criteria: 1) installing a greywater reuse system, 2) installing a rainwater harvesting system, or 3) installing a minimum of three qualifying water-saving options. This simplification has reduced the complexity of the program slightly, but the need for clear communication remains an important factor for the success of the BBH program.

Related to the program's complexity is also the level of flexibility within the program's standards. Participants' desire for flexibility is often at odds with reducing the complexity of the BBH program:

> *"We tried to make the program more flexible too. Some of the feedback that we received when we were doing research into the program update is that the builders wanted to see the flexibility in the program requirement… Our program requirements also have to account for diverse*

property types, affordability factors, and homeowner needs and preferences. So [flexibility] just makes it more accessible for residents" (P03, 2019).

While flexibility is important in increasing the accessibility of the BBH program to residents, it is challenging to develop a program that is both flexible and accommodative for complexities due to homeowner and builder preferences, affordability, and type of home (new, retrofit, single-family, or multi-family). For a program as broad as the BBH program is, the tension between flexibility and complexity will likely be ongoing, thus underscoring the importance of clear communication at every step of the way.

Targeting Potential New Home Buyers – At the outset of the BBH program, it made sense for the City of Guelph to target single-family residents for new buildings because this group would be seeking appliances and fixtures for their new homes. Further, the Ontario Building Code had not yet caught up to the progress made in performance fixtures for ultra-low flow or efficiency. However, this brought the challenge of attempting to market to residents who were not necessarily residents of the City of Guelph. Advertisements on surrounding cities' radio stations and home magazines were used; however, the BBH program's working directly with local builders was a crucial factor to overcoming this challenge in the early days:

"*It was challenging at first because with our program targeted at new builds. Our target audience were a lot of people who likely didn't already live in Guelph… We relied a lot on the word-of-mouth of the builders to promote the program for us to their customers. Because it's hard to reach people when they don't live in our city" (P03, 2019).*

As the program continued to develop ongoing relationships with the builders and the community since its 2011 inception, the initial challenges of targeting new-to-Guelph residents have become less pronounced. Furthermore, the latest update in 2018, which opens the BBH program up to also include existing homes and buildings, has further reduced the strain of marketing to non-locals.

Data Access – No ongoing measurement of the pilot community has occurred. The participant noted that while this was an area that they would like to explore, collecting data on water use patterns is time-consuming, costly, and difficult to access:

"It's time consuming. For adequate data comparison you need to monitor water use pre- and post-behaviour change interventions for an appropriate period of time. If possible, also want to

monitor enough participants to make your results statistically significant. Even as a municipality, it can be difficult for use to access water use data" (P03, 2019).

Difficulty in collecting and monitoring water consumption data is a common barrier for municipalities, making measuring the actual effectiveness of their specific water efficiency programs on influencing behaviour very challenging. In order to mitigate this challenge, the City of Guelph calculates estimates water savings for each property by comparing what each BBH homes' water use would be if they installed Ontario Building Code compliant fixtures instead of the BBH certified fixtures. From these calculations, the City of Guelph estimates that so far in 2019, the BBH homes and multi-residential properties have saved an estimated 6.9 m3 per day compared to the Ontario Building Code (P03, 2019). While these estimates are certainly helpful, the City of Guelph would benefit greatly from access to water use data.

8 Fusion Landscaping™: Peel Region (2010 – Present)

8.1. Background

The Region of Peel is a regional municipality in southern Ontario which encompasses three municipalities located west and northwest of Toronto – the cities of Mississauga and Brampton, and the town of Caledon. The Region is part of the Greater Toronto Area (GTA) and has seen significant population growth due to immigration and robust transportation infrastructure, including seven major highways and Toronto Pearson International Airport ("Regional Municipality of Peel," n.d.). Peel Region's population is expected to grow by more than 300,000, from 1.3 million in the 2016 census up to over 1.6 million by 2031 (Freeman Associates & Gauley Associates, 2017). Drinking water is provided to Peel residents from Lake Ontario, a regionally-owned well, and a private well. The Region also owns and operates 14 municipal wells in Caledon ("About Tap Water in Peel—Region of Peel," n.d.). Meeting increasing water demands associated with population growth requires both infrastructure expansion and a strategy for improving water efficiency (Freeman Associates & Gauley Associates, 2017; Region of Peel, 2012). The Region of Peel's Water Efficiency Strategy identified reducing peak water demand and increasing municipal water efficiency programming as primary objectives for the Region in managing their residential consumption (Region of Peel, 2012).

The Region of Peel identified many limitations in traditional broad-based water efficiency campaigns like rebate programs and education programs. These limitations include the use of participant volunteers, the opportunity for 'free-ridership' on rebate programs, ongoing costly investment, and difficulty reaching the highest water users. To combat these limitations, the Region endeavoured to take a market-based approach to water efficiency to "progressively move the marketplace toward more water-efficient products and practices such that water efficiency becomes imbedded or standard practice in the marketplace" (Freeman Associates & Gauley Associates, 2017, p. 3).

Market research studies done in surrounding communities found that the overall aesthetic of a home's landscape was essential to homeowners, and that homeowners held negative perceptions about the appearance of water-efficient landscapes. Water Smart Peel re-positioned their landscaping program as Fusion Landscaping to reflect the values of the homeowner and focus on aesthetics. "Fusion" comes from combining the desire for landscape aesthetic to meet the emotional needs of the resident while also promoting best practices and landscapes that require little to no supplemental irrigation. The Fusion Landscape program used peer influence marketing, demonstration homes and

buildings, and joint ventures with local landscape product and service providers to drive the uptake of water-efficient landscapes. Market-based programming aims to increase demand for a product or service by strategically intervening in the commercial marketplace, which then stimulates consumer uptake of the desired behaviour. As market forces 'take over' – in other words, the demand for the product or service that enables the behaviour increases to the point that it becomes standard practice – the program becomes self-fulfilling, water efficiency becomes imbedded within the marketplace and the supply chain, and the Region experiences decreasing costs over time (Freeman Associates & Gauley Associates, 2017).

8.2. Role of CBSM

On behalf of Fusion Landscape, a Region of Peel employee that is currently involved in the Fusion Landscape program's management, development, and strategy participated in this research. When the Fusion Landscape pilot program was first delivered in 2010, the participant was not in their current role of management and development; however, they were involved in delivering the Fusion Landscape consultations to the community. Since this participant could not speak to the early-stage development of the Fusion Landscaping program, an additional Region of Peel employee that supervised the team and worked directly with the consultants developing Fusion Landscape was contacted to gather supplementary information about the development of the program. This employee did not participate formally in this research through the survey and interview data collection; however, they did provide commentary and clarification related to the early stages of the Fusion Landscaping program. Furthermore, the participant indicated on their survey responses that they were "not familiar at all" (rated 1 out of 5) with the CBSM methodology. However, in follow-up discussion it was noted that the participant had received training in market-based approaches nearly a decade ago when they were first delivering the Fusion Landscaping consultations to the community. This training is still a part of the Fusion Landscaping student curriculum.

The employee in charge of leading the Fusion Landscape team indicated that they were first introduced to CBSM around 2009 where CBSM's founder Doug McKenzie-Mohr presented at a conference. This employee indicated that they were moderately familiar with CBSM, but that the majority of what they know about CBSM methodology came from working with the one the consultants that were obtained for the Fusion Landscape pilot. According to this employee, CBSM principles and methods primarily influenced the Fusion Landscape pilot, how the strategies were tested in the pilot across control and strategy groups, and how the Region collected data about the target behaviours.

8.3. Assessment

The following section will present an overview of each step of the CBSM theoretical model and then breakdown the assessment of each benchmark. Table 8.1 depicts an overview of the benchmark assessment.

Benchmark Assessment for Fusion Landscaping (Peel Region)				
CBSM Step (McKenzie-Mohr, 2011)	**CBSM Benchmark** (Lynes et al. 2014)	**Integrated**	**Partially Integrated**	**Not Integrated**
Step 1: Selecting Behaviours	1.1 Clearly identifies target audience	✓		
	1.2 Selects non-divisible/end-state behaviours		✓	
	1.3 Evaluates potential behaviours for impact, probability and penetration	✓		
	1.4 Limits number of targeted behaviours to no more than 6[8]		✓	
Step 2: Barrier & Benefit Research	2.1 Conducts research on barriers and benefits for each potential segment in the target group	✓		
	2.2 Identifies/distinguishes barriers and benefits that are internal vs. external		✓	
Step 3: Developing Strategies	3.1 Creates strategies that address barriers of the behaviour(s) being promoted and reduce the benefits of behaviour(s) being discouraged	✓		
	3.2 Develops **commitment** tools using best practices			✓
	3.3 Develops **prompts** using best practices			✓
	3.4 Engages well-known and well-respected people to be part of the campaign	✓		
	3.5 Encourages **norms** that are visible and reinforced through personal contact	✓		
	3.6 Develops **communication** tools using best practices	✓		
	3.7 Establishes **(dis)incentives** using best practices	✓		
	3.8 Initiates **convenience** strategy to address external barriers	✓		
Step 4: Piloting	4.1 Develops a pilot that can be compared with baseline measurements	✓		
	4.2 Utilizes a control group	✓		
	4.3 Participants are randomly selected and then randomly assigned to strategy or control groups			✓

[8] Six non-divisible, end-state behaviours

	4.4 Evaluates strategy effectiveness through unobtrusive measurements of behavior change rather than through self-report	✓		
	4.5 Focuses only on the strategies that can be implemented at a broad-scale	✓		
Step 5: Evaluation & Broad-scale Implementation	5.1 Measures activity prior to implementation and at several points afterwards		✓	
	5.2 Utilizes evaluation data to retool strategy and/or provide feedback to community		✓	
Summary		**13**	**5**	**3**

Table 8.1- Benchmark Assessment for Fusion Landscaping

Step 1: Selecting Behaviours – CBSM programs should identify a clear target audience and develop a shortlist of non-divisible, end-state behaviours. Potential behaviours should be evaluated based on impact, probability, and penetration to decide which to prioritize. No more than six non-divisible, end-state behaviours should be targeted.

Benchmark 1.1 – Clearly identifies a target audience (Integrated): In their 2012 Water Efficiency Strategy Update, the Region of Peel was clear about their objective to reduce peak day water demands to minimize and delay costly infrastructural updates to their water supply system (Region of Peel, 2012). The Fusion Landscapes program targets residents in single-family homes within the Region of Peel with a focus on those that are high outdoor water users. These users have high average annual or seasonal demand, and tend to own an automatic irrigation system or manually water their lawns without any clear idea of how much water they consume (Freeman Associates & Gauley Associates, 2017; P06, 2019). Focussing on high outdoor water users indicates that the Region of Peel strategically picked an audience that was a good match, easy to reach, and has the greatest need for intervention.

Benchmark 1.2 – Selects non-divisible/end-state behaviours (Partially Integrated): According to the participant, the target behaviour that the Fusion Landscapes program attempts to influence is "outdoor water use specific to the landscape" (P06, 2019). Reports and secondary data support this statement but also point specifically to the uptake of water-efficient landscapes and irrigation practices as being the primary behaviour that is promoted through the Fusion Landscapes (Freeman Associates & Gauley Associates, 2017; Region of Peel, 2012). The installation of water-efficient landscapes is end-state, such that these landscapes directly contribute to reducing peak day demand for water. However, There is a significant amount of other behaviours that are encapsulated within the installation of water-efficient landscapes, including evaluating the landscape, determining a plan for installation, purchasing the correct materials, etc.

Benchmark 1.3 – Evaluates potential behaviour (Integrated): The Region of Peel did not conduct their own studies of residential water-efficient landscaping; instead, they sampled from several market research studies that were conducted in neighbouring communities within the Greater Toronto Area (City of Mississauga & Freeman Associates, 2010; Patterson, Associates, & Carrigan, 2017; Regional Municipality of Halton & Freeman Associates, 2006). These studies provided some information related to impact, probability and penetration of adopting water-efficient landscapes within the area. These studies found that residential peak day water consumption was mostly due to irrigation practices, which signals the potential for impact of adopting of water-efficient landscapes. The information from these studies also found that "supplemental landscape irrigation" was "discretionary in nature" (Freeman Associates & Gauley Associates, 2017, p. 2), suggesting that water-efficient landscaping and irrigation may have a good probability of being adopted, but not offering an exact measurement of how likely residents are to adopt them. Finally, the studies also looked at residents' current irrigation practices, which provides information about how people currently irrigate their lawn but does not speak to how prevalent water-efficient landscapes are within the community. While these measurements are not perfectly aligned with CBSM methodology, they do give clear information about impact, probability, and penetration of the target behaviours. Therefore, this benchmark was integrated.

Benchmark 1.4 – Limits to no more than 6 (Partially Integrated): The Fusion Landscaping program targets a fairly narrow set of behaviours related to installing water-efficient landscapes and plants. However, these behaviours are not non-divisible, meaning they can be divided further, resulting in more than six non-divisible behaviours being promoted through the program.

Step 2: Barrier & Benefit Research – Understanding the barriers and benefits of each behaviour, how they differ across groups of the audience, and whether they are internal or external to the audience is important for developing CBSM strategies.

Benchmark 2.1 – Barrier & benefit research conducted for each potential audience segment (Integrated): The market research studies emphasized the importance of developing a sound understanding of the marketplace, what drives sustainable and unsustainable outdoor water use, and who or what is most influential in making landscaping decisions. The findings from this research illuminated significant barriers and benefits of sustainable outdoor landscaping in the GTA. Firstly, it was found that homeowners' primary concern was the aesthetic of their outdoor landscape; homeowners view their landscape as an extension of themselves and feel a sense of pride in its appearance. This research also found that homeowners believe that water-efficient landscaping results in an apparent

loss of aesthetic value, which acts as a barrier to the uptake of water-efficient landscaping practices (Freeman Associates & Gauley Associates, 2017). Since a market-based approach was embraced, this research attempted to develop a clear understanding of the marketplace to strategically target specific market segments and reach priority groups effectively (Freeman Associates & Gauley Associates, 2017; Patterson et al., 2017).

Benchmark 2.2 – Identifies barriers & benefits as either internal or external (Partially Integrated): The market research studies appear most focused on internal barriers and benefits[9]. The consultant that was obtained to complete the studies employed aa "market research and analysis methodology to determine intrinsic beliefs of residential customers" with the assertion that intrinsic beliefs are the primary driver of human behaviour (The Water Strategy, n.d.). This suggests that internal barriers and benefits were the primary focus of this research.

Step 3: Developing Strategies – Overall, CBSM strategies should be developed to address the barriers and benefits of both the desired behaviour and competing behaviour. There are a variety of CBSM tools that can be employed, each with a variety of best practices to bolster the influence on behaviour.

Benchmark 3.1 – Strategies are appropriate for both barriers & benefits of desired and competing behaviours (Integrated): Through addressing the barriers of cost, knowledge, and the negative perception of the appearance of water-efficient landscapes by focusing on the beauty of Fusion landscapes, this program has developed strategies that effectively address the barriers and benefits of the desired behaviours. Fusion also addresses competing behaviours by attempting to shift marketplace demand away from conventional landscapes towards Fusion landscapes. By shifting market demand, consumers may come to view conventional landscapes as dated, unattractive, or not aligned with the current home and landscaping trends, thus decreasing the benefits of the competing behaviour.

Benchmark 3.2 – Develops commitment tools using best practices (Not Integrated): Commitment tools, as they are described in the CBSM theoretical model, are not part of the Fusion Landscapes program.

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Benchmark 3.3 – Develops prompts using best practices (Not Integrated): Prompts are not employed in this program. Prompts remind people how and when to behave in an environmentally-friendly way when forgetting to do so is a common barrier.

Benchmark 3.4 – Engages well-known and respected people (Integrated): The earlier GTA market research conducted identified that single-family residents viewed garden centres, nurseries, landscape contractors and designers, and hardware retailers as trusted sources of landscape information. Strategically engaging these service and product suppliers helped to "magnify the impact of municipal water efficiency programming and leverage limited resources" (Freeman Associates & Gauley Associates, 2017, p. 3). Thus, the Fusion Landscapes developed a retail joint venture and local business support component to leverage existing trusted communication channels within the community. These partner organizations displayed Fusion Landscapes promotional material as well as delivered Fusion Landscape design and installation services throughout the community (Freeman Associates & Gauley Associates, 2017). Furthermore, the Fusion Landscapes program also partnered with Frankie Flowers, one of Canada's most widely popular and trusted gardening expert, to develop and deliver a series of short videos related to water-efficient gardening and landscaping. Frankie Flowers has earned the title of Landscape Ontario's Garden Communicator of the Year, making him widely-known and well-respected, especially within the GTA ("About Frankie," n.d.).

Benchmark 3.5 – Encourages norms that are visible and reinforced through personal contact (Integrated): There is a clear attempt at fostering social diffusion and social norming through the emphasis on creating beautiful water-efficient lawns and using peer-influence marketing tactics. According to Peel, one of the core advantages of using a market-based approach is the assumption that the marketplace will eventually take over (Freeman Associates & Gauley Associates, 2017, p. 4), suggesting that as more Fusion gardens and landscapes are installed, social diffusion throughout the community will generate demand for these types of landscapes within the marketplace. To begin the diffusion process, five homes were selected to win a free Fusion Landscape makeover at the outset of Peel's five-year pilot study in the community of Clarkson. Importantly for fostering social norms, one of the criteria for selecting the winning homes was "location in the neighbourhood to maximize visible impact and distance to the other demonstration sites" (Freeman Associates & Gauley Associates, 2017, p. 11). The pilot also developed a Fusion Landscape demonstration site at a local church located in a high traffic area within the community. The successful homeowners of the Fusion Landscape makeover received several consultations with a landscape architect, a landscape designer and the Region of Peel. These consultations fostered an open dialogue between stakeholders ensuring that the design and

installation of the garden met both the homeowner's and the Regions' vision for a Fusion Landscape. Winning a Fusion Landscape makeover and installing beautiful gardens the front yard of these homes, coupled with marketing and promotional material, intended to create a "buzz" between neighbours in the pilot community. Fusion Landscaping consultations were also offered at no cost to the residents in the community to reduce the cost barriers for residents (P06, 2019). After the 5-year pilot concluded, observational data found that 98 homes within the pilot community had made a minor or major change reducing lawn and hardscaped areas in their front landscape, compared to 6 and 2 homes in control areas A and B respectively (Freeman Associates & Gauley Associates, 2017). The Fusion Landscape program used normative strategies that were both highly visible as well as reinforced through personal contact to foster social norms and diffusion within their pilot community.

Benchmark 3.6 – Develops communication tools using best practices (Integrated): In order to align the Region of Peel's water efficiency strategy with the findings from the earlier market research studies, the Region re-positioned their Water Smart landscaping program to be more reflective of what homeowner values. Recognizing homeowners' negative perceptions of water-efficient landscapes, the new Fusion Landscapes were positioned as moving "from a landscape aesthetic involving excessive irrigation to one that requires little or no supplemental irrigation, but meets all the aesthetic and emotional needs of the homeowner" (Freeman Associates & Gauley Associates, 2017, p. 7). Thus, all subsequent communications from the Region regarding outdoor landscaping were focused on the beauty of Fusion Landscapes, featuring aesthetically pleasing flowers and landscapes. The goal of these communications is to instill a desire for Fusion Landscapes amongst homeowners, which the Region notes as a significant departure from traditional municipal water efficiency communications. Beyond the promotional communication items, Fusion Landscape consultants received in-class and in-field training to deliver personalized and comprehensive information to homeowners during free Fusion Landscape consultations. The consultants also provided plant lists, brochures, and discount coupons for Fusion plants. These communication tools are captivating, tailored to the target audience, come from credible sources, appropriately frame the message and deliver a message that is easy to remember.

Benchmark 3.7 – Establishes (dis)incentives using best practices (Integrated): Residents are incentivized to participate in a Fusion Landscape consultation for a few reasons. Firstly, as demand for Fusion Landscapes grows in the marketplace, homeowners become motivated to book a Fusion Landscape consultation because they desire a Fusion Landscape for their home. Fusion Landscape consultations are offered free as well, which isn't as much of an incentive so much as it is a reduced barrier. Finally, Fusion consultations provide homeowners with discounts for Fusion plants, which can be

used at participating local nurseries and garden centres (Freeman Associates & Gauley Associates, 2017). In some ways, the incentives used within the Fusion Landscape program are different from those employed in the other water efficiency programs because of their market approach. For Fusion, the key component of driving incentivization is through explicit attempts at generating market demand and desire the Fusion product. The additional incentives offered through free consultations and discounts on Fusion plants are useful in rewarding the desired behaviour and are closely tied to it.

Benchmark 3.8 – Initiates convenience strategies that address external barriers (Integrated): The Fusion Landscapes program primarily addresses internal barriers to water-efficient landscapes. However, Fusion also recognized that homeowners viewed the process of installing water-efficient landscapes as difficult and inconvenient, and many felt they could not do it by themselves. Fusion tackled this by tailoring the consultations to make the process of designing and installing a Fusion landscape as simple as possible. Fusion consultants also help the homeowner find a professional to help them install the Fusion features if the homeowner does not want to do the installation themselves. The participant spoke a couple of times about differentiating between those who are "do-it-yourselfers" and those who would prefer not to make these installations themselves, and ensuring that you have materials that meet both these needs (P06, 2019).

Step 4: Piloting – CBSM suggests piloting various strategies using test and control groups, random selection and assignment, and unobtrusive measurements. Piloting also helps to determine whether a program is appropriate for broad-scale implementation by considering cost-effectiveness as well as behavioural changes that occur as a result of the pilot.

Benchmark 4.1 – Develops a pilot that can be compared with baseline measurements (Integrated): The Region of Peel conducted a pilot study to test the impact of Fusion Landscapes during peak season water-use and evaluate the effectiveness of the Fusion Landscape program in driving uptake of water-efficient landscapes by homeowners. The pilot was delivered over five years from 2010 to 2015 in the community of Clarkson. The pilot consisted of four components: installation of the demonstration sites, residential engagement and Fusion Landscape promotion, joint ventures with community organizations and influencers, and ongoing monitoring and evaluation. In 2009, benchmark water demands were determined for the demonstration homes, study area homes, and homes in two control areas. Additionally, a photographic catalogue documenting front yard landscapes was collected before and during the pilot to monitor any changes related to water-efficient landscaping in the pilot.

These measuring activities occurred in both the pilot area as well as in two control communities (Freeman Associates & Gauley Associates, 2017).

Benchmark 4.2 – Utilizes a control group (Integrated): The Fusion Landscape pilot utilized a general pilot study area of 1456 homes, a Control Area A of 179 homes, and a Control Area B of 106 homes (Freeman Associates & Gauley Associates, 2017).

Benchmark 4.3 – Participants are randomly selected, then randomly assigned to strategy and control group (Not Integrated): The community of Clarkson was chosen as the pilot study area because the homes within the community were of mixed ages and contained homeowners of diverse demographics. Clarkson also contained several schools and churches, a large garden centre, many opportunities for demonstration gardens, and transportation routes with significant community traffic. The homes who received the Fusion Landscape makeover were also selected based on their characteristics, including the age and model of the house, location within the neighbourhood and in proximity to other demonstration sites, and the willingness of the homeowner to agree to additional terms of maintenance and ownership (Freeman Associates & Gauley Associates, 2017).

Benchmark 4.4 - Evaluates strategy effectiveness through unobtrusive measurements of behaviour change rather than through self-report (Integrated): Many different measurements were collected during the five-year pilot. Summer students collected weekly meter readings for the demonstration homes as well as a random selection of homes within the study and control areas. Homes that received free Fusion Landscape consultations were tracked, and customer satisfaction surveys were administered following the completion of the consultation. The photographic catalogue was conducted annually in both the control areas and the study area. Finally, the Credit Valley Conservation Authority completed stormwater modelling and analysis of the communities (Freeman Associates & Gauley Associates, 2017).

Benchmark 4.5 Focuses only on strategies that can be implemented at a broad-scale (Integrated): One of the key reasons that Peel Region took a market-based approach to outdoor water efficiency through Fusion Landscaping is because a market-based program's costs decline over time as market forces take over, thereby allowing the Region to focus on its core business of supply and managing water resources (Freeman Associates & Gauley Associates, 2017). This benchmark was fully integrated.

Step 5: Evaluation & Broad-scale Implementation – Measurements should be taken before the broad-scale implementation of your program as well as at several points after, which can then be used to retool the strategies and provide feedback to the audience

Benchmark 5.1 – Measures activity prior to implementation and at several points afterward (Partially Integrated): After the pilot had validated the idea, the Fusion Landscape program broadened the scope of their marketing and promotional material and local partnerships to the whole of Region of Peel. The Region of Peel did not collect additional water use activity measurements of the entire community prior to implementing Fusion Landscapes at a broad-scale. However, the Fusion Landscape program is continually monitored and evaluated through consumer uptake of Fusion products and services, as well as surveys of customer satisfaction following a Fusion Landscape consultation. There are also efforts to build upon the research that was conducted in the pilots (Freeman Associates & Gauley Associates, 2017).

Benchmark 5.2 – Utilizes evaluation data to retool strategy and/or provide feedback to the community (Partially Integrated): Feedback is not provided back to the community. However, the Fusion Landscape program has evolved since its pilot based on its evaluation efforts related to customer and partner organization satisfaction. The participant noted that one of the most significant evolutions of the Fusion program has been the development of the Fusion Landscapes Professional designation, made possible by the strong partnerships within the service sector. This Fusion Landscapes Professional designation allows the Region to broaden the reach of Fusion Landscapes and further supports customers who need additional support in developing and installing water-efficient landscapes (P06, 2019).

8.4. Successes

Shifting Marketplace Towards Water Efficiency. As is described in the 2017 Fusion Landscape report commissioned by the Region of Peel, the decision to utilize a market-based approach to a water efficiency program enables the Region "to progressively move the marketplace toward more water-efficient products and practices such that water efficiency becomes imbedded or standard practice in the marketplace" (Freeman Associates & Gauley Associates, 2017, p. 3). This approach has many advantages, including empowering the Region to reach high water users, declining costs and increasing momentum over time, creating opportunities within the marketplace that are catalysts for Regionally-based economic activity, and sharing the responsibility for water efficiency with consumers. During their interview, the participant noted the rationale for selecting a market-based approach and how that has led to success in past efficiency efforts:

"…once the market takes over we can pull back, we won't have to be as involved, and we will just achieve the savings. A good example is toilet rebates and all the work that was done with those a number of years ago … a lot of municipalities got together, and we spent a lot of resources… to shift the marketplace to where it is now. Those inefficient toilets are no longer really available because people are demanding the highest efficiency toilets" (P06, 2019).

Partnerships. In order to reach a broad marketplace, and in particular those who are high water users, it has been important for the Region of Peel to partner with various trusted organizations and local partners in the delivery of Fusion Landscapes. This crucial element of local support has allowed Fusion Landscapes to broaden their scope, develop a professional designation program, and reach consumers who would not traditionally be interested in water-efficient landscaping. These partnerships are mutually beneficial for both the Region's objectives as well as the partner organization's objectives, thus allowing them to grow and develop together:

"In terms of partnerships, for example, it's the garden centre because that's where people trust to go for advice, and the landscape professionals, horticulture trades organization, the other municipalities. Those are all the main partners in the program… we try to partner as much as we can because it helps us pool our resources together" (P06, 2019).

Furthermore, partnerships with other municipalities are also critical to the success of the Fusion Landscape program and for increasing residential outdoor water efficiency in the longer-term:

"We recognize in order to grow the 'Fusion Landscaping' brand and to increase its market transformation capabilities, we need more communities on board… People who are thinking of developing a program or have an existing program that would like to pool our resources together and leverage that way…. let's share... We've been at this for a number of years and we'd be willing to share market material, lessons learned, the ways and approaches that we've taken to make this program available to our community" (P06, 2019).

8.5. Challenges

Resources – In taking the market-based approach, the Fusion Landscape program required a large amount of effort and initial investment at the outset. Since effective communication and

marketing was the cornerstone to the success of the market-based approach, having enough resources and the correct personnel to develop and deliver these strategies was a significant challenge:

> *"…it really comes down to resourcing and having the right communication design teams to be able to execute some of the material… As long as you have the right people with the right experience and with the right skills to be able to develop these materials, it's not really a major issue… That's the biggest trick - coming up with this really great marketing material" (P06, 2019).*

While noting that having great marketing material was the "biggest trick," it is interesting to note that the participant also simultaneously indicated that it did not present a major issue in the long-term for Fusion. When probed further on this point, the participant responded:

> *"We had really good support from our executive leadership team and upper management… We were able to show that this was our plan, and this was how we were going to implement it. We were clear from the start that yes, it is more expensive at the beginning, but once the market takes over we can pull back and we won't have to be as involved, and we will just achieve the savings" (P06, 2019).*

It was later noted that the team developing Fusion Landscaping recognized early that senior-level support for the program was necessary. The Fusion Landscaping development team secured program approval from their Director and committed to reporting annually to regional council on water efficiency plans, tactics, and measurements utilized in the Fusion Landscaping program. This suggests that a key factor of overcoming challenges related to resources is gaining buy-in from leadership and upper-management.

9 Overall Results

The following section will report the results of all five case studies. Considering the results of the case studies against one another helps to illuminate common trends and themes, point to which benchmarks were most (and least) integrated into the case studies, and suggest areas for discussion about improvements and recommendations.

9.1. Benchmark Performance

Figure 9.1 below depicts each of the twenty-one CBSM benchmarks along the charts' *x* axis, and shows how many programs integrated, partially integrated, and did not integrate each benchmark. Out of all twenty-one benchmarks, four benchmarks were fully integrated by all five case studies (benchmarks 1.1. – clearly identifies a target audience, 2.1 – conducts barrier & benefit research for each segment of the target audience, 3.6 – develops communication tools using best practices, and 3.7 – establishes incentives/disincentives), making them the four best performing benchmarks. In total, eleven of the twenty-one benchmarks were either fully or partially integrated by all five case studies, while the remaining ten benchmarks were not integrated by at least one of the five case studies. These eleven fully or partially-integrated benchmarks are interspersed throughout all five of the CBSM steps, which suggests that programs are sampling from every step of CBSM (as opposed to focussing their efforts only on specific steps or elements of CBSM). Strategies and suggestions for more closely aligning the program toward fully integrating some of these CBSM benchmarks will be discussed in the following chapter of this paper.

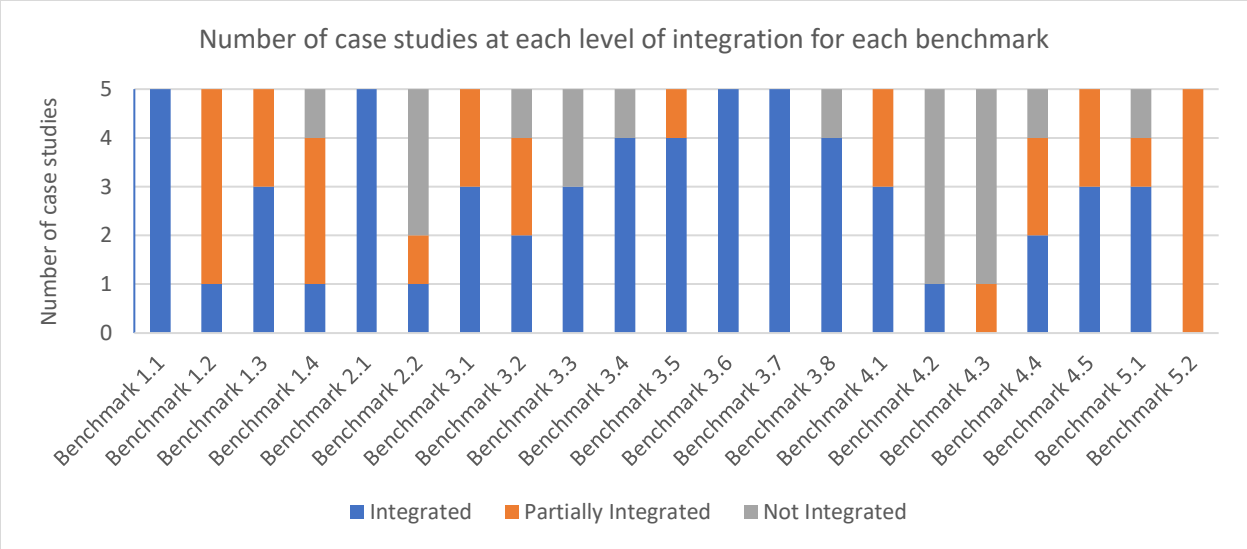

Figure 9.1- Overall Integration of All Benchmarks

Conversely, two benchmarks (4.2 – utilizes a control group, and 4.3 – participants randomly selected and randomly assigned to strategy and control conditions) were the poorest performing. Notably, both of the poorest performing benchmarks fall within the fourth step of piloting. In particular, benchmark 4.3 of randomly assigning and selecting participants to pilot groups was the least integrated, with only one case study partially integrating this benchmark while the remaining four did not. In the concluding chapter of this paper, implications of poorly integrated benchmarks will be discussed, as well as recommendations for how to increase the integration of these more difficult benchmarks. The full table describing how many case studies integrated each benchmark can be found below (table 9.1).

CBSM Step	Benchmark Criteria	Number of Case Studies		
		Integrated	Partially Integrated	Not Integrated
Step 1: Selecting Behaviours	1.1 - Clearly Identifies target audience	5	0	0
	1.2 - Selects behaviours that are both non-divisible and end state.	1	4	0
	1.3 - Evaluates list of selected behaviours for potential impact, penetration, and probability	3	2	0
	1.4 - Limits number of behaviours to target in any given CBSM campaign (no more than five to six).	1	3	1
Step 2: Identifying barriers and benefits.	2.1 Conducts research on barriers and benefits for each of the potential segments in the target group	5	0	0

	2.2 Identifies and distinguishes between barriers and benefits that are **internal** vs. **external** to the target segments	1	1	3
Step 3: Developing a strategy	3.1 Creates strategies that are appropriate for the barriers of the behaviour(s) being promoted and reduce the benefits of behaviour(s) being discouraged	3	2	0
	3.2 Develops **commitment tools** that: emphasize written over verbal; seek commitments in groups; actively involve the individual; avoid coercion; help people to view themselves as environmentally-concerned; and are public and durable	2	2	1
	3.3 Develops **prompts** that are: noticeable; self-explanatory; presented in close proximity to where the action is taken; and encourage positive behaviors rather than discouraging negative behaviors	3	0	2
	3.4 Engages well-known and well-respected people to be part of the campaign	4	0	1
	3.5 Encourages the use of norms that are visible and reinforced through personal contact	4	1	0
	3.6 Develops **communication tools** that are: captivating; tailored to the target audience; uses credible sources; appropriately frames the message; and makes message easy to remember	5	0	0
	3.7 Establishes **incentives/disincentives** that: reward positive behavior; are closely paired with behavior; and are visible	5	0	0
	3.8 Initiates convenience strategies that attempt to address external barriers	4	0	1
Step 4: Conducting a pilot	4.1 Develops a pilot that can be compared with baseline measurements	3	2	0
	4.2 Utilizes a control group	1	0	4

	4.3 Whenever possible, participants are randomly selected and then randomly assigned to strategy or control groups	0	1	4
	4.4 Whenever possible, evaluates strategy effectiveness through unobtrusive measurements of behavior change rather than through self-report	2	2	1
	4.5 Focuses only on the strategies that can be implemented at a broad scale	3	2	0
Step 5: Evaluating broad scale implementation	5.1 Measures activity prior to implementation and at several points afterwards	3	1	1
	5.2 Utilizes evaluation data to retool strategy and/or provide feedback to community	0	5	0

Table 9.1- Overall Integration of Each Benchmark

9.2. Case Study Performance

Due to many factors in this research design, no conclusions can be drawn about a relationship between a participants' familiarity with the CBSM framework and the programs' performance. Nonetheless, since CBSM provides the grounding theoretical framework of this paper, it is worth discussing the participants' overall familiarity with the central framework as well as each programs' performance. In the survey that participants completed before their in-depth interview, participants were asked to rate their familiarity with the CBSM framework from 1 ('not familiar at all') to 5 ('extremely familiar'). Table 9.2 displays the results of these survey responses and plots them alongside the number of benchmarks a program integrated, partially integrated, and did not integrate. Four of the five case studies report a CBSM familiarity of 3 ('fairly familiar') or higher. Participants from the WWGP program, the MWW campaign, and the BBH program explicitly noted having attended McKenzie-Mohr's CBSM workshop in the past.

Participant Familiarity with CBSM		**Assessment**		
Program Name	**Familiarity with CBSM (out of 5)**	**Integrated**	**Partially Integrated**	**Not Integrated**
WWGP	4, 5	9	9	3
MWW	3	14	3	4
RSN	3	11	6	4

BBH	4	11	5	5
Fusion	1[10]	13	5	3

Table 9.2- Participant Familiarity with CBSM & Program Benchmark Performance

Though statistical inferences cannot be drawn, there does not appear to be a clear relationship with benchmark integration and the participants' familiarity with CBSM. While the WWGP had two participants with a high familiarity with CBSM, the WWGP fully integrated the least number of benchmarks out of all five case studies. Notably, the participant from Fusion indicated the lowest familiarity with CBSM on their survey; however, later discussions revealed that this representation from the survey may not be entirely accurate due to forgetting over time. As well, it is also worth noting that since the participant from Fusion was not directly involved in the early-stage developments of the Fusion Landscaping program, an additional Region of Peel employee that worked directly on developing Fusion Landscaping provided supplementary information. This employee did not participate in the survey portion of this research, so their familiarity of CBSM is not represented in table 9.2. However, this employee indicated that they were moderately familiar with CBSM and obtained most of their CBSM knowledge from working the consultant on the Fusion Landscaping program.

The horizontal *x* axis on figure 9.2 below displays each of the five case studies' program names, and then tallies the number of benchmarks that were assessed as integrated, partially integrated, and not integrated for each program. The number of 'integrated' benchmarks ranged across the five case studies from 9 up to 14 in a single case study, with a mean average of 11.6, and a median and mode average of 11. The OBWB's Make Water Work (MWW) campaign had the highest number of integrated benchmarks with 14 integrated, and the City of Vancouver's Water Wise Garden Parties (WWGP) had the least number of benchmarks integrated with 9.

'Partially integrated' benchmarks ranged from 3 up to 9 benchmarks, with a mean average of 5.6, a median of 5, and a mode of 5. Interestingly, the results of these are the inverse of the 'integrated' benchmarks; the WWGP had the most partially integrated benchmarks at 9, and MWW had the least partially integrated benchmarks at 3. Finally, the 'not integrated' benchmarks had a much smaller range, from a minimum of 3 to a maximum of 5 benchmarks not integrated in a single case study. Across five

[10] This chart is based off of the participants' survey responses; however, it was later discussed how this representation may not be entirely accurate. Over ten years ago, the participant took a workshop about market-based community programming which included CBSM tools and principles. Thus, they acknowledge that they may have forgotten about and subsequently undervalued their previous exposure to CBSM. An updated rating of familiarity from 1-5 was not collected after this information came to light.

case studies, the benchmarks that were not integrated had a mean of 3.8, a median of 4, and a mode of 3 and 4.

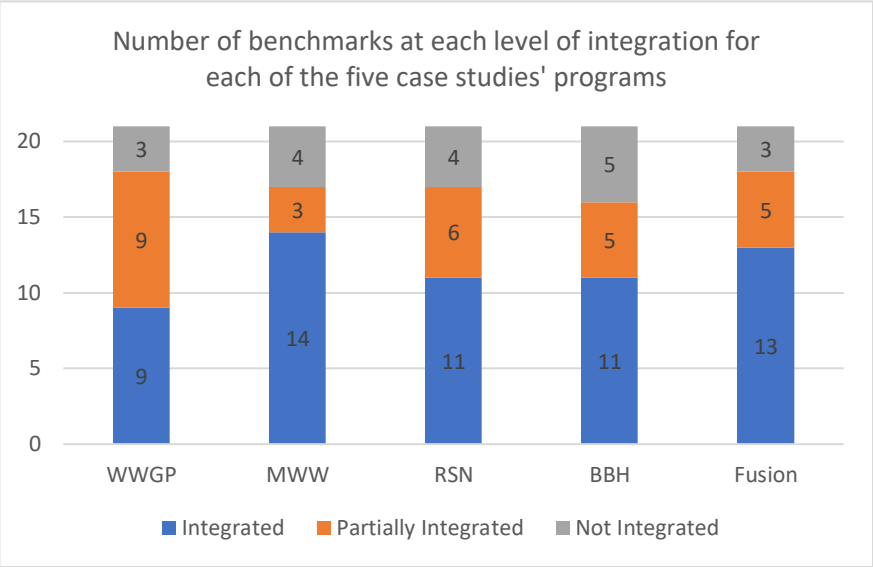

Figure 9.2- Number of Benchmarks that were Integrated, Partially Integrated, or Not Integrated by Each Case Study

In sum, benchmarks that were 'integrated' had mean average of 12 (11.6), benchmarks that were 'partially integrated' had a mean of 6 (5.6), and benchmarks that were 'not integrated' had a mean of 4 (3.8) across the five case study programs. These results show that, on average over the five case studies, just over half of the twenty-one criteria were fully integrated into the programs; whereas just under a third were partially integrated, and approximately one fifth were not integrated at all. This shows that the programs assessed in this research were more likely to fully or partially integrate a CBSM benchmark than they were to not integrate it at all. Further discussions about the performance of the benchmarks will occur in the concluding chapter of this paper.

9.3. Successes and Challenges

The successes and challenges experienced by each of the case studies' programs are displayed in table 9.3 below. These successes and challenges arose in discussion of each of the program's development, implementation, strategy, and use of the CBSM model. These discussions were limited to the content of the survey, interview, or secondary literature; presumably, these are not exhaustive lists of successes or challenges experienced by these programs over their full duration. Nonetheless, these

are these are the successes and challenges that were explicitly noted by the participants during the duration of this research. Future community programs that endeavour to implement similar strategies to the ones highlighted in this research's five case studies will benefit from seeing what other programs have successfully accomplished, and where there are lessons to be learned.

Successes & Challenges by Program		
Program Name	**Successes**	**Challenges**
WWGP	• Well received by the community • Partnerships	• Metering • Logistics • Cost
MWW	• Partnerships • Increased awareness	• Data access and measurements of success • Resources
RSN	• Moving beyond rain barrels	• Time • Cost
BBH	• Tackling indoor water use • Partnerships	• Program complexity and flexibility • Targeting potential new home buyers • Data access
Fusion	• Shifting the marketplace • Partnerships	• Resources

Table 9.3- Successes and Challenges of Each Case Study

It is interesting that while each program experienced a unique set of successes and challenges, there was also considerable overlap in the higher-level themes of the described challenges and successes. Programs differed greatly in terms of the type of organization, the strategies that were employed, and the various external factors that influence program implementation such as the environmental, infrastructural, societal, and geopolitical landscape that the programs were operating within. Nonetheless, common successes and challenges were discussed, as depicted in table 9.4 below. Table 9.4 displays the common themes identified for both successes and challenges, as well as which programs identified a success or challenge that fit within that theme. 'Increased awareness and/or acceptance' as well as 'strategic partnerships' were two very clear themes that participants pointed to when discussing the success of their programs. Conversely, 'resources' were the most common challenges encountered, with resources encompassing financial, time, and employee or personnel resources. Closely behind the challenge of resources are difficulties accessing data, which has implications for a programs ability to measure success concretely.

Common Themes of Successes and Challenges Across Case Studies			
Common theme	**Successes**	**Common theme**	**Challenges**
Increased awareness and/or acceptance	• WWGP ("Well-received by the community") • MWW ("Increased awareness") • RSN ("Moving beyond rain barrels) • Fusion ("Shifting the marketplace")	**Data Access**	• WWGP ("Metering") • MWW ("Data access and measurements of success") • BBH ("Data access")
Strategic partnerships	• WWGP • MWW • BBH • Fusion	**Resources**	• WWGP ("Logistics") • WWGP ("Cost") • MWW ("Resources") • Fusion ("Resources")
Tackling indoor water use	• BBH	**Communicating the program's value**	• BBH ("Program complexity and flexibility") • BBH ("Targeting potential new home buyers")

Table 9.4- Common Themes of Successes and Challenges

10 Discussion

10.1. Introduction

Before diving into the concluding chapter of this paper, it may be useful to revisit what has been covered in the previous chapters. The catalyst of this paper is the need to address the paucity of research in tracking and assessing the ways that CBSM has been applied in communities seeking to foster sustainable behaviour. While there is considerable evidence supporting the CBSM framework (Lynes et al., 2014; McKenzie-Mohr, 2000; McKenzie-Mohr & Smith, 1999), little is known about how the CBSM framework has been used as well as what program outcomes have been achieved. The primary objective of this research is to explore how the CBSM theoretical framework has been implemented into practice at the community level with a specific focus on water efficiency.

In order to achieve the primary objective, an additional three 'sub-objectives' were also identified. The first sub-objective was to 'develop a robust and replicable benchmark assessment procedure for CBSM that allows for assessing multiple programs efficiently and effectively'. Previous chapters have discussed the development, implementation, and results of the benchmark assessment procedure in detail, beginning in Chapter 2 with a discussion of the theoretical foundations of Lynes et al.'s benchmarks (2014) and the assessment procedure, and continuing in Chapter 3 where the CBSM benchmark assessment tool is introduced. The second sub-objective, 'determining the degree to which selected case study programs have integrated the CBSM benchmarks', was addressed in Chapter 4. Chapter 4 includes the full case studies of each of the five programs featured in this research, including utilizing the CBSM benchmark assessment tool to determine the degree to which each program was integrating each benchmark. The third and final sub-objective of this research was to 'make recommendations for better aligning practice with the intended framework', which will now be addressed in the upcoming sections of this chapter. As one of the first to employ Lynes et al.'s CBSM benchmarks (2014) as well as the first to apply it to multiple case studies, this chapter will then discuss the lessons learned from refining the CBSM benchmarks and then implementing the benchmark assessment tool across five cases. Finally, the chapter will conclude this paper with a discussion of implications and considerations for the future.

Before interpreting the following discussion, it is worth reiterating that, due to the small sample size of case studies explored, it is not possible to make any generalizable inferences about the water efficiency field or draw any correlation between CBSM benchmark criterion achievement and program success. The fact that this research was conducted using purely qualitative data was appropriate for

showcasing the five chosen case studies but did result in a clear lack of statistical data. Future research may endeavour to develop a more robust quantitative component for assessing the CBSM methodology.

Related to that, it is also very difficult to make any determination of the relative 'success' of each case study compared to the others, because a common metric of success is not used across programs. From a CBSM standpoint, the most important metric of success would be measuring the impact of the target behaviours' influence on the residents' overall water consumption or use. However, as was illuminated from these case studies, accessing, implementing, and obtaining that kind of data on a large scale is a common challenge. The recommendations discussed in the upcoming sections offer suggestions for programs to more closely align their strategies with the CBSM model; however, future research is needed to determine the actual impact that increased alignment to the CBSM framework has on a programs' success at influencing target behaviours.

10.2. Case Study Discussion and Recommendations

10.2.1. Step 1: Selecting Behaviours

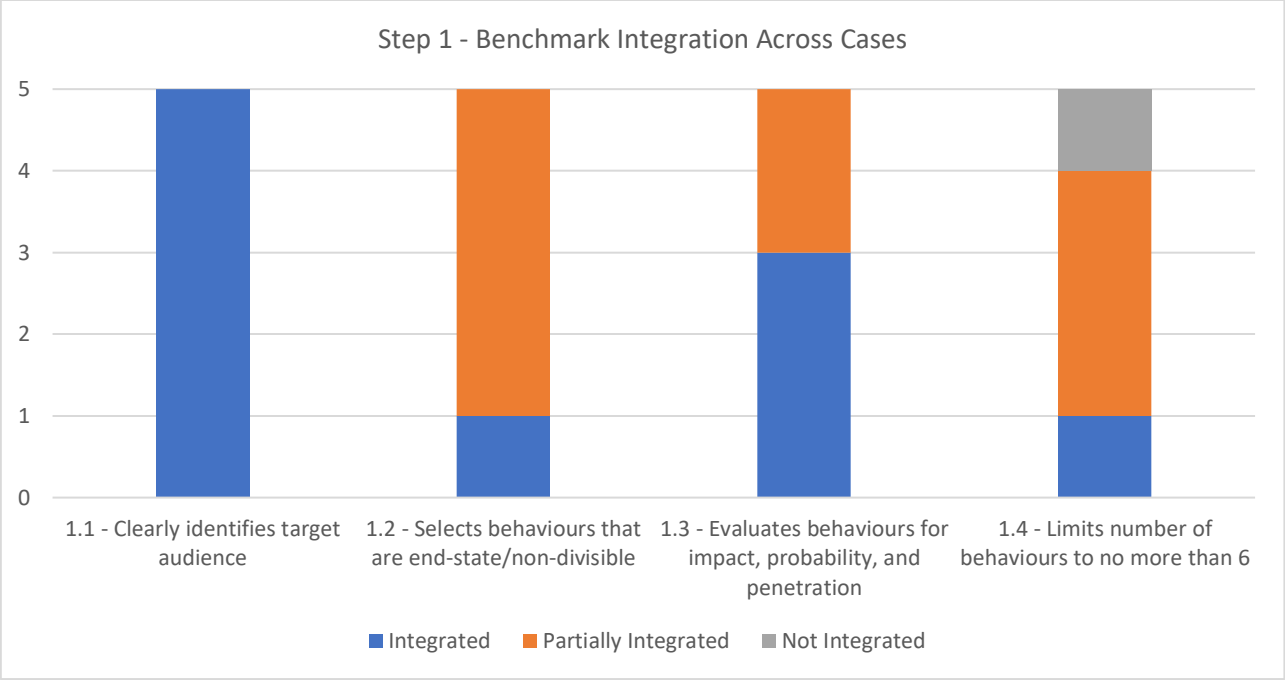

Figure 10.1- Overall Integration of Step 1

The four benchmarks within Step 1 are related to selecting behaviours to promote in the program. These four benchmarks were fairly well integrated by programs with the exception of benchmark 1.4 (limits number of targeted behaviours to no more than 6 non-divisible behaviours). Only

one program, the Make Water Work campaign, fully integrated this benchmark by targeting less than six non-divisible behaviours. Related to benchmark 1.4 are the results of benchmark 1.2 (selects non-divisible and end-state behaviours). Only one case study – again, Make Water Work – fully integrated this benchmark. The largest barrier to achieving full integration of both benchmarks 1.2 and 1.4 was that programs selected end-state behaviours that elicited the desired environmental outcome, but the behaviours were divisible into many other behaviours; therefore, these behaviours selected were not non-divisible and thus exceeded the maximum of 6 behaviours per program. In the CBSM model, the rigid approach to selecting behaviours is important to explicitly target and address the barriers and benefits of the desired behaviour. Indeed, at the 2019 World Social Marketing Conference held in Edinburgh, Doug McKenzie-Mohr presented about the importance of 'selecting and unpacking behaviours', which suggests that McKenzie-Mohr also recognizes behaviours selection as a priority area for improvement in community programs (McKenzie-Mohr, 2019). This signals an opportunity for programs that are struggling to overcome barriers or promote benefits of desired behaviours to consider narrowing their focus on behaviours that are non-divisible.

Benchmark 1.1 (selecting target audience) was particularly well-done, with all five case studies fully integrating that benchmark. This could be due to programs' well-defined target audiences, but it may also be due to the relatively loose criteria developed for this benchmark compared to other benchmarks. Since there was insufficient information about how to select an appropriate target audience in the CBSM framework, criteria for benchmark 1.1 were based off of theories from social marketing that were relatively broad. Furthermore, integration for benchmark 1.3 (evaluates behaviour for impact, probability, and penetration) was also fairly well-done. Challenges that programs encountered at this benchmark were often related to measurement constraints, such a lack of metered or survey data collecting for information about impact, probability, or penetration. In cases where concrete measurements – such as water metering – are not available, programs can consider incorporating self-report, observational, or even secondary data collection measures for investigating impact, probability, and penetration.

10.2.2. Step 2: Barrier and Benefit Research

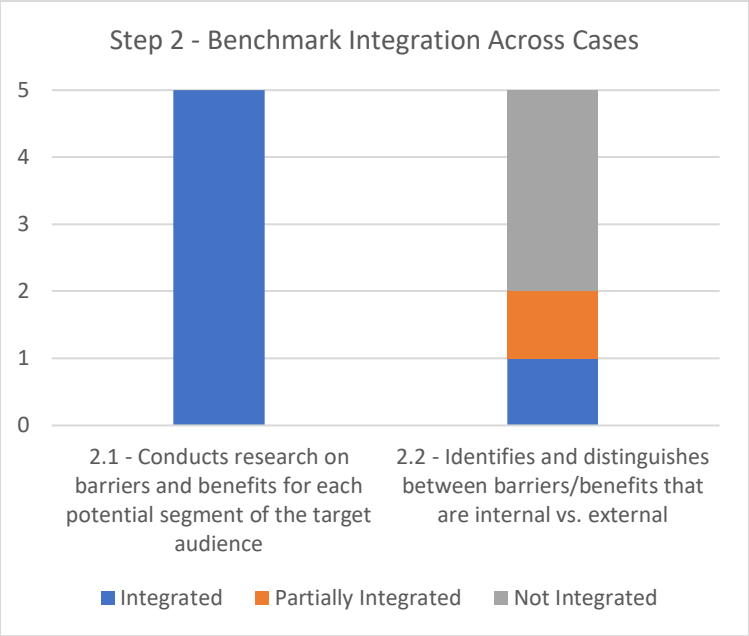

Figure 10.2- Overall Integration of Step 2

The second step of CBSM contains only two of the twenty-one CBSM benchmarks. However, these benchmarks are important because they capture a programs' ability to understand their audience enough to target and overcome (or amplify) the barriers and benefits of the desired behaviour. Benchmark 2.1 – 'conducts barrier and benefit research for each potential segment of the target audience' – was one of the four most commonly integrated benchmarks, with all five case studies fully integrating this particular benchmark. This indicates that not only do programs recognize the value of conducting barrier and research to gain audience insight, but they also see the importance of segmenting the audience for improved understanding. This is an important shift away from more traditional approaches to environmental behaviour that employed more mass-communication strategies to a general audience.

It is interesting, given that all five case studies integrated benchmark 2.1, that benchmark 2.2 – 'distinguishes between barriers and benefits that are internal versus external to the target audience' – was poorly integrated. Only one program fully integrated this benchmark, and three did not integrate benchmark 2.2 at all. The program that partially integrated this benchmark focussed only on internal barriers and benefits but did not explicitly discuss external barriers and benefits. This result suggests that while programs are collecting information about the barriers and benefits that their target audience

experiences generally, they could better align with the CBSM framework by then categorizing those barriers and benefits into internal versus external factors.

10.2.3. Step 3: Developing Strategies

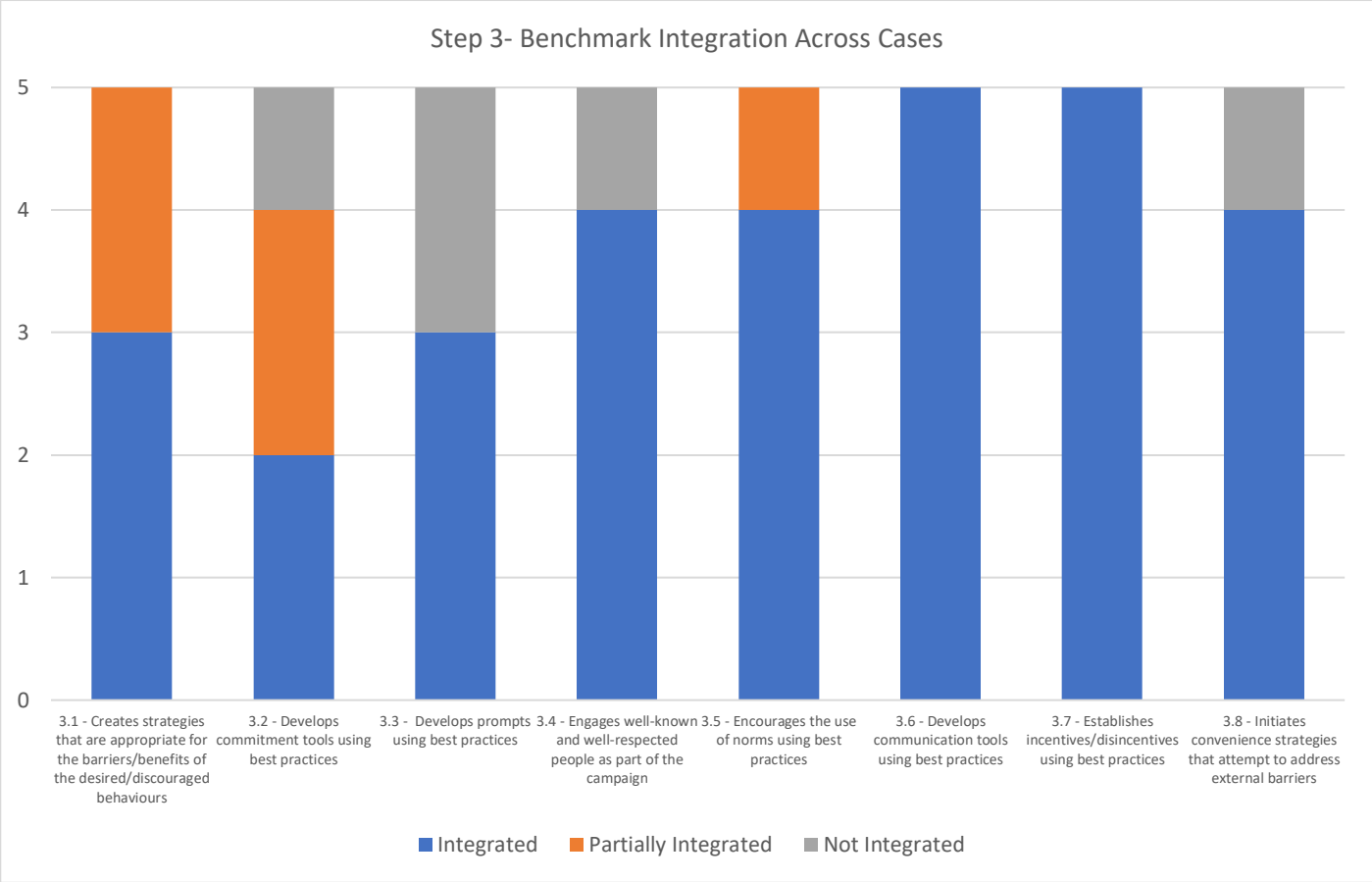

Figure 10.3- Overall Integration of Step 3

The third step of CBSM is dedicated to developing strategies for using behaviour change tools that are grounded in strong theoretical roots. The CBSM textbook outlines best practices for seven tools that can be implemented to increase the benefits and decrease the barriers of the desired behaviour, while simultaneously decreasing the benefits and increasing the barriers of the undesired behaviour. Accordingly, there are eight benchmarks relating to Step 3 – the first benchmark (3.1) examines how well a program is able to address the barriers and benefits of both desired and undesired behaviours, and the remaining seven outline the best practices for each of the behaviour change tools.

Benchmark 3.1 is fairly well done, but it is worth noting that two programs only 'partially' integrated the benchmark. These programs received assessments of 'partially integrated' because, while

they may have addressed the barriers and benefits of the desired behaviour successfully, they did not simultaneously decrease the benefits and increase the barriers to the undesired behaviours. Influencing the undesired behaviour is considerably harder to do; programs that fully integrated benchmark 3.1 utilized tools such as levying local taxes, fees, or bylaw enforcement which requires the authority of being (or partnering closely with) a municipal government. A notable exception to this is the case of Fusion Landscaping, which fully integrated this benchmark and addressed both desired and undesired behaviours without the use of fees or taxes. Fusion Landscaping's utilization of a market-based strategy to increase market demand for water efficient landscaping had the inverse effect of driving down consumer demand (in effect, decreasing the benefits) of inefficient landscapes. In focussing heavily on the aesthetics of Fusion Landscaping and strategically driving demand within the community using "Fusion Makeovers", Fusion positions traditional landscapes as boring, dull, and expensive to maintain. This may be an attractive option to consider for organizations that do not have the authority to put measures like taxes, fees, and bylaw enforcement in place.

The remaining benchmarks within Step 3 – benchmark 3.2 through to 3.8 – assess each of the programs' implementation of McKenzie-Mohr's seven suggested behaviour tools. Benchmarks 3.6 ('develops communication tools using best practices') and 3.7 ('establishes incentives/disincentives for the behaviours using best practices') are the best performing behaviour change tools, with each of the five case studies fully integrating these two benchmarks. This means that all programs used messaging that was captivating, appropriately tailored to the audience and desired outcome, as well as used incentives that rewarded the desired behaviour and were closely tied to it.

Four of the five case studies fully integrated benchmarks 3.4 ('engages well-known and respected people as a part of the campaign', 3.5 ('encourages norms that are visible and reinforced through personal contact'), and 3.8 ('initiates convenience strategies that address external barriers of the desired behaviour'). Benchmark 3.4 was assessed as an all-or-nothing integration (i.e. the program either did or did not include a well-known and respected individual), thus it is clear how future programs can endeavour to fully align with the CBSM model for this benchmark. With respect to benchmark 3.5, the single program that partially integrated this benchmark was the Water Wise Garden Parties; despite a solid effort at fostering social norms through the personal contact by encouraging folks to host Garden Parties, the action lacked visibility in the community and thus was unlikely to spread through social diffusion. This is a key consideration for programs seeking to include social norming strategies – strategies should aim to ensure that the desired behaviour is both social and highly visible in order for

social norms and diffusion to flourish. Benchmark 3.8 was also integrated by all but one case study; while this program did include some convenience strategies, these strategies failed to make the actual target behaviour more convenient. Thus, programs need to be targeted and deliberate about their convenience strategies to ensure they are directly making the desired behaviour more convenient.

The final two benchmarks to consider within Step 3 are benchmarks 3.2 (develops commitment tools using best practices) and 3.3 (develops prompts using best practices). The results of these two benchmarks are mixed, which suggests there may be some difficulty in integrating these two tools compared to the others. Each of these behaviour change tools has fairly prescriptive best practices for aligning with CBSM's framework, which may pose some difficulty to fully integrating these strategies but also suggest areas that programs may improve their use of these tools. For example, commitment tools (benchmark 3.2) has a list of six best practices within the CBSM benchmark, including that the commitment tool emphasizes written over verbal, is public and durable, is not coercive, and is sought in groups, with the objective of prompting folks to view themselves as environmentally-concerned. Prompts include four stated best practices, including that the prompt should be presented close to the behaviour, is self-explanatory and noticeable, and encourages the desired behaviour. The fact that these best practices are outlined suggest that it is not enough to simply include some form of commitment or prompt, but that the commitments and prompts employed should be designed deliberately considering these best practices for the most effectiveness. Considering each of these best practices for employing prompts and commitment tools is important in successfully aligning the tools with the CBSM framework.

In some cases, some behaviour change tools may simply not be appropriate to utilize in a given program. For example, prompts were not the most appropriate tool for Guelph's Blue Built Home program because it focused on installing efficient indoor fixtures; this target behaviour typically only occurs once (i.e. the installation of the fixture), thus prompts are not needed to repeatedly remind the audience of something. In fact, there is currently no evidence to suggest that not integrating some of the tools is detrimental to a program. In *Choosing Effective Behavior Change Tools* (2014), McKenzie-Mohr introduces the behaviour change tools and outlines when and how to use them, but there are no implications that integrating each tool is required for success. It could then be suggested that successful integration of the CBSM framework is not how many of the behaviour change tools were integrated, but how well the tools employed addressed the target behaviours. For programs looking to align their strategies to the CBSM framework, arguably the most critical element when making strategy decisions is to simultaneously target the desired behaviours (increase benefits + decrease barriers) and the

undesired behaviours (decrease benefits + increase barriers). This strategic targeting of the behaviours is reflected in benchmark 3.1 and requires strong audience insights that are developed in Step 2's barrier and benefit research.

10.2.4. Step 4: Piloting

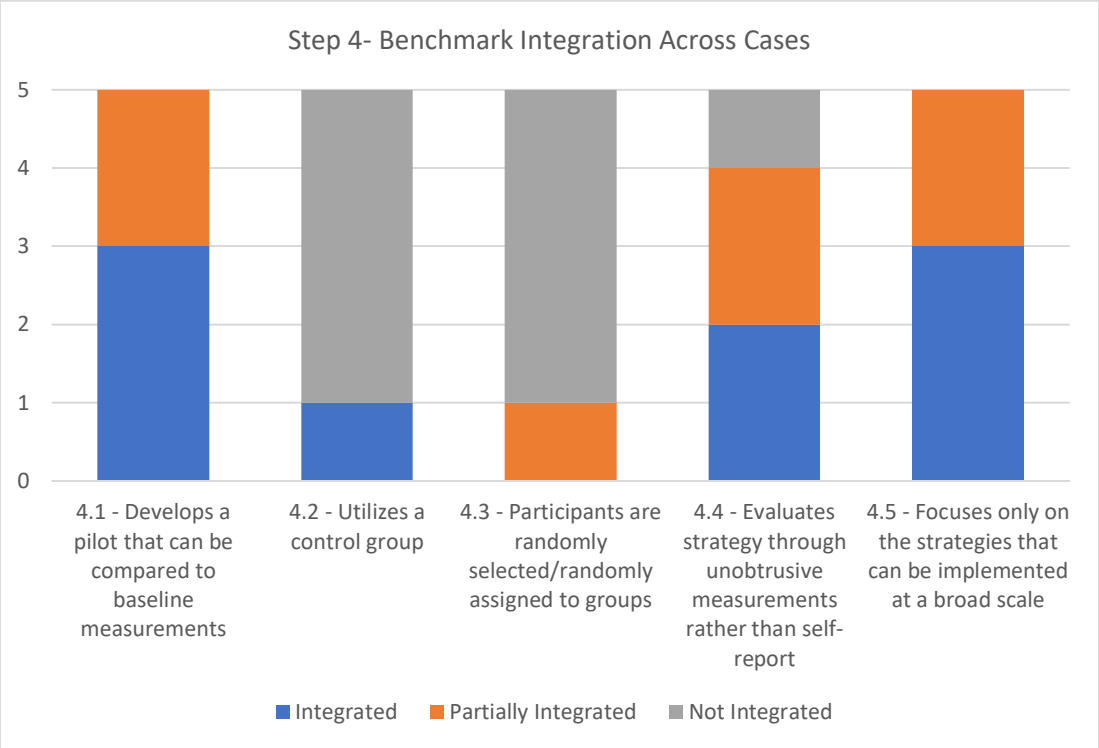

Figure 10.4- Overall Integration of Step 4

The results of benchmark integration in Step 4: Piloting are certainly mixed but also are illuminating about how programs are conducting pilots. Of the five benchmarks within Step 4, two were fully or partially integrated by all five case studies. Benchmark 4.1 ('develops a pilot that can be compared with baseline measurements') was fully or partially integrated by all five case studies, meaning that all five case studies included a pilot in some way. Programs that partially integrated 4.1 did not collect baseline measurements of the pilot area, which is critical to understanding the influence of your pilot program. The other benchmark that was fully or partially integrated by all five case studies was benchmark 4.5 ('focuses only on strategies that can be implemented on a broad scale'). This result suggests that the case studies are piloting projects that can easily, or with some effort, be adapted for wide-scale implementation. This is important for testing strategies that are ultimately cost-effective and sustainable when delivered at scale.

It is significant to note that the two worst performing benchmarks from the entire set of twenty-one benchmarks are both located within Step 4: Piloting. Benchmark 4.2 ('utilizes a control group') and 4.3 ('participants are randomly selected and assigned to groups') were both 'not integrated' by four of the five case studies. In particular, benchmark 4.3 was the least integrated by programs, with only one case study partially integrating the benchmark. This case study indicated that they used telephone random selection for participants but did not randomly assign participants to groups because they did not utilize a control group; notably, the use of a control group is assessed in benchmark 4.2, the second worst performing benchmark. This suggests that these two benchmarks are related, which makes sense; if one does not have a control group, random assignment to a control or strategy group is not possible. Programs did not use control groups and random selection and assignment for a variety reasons; most commonly, programs utilized residential neighbourhoods as pilot areas which made segmenting and randomly assigning participants to groups difficult. This challenge also relates to issues around metering and data access, which further compounds the challenge of developing control and strategy groups to compare against one another.

The final benchmark to consider within Step 4 is benchmark 4.4 (evaluates the strategy through the use of unobtrusive measurements) which also returned mixed results at best. While some programs successfully employed unobtrusive measurements of the desired behaviour, other programs relied on self-report data or did not collect measurement data at all. Unobtrusive measurements are important to measuring a programs' effectiveness because they are more likely to accurately depict the behaviour change (McKenzie-Mohr, 2011). However, unobtrusive measurements are also considerably more difficult to employ; the behaviours that programs are targeting are often private and difficult to measure without the installation of metering technology. Thus, many programs are limited to self-report measurements. Notably, Fusion Landscaping utilized a 'photographic catalogue' for outdoor landscape changes, which did not require the installation of metering technology but did allow Peel to unobtrusively measure the impact that their pilot was having on community landscapes. These types of lower-cost measurements may be attractive to programs with limited access to data, which was a common challenge among the featured case studies.

10.2.5. Step 5: Evaluation and Broad-scale Implementation

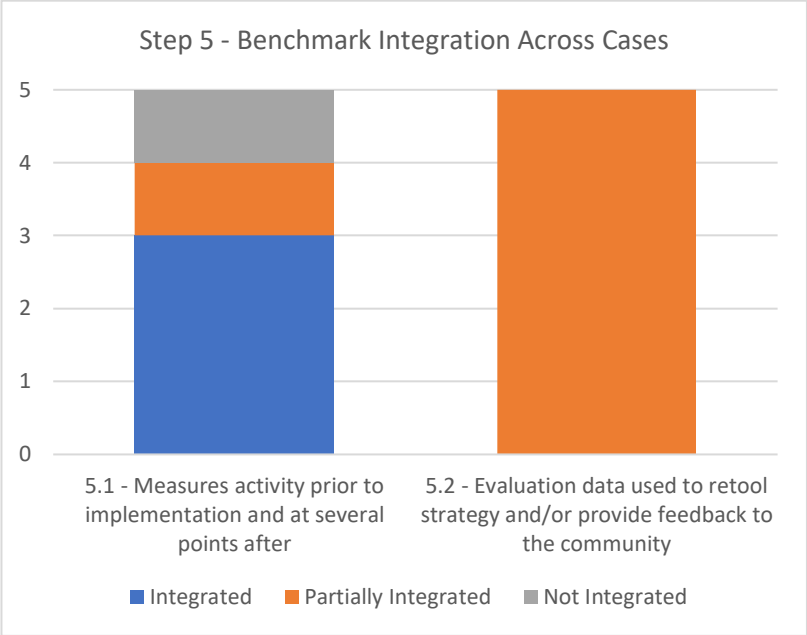

Figure 10.5- Overall Integration of Step 5

The fifth and final step of CBSM is 'evaluation and broad-scale implementation', which includes two benchmarks. Benchmark 5.1 ('measures activity prior to implementation and at several points afterwards') showed mixed degrees of integration across the case studies. This benchmark suggests that programs establish the present level of engagement within the target audience after the pilot has been completed and before the program is widely implemented, as well as at several times after implementation. Some programs did this successfully, while others only measured implementation post-hoc. Reep's Rain Smart Neighbourhoods project is the only program that did not integrate benchmark 5.1, as it the project itself was a pilot and thus was not adapted for the broader scale.

The final benchmark, benchmark 5.2 ('utilizes evaluation data to retool strategy and/or provide feedback to community') was partially integrated by all five case studies. Unanimously across all cases, programs used what they had learned to 'retool' their strategy; this is promising, as it shows that programs are continuing to evolve based on the evaluation data they have collected. However, no programs indicated that they provide feedback back to the community. Providing feedback about the impact that the change in behaviour has had on the environment is important for reinforcing the changes that have been made and establishing the individuals' self-perception as someone who is environmentally-minded (McKenzie-Mohr, 2011). Thus, providing the community with feedback is an important element in maintaining the strategy across a wider scale and a longer term. While revising the

strategy over time is certainly important, one could suggest that developing a feedback loop with the target audience would only serve to bolster efforts to improve programs.

10.2.6. Successes and Challenges

Each of the case studies discussed their own set of unique successes and challenges, and yet there were still a few common over-arching themes that emerged. These themes have been previously identified in Table 9.4 from the previous chapter which have then been arranged into pie charts below (Figure 10.6 and 10.7). The next section will take a closer look at the most common themes of successes and challenges that emerged from the five featured case studies.

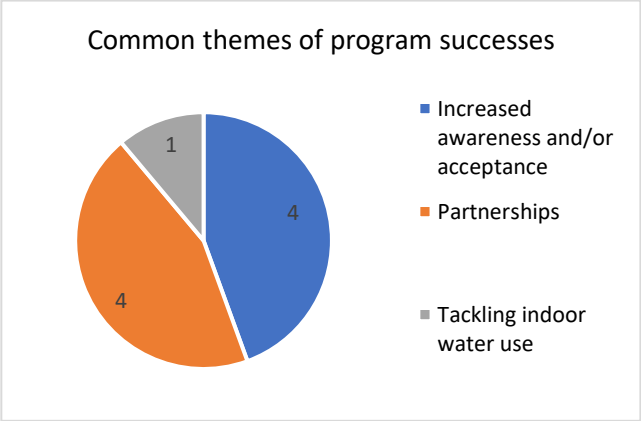

Figure 10.6- Common Themes of Program Successes

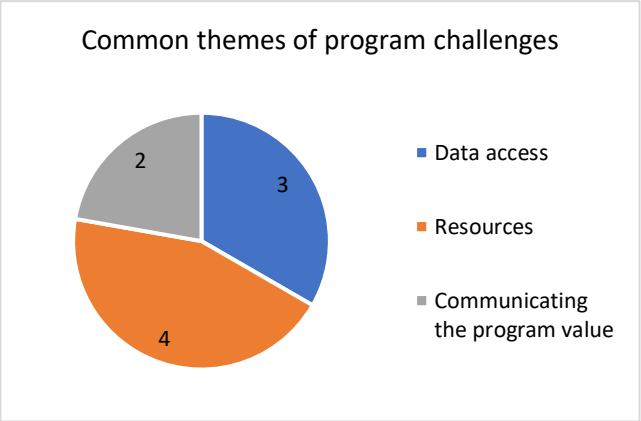

Figure 10.7- Common Themes of Program Challenges

The two most common themes of success that programs discussed were increasing awareness and/or acceptance and the strategic use of partnerships with other local organizations. In both cases, four of the five case studies discussed each of these as being key areas of success for their program. Interestingly, increasing awareness and acceptance of the target behaviour reflects evidence of a successful outcome, while the use of strategic partnerships reflects evidence of a successful approach. Increasing awareness and acceptance of the target behaviour was discussed in a variety of different ways; for example, programs discussed how media coverage for their organization and their campaigns had increased, how they were able to successfully target difficult behaviours, and that they received positive feedback from the community and stakeholders regarding the program. While these certainly are positive outcomes, notably, they do not touch on any actual behaviour changes that occurred. This is

a critical opportunity for programs to better align with the CBSM framework, by ensuring that their measurements of success are tied to actual changes in behaviour.

The second most-common area of success was programs' strategic use of partnerships within the community. Four of the five case studies discussed this success area; arguably, the fifth case study could have also been included within this category had this topic arose in the interview (Reep's RSN project is the outlier in this case, but it is clear that their relationship with the City of Kitchener was certainly critical to their success). Partnerships ranged from local media stations, garden and home centres, municipal governments, neighbouring environmental organizations, local consultants and experts, and more. These partnerships are deeply embedded throughout many of the strategies employed by each case study, which exemplifies the diverse and widespread impact that these strategic partnerships can have on community behaviour-change programs.

Conversely, the two most commonly discussed challenges faced by programs were access to data and resources. Limited access to data, especially within a water-efficiency context, meant that programs lacked important measurements of the target behaviours. This challenge is reflective of the Canadian water efficiency field as a whole, where there are long-standing disagreements about how best to measure water-efficiency in the face of a lack of a standardized metric. In order to unobtrusively determine if someone has meaningfully changed their behaviour – that is to say, that they have altered their water-use behaviour and sustained the changes – it is almost always necessary to determine the impact that this change has had on household water consumption, peak-day usage, stormwater run-off reduction, or whatever water metric measures that specific water-use behaviour. This challenge is then exacerbated by the fact that, to determine if long-term sustained change occurs, the data collection period should ideally be fairly long-term. Without access to (or the ability to gather) these specific metrics, programs are limited to making assumptions of their programs' impact based on less-robust assumptions, proxies, and self-reports. The challenge of accessing data is unfortunately difficult to overcome, as the existence of data collecting infrastructure (and who owns it) is a significant external barrier that varies from community to community. Programs can endeavour to use innovative solutions to data collection where appropriate, such as Fusion Landscapes' "photographic catalogue" which unobtrusively measured landscape changes over time. However, this challenge illuminates a broader-scale issue that is external to community organizations, which is a dearth in the data collection infrastructure needed to develop informed strategies about water-efficiency.

Perhaps unsurprisingly, the other most commonly discussed challenge that programs faced was an issue of resources. Resources of course include financial resources, but also include the resources

that employees provide to programs including time and effort, as well as the resources and materials required to implement the program. In many cases, programs were relying on external funding for financial resources, thus their ability to implement strategies was constrained and also uncertain. Programs typically did not include a long roster of managers; some programs only had a single manager who was in charge of more than one related program. Programs also often brought in consultants, external resources, and part-time or contract employees that reduced the load on the managing employees, but also increased the financial investment of the program. Finally, as if issues around resources were not already an issue, CBSM strategies themselves are fairly resource intensive. More often than not, CBSM strategies require ongoing communication with the target audience, personal interaction, multiple communication channels and tactics, and several other 'moving parts' of a campaign that all work together to foster sustainable behaviour. It is clear that programs utilizing the CBSM framework are encountering issues related to obtaining resources, and yet having adequate resources is critical to the success of CBSM programs.

10.3. Benchmark Assessment Tool – Lessons Learned

In pursuing this research project, one of the stated aims was to develop a robust and replicable benchmark assessment procedure that allows for assessing multiple programs efficiently and effectively. This objective was important for a couple of reasons. The CBSM benchmarks that were developed by Lynes, Whitney, and Murray have remained largely untested (2014). Furthermore, Lynes et al. (2014) only tested a single case study against the benchmarks. In pursuing this objective and in being one of the first to operationalize this set of benchmarks, many lessons were learned along the way about the benchmarks themselves, the assessment process, and more broadly, how these benchmarks translate from theory to practice. Thus, the following section will present these lessons learned for consideration by any researchers looking to do something similar in the future.

10.3.1. Assessment Challenges

In order to fulfill the objective of exploring how the CBSM theoretical model has translated from theory to practice, it was necessary to operationalize a set of benchmark criteria developed for the CBSM model by Lynes, Whitney and Murray (Lynes et al., 2014). Since the set of benchmarks had previously only been applied to a single case study, it became evident that decision-making criteria for each benchmark would need to be established to apply the set of benchmarks to multiple case studies

in a robust way. However, the process of applying these decision-making criteria using a set of relatively un-tested benchmarks illuminated a number of challenges.

As was briefly mentioned in Chapter 3, assessing the benchmarks using the qualitative criteria of 'integrated', 'partially integrated', and 'not integrated' leaves ample room for interpretation (Lynes et al., 2014; Wettstein & Suggs, 2016). Developing criteria for each benchmark establishing a minimum standard of action at each level of the benchmark integration helped to reduce the amount interpretation required to apply the benchmark assessment tool. However, there were inevitably instances when the criteria did not adequately capture the activities undertaken by a program, or the program's activities appeared to straddle two criteria. Furthermore, the established criteria are relatively flexible; for example, the threshold for achieving an assessment of 'integrated' in several of the benchmarks is "the majority", meaning that over 50% of the criteria's best practices were met. This was done to allow some flexibility on behalf of the programs. Nonetheless, these thresholds may be criticized for being too flexible, as some may argue that they may over-state a program's integration of the CBSM methodology. While this is certainly a valid criticism, it was the author's position to make judgments in favour of the programs when tensions arose (see Chapter 4 four a more fulsome discussion about this decision). Finally, while the current research's author developed the assessment criteria using McKenzie-Mohr's *Fostering Sustainable Behaviour* (2011) textbook as a guide, one should acknowledge that there may be limitations to the criteria and assessments due to the authors' own knowledge, understanding, and perception of the CBSM methodology and the benchmarks. To ensure transparency in the assessment process, evidence is provided for each benchmark of each case study so that it is clear how and why the author made assessment decisions that are presented. Nonetheless, subjectivity in utilizing the benchmark assessment tool is a clear limitation in applying the CBSM benchmarks, especially if future research attempts to do so on a broader scale and using multiple researchers. To combat this, future endeavours may consider bolstering the benchmark criteria by including tools such as the Social Marketing Indicator (SMI), which is a visual representation of the extent that an intervention corresponds to social marketing methods based on two procedural dimensions, process integrity and process quality (Wettstein & Suggs, 2016)

10.3.2. Benchmark Limitations

In addition to encountering challenges in applying the benchmarks to programs, there were also a number of limitations about the benchmarks themselves that were identified. Firstly, each benchmark is weighted equally which provides no indication of priority actions within the benchmarks. There is also

no prescribed minimum number of benchmarks that a program must integrate to have implemented CBSM successfully (Lynes et al., 2014; Wettstein & Suggs, 2016). This may be problematic because it further compounds the challenge of assessing the success of these programs, as well as fails to communicate to practitioners which CBSM principles are most impactful. An interesting avenue of future research may be investigating which of the suggested CBSM tools and principles are most important in bringing about program success, and subsequently endeavouring to weigh the benchmarks appropriately to give indication of priority areas.

Furthermore, the set of benchmarks that were developed by Lynes, Whitney and Murray (2014) did not always align perfectly with McKenzie-Mohr's CBSM principles (2011). For example, benchmark 1.1 dictates that a target audience should be clearly identified. However, the CBSM methodology is not explicit about how or why a target audience should be selected (McKenzie-Mohr, 2011), which made establishing criteria for this benchmark difficult and also begs the question of why it was included as a CBSM benchmark. It also calls into question the validity of the results of benchmark 1.1, whereby all five case studies received an assessment of "integrated". Similarly, benchmark 4.5 states to "focus on strategies that can be implemented on a broad scale" when piloting strategies. This does not align with the CBSM text and may communicate information that is in some ways contrary to CBSM principles around piloting. McKenzie-Mohr advocates for piloting multiple strategies which allows for revising and re-testing pilots until they are deemed effective (McKenzie-Mohr, 2011). McKenzie-Mohr does not state that in order for a pilot to be deemed effective it needs to be possible to implement on a broad scale (this may be an implied consideration in ultimately selecting a strategy for the program to implement, but McKenzie-Mohr is not from explicit about this). Including the benchmark stating to focus on strategies that can be implemented on a broad scale is problematic for two reasons: 1) it does not include McKenzie-Mohr's suggestion of piloting multiple strategies to revise and re-test strategies, and 2) it may communicate to practitioners that the most outcome of the pilot is determining that it can be implemented broadly. As we have learned from ineffective mass communication efforts aimed at changing behaviour, strategies that can be implemented broadly are not necessarily the most effective at changing behaviour (McKenzie-Mohr, 2011).

Finally, some of the language used within the benchmark could be clarified to be more specific and descriptive of best practices. For example, in step 5, the use of the word "activity" is vague and open to interpretation. Undertaking measurement "activity" may range anywhere from informal conversations to the installation and monitoring of meters that capture hourly water consumption rates. It also is not informative about what *kind* of activity is to be measured. The CBSM model encourages

measurement of specifically the target behaviours, and not simply program "activity", which can be interpreted widely.

In being one of the first to operationalize Lynes et al.'s benchmarks (2014), this research had the opportunity and the challenge of testing the benchmarks against multiple case studies. This was an effective way to test the robustness of the benchmarks and illuminated many opportunities for improvement. Despite needing some refining, this set of CBSM benchmarks is the foremost tool for assessing community programs using a CBSM lens and has the potential to be invaluable in ultimately quantifying the effectiveness of the CBSM methodology in eliciting positive behavioural outcomes. Many useful and enlightening insights were obtained from the application of this tool.

10.3.3. Tensions between Theory and Practice

In 2000, Doug McKenzie-Mohr introduced the CBSM model in an article published in the Journal of Social Issues entitled *Promoting Sustainable Behaviour: An Introduction to Community-Based Social Marketing*. McKenzie-Mohr begins the article with the following passage:

> "I have a simple wish. Each time I journey to the library to review new contributions to the environmental psychology literature, I hope that I will see an individual whom I know, from either a nongovernmental organization, or the Department of the Environment, or the city, who works on environmental programs. My wish is that I will find this individual reviewing the literature and contemplating how best to apply it to program delivery. I have carried this wish for a decade now and it is not yet to be realized… We have created psychological literature that is largely invisible to those who can most benefit from it" (McKenzie-Mohr, 2000, pp. 543–544).

We are now far more likely to journey to an online library than a physical one, but nearly twenty years after this testament, the gap between the literature and those who can most benefit from it remains (Lynes et al., 2014). McKenzie-Mohr's wish and subsequent introduction of CBSM shows that the theoretical model of CBSM was conceptualized and developed as a solution for environmental programs in communities (McKenzie-Mohr, 2000). This research project set out to explore how the CBSM theoretical model was being implemented into practice by these communities.

The case studies did not develop and implement their programs based exclusively on CBSM methodology, which resulted in some tensions between trying to adhere to the theory while also account for what and how it was done in practice. In some cases, such as the OBWB's Make Water Work campaign and Guelph's Blue Built Home program, programs began integrating CBSM into their strategy

after it had already been delivered to the community for a period of time. Even those that were developed using CBSM principles from the outset, such as Vancouver's Water Wise Garden Parties or Reep's Rain Smart Neighbourhood pilot project, sampled some but not all of the CBSM principles. Only two CBSM benchmarks were fully integrated by all five case studies, and these benchmarks (1.1 – identifies a target audience and 3.6 – uses communication tools using best practices) are arguably low-hanging fruit compared to the other CBSM benchmarks. Community programs attempting to foster sustainable behaviour through the use of communication is certainly not a new phenomenon (McKenzie-Mohr, 2000).

Of particular challenge in comparing theory and practice was the principle that "CBSM is pragmatic; each step builds on those that precede it" (McKenzie-Mohr, 2011, p. 44). Of course, in theory, this consecutive approach feels pragmatic, clean, and straightforward. Admittedly, this principle initiated an erroneous assumption made by the researcher in the initial stages of this research. Survey and interview questions were developed under the assumption that communities were implementing CBSM as prescribed; that each step was conducted in succession in a pragmatic and chronological order. In nearly every case study, this was not the case. For example; one survey question asked: *'Was a pilot conducted prior to broad-scale implementation?'.* This question, while aligned with CBSM methodology and the benchmarks, was unintentionally limiting because it implied that to have a successful pilot, it had to be conducted before the program was delivered broadly. Another example: several case studies had implemented successful pilots using CBSM principles, but due to various factors, the pilot was implemented during or in the initial stages of broad scale implementation. It became clear that programs learned, evaluated, and modified their strategies as they continued, but not necessarily in a linear fashion. It was difficult to accurately capture this information within the benchmark assessment tool, both from the perspective of the program's activities as well as in attempting to honour the CBSM methodology.

It should be noted that the tensions experienced in this research was at least partly due the author's decision to target programs that use CBSM principles but do not necessarily identify as "CBSM programs" per se (a distinction that was discussed in Chapter 3 of this paper). This was a deliberate choice that was made in an attempt to capture a realistic picture of how community programs are utilizing the CBSM methodology. However, this decision also had implications for attempting to apply the assessment tool neatly to each case study. This challenge is likely to occur in any qualitative research that investigates how CBSM translates from theory to practice; however, it was likely exacerbated by choosing not to focus exclusively on programs that self-identify as "CBSM programs". Future research

endeavours may choose to narrow their case study selection criteria to mediate this challenge and develop a greater understanding of self-described CBSM programs specifically, as opposed to how the CBSM model has been implemented by communities more generally.

In any case, all of the above begs the overall question: how much can (or should) the CBSM theoretical model be altered to suit the needs of the programs before it loses its theoretical value of changing behaviour? There were many reasons for why these programs did not rigidly adhere to the CBSM principles. For example, the CBSM model and its prescribed tools and strategies can be resource-intensive, logistically challenging, and difficult to administer at scale. Furthermore, many program managers became introduced to CBSM after a water efficiency program was already in place and began integrating the principles in post hoc. Quite simply, some programs chose to integrate some elements of CBSM that suited their needs while not others. The CBSM framework does not identify anything 'wrong' about altering or sampling from a theory, but it does call into question how effective that framework then becomes once implemented into the community. Additional questions emerge: when tensions between theory and practice arise, should the theory be changed to accommodate the barriers that programs experience when integrating theory? Or, do the programs need to better align their objectives and strategies with theoretical underpinnings? And, in either case, how is that accomplished? Challenges and limitations exist in both scenarios, ranging from maintaining the integrity of theory and program effectiveness (theoretical challenges) to obtaining adequate resources and managerial buy-in (practitioner challenges). Unfortunately, without knowing how effective these programs have been in changing behaviour and which benchmarks are most important to achieving program success, it is difficult to address these questions.

10.4. Future Directions & Conclusion

In concluding this paper, it is necessary to revisit the objectives that were established in the introductory chapter. The primary objective of this research was to explore how the CBSM theoretical framework has been implemented into practice at the community level with a specific focus on water efficiency. There were also three specified sub-objectives, which were: to develop a replicable benchmark assessment procedure for CBSM that allows for assessing multiple programs efficiently; to determine the degree to which each case study integrated the CBSM benchmarks; and finally, to make recommendations for better aligning practice with the intended framework. This research was largely successful in accomplishing each of its stated objectives. The primary objective was integrated through the five case studies, which allowed for a fulsome exploration of how each program integrated the

CBSM model and their experience with it. The CBSM benchmark assessment tool enabled the researcher to streamline assessment across multiple case studies, determine the degree that each case study integrated each benchmark, and identify areas for better alignment with the CBSM model.

However, in pursuing this study, a number of recommendations and considerations for future research were identified. These recommendations can be summarized as follows:

- **Scrutinize and Validate Benchmarks:** Developing a robust and replicable benchmark assessment procedure proved challenging due to a number of tensions, limitations, and challenges that arose during the assessment process. While Lynes et al.'s CBSM benchmarks (2014) and this paper's proposed CBSM benchmark assessment tool offer a systematic approach to evaluating a program's CBSM integration, there are a number of considerations (as outlined in chapter 10.3) that suggest future areas of refinements for CBSM benchmark criteria. For example, how much flexibility should be afforded to the programs before the integrity of the CBSM model is jeopardized? Are there benchmarks missing, and what should be done about areas where the benchmarks and the CBSM theory do not align? Are the criteria that have been established for each benchmark appropriate? While this research took Lynes et al.'s (2014) twenty-one benchmarks and expanded upon them, future research may endeavour to evaluate both the benchmarks and the criteria with a critical lens to determine their effectiveness in assessing CBSM programs. Once the benchmarks have been sufficiently scrutinized and refined, the benchmarks could be validated by both the academic community as well as the practitioner community, and perhaps could be offered as a standardized tool for practitioners seeking to integrate CBSM methodologies.
- **Increase the Sample Size:** While the case studies in this research are useful for a deep exploration of each program, there is still so much to be learned about how the CBSM theoretical framework is being implemented overall. These case studies are not generalizable, and thus no inferences can be made about the water-efficiency field or about pro-environmental programming more generally. Increasing the number of programs that are assessed is essential to understanding how the CBSM theoretical model has been integrated by practitioners on a wide scale. With over 70,000 program planners having been trained in a CBSM workshop to date (McKenzie-Mohr, 2019a), there is ample opportunity explore how these professionals have then harnessed their CBSM knowledge and implemented it into their communities. Further, this research focussed exclusively on water-efficiency programs,

however, CBSM can be employed in a wide range environmental disciplines and desired behaviours. While the case studies are useful in discerning a depth of knowledge about a few specific cases, there is need for increased breadth in knowledge about how the model applies in a variety of contexts, environments, and disciplines.

- **Quantify Effectiveness**: Related to both of the above points is the notion that there is a need to be able to quantify the effectiveness of the CBSM model. Since the CBSM model can be applied to a variety of diverse contexts and programs, discussions of relative 'success' are currently limited to a case-by-case basis. This research utilized qualitative data collection to accurately capture these successes, however, qualitative data is limited in that it offers no indications of statistical significance. Quantitative analysis that yields statistical information about the effectiveness of CBSM programs in fostering sustainable behaviour is necessary to make truly reliable and robust claims about the success of CBSM. However, without a common metric of success to tie each CBSM program together, the true effectiveness of the CBSM model in eliciting behaviour change remains unknown. This challenge is compounded by the fact that measuring changes in behaviour reliably is notoriously challenging and also varies from case to case, making quantifying effectiveness an elusive – yet necessary – future objective.

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Appendices

A. Copy of Survey Questions

Consent to Participate: CBSM Intervention Benchmark Integration

You are invited to participate in a research study conducted by Sarah Fries, under the supervision of Dr. Jennifer Lynes of the University of Waterloo, Canada. The objective of the research study is to determine the degree to which interventions related to water sustainability have integrated each of the community-based social marketing (CBSM) benchmark criteria.

If you decide to volunteer, you will be asked to complete a 10-minute online survey, a 1-hour interview, and a 30-minute follow-up interview related to your survey responses. The interviews can be completed over the phone or via Skype. In total, the time commitment for participation in this research is a maximum of 2 hours. Participation in this study is voluntary. There is a risk in this study that, due to the small sample size of participants, a motivated individual could ascertain your identity. You may decline to answer any questions that you do not wish to answer, and you can withdraw your participation at any time by not submitting your responses in the survey or letting the researcher know during the interview. You will receive a $25 remuneration in cash or as a gift card to a retailer of your choice as a thank you for your participation. This gift card will be mailed following the follow-up interview; participants are still eligible for remuneration if they decide to exit the study before completion. The amount received is taxable. It is your responsibility to report this amount for income tax purposes.

The information collected through these interviews and surveys will be used to evaluate several CBSM case studies against the CBSM benchmark criteria.It is important for you to know that your identity will be kept confidential. All of the data will be summarized and no individual could be identified from these summarized results.

You will be completing an online survey, operated by Qualtrics. You have received a unique survey link in order to collect your information without direct identifiers. When information is transmitted or stored on the internet privacy cannot be guaranteed. There is always a risk your responses may be intercepted by a third party (e.g., government agencies, hackers). Qualtrics temporarily collects your contributor ID and computer IP address to avoid duplicate responses in the dataset but will not collect information that could identify you personally. If you prefer not to submit your survey responses through this host, please contact the researcher (slfries@uwaterloo.ca) so you can participate using an alternative method such as through an e-mail or paper-based questionnaire. The alternate method may decrease anonymity but confidentiality will be maintained.

If Skype is the chosen method for your interview, it is important for you to know that when information is transmitted over the internet privacy cannot be guaranteed. There is always a risk your responses may be intercepted by a third party (e.g., government agencies, hackers). University of Waterloo researchers will not collect or use internet protocol (IP) addresses or other information which could link your participation to your computer or electronic device without first informing you.

The data, with no personal identifiers, collected from this study will be maintained on a password-protected computer database in a restricted access area of the university. As well, the data will be

electronically archived after completion of the study and maintained for a minimum of two years and then erased.

This study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#40840). If you have questions for the Committee contact the Office of Research Ethics, at 1-519-888-4567 ext. 36005 or ore-ceo@uwaterloo.ca.

For all other questions about the study, please contact either Sarah Fries (slfries@uwaterloo.ca) or Jennifer Lynes **(**jklynes@uwaterloo.ca**)**. Further, if you would like to receive a copy of the results of this study, please contact either investigator.

Thank you for considering participation in this study.

By agreeing to participate in the study you are not waiving your legal rights or releasing the investigator(s) or involved institution(s) from their legal and professional responsibilities.

With full knowledge of all foregoing, I agree, of my own free will, to participate in this study.

- I agree to participate
- I do not wish to participate (please close your web browser now)

Q3 Please provide the title (or a short description) of the intervention you were involved in.

(e.g. City of Waterloo water conservation strategy)

_____

Q4 Please provide your role in the above intervention.

_____

Q5 Please state which city the above intervention took place in.

_____

Q6 To the best of your ability, please provide the approximate dates that the intervention was active. If the intervention is ongoing, please only provide the approximate start date.

(e.g. May 2014 to October 2016)

_____

Q7 How familiar do you consider yourself with Doug McKenzie-Mohr's five-step CBSM model?

- Extremely familiar (1)
- Very familiar (2)
- Moderately familiar (3)
- Slightly familiar (4)
- Not familiar at all (5)

End of Block: Introduction

Start of Block: Selecting Behaviours

Q8 Who was the target audience of your intervention? If more than one target audience, list all that apply.

_____

_____

_____

_____

_____

Q9 What was the behaviour that your intervention targeted? If more than one behaviour was targeted, please list all that apply.

_____

_____

_____

_____

_____

Q10 Was the target behaviour assessed for its estimated **impact**? If more than one target behaviour, consider whether each behaviour was assessed for impact.

(i.e. determining the impact that the particular behaviour has on achieving the desired environmental outcome)

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q11 Was the target behaviour assessed for its **probability of being adopted**? If more than one target behaviour, consider whether each behaviour was assessed for its probability.

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q12 Was the target behaviour assessed for its **current level of penetration** (i.e. determining the number of people currently doing the target behaviour)? If more than one target behaviour, consider whether each behaviour was assessed for its penetration.

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q13 If you have any additional thoughts or feedback to share regarding this section, please write them here. Otherwise, you may skip this question.

_____

End of Block: Selecting Behaviours

Start of Block: Identifying Barriers and Benefits

Q14 Was research conducted into investigating barriers and benefits of the **target behaviour(s)**?

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Skip To: Q17 If Was research conducted into investigating barriers and benefits of the target behaviour(s)? = No

---

Q15 Was barrier/benefit research for the target behaviour conducted for **each segment of the audience**?

- Yes (1)
- Partially (2)
- No (3)
- Unsure (4)

Q16 Were barriers and benefits classified as either internal (e.g. lack of knowledge) or external (e.g. lack of infrastructure) to the individual performing the behaviour?

- Yes (1)
- Partially (2)
- No (3)
- Unsure (4)

Q17 Was barrier/benefit research conducted for the **competing behaviours** (i.e. the behaviours that your intervention was attempting to discourage)?

- Yes (1)
- Partially (2)
- No (3)
- Unsure (4)

Q18 If you have any additional thoughts or feedback to share regarding this section, please write them here. Otherwise, you may skip this question.

_____

End of Block: Identifying Barriers and Benefits

Start of Block: Developing a Strategy

Q19 In a couple of brief sentences (short form is also acceptable), **please describe the intervention strategy** that was implemented. For example, this may include events, communication strategies, community competitions, advertising campaigns, signage, street teams, or any other form of intervention. It may also include multiple components.

_____

_____

_____

_____

_____

Q20 Which of the following categories of behaviour-change tools were present within the intervention? Select all that may apply.

- [ ] Communication (e.g. education, persuasion, attention-grabbing messaging) (1)
- [ ] Prompts (i.e. reminders for target behaviour) (2)
- [ ] Obtaining commitments from target audience (3)
- [ ] Establishing social diffusion (i.e. showing that others are engaging in the target behaviour) (4)
- [ ] Establishing social norms (i.e. showing that behaviours are common and accepted within a group) (5)
- [ ] Establishing incentives or disincentives (6)
- [ ] Providing feedback to audience about target behaviour (7)
- [ ] Increasing the level of convenience of the target behaviour (8)
- [ ] Using a well-known and well-respected individual to help convey the message (9)

Q21 If you have any additional thoughts or feedback to share regarding this section, please write them here. Otherwise, you may skip this question.

_____

End of Block: Developing a Strategy

Start of Block: Conducting a pilot

Q22 Was a pilot of the intervention strategy conducted before a full-scale implementation?

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Skip To: End of Block If Was a pilot of the intervention strategy conducted before a full-scale implementation? = No

Q23 In the pilot study, were baseline measurements collected?

(i.e. measurements of the pilot audience before the intervention took place)

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q24 In the pilot study, was a control group used?

(i.e. a separate group of the pilot audience that does not receive the intervention, but is measured)

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q25 In the pilot study, were participants randomly selected and assigned to intervention and control groups?

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q26 In the pilot study, which measurement tools were used to measure the target behaviour? Select all that may apply.

- ☐ Participant self-report (1)
- ☐ Observations (2)
- ☐ Meters (e.g. water meters, electricity meters, etc.) (3)
- ☐ Other (4) _____
- ☐ Unsure (5)

Q27 If you have any additional thoughts or feedback to share regarding this section, please write them here. Otherwise, you may skip this question.

_____

End of Block: Conducting a pilot

Start of Block: Evaluation

Q28 Was baseline data collected before the full-scale intervention was implemented?

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q29 Did measurement of the intervention continue after the full-scale implementation?

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q30 Based on any post-intervention data collected, have changes been made to the intervention strategy?

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q31 Based on any post-intervention data collected, have any feedback been provided to the target audience?

- ○ Yes (1)
- ○ Partially (2)
- ○ No (3)
- ○ Unsure (4)

Q32 In a couple of brief sentences (short form is also acceptable), please describe what you believe to be the **main outcome of the intervention**. These may be areas that you perceive as successes, failures, changes made, responses from the community, etc.

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_____

Q33 If you have any additional thoughts or feedback to share regarding this section, please write them here. Otherwise, you may skip this question.

_____

End of Block: Evaluation

Start of Block: Block 7

Q34 If you have any additional thoughts or feedback to share regarding the project as a whole, please write them here. Otherwise, you may skip this question.

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B. Sample of Semi-Structured Interview Questions

Interviewer: This is a study conducted by myself and Dr. Jennifer Lynes, who is an associate professor in the School of Environment, Enterprise and Development at the University of Waterloo. We are studying the degree to which benchmark criteria are integrated into community-based social marketing interventions related to water sustainability. Excerpts from the interview may be included in my thesis, publications and/or presentations from this research, but the quotations will be anonymous. You may withdraw your consent at any time by letting me know. The study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee. If you have any questions for the committee, please let me know and I will provide you their contact information. If you have questions about the study itself, please let me know. For your information, I am audio recording right now and I would like to audio record the interview itself to ensure an accurate recording of your responses. However, if you feel uncomfortable, that's not a problem; I will simply turn off the device and record your responses on my laptop. Finally, I would like to remind you that you are free to skip any questions that you do not want to answer. Having said all of that, could you please let me know if you agree to participate in the study?

Wait for participant response.

Interviewer: Thank you. Do you agree to having your responses audio recorded?

Wait for participant response.

Interviewer: Thank you. Do you agree to the use of anonymous quotations?

Wait for participant response.

Interviewer: Thank you. We will now begin with interview portion of this discussion. This is a semi-structured interview discussing your responses from the survey you completed earlier. In your survey response, you indicated that you perceived that target audience identification was poorly integrated into the development of this CBSM intervention. Could you please discuss this target audience identification process a bit more, and why you feel it was not well integrated?

The remaining questions will follow the same semi-structured format. The objective is to discern greater detail about the process of developing the intervention, as well was why the participant perceived the degree of integration as they indicated on the survey. The following is a list of key themes for information required to assess the degree of integration of the CBSM benchmark criteria, as well as some potential prompts to discern more specific information from the participants:

The development of the intervention:

- What were the main processes that occurred throughout the development of the intervention?
- Which steps in CBSM were partially or fully included in the process? Which steps were missed?
- Was research conducted to identify and understand barriers and benefits?
- What strategies were used?
- What communication tools were used?

Information about the audience and behaviour(s) selected:

- Who was the target audience?
- How was the target audience determined?
- What behaviours were selected? How many?
- Was this target audience appropriate for the behaviour selected?
- Were the behaviours selected evaluated for impact, penetration, and probability?
- Were the strategies/communication tools appropriate for the target audience?

Type of evaluation tools used to track outcomes:

- Was a rigorous pilot conducted? (i.e. did it have a control group, random selection, unobtrusive pre- and post-intervention measurements?)
- Were pre- and post-intervention measurements collected before and after full scale implementation?
- Was feedback given to the community?

The role of partners and stakeholders

- In which areas did partners and stakeholders influence the process of development?
- What was their influence?

Evidence of campaign outcome and success

- How were each of the chosen CBSM elements eventually integrated into the delivery of the program?
- How did the target audience receive and respond to the intervention?
- Was there evidence of changing behaviours?

C. Invitation to Participate

[Date]

Dear [name],

I am contacting you because of your involvement with [program name]. My supervisor, Dr. Jennifer Lynes, and I are conducting research to determine the degree to which programs who have used community-based social marketing (CBSM) have integrated a series of CBSM benchmark criteria. It is largely unknown how well the CBSM model translates from paper to practice, and thus it is important to understand how the model is being implemented in the field.

Participation in this study involves completing a short, approximately 15-minute online survey regarding your program, as well as two follow-up Skype or telephone interviews. In total, the time commitment for participation in this research is a maximum of 2 hours (15-minute online survey, 1-hour interview, 30-minute follow-up). As a thank you for participating and volunteering your time, you will receive $25 in cash or as a gift card to a retailer of your choice.

The online survey will pertain to the water conservation program mentioned above and will determine a baseline of your interpretation of the degree that various CBSM benchmarks were integrated into the program. We will then discuss your survey responses in a 1-hour interview in order to discern any further information about the intervention. The interview will be either on Skype or over the phone and will be recorded for later analysis. After the researcher has reviewed the survey, interview, and secondary data, an assessment of the degree of integration of the benchmark items will be conducted. Once this is complete, a report will be drawn up and the final 30-minute follow-up interview will be conducted to ensure agreement between the researcher, data, and practitioner participant.

All information you provide will be considered confidential and grouped with responses from other participants. No faculty members will be present during the session and your name will not be identified with the input you give to this session. The information collected through these interviews will be used to evaluate several CBSM case studies against the CBSM benchmark criteria. I would like to assure you that the study has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE#40840).

The final decision about participation is yours. If you are interested in participating, please respond to this email or contact me at slfries@uwaterloo.ca. I will then send you the link to survey, to be completed on your own time, as well as schedule an interview with you for a date following your completion of the survey. If you have to cancel your participation, please email me at slfries@uwaterloo.ca.

Thank you for your consideration, and I look forward to hearing from you.

Sincerely,

Sarah Fries

Candidate for MES Sustainability Management

School of Environment, Enterprise and Development

University of Waterloo

D. Example of Program Report (WWGP example)

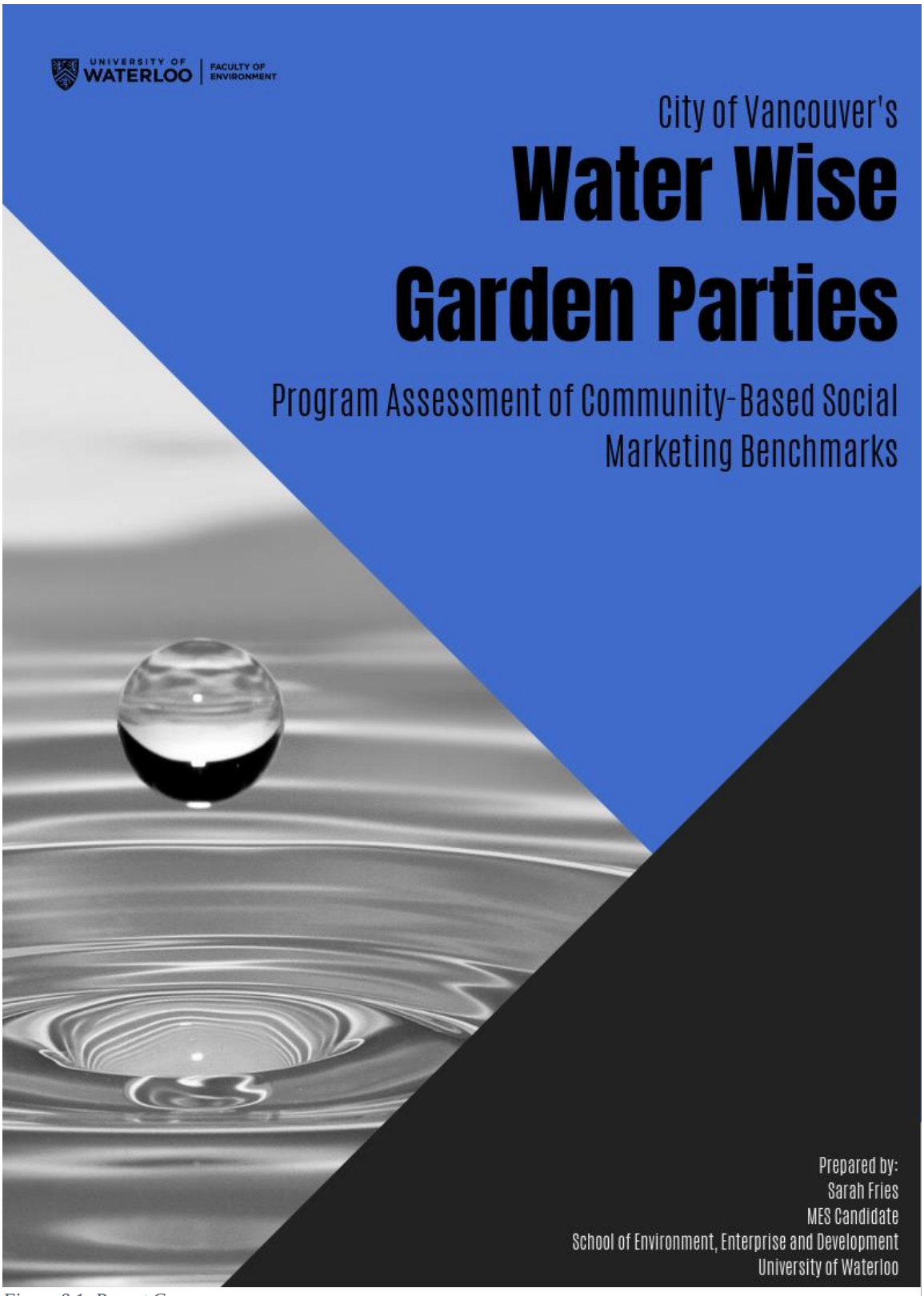

Figure 0.1- Report Cover