

DRINKING WATER SOURCE WATER PROTECTION PLAN IMPLEMENTATION:

BARRIERS AND SUPPORTS FOR FIRST NATIONS

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By

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ABSTRACT

Access to safe drinking water in First Nations communities is an ongoing problem in Canada with approximately one in five First Nations communities under a drinking water advisory at any one time. The incidence of waterborne illness, resulting from contaminated drinking water, affecting First Nations is more than double that in non-First Nations communities in Canada. Poor source water quality originating from natural conditions is one explanation for this situation; however, other factors also play a role including lack of effective water treatment, lack of water distribution systems, and land use activities and practices that negatively affect source water quality.

Sophisticated water treatment and monitoring of treated drinking water is one method to ensure drinking water is safe for human consumption. In contrast, Drinking Water Source Water Protection (DWSWP) takes a preventative approach to the protection of groundwater and surface water used as sources for drinking water. The DWSWP planning process begins with the identification of risks to drinking water sources and ends with plan implementation. In the context of this research, risks are defined as anything that might cause chemical or biological contamination to drinking water sources. The problem is that there has been little research into ensuring that the plans are implemented. This research identified and described 1) the chemical and biological risks to the groundwater source of drinking water in the Muskowekwan First Nation; 2) barriers to First Nations DWSWP plan implementation; and 3) factors supporting First Nations DWSWP plan implementation.

Research methods included a literature review to identify institutional arrangements to support DWSWP plan implementation in First Nations. Next, case study research to undertake a DWSWP planning process with Muskowekwan First Nation was undertaken. The case study to identify the chemical and biological risks to the groundwater source of drinking water, develop an implementation strategy for the DWSWP plan and reveal barriers to and opportunities for plan implementation. Semi-structured interviews with key informants were conducted to document existing programs that might support the implementation of DWSWP plans and any known barriers to and supports for DWSWP plan implementation. Interviews also provided data regarding known barriers to the efficient application of these programs for the purposes of DWSWP plan implementation. Document Review, using a set of parameters, was undertaken to analyze the documents associated with the noted programs to identify program accessibility,

funding availability, and educational programs and planning tools that might support DWSWP plan implementation.

Results indicate that, while programs exist to support First Nations DWSWP plan implementation, dedicated funding is required. Educational opportunities and increased awareness of the importance of DWSWP for those responsible for the provision of safe drinking water in First Nations and better communication among stakeholders, including First Nations administration, Provincial and Federal Government agencies, and non-government watershed organizations, is required to support the implementation of these plans. In addition, the continued prioritization of funding directed toward sophisticated water treatment over activities aimed at protecting raw water sources from becoming contaminated is a barrier to First Nations DWSWP plan implementation.

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DEDICATION

This thesis is dedicated to my late father, Howard Grant, who taught me the value of hard work and perseverance.

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LIST OF ABBREVIATIONS

AANDC	Aboriginal Affairs and Northern Development Canada	1
<i>Act</i>	Safe Drinking Water for First Nations Act	38
BCR	Band Council Resolution	47
BSF	Band Support Funding	25
CCME	Canadian Council of Ministers of the Environment	37
CDWQ	Canadian Drinking Water Quality	10
<i>CRTP</i>	<i>Circuit Rider Training Program</i>	104
DWSP	Drinking Water Source Protection.....	16
<i>EDF</i>	<i>Environmental Damages Fund</i>	102
<i>FNLMA</i>	First Nations Land Management Act.....	38
FNWWAP	First Nation Water and Wastewater Action Plan.....	38
<i>FRWIP</i>	<i>Farm and Ranch Water Infrastructure Program</i>	102
Guide and Template	First Nations On-Reserve Source Water Protection Plan Guide and Template	38
<i>IPRM</i>	<i>Indigenous Peoples Resource Management</i>	104
<i>LEDSP</i>	<i>Lands and Economic Development Services Program</i>	97
MBA	multi-barrier approach	14
<i>NALMA</i>	<i>National Aboriginal Land Managers Association</i>	104
<i>NBCF</i>	<i>New Building Canada Fund</i>	103
NWT	Northwest Territories	29
<i>PLMCP</i>	<i>Professional Lands Management Certification Program</i>	104
<i>PTIC-SCF</i>	<i>Provincial-Territorial Infrastructure Component, Small Communities Fund</i>	103
Regime	First Nations Land Management Regime	39
SDWA	Safe Drinking Water Act	17
SWAP	Source Water Assessment and Protection.....	29
SWP	Source water protection	ii
USEPA	United States Environmental Protection Agency	17
WSA	Saskatchewan Water Security Agency	40

1 INTRODUCTION

1.1 Research context

As described by Aboriginal Affairs and Northern Development Canada (AANDC, 2015) First Nations people are descendants of the original inhabitants of Canada who lived here for thousands of years before explorers arrived from Europe. In 1876 Canadian federal legislation that governed First Nations and made them wards of the Crown, known as the Indian Act, was first passed (Basdeo & Bharadwaj, 2013). Section 91(24) of the Canadian Constitution Act of 1867 sets out certain federal government obligations and the Indian Act regulates the management of Indian Reserve lands, Indian moneys and other resources (AANDC, 2015). For reasons set out in the Indian Act, the federal government has retained jurisdictional responsibility for matters related to health and safety, such as the provision of safe drinking water in First Nations communities (AANDC, 2015; Davies & Mazumder, 2003; Boyd, 2011).

As a result of the treaty process, tracts of land were set apart from the rest of Canada for the use and benefit of Indian bands, the legal title to which is held by the Crown. These tracts of land have historically been referred to as Indian Reserves and more recently as First Nations communities (AANDC, 2015). As of October 14, 2015 AANDC recognized 618 First Nations and approximately 3080 Reserves in Canada. Not all of these Reserves are First Nations residential communities; rather, some consist of lands set aside for First Nations but are not used for residential purposes (AANDC).

Due to colonial practices, which led to the development of the Indian Act, the majority of First Nations communities are isolated from the rest of Canadian communities (Patrick, 2013). Patrick (2013) suggests that this isolation has led to limited access to safe drinking water in First Nations communities. While most people in developed countries take access to safe drinking water for granted, this is not the case in many First Nations communities in Canada (White et al., 2012). Rather, in Canada, access to safe drinking water depends on where you live and who you are, if you are a First Nations person living in a First Nations community the likelihood of having access to safe drinking water is greatly compromised (Hrudey, 2008; Patrick, 2011). For example, Spence and Walters (2012) reported that boil water advisories in First Nation communities were 2.5 times more frequent than for non-First Nation communities. Drinking water advisories, such as boil

water advisories are preventive measures put in place to protect public health from drinking water that might be contaminated and thus cause waterborne illnesses. Drinking water advisories and other unsafe drinking water conditions in Canada are reported by Health Canada, the federal government department responsible for ensuring that the water Canadians drink is safe.

Boyd (2011) and Patrick (2013) suggest that the settlement of First Nations peoples onto Indian Reserves set the stage for the current problems related to First Nations' access to safe drinking water. Recent literature indicates that community isolation, limited funding, and a lack of land management practices that protect raw water sources might lead to inadequate access to safe drinking water in First Nations (Walters, 2012; Patrick, 2011 and 2013; Lebel and Reed, 2010). Land management is the process of managing the use and development of land resources, including water resources, with the goal of ensuring that these resources are used in such a way as to meet human needs while preventing contamination to land and water resources. Land use planning is the tool used to carry out land management. Therefore, land use planning is the act of making short- and long-term plans that define where certain activities can take place and determine the effect of human impacts on land resources.

Source water protection (SWP) is one of these land management practices, broadly defined as “a coordinated approach to develop short- and long-term plans to prevent, minimize, or control potential sources of pollution or enhance water quality where necessary” (Patrick et al., 2013). Simms et al (2010) narrow the definition to explain that SWP is a land-use planning tool which seeks to identify and assess risks to drinking water sources and develop strategies to mitigate those risks. This research uses this definition to differentiate between SWP as drinking water source water protection (DWSWP), the protection of water sources intended for human consumption, and SWP intended for all other uses of water. Therefore, in the context of this research, DWSWP is an important step in any land management plan to ensure access to safe drinking water for humans.

In Canada SWP is most often applied at the watershed scale, considers multiple water uses, including but not limited to drinking water, and is provincially led. Due to the mismatch between watershed and political/jurisdictional boundaries, operational and implementation issues arise between provincial, federal and First Nations governments (Cohen & Davidson, 2011; Minnes, 2015). For example, the boundaries of Muskowekwan First Nation are embedded within the Lower Qu'Appelle River west watershed, which is within the boundary of the province of Saskatchewan. Therefore, because First Nations boundaries do not align with the boundaries of

watersheds and because First Nations fall under federal jurisdiction, any recommendations resulting from the Provinces' watershed scale SWP plans cannot be enforced on First Nations lands. In turn, First Nations SWP plans use the borders of the First Nation, rather than the watershed boundary, to define the boundaries of the plan; thus, potential sources of pollution originating outside these borders are not considered or mitigated for (Patrick, 2013).

Patrick (2013) suggests that the isolation of First Nations communities from neighbouring non-First Nations communities, leads to limited access to, and increased costs associated with the provision of, safe drinking water and that SWP might be a useful tool to remedy this access problem. He argues that SWP has been shown to lower the costs associated with providing safe drinking water because it is easier and cheaper than remediating contaminated water (Patrick, 2009, Timmer et al., 2007). Furthermore, recent literature suggests that the costs related to the provision of safe drinking water in First Nations communities affects access to safe drinking water in many First Nations communities (Patrick, 2013, Timmer et al., 2007). Therefore, SWP might be a helpful tool to address the problem, lack of access to safe drinking water in First Nations communities by preventing contamination of drinking water sources from occurring and thus reducing the costs of water treatment.

Recent literature indicates that historically SWP has been conspicuously absent in First Nations communities in Canada (Walters 2012; Lebel & Reed 2010; Patrick 2013). In order to support First Nations in the provision of access to safe drinking water, AANDC has established water and wastewater protocols that require all First Nations communities in Canada to develop SWP plans. The First Nations On-Reserve Source Water Protection Guide and Template (Guide and Template) was developed by AANDC in collaboration with Dr. Robert Patrick in order to provide a step-by-step guide for First Nations to develop their on-Reserve SWP plan (AANDC, 2013). The Guide and Template was used during this research to guide the development of a DWSWP plan with Muskowekwan First Nation located in Treaty Four in southeastern Saskatchewan.

While this research identified some recent evidence of First Nation SWP planning in Canada, implementation of these early plans is the next challenge. For example, recent pilot projects in Alberta, Saskatchewan, Nova Scotia and Ontario indicate success in First Nations SWP plan development through community-based planning projects. However, there is little evidence in the literature of the successful implementation of these plans.

Whereas the development of any land use plan is an important first step, plan implementation is crucial to ensuring that the land use problem in question, in this case access to safe drinking water for First Nations, is resolved. The implementation of planning documents requires a strategy to carry out the key actions identified during plan development. This includes the identification of partnerships, funding sources and educational programs to support plan implementation. This thesis was devoted to studying DWSWP plan implementation in the Muskowekwan First Nation community with the purpose of identifying factors affecting the challenge of implementing First Nations DWSWP plans.

1.2 Purpose and Objectives

The purpose of this research was to improve First Nations DWSWP plan implementation with the goal to improve access to safe drinking water in First Nations communities in Canada.

Objective 1:

To identify and describe the chemical and biological risks (threats) to the groundwater source of drinking water in the Muskowekwan First Nation community during the period between November 2013 and June 2014.

Objective 2:

To identify and describe barriers to First Nations DWSWP plan implementation in the Muskowekwan First Nation.

Objective 3:

To identify and describe factors supporting First Nations DWSWP plan implementation in the Muskowekwan First Nation.

2 LITERATURE REVIEW

This literature review provides background information regarding the lack of access to safe drinking water in First Nations communities in Canada. It begins with a review of the literature outlining the extent of the problem related to drinking water quality and lack of access to safe drinking water in First Nations communities. This is accompanied by a review of the root causes of this problem, the reasons for their continuation and the ways drinking water SWP might help remedy the situation.

The second section focuses on the governance and management of water in Canada with respect to the provision of safe drinking water. This is followed by a review of the literature discussing how First Nations water governance and management differs from non-First Nations communities' and how this affects access to safe drinking water in First Nations communities.

In the third section, SWP is introduced and its function and role with regard to the provision of safe drinking water is discussed, including an outline of common SWP strategies. This section concludes with a discussion of the various responsibilities for SWP in Canada in general and First Nations communities specifically. This leads into the fourth section, which outlines DWSWP and how it differs from SWP. A discussion of the differences between DWSWP planning in First Nations versus non-First Nations communities is presented, followed by an outline of the process used for the development of DWSWP plans.

The fifth section defines plan implementation and outlines how plans get implemented, why plan implementation is important to solving planning problems and what communities require to successfully implement plans. Finally, the literature discussing institutional arrangements intended to support DWSWP planning with the goal of providing safe drinking water in First Nations communities in Canada in general and Saskatchewan in particular is reviewed.

2.1 Water Quality and Access to Safe Drinking Water in First Nations Communities in Canada

While the conditions that led to the tragedies in Walkerton, Ontario (2000) and North Battleford, Saskatchewan (2001) are relatively rare in most areas of Canada, they are all too common in First Nations communities (White et al., 2012; Patrick, 2013). For this reason, Plummer et al. (2013) draw a correlation between First Nations communities and countries in the

developing world with respect to lack of access to safe drinking water. Patrick (2013) suggests that the colonial practices that led to the isolation of many First Nations communities in areas with limited access to safe drinking water are important factors setting the background for the conditions that exist today. Recent literature indicates that these conditions include serious water quality problems leading to drinking water advisories that have persisted over long periods of time in many First Nations communities (Spence & Walters, 2012; Patrick, 2013; Simeone, 2010). Furthermore, First Nations communities have been reported to be at a higher risk of developing water quality problems than non-First Nations communities (Spence & Walters, 2012; Patrick, 2013).

Recent literature provides evidence that substandard conditions have continued for several years, decades in some cases (Lebel & Reed, 2010; White et al., 2012; Walters, 2012; Simeone, 2010; Spence & Walters, 2012; Polaris Institute, 2008). For example, Patrick (2013) reports that the Neskantanga First Nations in northern Ontario have been under a boil water advisory since 1995. Furthermore, Boyd (2011) reported that as of 2010 the majority of the people residing in the Reserve communities of Pikangikum, Ontario; Kitcisakik, Quebec; St. Theresa Point, Wasagamack, Red Sucker Lake, and Garden Hill in Manitoba; and Little Buffalo, Alberta lack access to safe drinking water as well as to running water and indoor toilets.

Further evidence of persistent water quality problems in First Nations includes the Polaris Institute (2008) report which reported that approximately 100 First Nations communities were under boil water advisories as of April 18, 2008. Additionally, Simeone (2010) stated that as of April 30, 2010 116 First Nations communities were under drinking water advisories. The conditions that led to unsafe drinking water for on-Reserve populations have persisted and boil water advisories are 2.5 times more frequent than for non-First Nations communities (Norman et al., 2011; Spence & Walters, 2012). Patrick (2013) reiterated and reported that 30 percent of water systems in First Nations communities were considered “high risk” and that water-borne infections were 26 times higher than the national average.

Evidence that these conditions have continued include Spence and Walters (2012) who report that as of June 30, 2012 146 First Nations communities were under a drinking water advisory. More recently, Health Canada’s website indicates that the conditions have not improved significantly; as of September 30, 2015 94 First Nations communities were under a drinking water advisory. And the Polaris Institute report, *Boiling Point* (2012) states that “this situation is the

culmination of years of neglect and the absence of effective programs for the provision of safe drinking water for First Nations” (Polaris Institute, 2012).

Therefore, recent literature illustrates that the risks to drinking water quality in First Nations communities are much higher than in non-First Nations communities (White et al., 2012; Patrick, 2011 and 2013; Saskatchewan Roll-Up Report, 2011; Plummer et al., 2013; Walters, 2012; Lebel & Reed, 2010). In recent literature this inequity has been linked to several factors such as community isolation, limited funding, inadequate legislation and a lack of land management practices that protect drinking water sources (Walters, 2012; Patrick, 2011 and 2013; Lebel & Reed, 2010). Davies and Mazumder (2003) point to the division of responsibilities between the federal and provincial governments for protecting drinking water as a substantial problem. While the federal government has jurisdiction over First Nations Reserves, the provinces are responsible for water-related legislation (Davies & Mazumder, 2003). Restated, this places the provision of safe drinking water in First Nations communities under the jurisdiction of the federal government within provincial jurisdictions. White et al. (2012) indicate that this situation contributes to the lack of legislation and regulation applicable to on-Reserve water management.

Finally, the Saskatchewan Roll-Up Report (2011) states that “the absence of [drinking water] SWP planning is a significant driver of on-Reserve [drinking] water quality problems.” Patrick (2013) agrees, suggesting that SWP planning might be a successful tool to reduce drinking water quality problems in First Nations communities in part by reducing the costs associated with the provision of safe drinking water.

Furthermore, Patrick (2013) and Plummer et al. (2013) suggest that First Nations communities are affected to a greater degree than non-First Nations communities when water sources are contaminated because of the interconnectedness of water and First Nations’ lives, as they live closely with the land. Several authors propose that this interconnectedness with the land and water suggests that First Nations communities are well-suited to holistic water protection strategies such as SWP (Walkem, 2006; Plummer et al., 2013; Patrick, 2013). The First Nations perspective envisions SWP as more than drinking water protection; rather it is more reflective of environmental protection, encompassing all things in nature for human sustenance, meshing with the Western concept of sustainable development (Chiefs of Ontario, 2007; Patrick, 2013).

In summary, recent literature points to serious water quality problems in First Nations communities leading to widespread lack of access to safe drinking water for First Nations that has

persisted for decades. The lack of access to safe drinking water is significantly higher in First Nations communities than in non-First Nations. Recent literature argues that this inequity is due to colonial practices that led to the isolation of First Nations communities, jurisdictional issues related to water management in Canada, and a lack of land management practices, including SWP. Finally, SWP has been identified in the literature as a culturally relevant tool to improve access to safe drinking water in First Nations communities.

2.2 Water Governance and Management in Canada

Water governance is the decision-making process by which water is managed; this includes political, organizational and administrative processes through which decisions are made and implemented (Norman, et al., 2011; de Loë & Murray, 2012). It also articulates how decision makers are held accountable for the development and governance of water resources and the delivery of water services (Norman, et al., 2011; Bakker, 2002).

Water governance in Canada is decentralized. It is spread among four orders of government: federal, provincial, municipal and First Nations (Bakker & Cook, 2011; Norman, et al., 2011; de Loë & Kreutzwiser, 2007). The decentralization of jurisdiction over water governance is the result of the constitutional division of powers between scales of government arising from the Constitutional Act of 1867 (Dunn, et al. 2014; Bakker & Cook, 2011; Saunders & Wenig, 2007). The *Natural Resources Transfer Act* of 1931 further devolved the federal government's responsibility to manage water to the provinces; however, its validity is questionable as it appears to contravene the treaties between the Crown and First Nations (Basdeo & Bharadwaj, 2013). Decentralization has resulted in the most direct responsibility for drinking water being given to the provinces, which then delegate municipal governments' responsibilities (de Loë & Kreutzwiser, 2007).

In Canada the Federal Water Policy (1987), a statement of the federal government's philosophy and goals for the nation's freshwater resources and of the proposed ways of achieving them, deals with safe drinking water policies and guidelines (McMillan, 1987). Direct control of many aspects of water management was delegated to the provinces under the Constitution Act of 1867, resulting in the provision of drinking water to Canadians falling within the provincial government's responsibility. The exception is First Nations communities because the federal government retained direct responsibility for drinking water standards while First Nations are

responsible for supply and monitoring (McMillan, 1987; Davies & Mazumder, 2003; Boyd, 2011; Bakker & Cook, 2011; Walter, 2012; Dunn, et al., 2014).

Due to decentralization, each order of government has authority over different, and sometimes overlapping, areas of water governance (Dunn, et al., 2014). This has led to vertical (jurisdictional, territorial and scalar) fragmentation creating a series of governance gaps (Saunders & Wenig, 2007). These governance gaps include a lack of inter-governmental coordination, duplication of efforts, poor data collection and sharing, and inadequate monitoring and enforcement in water management (Boyd, 2003; Bakker & Cook, 2011; Dunn et al., 2014). Bakker (2007) suggests that, while regional differences make the distribution of authority over water to local levels sensible in Canada, some water matters, such as those that deal with human and environmental health, are best dealt with federally.

Horizontal fragmentation also occurs across and among each level of government. For example, over twenty federal departments play some role in water governance and variation in water standards exists across the provinces and territories (McMillan, 1987; Bakker, 2007; Hill et al., 2008; Bakker & Cook, 2011; Dunn, et al., 2014). Water management at the provincial and municipal level is further complicated by the existence of water bodies that span more than one political jurisdiction (Saunders & Wenig, 2007). Fragmentation occurs in Canada's decentralized approach to drinking water management because of the lack of robust coordinating institutions that harmonize drinking water governance (Bakker & Cook, 2011).

Therefore, drinking water governance in Canada is characterized by a high degree of fragmentation in a decentralized state, which has led to tension between harmonization (standardized laws, rules and norms) and subsidiarity (delegation of authority to the lowest-appropriate scale) (Bakker & Cook, 2011; Dunn, et al., 2014). The result is a lack of legally enforceable national standards for drinking water and consequently to variation in drinking water standards across the country (Dunn, et al., 2014).

This is important to the problem, the lack of access to safe drinking water in First Nations, because decentralization has led to confusion regarding roles and responsibilities among different orders of government. This has in turn led to governance gaps (such as lack of inter-governmental coordination, duplication of efforts, poor data collection and sharing, and inadequate monitoring and enforcement in water management) which set the stage for access to safe drinking water being

less secure for those residing in First Nations communities than for those in non-First Nations communities.

2.2.1 Drinking Water Governance in Canada

The federal government has jurisdiction over navigable waters, fisheries, transboundary waters and First Nations (Dunn, et al., 2014; Bakker & Cook, 2011; Norman, et al., 2011). At the federal level, three government departments are responsible for different aspects of drinking water management. Environment Canada is responsible for environmental protection including the prevention of pollution to Canada's water resources through environmental protection laws (McMillan, 1987). Health Canada governs the provision of safe drinking water by setting guidelines for water quantity (supply), quality, monitoring and enforcement (Health Canada, 2012) and AANDC has jurisdiction over the provision of safe drinking water in First Nations communities (AANDC, 2015).

However, the federal government does not have a direct regulatory role or responsibility for the provision of safe drinking water in non-First Nations communities (Hill & Harrison, 2006). And, while national guidelines exist, the Canadian Drinking Water Quality (CDWQ) Guidelines are voluntary (Bakker & Cook, 2011; Dunn et al., 2014; Hill, et al. 2008). To date only four of the ten provinces have adopted the standards set out in the CDWQ guidelines and only one has made them legally enforceable (Bakker & Cook, 2011; Dunn et al., 2014; Hill, et al., 2008).

The responsibility for fresh water resources was delegated to the provinces and territories as part of the concept of provincial ownership of natural resources in the Constitution Act of 1867 (Norman, et al., 2011; Hill et al., 2008; Saunders & Wenig, 2007). Edgar and Graham (2008) state that, in order to protect drinking water sources, most provinces have regulations regarding the discharges of wastewater to ward against the contamination of water bodies; the release of potential contaminants to land that could result in negative environmental impacts, such as those originating from contaminated sites; solid waste and hazardous waste landfills; and the use, discharge and storage of nutrients and pesticides. Furthermore, the provinces have rules that address matters related to land use, water use, and natural resource extraction, harvest and use (Edgar, 2008).

Each provincial government is responsible for creating water legislation and policies for water supply management, resource management and drinking water governance within their boundaries (Hill et al., 2008; Simms et al., 2010). Therefore, protection of drinking water resources and provision of safe drinking water to all residents, except residents of First Nations

communities, is the provincial/territorial governments' responsibility (Hill & Harrison, 2008; de Loë & Kreutzwiser, 2007; Dunn, et al., 2014). As such, the provinces and territories have responsibility for defining drinking water standards and ensuring public health goals are met within their boundaries (Simms et al., 2010; Dunn, et al., 2014). Thus, legislation and standards for drinking water resources vary considerably across the country, largely due to a lack of enforceable national standards (Hill et al., 2008). The significant differences in disinfection, filtration and monitoring standards for drinking water at the provincial level has resulted in variation in access to safe drinking water across the country (Dunn, et al., 2014; Hill, et al., 2008).

While the provinces maintain constitutional responsibility for the provision of safe drinking water, responsibility for the implementation of drinking water policies is delegated to municipalities (Hill et al., 2008). Because water supply is municipally managed, municipalities bear the burden of responsibility for monitoring water quality and ensuring drinking water is safe (Dunn et al., 2014; Hill & Harrison, 2006; Bakker & Cook, 2011). Shortfalls in technical, managerial, and financial capacity leads to variation in drinking water quality between larger and smaller (mostly rural) communities (Hill et al., 2008; Dunn et al., 2014; de Loë & Kreutzwiser, 2005; Hrudehy, 2008). Capacity in the context of this research is defined as the community's ability to provide safe drinking water using the technical, managerial, and financial resources available to them.

Because larger communities are generally able to purchase better technology and hire specialized personnel, they tend to be held to more rigorous standards than smaller communities are (Dunn, et al., 2014). This can result in further inequity with regard to access to safe drinking water as smaller communities often lack the financial and human capacity to meet more rigorous standards and these shortfalls might lead to outbreaks of waterborne illnesses (Dunn, et al, 2014; De Loë & Kreutzwiser, 2005).

Due to the shared responsibility for water management between the federal and provincial governments, Canada lacks clear leadership in water management, resulting in confusion regarding roles and responsibilities (Saunders & Wenig, 2007; Norman, et al., 2011). Furthermore, Bakker and Cook (2011) indicate that intergovernmental coordination with regard to water management is difficult because environmental governance, including water governance, often restricts resource development, the major source of income for the provinces.

This is important because as Bakker and Cook (2011) explain, decentralization in the management of water in Canada has led to a high degree of jurisdictional, territorial and scalar fragmentation. The delegation of water governance to the provinces and territories combined with the CDWQ Guidelines being voluntary and therefore not legally enforceable; there is variation across the provinces and territories with regard to the security of drinking water quality. Because drinking water quality monitoring is the responsibility of the municipality, residents of those communities with less capacity (primarily small, rural communities) often do not have the same level of access to safe drinking water that residents of larger communities do. Thus, different populations are exposed to different levels of risk regarding the quality of their drinking water and vulnerable and lower income populations often do not enjoy adequate levels of protection.

2.2.2 First Nations Drinking Water Governance

Because the federal government has jurisdiction over First Nations lands, the federal government rather than to the provinces is responsible for the provision of safe drinking water in First Nations communities (Dunn, et al., 2014; Basdeo & Bharadwaj, 2013; AANDC, 2015). This means that provincial water regulations do not apply in First Nations communities, which, combined with the lack of federal standards for drinking water quality, contributes to a gap in legislation and regulation applicable to on-Reserve water management (Simms et al., 2010; Boyd, 2011; White et al., 2012). The involvement of at least three federal government departments in the provision of water services to First Nations communities; AANDC, Health Canada and Environment Canada; further complicates this situation (AANDC, 2015; Morrison, et al., 2015).

As with municipal water systems in non-First Nations communities, the community (in this case, the Band Councils) are responsible for the management and operation of the community's water system (Morrison, et al., 2015; Simeone & Troniak, 2012). While First Nations own and operate their on-Reserve water treatment facilities, AANDC provides funding for construction and maintenance and technical support (AANDC, 2015; Simeone & Troniak, 2012; Morrison, et al., 2015). Thus, First Nations communities are responsible for ensuring that water operators are trained, on-Reserve drinking water quality is monitored, and drinking water advisories are issued if water quality is deemed to be unsafe (AANDC, 2015; Simeone & Troniak, 2012; Basdeo & Bharadwaj, 2013). The community must also ensure that facilities related to the provision of safe drinking water meet established standards pertaining to design and construction (AANDC, 2015; Morrison, et al., 2015; Simeone & Troniak, 2012; Basdeo & Bharadwaj, 2013). Therefore, First

Nations Band Councils and several departments of the federal government share jurisdiction over the provision of drinking water services to First Nations (Morrison, et al., 2015; Simeone & Troniak, 2012).

First Nations drinking water protection is further compromised by the absence of binding federal legislation for water supplies and wastewater on Reserves, including laws and regulations governing the provision of drinking water on Reserves similar to those for non-First Nations communities (Boyd, 2011; Simms, et al., 2010). A 2005 report of the Commissioner of the Environment and Sustainable Development stated that the level of protection with regard to drinking water for residents of First Nations communities is not equal to that of people living off Reserves (Boyd, 2011). In 2006, the Expert Panel on Safe Drinking Water concluded that “the federal government has never provided enough funding to First Nations to ensure that the quantity and quality of their water systems was comparable to that of off-Reserve communities” (INAC 2006:22).

The shared jurisdictional authority over environmental assessment requirements between the federal and provincial governments further complicates the provision of safe drinking water in First Nations communities (Edgar & Graham, 2008). Most provinces are responsible for environmental assessments that apply to some projects to help protect against environmental impacts of new developments in part to protect water resources (Edgar & Graham, 2008). However, provincial requirements related to land do not apply on Reserves, and federal requirements under the *Canadian Environmental Assessment Act* only apply to proposed developments on Reserves where federal resources or regulatory approvals are involved with the project (Edgar & Graham, 2008). Thus, Boyd (2011) suggests that this has resulted in the jurisdictional gap that contributes to those residing on-Reserve living without the same guarantees of water quality that off-Reserve populations enjoy.

This jurisdictional gap means that those residing on-Reserve do not benefit from the same level and types of environmental protection that those residing off-Reserve do, primarily because of gaps in the environmental management regime (Edgar & Graham, 2008). Edgar and Graham (2008:2) note that this difference is due to jurisdictional problems and, quoting a study commissioned by Environment Canada, state that “the problem with respect to federal land in general and Reserves in particular is that the extensive regime of provincial and municipal environmental and natural resource laws and regulations does not apply on these lands, including

Reserves.” As such, except where the federal government has replicated provincial requirements in a parallel regime for federal lands, a “gap” exists between the scope of the rules that apply on-Reserve and those that apply off-Reserves (Edgar & Graham, 2008).

The gaps in constitutional responsibility for environmental protection and the provision of safe drinking water between the federal and provincial governments mean that on-Reserve populations do not enjoy the legal guarantees of water quality that off-Reserve populations do (Boyd, 2011; Patrick, 2011 & 2013; Lebel & Reed, 2010; White et al., 2012; Walters, 2012; Simeone, 2010; Spence & Walters, 2012). This prompted Patrick (2011:387) to argue that “access to safe drinking water in Canada is a function of both where you live and who you are.”

In summary, the collective responsibility for water governance in Canada has led to governance gaps and confusion over roles and responsibilities for the provision of safe drinking water. Recent literature indicates that water governance in First Nations is linked to the urban-rural issue in Canada that often leaves small, rural communities with inadequate access to safe drinking water (Dunn, et al., 2014). This is further complicated by the number of federal departments involved with drinking water provision in First Nations, the gap between federal and provincial government legislation and responsibility, and the lack of adequate funding for First Nations to meet their responsibilities to ensure drinking water is safe.

2.3 Source Water Protection (SWP) in Canada

Following the tragedies in Walkerton, Ontario, and North Battleford, Saskatchewan, along with increased pressure on drinking water supplies, many jurisdictions have developed strategies to minimize the risks to human health from waterborne illness (Ferreyra et al., 2008; Walters, 2012; Rawlyk & Patrick, 2013; Minnes, 2015). The multi-barrier approach (MBA), defined by the Canadian Council of Ministers of the Environment (CCME) as an “integrated system of procedures, processes and tools that collectively prevent or reduce the contamination of drinking water from source to tap in order to reduce risks to public health”, has become an important strategy in Canada to provide safe drinking water (Ferreyra et al., 2008; Walters, 2012; Rawlyk & Patrick, 2013; Minnes, 2015). The MBA has the overarching goal of protecting drinking water from the source to the tap and has become a commonly used strategy in the provision of safe drinking water (Davies & Mazumder, 2003; Islam et al., 2011; Walters., 2012; Ivey et al., 2006; Patrick 2013). The MBA consists of five stages or “barriers”: SWP, water treatment technology,

distribution system maintenance, water quality monitoring and testing, and emergency response planning (Walters, 2012; AANDC, 2015; CCME, 2002).

Contamination to drinking water can occur at any point between the source and the tap; therefore, the MBA takes into account the potential for contamination to occur at any stage in the process and makes sure there are protective barriers in place to either eliminate them or minimize their impact (Health Canada, 2015; CCME, 2002). The MBA recognizes that each individual barrier might not be able to prevent contamination, and therefore protection to public health occurs by using the barriers together to provide greater assurance that the water will be safe to drink. This research focuses on the first step of the MBA to safe drinking water, SWP.

There are two types of sources of drinking water: surface water and groundwater (Papa, 2004). Surface water consists of water contained at the earth's surface in a variety of water bodies such as lakes, rivers and other water streams (Papa, 2004; McMillan, 1987). In contrast, groundwater is water that flows beneath the surface of the earth in the spaces between particles of rock and soil, or in crevices and cracks in rock (Papa, 2004; McMillan, 1987). According to Environment Canada, 8.9 million people in Canada, or 30.3% of the population, rely on groundwater for domestic use; therefore the protection of groundwater is important to the provision of safe drinking water.

Contamination of drinking water sources often occurs as a result of human land use activities such as agricultural operations, urban development and industrial activity (Davies & Mazumder, 2003; Papa, 2004; Patterson, 2013). Because surface water and groundwater are closely related, when one becomes contaminated, it is likely that the pollutants will eventually make their way into another water source (Papa, 2004). Two broad categories of pollutants have the potential to affect water sources: point source and non-point source (Papa, 2004; Patterson, 2013). Papa (2004) defines point source pollution as that which enters the water from a specific and identifiable source, such as leaking underground fuel tanks, wastewater effluent discharge, industrial spills and discharges, landfill site leachate, wastes from mining sites and on-site septic systems.

Non-point source pollution has been defined as pollution that is generated from a combination of different and diffuse sources within the watershed catchment area (Papa, 2004; Patterson et al., 2013). A catchment area, or watershed, is an area of land from which surface runoff and ground water drain into a common water body such as a lake, river, stream, creek, or

estuary (Papa, 2004). Non-point source pollution is caused by overland drainage as water runs over land, picks up contaminants, and deposits them directly into water bodies or into groundwater through absorption (Papa, 2004; Patterson et al., 2013). Pollutants might come from natural events such as erosion, fire, and flooding, or from human land use activities such as urban development, agricultural operations, forestry, and industrial activities (Papa, 2004; Patterson et al., 2013). Due to the variety of sources of non-point source pollution, Patterson et al. (2013) state that coordinated management action across multiple levels involving multiple stakeholders is necessary to address the problem.

Broadly defined, SWP is a coordinated approach to develop short-term and long-term plans to prevent, minimize, or control potential sources of pollution or enhance water quality where necessary (Patrick et al., 2013). While SWP is most closely linked to the provision of safe drinking water, a broader perspective exists, such as the protection of source waters to maintain water quality and quantity for agricultural uses, including livestock watering and irrigation; industrial and commercial uses; and wildlife uses, including supporting aquatic ecosystems (de Loë & Murray, 2012; Davies & Mazumder, 2003; de Loë & Kreutzwiser, 2006). de Loë and Murray (2012) also suggest that the protection of source waters for all human uses contributes to the sustainability of watersheds.

Drinking water is that water that is intended for human consumption and is therefore expected to be the highest quality of water produced by water systems. Health Canada states that the key to ensuring clean, safe, and reliable drinking water is to understand the drinking water supply from the source all the way to the consumer's tap. Drinking water source water protection (DWSWP) is the protection of water bodies used as sources of drinking water for human consumption and is the focus of this research (Simms et al., 2010).

DWSWP includes understanding the general characteristics of the water and the land surrounding the water source, and identifying threats to the quality of the source water (Health Canada, 2012). These threats might be natural, such as seasonal droughts or flooding, or created by human activity, such as agricultural practices, industrial practices, or recreational activities in the watershed. DWSWP has been recognized globally as an important and cost effective method to protect drinking water quality and thereby protect human health (Davies & Mazumder, 2003; de Loë & Murray, 2012; Islam et al., 2011; Walters, 2012; Ivey et al., 2006).

Therefore, there are multiple definitions of SWP depending on how broadly it is defined and the intended use of the water being protected. DWSWP narrows the focus to water sources used to produce water intended for human consumption. This is important to the provision of safe drinking water because it is easier and cheaper to protect source water than it is to remediate contaminated water (Patrick, 2009; Timmer, et al., 2007). Furthermore, Davies and Mazumder (2003) indicate that risks to water quality are higher in unprotected watersheds. It follows that, when drinking water quality problems due to treatment facility breaches occur, the risk to human health is higher where source water quality is poor (Davies & Mazumder, 2003; Emelko et al., 2011). For this reason, Davies and Mazumder (2003) suggest placing the focus of the MBA on the quality of source water rather than on sophisticated water treatment facilities.

DWSWP is important to the provision of safe drinking water because contamination to drinking water sources can occur due to a large variety of human activities and human and naturally occurring pollution sources across the catchment area for the water body. DWSWP is especially important for smaller communities such as First Nations because they often lack the capacity to construct and operate sophisticated water treatment facilities.

2.3.1 Governance for Source Water Protection in Canada

Legislation surrounding SWP emerged in the United States and Europe in the 1970s with the United States being the frontrunner with the *Safe Drinking Water Act* (SDWA) of 1974. The scope of the SDWA switched from a focus on monitoring and treatment of contaminated water to prevention of contamination with amendments in 1996 (Plummer et al., 2011). In the United States, SWP falls under the United States Environmental Protection Agency (USEPA). Islam et al. (2011) describe several strategies to protect source waters in order to reduce the incidence of contaminated drinking water (Table 2.1).

Table 2.1: Source Water Protection Strategies under USEPA

SWP strategies
Agricultural management USEPA (2001a)
‘Yearly soil sampling’ to evaluate the exact fertilizer demand of the crop.
Use of ‘ammonia nitrogen fertilizer’ to get rid of immediate leaching.
Proper ‘fertilizer timing’, e.g., close time of fertilizer application to the period of maximum uptake time.
Proper calibration of the fertilizer application equipment to ensure the required amount of fertilizer.
Correct placement of the fertilizer
Proper application of the irrigation water
Careful fertilizer storage from any source of water.
‘Conservation tillage’ to reduce runoff.
Using ‘buffer strips or filter strips’, e.g., planting dense vegetable near water bodies to filter fertilizers.
Use of ‘crop rotation’ to minimize fertilizer need.
Use of ‘cover crops’ to stop wind and soil erosion.
Managing large-scale application of pesticides USEPA (2001b)
Careful use of integrated pest management (IPM) with chemical and non-chemical ways, e.g., mechanical, cultural, biological, sanitation and planting pest resistant plants.
Proper pesticide application (proper setbacks and never start the application before any weather event).
Economic and effective use of pesticides.
Careful management of the pesticide storage and handling.
Managing small-scale application of pesticides USEPA (2001c)
In case of the large-scale pesticide-use manual activities, e.g., spading, hoeing, hand picking weeds and pests, mulching to remove pests without pesticides are recommended.
Proper plant management to reduce the need for the pesticides.
Maintain proper drainage and aeration to have the microbes to degrade the pesticides.
Using biological control (e.g., birds and bats).
Farming management USEPA (2001d)
Feedlot management such as by using waste storage lagoons, litter storage structures, clean water divisions, composting and runoff treatment.
Using poultry liner storage, which can keep the rainwater runoff from poultry home waste.
Water diversion especially clean water to keep them away from the pollution.
Use of ‘vegetation buffer’ for feedlot management.
Proper application of manure with proper placement.
Pasture management such as by ‘fencing’.

Table 2.1: Source Water Protection Strategies under USEPA, cont'd

SWP strategies
Stormwater or runoff management USEPA (2001e)
Plant temporary fast-growing vegetation, grasses and flowers to filtrate water.
Proper 'planning' to minimize directly connected impervious areas (connect runoff from roofs and sidewalks).
Placement of concrete grid pavement placed on a sand or gravel base with a void area filled with pervious materials.
Effective structural 'design' to control runoff.
Use of 'grass swales'.
'Buffer strip', which is made of three zones is recommended (Four or five rows of trees closest to the source water, One or two rows of shrubs, and 20/24-foot-wide grass zone).
Long rooted vegetation is preferred for buffer strip.
'Stormwater ponds', which can settle the solids and with the help of the wetland vegetation zone contaminants can be removed biochemically.
'Constructed wetlands' whose main function is similar to stormwater ponds is recommended.
'Swirl-type concentrators', which can create circular motion to remove oil, and grease can be used for oily substances.
Managing pet and wildlife USEPA (2001f)
Clean up and waste disposal.
Bury waste.
Keep the pets away from the water bodies.
'Long grass', which not only attracts the pets but also infiltrate the contaminate particle is used for managing wildlife.
Managing septic systems USEPA (2001g)
Proper sitting of septic system: Maintenance of proper setback distances (both horizontal and vertical) and adequate soil permeability to ensure septic system effluent.
Design and construction consideration.
Annual inspection of the septic tank.
Managing sanitary sewer USEPA (2001h)
Visual inspection about the proper working of the septic tank system.
Monitoring and maintenance.
Employee training.
Public education.
Eliminating direct pathways to source water.

(Source: Islam, et al., 2011:81-82)

Patrick (2009) and Plummer et al. (2011) report that drinking water policy in Canada shifted following the tragedy in Walkerton, Ontario, (2000) that resulted in seven deaths and many

more people becoming seriously ill when their water supply was contaminated. This policy shift brought about two key statutes: the *Safe Drinking Water Act* (2002), which strengthened the regulations surrounding water supply systems, and the *Clean Water Act* (2006). Plummer et al. (2010) explains that the *Clean Water Act* gave rise to the development of SWP plans in southern Ontario by multi-stakeholder committees. As Plummer et al. (2011) argues, the *Clean Water Act*'s requirement that official community plans to be consistent with SWP plans established a critical link between land and water management. Official community plans are a community's land use plan, which identifies a variety of types of land uses and their locations within the community. In order to protect water sources, land uses that could pollute need to be located in areas that lessen the potential for contaminants to enter the water sources (Plummer et al., 2011). This goal can be reached in two ways: first through the development of SWP plans and official community plans in conjunction with one another, and second through consultation of the SWP plan that encompasses the area in which a community is located when changes to community land uses are considered.

In Canada the provincial governments have jurisdiction over water management and therefore are responsible for the development of regulations governing drinking water management (Simms, et al., 2010; Timmer et al., 2007; Ivey et al., 2006). Patrick (2013) reports that the drinking water strategies of most provinces and territories reference SWP and include enabling legislation to support SWP (Table 2.2). Furthermore, four provinces, Manitoba, Nova Scotia, Ontario and Saskatchewan, have water agencies dedicated to supporting provincially-led SWP (Patrick, 2013). In Saskatchewan the Water Security Agency (WSA) was created to begin SWP planning in the province as recommended by the *North Battleford Water Inquiry* (2002) (Laing, 2002; Patrick, 2013; Simms et al., 2010).

Table 2.2: SWP Legislation in Canada

Province/Territory	Broad Water Strategy	Enabling Legislation	Scale of SWP Plans
Alberta	Alberta Water for Life Strategy (2003)	Water Act (2000); Environmental Protection & Enhancement Act (2000)	None
British Columbia	Living Water Smart (2008)	Drinking Water Protection Act (2001)	Watershed-scale
Manitoba	The Manitoba Water Strategy (2003)	Drinking Water Safety Act (2002); Water Protection Act (2006)	Watershed-scale
New Brunswick	Watershed Protection Program	Clean Water Act (1989)	Wellfields designated as protected areas
Newfoundland & Labrador	Newfoundland and Labrador Water Resources Portal	Water Resources Act (2002); Environmental Protection Act (2002)	Municipal/Local
Nova Scotia	Water for Life (2010)	Water Resources Protection Act (2000)	Protected Water Areas are delineated
Ontario	Drinking Water Stewardship Program (2007)	Clean Water Act (2006)	Watershed-scale
Prince Edward Island	10 Points to Purity (2001)	Environmental Protection Act (1998)	Wellfield Protection Plans
Quebec	Quebec Water Strategy (2002)	Groundwater Catchment Regulation (2002)	Watershed-scale
Saskatchewan	25-Year Water Security Plan	SWP are not legally binding/have no regulatory authority	Watershed-scale
Yukon	Draft Yukon Water Strategy (2013)	None	None
Northwest Territories	NWT Water Stewardship Strategy (2010)	None	None
Nunavut	None	None	None

(Source: Patrick, 2013:10)

As presented in Table 2.2 (above), SWP regulations vary significantly from province to province (Patrick, 2013; Walters, 2012; Lebel & Reed, 2010). For example, Ontario and New Brunswick have SWP programs that are developed and implemented through legislation, the *Clean Water Acts*, 2009 and 1989 respectively. In Ontario SWP plans are watershed based and mandatory in regions where conservation authorities are operating. The SWP planning process is directed by the conservation authority and the SWP planning activity is carried out by a source protection committee, composed of local, municipal and regional government and non-government actors (Simms et al., 2010; Patrick, 2013).

In contrast, Simms et al. (2010) explain that some provinces use watershed management plans to protect water sources and SWP is assumed to be included in the broad goals of the plans. For example, *Saskatchewan's Long Term Safe Drinking Water Strategy* (2002) and Prince Edward Island's *10 Points to Purity* (2001) address the five stages of the MBA and outline specific provincial level actions. While in Saskatchewan SWP planning is carried out by watershed level actors, Prince Edward Island's SWP planning and implementation are the sole responsibility of municipalities and there is no requirement for public consultation (Simms et al., 2010). Saskatchewan's strategy involves the coordination of SWP activities at the watershed scale by the WSA (Simms et al., 2010; Patrick, 2013), yet Patrick et al. (2013) report that in Saskatchewan provincially led SWP plans are discretionary, not legally binding, and have no regulatory authority.

In addition, First Nations' involvement with SWP varies from province to province and is not mandated by the provinces, because the provinces do not have the jurisdictional authority to do so (Boyd, 2011; Walters, 2012; Patrick, 2013). For example, in Ontario and Saskatchewan there is opportunity for First Nations to participate in watershed-scale SWP planning along with all other affected stakeholders (Walters, 2012; WSA, 2015). In Saskatchewan, the province has a duty to consult with First Nations on environmental matters that affect First Nations lands; however, there are no regulations requiring First Nations to participate in SWP planning with the province, therefore participation is voluntary and varies throughout the province (WSA, 2015).

In Canada because responsibility for water management is delegated first to the provincial level and then further delegated to the local level (municipalities and non-government organizations), watershed groups bear the responsibility for planning and implementation activities of SWP (de Loë & Murray 2012). However, de Loë and Murray (2012) explain, that the authority to make decisions about which actions are appropriate to the protection of water sources

remains with the provincial government, so government accountability remains intact. Therefore, planning and implementation of SWP plans relies on local scale actors, who hold the knowledge regarding local conditions affecting their water sources and provincial governments retain accountability for the provision of safe drinking water.

In summary, the variation in provincial regulations regarding water management leads to variation between local SWP activities in Canada (Simms, et al., 2010; de Loë & Murray, 2012). For example, in some jurisdictions SWP activities are carried out separately from related land use planning and water management policies while in others SWP occurs as a part of watershed management (de Loë & Murray, 2012). Either way SWP governance is closely tied to local circumstances leading to the potential for collaborative approaches to water governance, which is appropriate for SWP as it allows local level organizations to create plans to guide operational decisions made by the provincial and federal governments (de Loë & Murray, 2012; Simms et al., 2010).

2.4 Drinking Water Source Protection Planning

By definition SWP planning involves land use planning to identify and assess risks to water supplies and develop and institute strategies to mitigate those risks (Simms et al., 2010; Patrick et al., 2013). More specifically, DWSWP plans are planning tools for the management of raw water resources used as sources of water for human consumption with the goal of protecting drinking water from contamination (Timmer et al., 2007; Patrick, 2009; Plummer et al., 2010). Therefore, DWSWP planning is integral to drinking water management. Like SWP, DWSWP requires the involvement and integration of both land use planning and watershed management to protect sources of drinking water (Ivey et al., 2006; Plummer, et al., 2011; Timmer et al., 2007).

Communities that rely on untreated water such as groundwater accessed via private wells are more susceptible to water-borne illnesses resulting from contaminated source waters (Davies & Mazumder, 2003). Patrick (2013) suggests that the burden of the high operation and maintenance costs of water treatment limits the viability of water treatment facilities in smaller communities that are already lacking financial resources to meet operating costs. Thus, Papa (2004:3) indicates that DWSWP planning “is of particular concern for rural consumers whose geographic location may prevent them from having access to municipally treated water.” However, recent literature indicates that DWSWP planning might also present challenges for

smaller communities that often do not have sufficient financial, technological, and human resources to implement the completed plan (Ivey et al., 2006; Timmer et al., 2007; Walters, 2012). Boyd (2011), Walters (2012) and Lebel and Reed (2010) report that First Nations communities face further financial resources concerns due to the lack of adequate and consistent funding from the federal government to ensure that their access to safe drinking water is similar to that of non-First Nations communities.

2.4.1 First Nations DWSWP Planning

While the planning process is the same, First Nations DWSWP plans differ from most of those developed in the rest of the country with regard to scale. That is, First Nations DWSWP plans use the boundaries of the First Nation as the scale of assessment rather than the entire watershed, as is the most common scale used in Canadian DWSWP plans. Recent literature indicates that this difference is the result of the jurisdictional gap between the federal and provincial governments with regard to water management (Boyd, 2011; Walters, 2012; Patrick, 2013). Therefore, these plans might not identify adjacent land uses and the potential risks to source water that they carry. Furthermore, if these risks are considered, a plan to mitigate them will be complicated by jurisdictional issues (Wilson, 2004; Patrick, 2013) because First Nations communities do not have the authority to control neighbouring land uses that might be the source of potential contamination to their drinking water sources. These DWSWP plans, using the boundaries of the First Nation as the scale of assessment, might have limited value to the protection of First Nations drinking water (Patrick, 2013).

Recent First Nations DWSWP plans, developed independently of one another, have identified similar risks of contamination to drinking water sources. For example, the North Saskatchewan River Basin Council's (NSRBC) website provides links to DWSWP plans developed by five First Nations in Saskatchewan: Sweetgrass, Muskeg Lake, Witchekan, and Thunderchild First Nations. These DWSWP plans each identified some or all of the following threats to their source water:

1. Abandoned wells;
2. Leaching from wastewater, including sewage lagoons and household septic outflows;
3. Waste disposal, including landfills, and improper disposal of household waste and fuel containers; and

4. Agricultural operations, both on- and off-Reserve.

In addition, the Rama First Nation in Ontario has had their DWSWP concerns identified in the South Georgian Bay Lake Simcoe Source Protection Region's SWP Plan document (Lake Simcoe Conservation Authority). These concerns include:

1. Untreated wastewater, including sewage lagoons;
2. Waste disposal sites;
3. On-site septic systems;
4. Leaching from Industrial effluent;
5. Leaching from Agricultural operations; and
6. Leaching from fuel storage.

It is important to note these similarities because they might suggest that the implementation strategies for First Nations SWP plans might share commonalities such as potential partnerships, funding sources and educational programs to support plan implementation.

Although many of these threats have been identified by watershed scale DWSWP plans, the potential for contamination from sewage lagoons, on-site septic systems, and waste disposal, including landfills and improper disposal of household waste and fuel containers, are more common in First Nations communities than in non-First Nations communities because of the absence of enforceable environmental protection legislation regulating potential contamination from these sources on Reserves (Hill, et al., 2008; Bakker & Cook, 2011; Dunn, et al., 2014). This absence is in part due to the mismatch between watershed and jurisdictional boundaries and the separation of responsibility for safe drinking water between the federal government for First Nations and the provinces for non-First Nations communities (Davies & Mazumder, 2003; Boyd, 2011; Cohen & Davidson, 2011; White et al., 2012; Patrick, 2013; Minnes, 2015).

In addition, recent literature indicates that annual federal funding provided to First Nations for the delivery of Band-led initiatives, referred to as Band Support Funding (BSF), under which the provision of safe drinking water and therefore, DWSWP planning would fall, is inadequate (Polaris Institute, 2012; Patrick, 2013; Ivey et al., 2006; Timmer et al., 2007; Walters, 2012). This is mirrored by the opinions of the Expert Panel on Safe Drinking Water, who stated that "the federal government has never provided enough funding to First Nations to ensure that the quantity and quality of their water systems was comparable to that of off-Reserve communities" (INAC, 2006:22).

Therefore, First Nations DWSWP plans differ from those of non-First Nations communities with regard to scale, the lack of enforceable standards to control or prevent sources of contamination, and inadequate financial resources. These differences contribute to the lack of access to safe drinking water in First Nations communities.

2.4.2 DWSWP Planning Process

DWSWP is a systematic planning process involving multiple stages and multiple levels of actors as stakeholders. Stakeholders might include the local community; municipal, provincial and federal agencies; environmental groups; First Nations; industry and business representatives; agricultural land users; scientists; planners; and other individuals who have vested interests in the affected watershed (Papa, 2004; Patterson et al., 2013; Wilson, 2004). DWSWP planning is a six stage planning process (Figure 2.1).

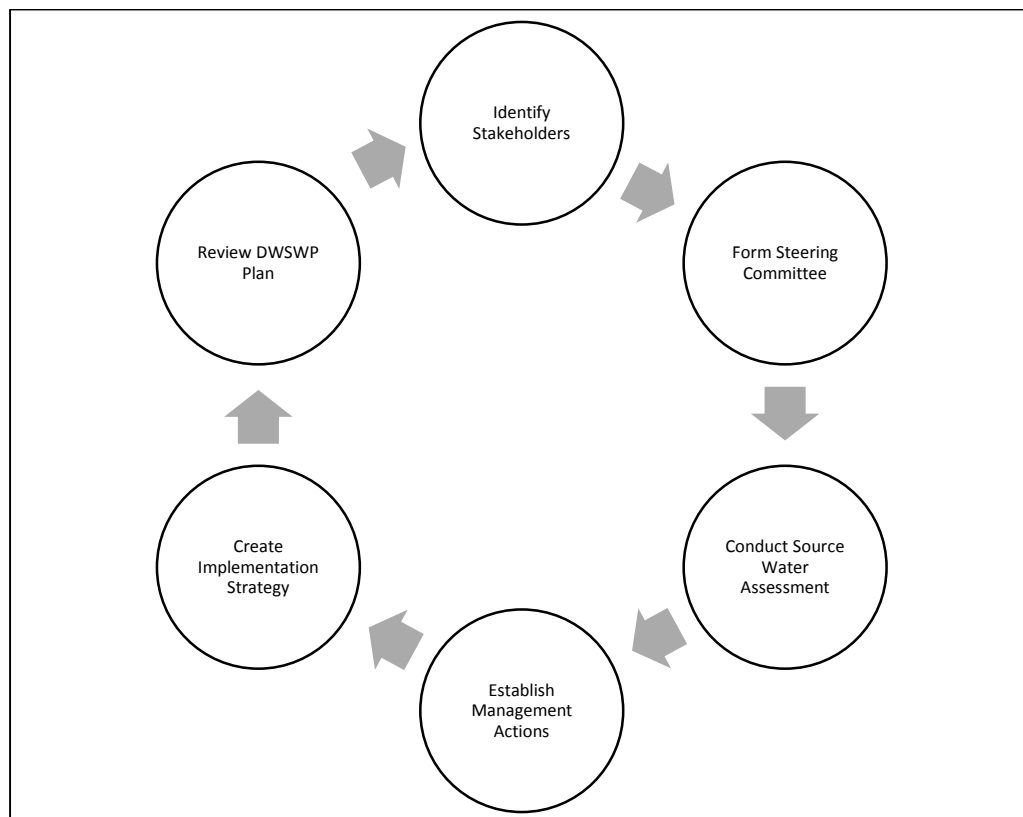


Figure 2.1: DWSWP Planning Process: Source: AANDC, 2014:8

The DWSWP planning process begins with the identification of local stakeholders in the watershed area surrounding the drinking water source (Papa, 2004; Simms et al., 2010). Once local stakeholders have been identified, a Steering Committee, composed of representatives of the

stakeholders, is struck (stage two) to lead the planning process. The Steering Committee's recommendations form the basis of the DWSWP Plan (Papa, 2004; Simms et al., 2010; AANDC, 2014).

Stage three of the planning process involves the Steering Committee's first task: to conduct a drinking water source assessment and to define and identify threats to the drinking water source protection area. This begins with the identification of the drinking water source and the recharge areas affecting it, along with information regarding the cultural and social characteristics of the people who inhabit or frequent the watershed in which the drinking water source is located (Papa, 2004; AANDC, 2014). The Steering Committee creates a map of the source protection area that will become the boundary for the DWSWP protection plan. This stage also includes the identification and locations of drinking water systems drawing water from the source water to produce clean drinking water. This allows for the identification of potential locations where the drinking water source is vulnerable to contamination and the potential sources of contamination (Papa, 2004; AANDC, 2014).

The Steering Committee then uses this information to identify, assess and prioritize the potential threats associated with sources of contamination to the drinking water source. In doing so, the threats are ranked according to their degree of threat to contamination of drinking water sources. The areas where water sources might be vulnerable to these threats are also identified. Decision makers can use this information to prioritize and decide which threats require the most immediate management actions to prevent, reduce, or eliminate risks to water sources (Papa, 2004; AANDC, 2014).

In the fourth stage, the Steering Committee works to identify a management plan aimed at reducing significant risks of contamination to an acceptable level. This management plan might involve a combination of protection, mitigation and rehabilitation measures aimed at reducing the overall risk of contamination to the drinking water source. In stage five, an implementation strategy for the DWSWP plan is developed. This includes the identification of stakeholders and/or partnerships that will share responsibility for mitigating each risk to the source water along with a proposed timeline for implementing each management action. This stage might also include the development of regular monitoring and reporting practices to monitor changes in quality and quantity of the source water (Papa, 2004; AANDC, 2014).

An important aspect of the implementation strategy is securing adequate funding to implement the DWSWP plan. This might include cost-sharing partnerships among the broad scope of stakeholders identified in the first stage. In addition, opportunities for funding partnerships might include developers, local governments, provincial and federal agencies, and landowners. When the DWSWP plan is complete it is shared with decision makers and the public so it can be used to guide future decisions which might affect drinking water quality (Papa, 2004; Guide and Template). Lastly, the DWSWP plan is intended to be a living document that requires periodic review and updates to address any concerns that arise over time. It is recommended that a complete review take place on a 5-year cycle (Papa, 2004; AANDC, 2014), which is stage six of the planning process.

DWSWP planning is important because it is the first step in protecting human health from waterborne illnesses contracted from contaminated drinking water. Because it has been shown to reduce the costs associated with the provision of safe drinking water, it is particularly important for small, isolated communities such as First Nations.

2.5 Plan Implementation

Once any plan has been completed, the planning process moves to the implementation stage, that is, the key actions identified in the plan are put into effect. The implementation phase of land use plans such as DWSWP plans requires the development of regulations and collective action to guide adoption of the actions prescribed in the implementation strategy (Brody & Highfield, 2003). Talen (1996) defines a plan as a guide for future development and implementation as following the course of development that is put forth in the plans. Therefore, plan implementation is the carrying out, execution, or practice of a plan or the action that must follow any preliminary thinking in order for the plan to take effect. Brody and Highfield (2003) elaborates that, for comprehensive land use plans to be effective, the implementation strategy, including designation of responsibility for each action and sanctions for failure to comply, must be clearly defined. Joseph et al. (2008) indicate that effective plan implementation is reached when the objectives and desired outcomes of the plan have been achieved.

The importance of plan implementation is obvious, as stated by Berke, et al. (2006) and Joseph et al. (2008), because if the plan of action is not put into practice the plan's objectives are not likely to be reached. Berke, et al. (2006:581) state that "failure to implement plans has long

been considered a significant barrier to planning” and that “practitioners have long questioned the value of plans when the issues raised by plans are not acted on.”

2.5.1 Plan implementation process

Despite the obvious importance of implementation, there is a dearth of studies devoted to the process of implementation and the relationship between planning and plan implementation (Alterman & Hill, 1978; Berke, et al., 2006; Gordon, 2013). Rein and Rabinovitz (1980) suggest that plan implementation follows a continuum beginning with the development of implementation guidelines (implementation strategy) and ending with oversight (plan review). Guidelines are developed to translate legislation into administrative prescriptions for action and oversight focuses on the process of plan review (Rein & Rabinovitz, 1980; Berke, et al., 2006). Plan review focuses on whether outcomes comply with the guidelines and whether the desired results are achieved (Berke, et al., 2006).

Berke, et al. (2006) build on Rein and Rabinovitz’s (1980) plan implementation continuum and outline four sequential phases within this continuum. These phases align with the Northwest Territories’s (NWT) Water Stewardship Strategy for the implementation of the draft NWT Source Water Assessment and Protection (SWAP) Program (2012). For this reason, specific examples from the NWT Water Stewardship Strategy are included in the description of the four-phase process of plan implementation that Berke et al. (2006) outline. These examples are included to provide DWSWP context to the generic plan implementation process below.

2.5.1.1 Phase 1: Development Management:

Development management involves the translation of plans into guidelines designed to influence development, that is, guidelines or regulations that describe how, where and when development might take place in order to achieve the goals of the plan are developed (Berke et al., 2006). Legal actions such as new bylaws might be developed to regulate how and where development will be permitted in order to achieve the goals of the plan (Simms et al., 2010; NWT, 2012). Development Management is typically based on regulatory, incentive, and public-investment techniques that can be adopted by local governments (Rein & Rabinovitz, 1980; Berke, et al., 2006).

2.5.1.2 Phase 2: Project Permit Review:

Project permit review involves how and by whom decisions are made regarding development permits as they relate to the goals of the plan (Berke, et al., 2006), that is, the level of government tasked with the authority to regulate development is determined. Then a process to assess proposed developments in order to ensure these will not have a negative effect on the goals of the plan is developed (NWT, 2012). This phase works to ensure that future development aligns with the plan's goals (Rein & Rabinovitz, 1980; Berke, et al., 2006).

Phases 1 and 2 make up the implementation strategy development stage, which is often a mix of strategies including legal and institutional arrangements. Legal actions include zoning and building bylaws, subdivisions regulations, and the enforcement of other land use regulations. Agreements between landowners, inter-jurisdictional agreements, and commitments from and among individuals and government and non-government organizations to promote the goals of the plan (ie: protect source waters) make up institutional arrangements. In the case of community-based DWSWP plan implementation strategies, the local community has jurisdiction over decision-making regarding the regulation of land uses within the boundary of the community (NWT, 2012; Rawlyk & Patrick, 2013).

Phases 3 (Outcomes) and 4 (Monitoring and Evaluation) below make up the plan review stage of plan implementation. This stage involves a review of the progress of plan implementation that determines whether the actions outlined in the plan have been enacted. In addition, this stage assesses whether new concerns related to the issue or problem addressed by the plan have arisen and, if so, whether they be mitigated by the plan and, if not, whether amendments might be required (Berke et al., 2006; NWT, 2012).

2.5.1.3 Phase 3: Outcomes:

Outcomes include evaluation of the physical, economic, and social conditions generated by the plan. For example, in the case of DWSWP planning, any changes to the quantity and quality of drinking water sources, to funding for the provision of safe drinking water, and to interactions among stakeholders resulting from the implementation of the plan might be assessed. Therefore, this phase assesses whether the plan affected decision making in phases 1 and 2, and if so, how changes in decision making generated outcomes that aligned with the goals of the plan. (Berke et al., 2006; NWT, 2012).

2.5.1.4 Phase 4: Monitoring and Evaluation:

The continuous tracking and assessment of outcomes involves the comparison of actual outcomes with desired goals to assess the effectiveness of plan policies to determine if these need to be revised (Berke et al., 2006). The objective of this phase is to assess the progress of plan implementation, to review issues and concerns that are related to the plan's intent and goals, and to determine if a full review of the plan is required (Berke et al., 2006; NWT, 2012).

Despite this outline, Berke et al. (2006) and Laurian et al. (2004) indicate that there is a dearth of studies focusing on implementation practices that facilitate action regarding the concerns identified in the plans and whether plan goals are met. Slotterback et al. (2008) indicate that, although planning tends to be a government-mandated process, often little attention is paid to what happens after the implementation of mitigation measures identified during the planning process. As a result, Slotterback et al. (2008:549) state that “the implementation of planning documents and their associated objectives and strategies, including those related to environmental review, remains a challenge for planners.”

Brody and Highfield (2003) explain that effective implementation of planning documents related to environmental protection must occur at the local level because this is where decisions that affect the local environment occur. However, they note that little work has been done to evaluate what tools and strategies are available to assist local jurisdictions to determine how to incorporate the principles of environmental management into their planning and regulatory frameworks (Brody & Highfield, 2003). They also state that “[l]ong-term success of ecosystem approaches to resource management thus rests on understanding how local plans effectively capture their key principles and practices” (Brody & Highfield, 2003:513).

Powell (2010) indicates that a lack of intergovernmental coordination and cooperation across eco-regional scales is one of the most significant barriers to implementing regional and eco-regional conservation plans. Powell (2010) states that “existing legal, geopolitical, and jurisdictional boundaries coupled with other social forces drive a high degree of both horizontal and vertical fragmentation in land-use management.” Therefore, due to Canada’s shared water governance amongst four orders of government—municipal, provincial, federal and First Nations—a high degree of fragmentation is seen as leading to implementation failure for environmental protection plans such as DWSWP plans intended to improve access to safe drinking water. This is shown in the continued lack of access to safe drinking water in a large number of

First Nations communities (Bakker and Cook, 2011). Furthermore, recent literature indicates that implementation of DWSWP plans specifically have proven to be problematic for a variety of reasons, including lack of capacity at the local level (Rawlyk & Patrick 2013).

Therefore, plan implementation is important if the goals of the plan are to be achieved. It is also important to the provision of safe drinking water in First Nations communities because implementation of DWSWP plans that are developed involve taking action to prevent potential contaminants from causing inadequate drinking water quality that might affect human health in First Nations communities.

2.5.2 Capacity needs for DWSWP plan implementation

Five capacity needs to support the implementation of DWSWP plans have been identified in recent literature (Timmer et al., 2007; de Loë & Kreutzwiser, 2005). In this context, capacity is defined as the ability of a community to accomplish its [drinking water] SWP objectives (de Loë & Kreutzwiser, 2005; Rawlyk & Patrick, 2013). These are described below.

2.5.2.1 Institutional Capacity

Institutional capacity refers to the existence of institutional arrangements such as governance structures that provide guidance and legal support for land use planning, land acquisition, and protective zoning to protect drinking water sources (Timmer, et al., 2007; Ivey et al., 2006). Institutional arrangements include legislation and regulations, policies and guidelines, administrative structures, economic and financial arrangements, and political structures and processes (Ivey et al., 2006). Under the context of DWSWP, these arrangements include the development of standards and testing procedures for potential contamination, provincial and federal regulations and policies, and drinking water SWP plans developed at the local and provincial scale (de Loë & Kreutzwiser, 2005; Ivey et al., 2006; Timmer et al., 2007). Brody and Highfield (2003) explain that, while the majority of plans include broad goals, specific objectives lead to the development of precise land use tools, policies, and regulations that drive successful implementation.

Ivey et al. (2006) explain that institutional arrangements for land use planning and water resource management are important because they are key determinants that shape capacity for drinking water SWP. Provincial and federal institutional arrangements affect the ability of local communities to protect their drinking water sources through the allocation of responsibility,

funding, including the power to raise funds through water rates paid by customers, and technical support (de Loë & Kreutzwiser, 2005). Institutional capacity includes the legal authority of the local community to influence existing and future land uses and management practices to protect their drinking water sources (de Loë & Kreutzwiser, 2005; Ivey et al., 2007). Therefore, the development of local land use planning institutions, such as official community plans, zoning bylaws, storm water and wastewater management procedures, and conservation programs including easements and buffer areas to protect groundwater from contamination, add to the local community's institutional capacity (de Loë & Kreutzwiser, 2005).

2.5.2.2 Financial Capacity

Financial capacity is defined as the ability to generate and access funding, beyond the municipal budget, for drinking water protection projects, access to adequate resources to meet water system operating expenses, and the management of water supplies (Timmer et al., 2007; Patrick et al., 2013; de Loë & Kreutzwiser, 2005). Financial flexibility with regard to water rates charged to customers that both recovers the full cost of providing safe drinking water and encourages customers to reduce the quantity of water used is an indicator of financial capacity (Timmer et al., 2007). Financial capacity is important because local communities, especially small rural ones, often lack the financial resources to meet their basic drinking water production needs and therefore often rely on grants and other types of occasional funds to carry out projects such as DWSWP planning and implementation (de Loë & Kreutzwiser, 2005; Timmer et al., 2007).

2.5.2.3 Human Capacity

Human capacity includes factors such as levels of local citizens' awareness about DWSWP and the level of local citizens' concern and participation regarding activities related to DWSWP (de Loë & Kreutzwiser, 2005). Human capacity also includes access to individuals with the specialized knowledge, skills and abilities to carry out the technical activities related to DWSWP planning and implementation, and access to education and training for local employees to acquire the necessary knowledge and skills (Timmer et al., 2007; de Loë & Kreutzwiser, 2005). The ability of community leaders, water operators, and others responsible for tasks related to DWSWP to research available funding opportunities, such as grants, and apply for these is a measure of the community's human capacity (de Loë & Kreutzwiser, 2005).

2.5.2.4 Social Capacity

Social capacity involves intergovernmental coordination including vertical linkages between local, provincial, and federal government agencies; horizontal linkages among watershed stakeholders; and local support for DWSWP (Timmer et al., 2007). Joseph et al. (2008) stated that strong stakeholder support is a key criterion to implementation success and that involving stakeholders in plan development positively affects the successful implementation of land use management plans.

Intergovernmental coordination across jurisdictional boundaries and sharing of technical requirements such as data, instruments, expertise and funding among watershed communities are important elements of social capacity (Patrick et al., 2013; de Loë & Kreutzwiser, 2005). Brody and Highfield (2003) explain that, in order for environmental plans, such as DWSWP plans, to be successfully implemented, the implementation strategy must define how collaboration will take place across regional and political jurisdictions to coordinate cross-jurisdictional environmental concerns and mitigation strategies through regulatory systems.

Social capacity also includes the existence of clear leadership that is able to provide direction to government and non-government agencies and local communities with regard to DWSWP (de Loë & Kreutzwiser, 2005; Timmer et al., 2007). De Loë and Kreutzwiser (2005) note that it is important that political leadership at all levels are able to recognize potential threats to drinking water sources and to implement solutions such as DWSWP plans.

2.5.2.5 Technical Capacity

Technical capacity refers to the ability of the local water system to meet established safe drinking water quality standards. In order to accomplish this goal, communities must be able to monitor drinking water from the source to the tap to prevent contamination that could affect human health (Timmer et al., 2007). Therefore, the water operator must have the capacity to complete the technical tasks involved, such as the identification of the drinking water source, identification and assessment of potential sources of contaminants and appropriate mitigation strategies, monitoring of quality and quantity of treated water, management of data, and emergency response planning (de Loë & Kreutzwiser, 2005; Ivey et al., 2007). Ivey et al. (2007) and de Loë and Kreutzwiser (2005) note that technical capacity is related to local communities' ability to access and share technical data and resources produced by other organizations and to transform data acquired at a larger scale into locally relevant knowledge.

2.5.2.6 Overall Capacity

While the five capacity needs do not exist in isolation and all five must interact with one another for plans to be successfully implemented, institutional capacity sets the regulatory framework that establishes the mechanisms to provide for the other four capacity needs. Therefore, institutional capacity can provide support for DWSWP plan implementation by facilitating land use planning processes, including land use regulations, to protect drinking water through DWSWP (de Loë & Kreutzwiser, 2005; Ivey et al., 2007; Timmer et al., 2007). Regulations might include resource extraction restrictions to protect water quantity and ecosystem quality and land-use restrictions in areas of water recharge to prevent contamination of drinking water sources (Brody & Highfield, 2003). However, while legislation and regulation exists in Canada requiring the development of DWSWP plans, there is none requiring that the plans get implemented (Ivey et al., 2007). This is important because, as Berke, et al. (2006) and Joseph et al. (2008) stated, if the plan of action is not put into practice, the plan's objectives are not likely to be reached.

Berke et al. (2006) summarize several definitions of plan implementation success, including the assessment of plan implementation based on whether the objectives of the plan are achieved, whether actions following plan implementation conform to the plan, how often the plan is consulted by decision makers, how a plan affects decisions-making and how decisions affect outcomes. Similarly, Joseph et al. (2008:595) outline six key criteria determining implementation success: “clear and consistent objectives; accurate causal linkages between objectives and actions; use of a sympathetic agency with adequate resources and authority to implement the plan; skilled and committed implementation managers; public and stakeholder support; and, a supportive socioeconomic and policy environment”.

Therefore, the coordination of watershed activities (i.e. drinking water, livestock watering, irrigation, and industrial water needs), competing interests (i.e. human consumption, ecosystem needs, and industrial interests), and diverse agencies (i.e. environmental groups, First Nations, rural municipalities, and governments) involved in DWSWP is necessary for the successful implementation of the plans (Joseph et al., 2008). Sharing of resources (including human, technical, and financial capacity) between communities and organizations for DWSWP is important because small communities most often do not have the financial capacity to fund data collection and cover the costs of obtaining the required technical expertise (de Loë & Kreutzwiser, 2005; Ivey et al., 2007).

Because of the absence of existing legislation and regulations requiring DWSWP plan implementation in Canada, there is no mechanism requiring that threats to drinking water sources are reduced and/or mitigated through DWSWP (Ivey et al., 2007). Slotterback et al. (2008) explain that the existence of regulations requiring plans' implementation, including sanctions for failure to implement plans, were associated with higher levels of implementation. Therefore, while financial, social, human and technical capacity are necessary for the success of DWSWP plan implementation, institutional capacity guides the planning process and drives implementation.

2.6 Institutional arrangements for First Nations DWSWP in Canada

Institutional arrangements, including legislation and regulations, policies and guidelines, administrative structures, economic and financial arrangements, and political structures and processes for First Nations DWSWP in Canada, exist as federal initiatives. These affect the legislative requirements for DWSWP planning and plan implementation in First Nations communities. Several initiatives (outlined below) have been introduced by the federal government that affect the provision of safe drinking water in First Nations communities by providing legislation and regulations for DWSWP in First Nations.

2.6.1 Federal Government Initiatives

Recent literature states that a lack of adequate legislation governing the provision of drinking water in First Nations communities is founded in the absence of federal legislation and uniform national standards for drinking water in Canada (Boyd, 2011; Walters, 2012). National guidelines established by the Federal-Provincial-Territorial Committee on Drinking Water exist in the form of the CDWQ Guidelines. These have been adopted to varying degrees by the provincial and territorial governments. The CDWQ Guidelines establish acceptable parameters specifically for contaminants that meet all of the following criteria:

1. Exposure to the contaminant could lead to adverse health effects in humans;
2. The contaminant is frequently detected or could be expected to be found in a large number of drinking water supplies throughout Canada; and
3. The contaminant is detected, or could be expected to be detected, in drinking water at a level that is of possible human health significance (Health Canada, 2012).

The CDWQ Guidelines are the basis for establishing drinking water quality requirements for all Canadians residing on and off Reserves. The CDWQ Guidelines reference SWP as part of the MBA to prevent contamination of water intended for human consumption. The MBA is defined by the Canadian Council of Ministers of the Environment (CCME) as “an integrated system of procedures, processes and tools that collectively prevent or reduce the contamination of drinking water from source to tap in order to reduce risks to public health” (Federal-Provincial-Territorial Committee on Drinking Water, 2002). However, the CDWQ Guidelines focus on treatment and monitoring of treated drinking water rather than on the protection of raw water sources (Health Canada, 2012). The following initiatives undertaken by the federal government to address the water quality problems in First Nations communities are guided in part by the CDWQ Guidelines.

White et al. (2012) outline several initiatives brought about by AANDC and Health Canada between 2003 and 2012 in attempts to address the water quality problems in First Nations communities, such as the First Nations Water Management Strategy (2003) and the Plan of Action for Drinking Water in First Nation Communities (2006), which included the Protocol for Safe Drinking Water for First Nation Communities (*Protocol*) (White et al., 2012, Patrick, 2013). The *Protocol* is a guiding document intended to ensure that any drinking water system intended for use by First Nations meets the standards for design, construction, operation, maintenance, and monitoring of drinking water systems and that it complies with the requirements of this protocol (AANDC, 2006).

The *Protocol* is based on the MBA to ensure the provision of safe drinking water. The first step of the MBA is SWP, and the *Protocol* has a section devoted to source protection requirements. Specifically, the *Protocol* states that “First Nation authorities responsible for drinking water systems covered by this protocol shall participate with other stakeholders in the development and implementation of a watershed and aquifer protection plan. First Nations communities shall also develop and implement community-specific SWP plans to prevent, minimize, or control potential sources of contaminants in or near the community’s raw water sources” (AANDC, 2006).

Furthermore, Appendix B: General Guidance on Developing a Source Water Protection Plan of the *Protocol* provides guidance for developing a DWSWP plan. Appendix B notes that “Environment Canada is developing a Guide, designed to aid Operating Authorities of water systems in First Nations Communities to develop a SWP plan, which will supersede the material

presented here” (AANDC, 2014). To date no SWP planning guide has been made public by Environment Canada; however the First Nations On-Reserve Source Water Protection Plan Guide and Template (Guide and Template) has since been developed by AANDC in collaboration with Dr. Robert Patrick, Associate Professor, University of Saskatchewan, and made available to First Nation communities. This guide and template has been piloted in two First Nations in Alberta, facilitated by Dr. Patrick. As part of this research, it was piloted in Muskowekwan First Nation.

The *Safe Drinking Water for First Nations Act (Act)*, passed into law in June of 2013, is an important piece of enabling legislation and represents a crucial step towards ensuring that people residing in First Nation communities enjoy similar health and safety protections for drinking water as other Canadians. This legislation permits the federal government to work with First Nations to develop enforceable federal regulations ensuring access to safe, clean, and reliable drinking water and the production of on-Reserve DWSWP plans. However, these regulations are currently being developed and this legislation is currently not enforceable (AANDC, 2013).

Boyd (2011) reported that in 2008 AANDC introduced a new plan, the First Nations Water and Wastewater Action Plan (FNWWAP). Boyd (2011) explains that FNWWAP provided \$330 million in funding over two years for water and wastewater treatment facility construction and renovation, operation and maintenance of facilities, training of operators, and related public health activities on-Reserve. In 2010 FNWWAP was extended for two more years until 2012, providing an additional \$330 million to improve drinking water in First Nations communities.

In addition to the federally-led initiatives described above, the *First Nations Land Management Act (FNLMA)* came into law in 1999. AANDC’s website explains that *FNLMA* was brought about when a group of First Nation Chiefs brought a proposal to AANDC in 1991 that would allow First Nations to opt out of the *Indian Act* provisions dealing with land and resources, ultimately permitting them to implement their own land management regimes. The proposal, the *Framework Agreement on First Nation Land Management*, was signed by the federal government and 14 First Nations on Feb. 12, 1996 (Windspeaker, 1997). Mullis (2013) explains that, although title to Reserve lands will remain with the federal government, First Nations who sign the agreement will have the authority and jurisdiction to manage their own lands and resources.

Edgar and Graham (2008) stated that the *FNLMA* provides the opportunity for participating First Nations to fill the gap in environmental management created by the federal-provincial jurisdictional gap. In particular, it provides the opportunity for First Nations to address the

regulatory gaps related to environmental protection and assessment, and issues related to land use, including wastewater and solid waste (Edgar & Graham, 2008). According to AANDC's website (last accessed on May 25, 2015), there are currently 94 First Nations who are operating under, or developing, their own land codes under the First Nations Land Management Regime (Regime). As described by AANDC, under the Regime, First Nations may choose to opt out of the 34 land-related sections of the *Indian Act* in order to govern their own Reserve lands and resources, ultimately allowing them to enact laws with respect to land, the environment, and most resources in order to take advantage of economic development opportunities.

Edgar and Graham (2008) explains that First Nations wishing to transition to *FNLMA* must enter into Environmental Management Agreements (EMAs) with the federal government. The EMA outlines how the First Nation will enact environmental protection legislation, including timing, resources, inspection, and enforcement requirements, and identify areas "essential" for each First Nation (Edgar & Graham, 2008). The Agreement identifies solid waste management, fuel storage tank management, sewage treatment and disposal, and environmental emergencies as the four areas that were considered essential for all First Nations (at the time of the signing of the Agreement) (Edgar & Graham, 2008). Edgar and Graham (2008) notes that this list of essential areas is not intended to limit First Nations from addressing other areas of concern specific to its interests and needs, such as DWSWP.

In order to make the transition to *FNLMA*, First Nations must follow the steps outlined by AANDC:

- The First Nation must submit a Band Council Resolution (to their AANDC Regional office or the Resource Center) expressing interest in joining the First Nations Management Regime.
- The First Nation must also complete an Assessment Questionnaire, which assesses five main components identified as strong indicators of success in the Regime: economic development potential; economic development capacity; environmental management experience; governance and communication tools; and any outstanding land issues. This is submitted to their AANDC Regional Office.
- Upon a positive assessment by the Department, a recommendation is made to the Minister to add the First Nation to the Framework Agreement via an adhesion document.

- Once the adhesion document is signed by the Minister and the First Nation, the First Nation is added to the Schedule of the *First Nations Land Management Act*.
- The First Nation must then enter into the Community Approval Process Plan, develop a land code, and negotiate their Individual Agreement, (typically a two-year process).
- After the land code and individual agreement are drafted, both must be brought to the First Nation community for a ratification vote.
- With a successful ratification vote, the Minister will sign the Individual Agreement to transfer administration and control over the First Nation's land and resources to the First Nation. At this point, the 34 sections of *Indian Act* which deal with land, resources, and environment no longer apply to that First Nation.

Finally, AANDC's website explains that there is funding available, intended to support First Nations through the developmental phase and with operational land management activities. Specifically, the developmental funding exists to assist communities with the approval process, development of the land code, and negotiation of the individual agreement. Operational funding is determined through a formula and is set out in the individual agreement.

Due, in part, to community isolation, the federal initiatives described above promote community-specific drinking water protection, such as DWSWP planning, rather than watershed scale planning. Despite the improvements resulting from these federal initiatives, Boyd (2011) and Patrick (2013) indicate that more than thirty percent of on-Reserve water systems continue to pose a high risk to human health due to the potential for water-borne illnesses contracted from contaminated water originating from the community's water system.

2.6.2 Saskatchewan Provincial Government Initiatives

In Saskatchewan, the provision of safe drinking water is the responsibility of the Water Security Agency (WSA). In an effort to do so, the WSA has two guiding documents: their 25-year plan and the *Safe Drinking Water Strategy*, which emphasize source to tap solutions, including DWSWP, to ensure that the drinking water quality needs of all people in the province are met (WSA, 2015). These documents indicate that in Saskatchewan provincial initiatives are carried out at the watershed scale and aim to include all affected parties, including government and non-government organizations, public and private landowners and First Nations as watershed stakeholders. Therefore, although Davies and Mazumder (2003) and White et al. (2012) state that

the provincial government is not responsible for the provision of safe drinking water in First Nations communities, the province is responsible for ensuring the provision of safe drinking water to all people in Saskatchewan. And as part of meeting this responsibility, the WSA invites First Nations to participate in provincially led DWSWP initiatives, such as watershed scale DWSWP planning (WSA, 2015).

2.7 Summary

This literature review indicates that substantial attention has been devoted to drinking water protection in Canada and that the lack of access to safe drinking water in First Nations communities has been well documented. The problems surrounding Canadian water policy are well represented in recent literature, as is support for the value of SWP and DWSWP planning in Canada in general and First Nations in particular. However, there exists a gap in the literature regarding the implementation of plans in general and, more specifically, in identifying those dealing with DWSWP planning and the implementation of the resulting plans in First Nations communities in Canada. This literature review focuses on the problems associated with the ongoing lack of access to safe drinking water in First Nations communities in Canada, the causal factors associated with this problem, and past and current initiatives enacted in an effort to solve the problem. DWSWP planning was identified as a potential solution.

3 RESEARCH METHODS

3.1 Research Design

3.1.1 Rationale

A qualitative instrumental case study was designed to meet the objectives of this research study. Qualitative research intends to answer questions about individuals' experiences of places and events (Winchester & Rofo, 2010). Therefore, it allows for the perspective of the people affected by the problem being researched to be gained (Padgett, 2012). In doing so, qualitative research seeks to emphasize multiple meanings and interpretations of the problem rather than seeking to impose any one 'correct' interpretation (Winchester & Rofo, 2010). Qualitative case study research design was selected for this research because the researcher sought to elucidate the perspective of one First Nations community with regard to the risks of chemical and biological contamination to the groundwater source of their community drinking water supply.

This research design has been applied successfully in two other communities where risks of contamination to drinking water sources and capacity needs for DWSWP planning were identified in Montreal Lake First Nation (Lebel & Reed, 2010) and in the South Saskatchewan River Basin (Rawlyk & Patrick, 2013).

Winchester and Rofo (2010) identified qualitative research methods, such as case study, as effective at collecting information that is often been considered unknowable. Unknowable information is often held by groups of individuals that have had their voices silenced or ignored because colonial structures are in place (Winchester & Rofo, 2010). Due to the colonial structures instituted by the Indian Act of 1876, the perspectives of First Nations in Canada are often not considered during deliberations concerning the environmental impacts of land use decisions resulting in low participation rates of First Nations in watershed scale DWSWP planning (Walters, 2012). Therefore, qualitative research and a single case study design was identified as an effective research methodology to gain the perspective of First Nations with regard to advancing First Nations DWSWP planning to improve access to safe drinking water in First Nations communities in Canada.

3.1.2 Case Study

An instrumental single case study type was selected to provide insight into the problems associated with the implementation of DWSWP plans in First Nations communities. An instrumental case study is used when the case itself is used to facilitate the discovery of something else (Stake, 1995). In this research, the case study was used to discover two things: first, to identify common risks of contamination to drinking water sources; and second, to identify the institutional, financial, human, social, and technical capacity needed to support the process of plan implementation along with any available capacity supports and barriers to accessing the identified supports. Therefore, the DWSWP planning process facilitated the discovery of existing supports for DWSWP plan implementation in First Nations (Stake, 1995).

The single case study approach was appropriate due to the similarity in risks of contamination to source water identified by previous DWSWP studies. The similarity indicated that a single case study was sufficient to verify the continuation of the recorded risks over time and in different locations. The single case study identified the risks of contamination to the groundwater source of drinking water from the perspective of a single First Nations community. This allowed for the identification of capacity needs for implementation of the resulting DWSWP plan. These capacity needs were then compared to the available capacity supports identified during data collection using the document review parameters that identified barriers to accessing and applying the available capacity supports (Figure 3.1).

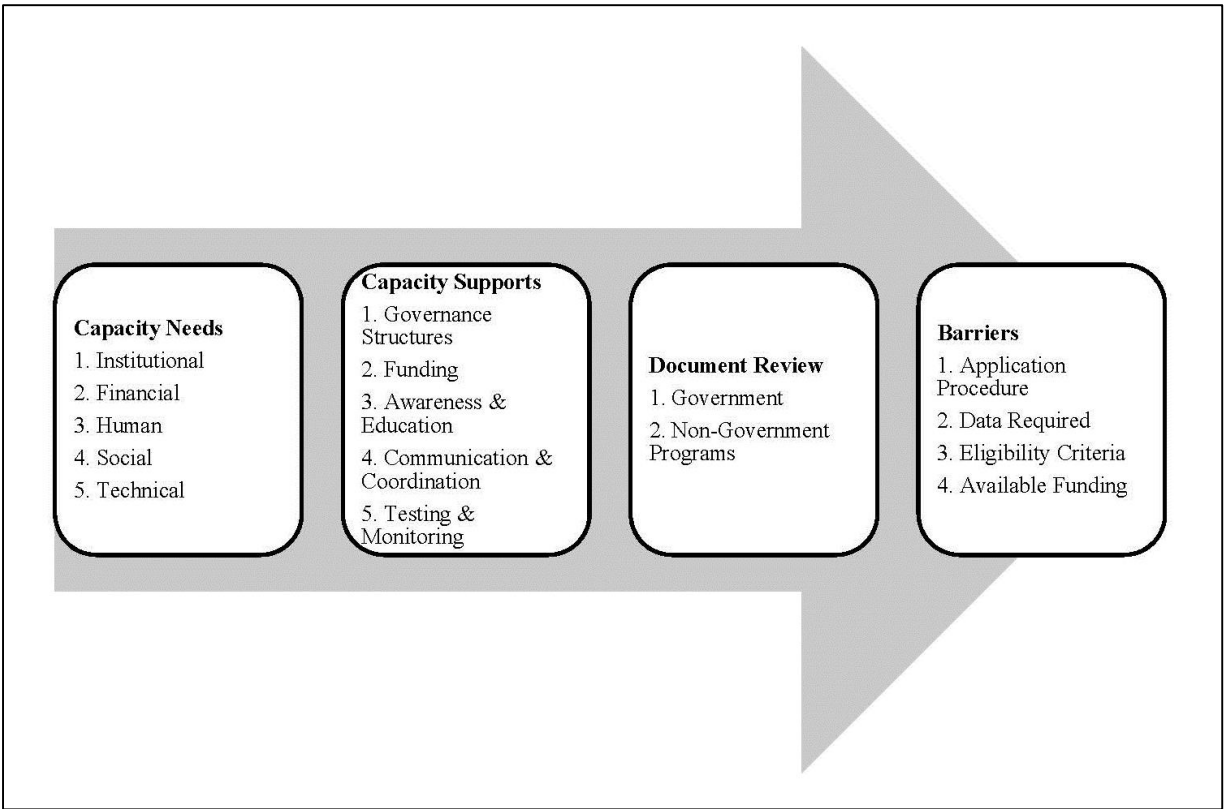


Figure 3.1: Identification of Barriers to DWSWP Plan Implementation

The unit of analysis (case) in the case study was the DWSWP planning process that is embedded in Muskowekwan First Nation. Padgett (2012) explains that case study design (methodology) allows for multiple perspectives of a problem to be gathered. In this research this investigation method allowed for the collection of the individual perspectives of a sample of members from Muskowekwan First Nation regarding risks of contamination to the drinking water source during the DWSWP planning process. This increased the depth and meaning of the data collected (Winchester & Rofo, 2010; Padgett, 2012). The sample of members selected to participate in the case study consisted of the members of the Working Committee. The Working Committee consisted of a broad and inclusive group of members of Muskowekwan First Nation, including an Elder. The Working Committee administered the development of the DWSWP plan, which ensured that broad perspectives and multiple worldviews on water and the environment were captured (AANDC, 2014).

During the case study a DWSWP plan was developed and this was deemed to be an effective means to satisfy the first objective of this research, to identify chemical and biological

risks of contamination to the groundwater used as the raw water source for potable water in the Muskowekwan First Nation community. This conclusion is supported by the results of the existing DWSWP plans developed independently by five First Nations in Saskatchewan, which each identify risks of contamination to the raw water source used for potable water in the respective First Nation (NSRBC, 2015).

The First Nations On-Reserve Source Water Protection Plan Guide and Template (AANDC, 2013) was selected as a tool to guide the case study first because it is the only DWSWP planning tool developed specifically for First Nations to develop their own on-Reserve DWSWP plan. Second, the Guide and Template was selected because it has been recently piloted successfully in two First Nations in Alberta to develop on-Reserve SWP plans (Patrick, 2013). Third, the Guide and Template was selected as a tool to identify existing barriers and supports to the implementation of First Nation DWSWP plans through the development of the implementation strategy. Using the Guide and Template to develop the DWSWP plan was expected to identify the chemical and biological risks of contamination to the drinking water sources. It was also expected that barriers and supports would emerge during the process of identifying stakeholders and potential partnerships, allocating resources and developing an implementation schedule. It was assumed by the researcher that the development of the implementation strategy would elucidate any known or perceived barriers to and supports for the implementation of on-Reserve First Nation DWSWP plans.

3.1.2.1 Case Study Site

The study site, Muskowekwan First Nation in Treaty 4, Saskatchewan, was chosen as the location for the SWP planning process because, prior to this research starting, the band contacted Dr. Robert Patrick to engage him in a DWSWP planning process. Muskowekwan First Nation covers approximately 16,479 acres located in the southeastern portion of the province within the Lower Qu'Appelle River west watershed. It is approximately 270 kilometers southeast of Saskatoon and approximately 140 kilometers northeast of Regina (Figures 3.2 & 3.3).



Figure 3.2: Muskowekwan First Nation location: Source: <http://www.muskowekwan.ca/home> (2015)

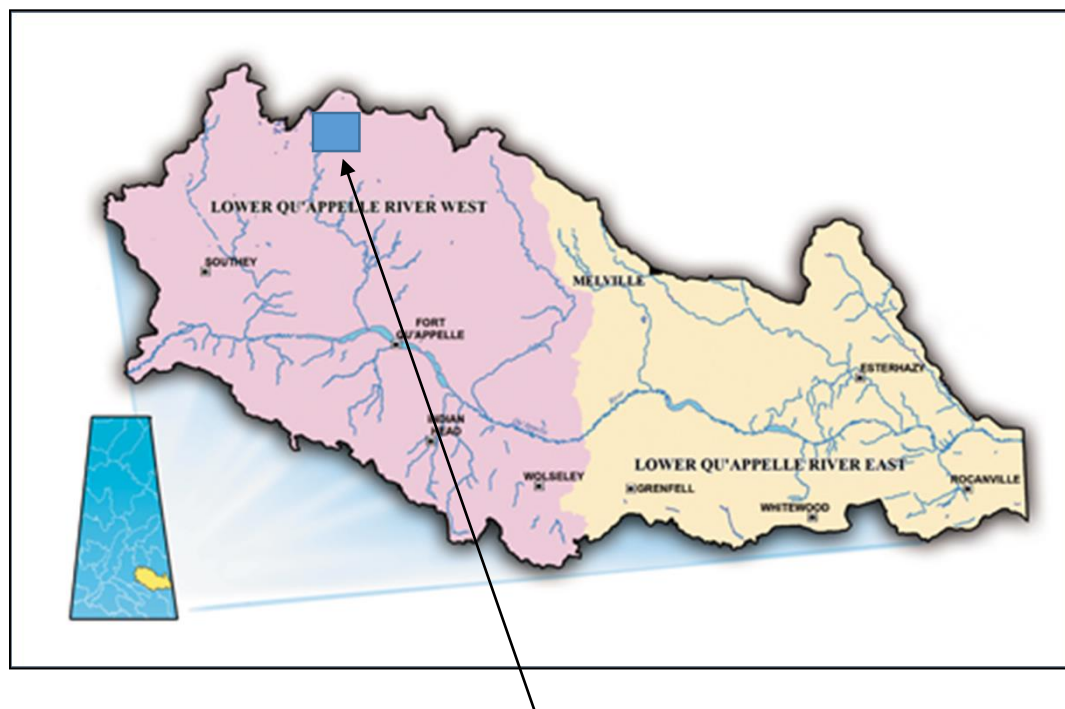


Figure 3.3: Muskowekwan First Nation location within Lower Qu'Appelle Watershed: Source WSA (2013: Cover)

The case study unit of analysis was Muskowekwan First Nation and is bounded first by the DWSWP planning process using the Guide and Template in order to identify risks of contamination to the groundwater source of drinking water in the First Nation along with barriers and supports to the implementation of the resulting DWSWP plan. The case study is further

bounded by the timeframe of November 2013 to May 2014 and by the participants in the DWSWP planning process, the Working Committee. The Working Committee was comprised of a broad and inclusive group of Muskowekwan First Nation band members. The role of the Working Committee was to oversee the DWSWP planning process.

3.2 Research Process and Data Collection

The research process unfolded in six stages. Case study evidence was collected using the following data collection methodologies: literature review, observation, and semi-structured interviews. Data collection methodologies will be described within the relevant stages of the research process. The research process is summarized below.

3.2.1 Community Engagement

Prior to the start of this research, an initial meeting was held on October 7, 2013 during which Dr. Robert Patrick gave a DWSWP protection planning presentation at a Band Council meeting. This presentation was given to inform Band Council members of the importance of DWSWP planning and ultimately to obtain a Band Council Resolution (BCR), permission from Band Council, to move forward with the DWSWP planning process. Muskowekwan First Nation subsequently agreed to participate in this portion of this research. Subsequent to this meeting, a Working Committee was struck comprised of an Elder, band staff, band council members, and band members.

3.2.2 Stage 1: Literature Review

The literature review took place between October 2013 and November 2015. Literature to be reviewed was identified through searches of the Web of Science and Scopus databases, federal and provincial government websites, and via discussions with other researchers. The purpose of the literature review was to discover any available institutional arrangements to support DWSWP plan implementation in First Nations. Each piece of literature was reviewed in order to reveal content that referenced SWP, DWSWP, drinking water source contamination, First Nations access to safe drinking water, and plan implementation.

In doing so, the literature review identified the existence of federal and provincial government legislation, policies, protocols, and initiatives that reference SWP. The program documents associated with these were then selected for further analysis during Stage 6: Document Review. The literature review also revealed data regarding the plan implementation process and

capacity needs to support the implementation of planning documents. These capacity needs form the themes by which the research results are reported and discussed in this thesis.

3.2.3 Stage 2: Community Facilitation: Developing a DWSWP Plan

A DWSWP planning process was facilitated by the researcher and Dr. Robert Patrick, between November 2013 and May 2014. The process of plan development followed the five stages outlined in the Guide and Template (AANDC, 2013), which are similar to those used in non-First Nations DWSWP planning in Canada. The facilitation of the DWSWP planning process provided opportunity to gather data relevant for the research objectives through observation of the First Nations DWSWP planning process. Through the DWSWP planning process, the sources of drinking water and risks of contamination to those drinking water sources were identified, and an implementation strategy was developed by the working committee and recorded in the on-Reserve DWSWP plan document.

The implementation strategy highlighted barriers to implementation through the identification of capacity needs. Supports for implementation were recognized through the identification of programs that might be used as capacity supports. The on-Reserve DWSWP planning process consists of five stages outlined in the Guide and Template (Figure 3.4).

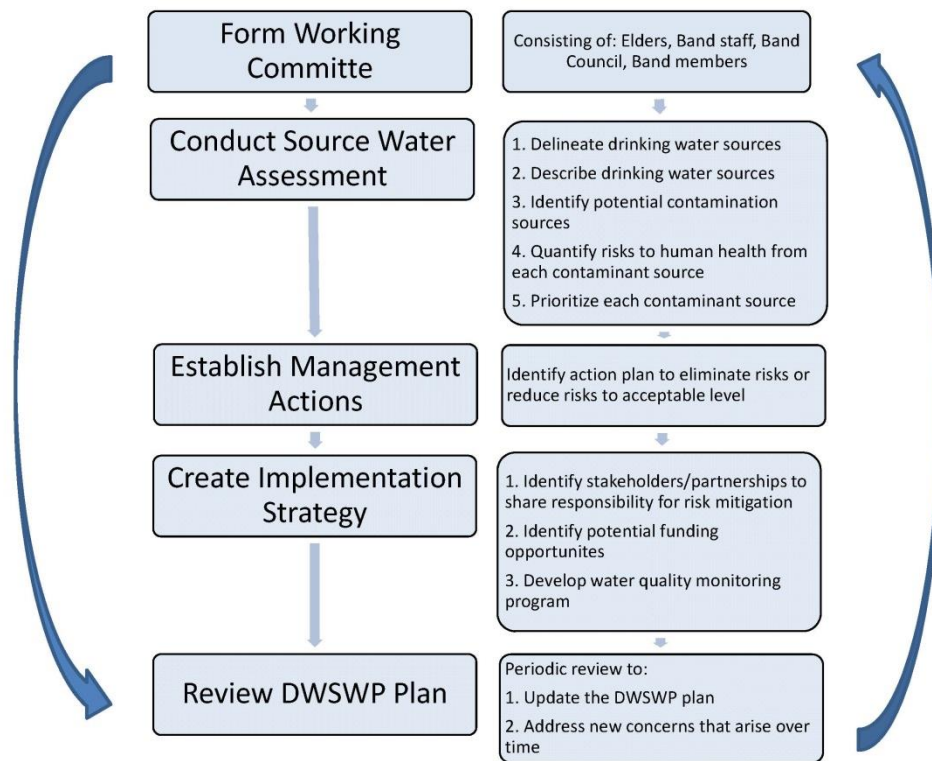


Figure 3.4: Drinking Water Source Water Protection Process: Source: AANDC, 2014:8

Direct observation was used in this process to collect data and took place between January and May 2014 at Muskowekwan First Nation. During the DWSWP planning process, data regarding barriers and supports for DWSWP plan implementation were collected through observation as the working committee strived to assign responsibility and funding sources for each management action. The risks of chemical and biological contamination to source water and the supports for and potential barriers to DWSWP plan implementation, as identified by the Working Committee, were recorded by the researcher (Table 4.6) in the Case Study Results section of this thesis.

3.2.4 Stage 3: Semi- Structured Interview Instrument Development

Data regarding known barriers and supports for the implementation of First Nations DWSWP plans were gathered via semi-structured interviews. Semi-structured interviews were chosen to allow conversation to develop in a way that might elucidate new questions and answers

not directly related to the questions on the interview instrument. A semi-structured interview instrument (Appendix 1) was developed to guide interviews with selected participants in order to identify supports for and barriers to DWSWP plan implementation in First Nations communities. The interview instrument was not pretested before research began. The interview instrument contained eight questions that were developed by the researcher for three reasons. First, to identify existing programs, that is, programs that have been developed and released for use by the provincial and federal governments, which might support DWSWP in First Nations communities and to identify any barriers to accessing these programs for the purpose of implementing DWSWP plans. For the purposes of this research, barriers are defined as anything that makes it difficult or impossible to apply for or use a program for the purposes of implementing a DWSWP plan in a First Nations community. Second, to gain the perspectives of those tasked with providing safe drinking water in First Nations communities with regard to barriers to DWSWP plan implementation. And, third, to identify known capacity needs to support DWSWP plan implementation in First Nations communities. Capacity needs are defined as those needs that, if available, support the community's ability to implement its DWSWP plan.

The interview instrument was developed (Table 3.1) using criteria for successful plan implementation identified in recent literature (Timmer et al., 2007; de Loë & Kreutzwiser, 2005). The criteria included capacity at the local level, including financial and human capacity for implementation (Rawlyk & Patrick, 2013), use of a sympathetic agency with adequate resources to implement the plan, and a supportive policy environment (Joseph et al., 2008).

Table 3.1: Interview Instrument Development

Question	Intent
How does your organisation get involved with Source Water Protection planning?	To identify how the respondent's organization is involved with DWSWP planning.
Please identify programs or policies that you access for Source Water Protection plan making and plan implementation	To discover what programs might exist that could be used to support the implementation of First Nations DWSWP plans. To find out if interviewees knew that existing programs could be used to support First Nations DWSWP plan implementation.
Do those programs and policies apply to First Nations?	
What funding are you aware of for Source Water Protection in First Nations?	
What barriers do you think might prevent Source Water Protection in Saskatchewan First Nations?	To identify any known barriers to the implementation of First Nations DWSWP plans as well as any inferred capacity needs.
What, in your view, is needed to stimulate and support Source Water Protection in Saskatchewan for First Nations?	
Can you suggest any other organisations or individuals that I should contact?	To identify subsequent interviewees using a snowball technique.
Do you have any other comments that you would like to make about Source Water Protection planning in this province in First Nations?	To allow respondents to add information not solicited via the first seven questions. This was expected to expand the researcher's knowledge of the factors associated with the barriers to DWSWP plan implementation as well as the larger problem (lack of access to safe drinking water in First Nation communities) which might not have been garnered from the responses to the previous seven questions.

These questions provided an outline of the existing programs and policies currently being used to support DWSWP planning and plan implementation in First Nations communities from the perspectives of the interviewees. Question two also provided data regarding awareness of existing programs, that is, if the program was identified by an interviewee for the purpose of supporting First Nations DWSWP plan implementation, the response represented awareness of the

program. The interview questions received ethics waiver from the Behavioural Research Ethics Board at the University of Saskatchewan in April 2014.

3.2.5 Stage 4: Participant Selection

Selection of interview participants first used purposive sampling to select respondents involved with the provision of safe drinking water in First Nations and with DWSWP in Canada because it was expected that these individuals would be knowledgeable about the barriers to and opportunities for First Nations DWSWP planning and plan implementation (Padgett, 2012). In addition to purposive sampling, snowball sampling was used to identify new interviewees through referral by initial and subsequent respondents. The sample size was determined to be large enough when no new interviewees or information was obtained through referrals (Bradshaw & Stratford, 2010; Padgett, 2012).

In order to ensure that the perspectives of all stakeholders (those involved with First Nations DWSWP planning) were gathered, individuals from First Nations groups, a river basin council, and the provincial and federal governments were identified and interviewed. These categories of participants were identified as important because they encompass those who are involved in the provision of safe drinking water in First Nations communities and/or with DWSWP (Table 3.2).

Table 3.2: Participant Breakdown

Affiliation	Job Title	Purpose of Selection
River Basin Council	General Manager	Employed by organizations directly involved with DWSWP at the watershed scale in Saskatchewan.
Saskatchewan Government	Watershed Planning Coordinator	
	Program Manager	Employed by AANDC, the federal government department which is directly responsible for the provision of safe drinking water in First Nations communities.
Federal Government	Manager	Because another interviewee suggested that they be included in the interview portion of this research.
	Senior Environment Officer	
	Senior Municipal Engineer	
	Regional Manager	
First Nations	Associate Director	Role as band manager in a First Nations community
	Band Manager	
	Land Manager	Because another interviewee suggested that they be included in the interview portion of this research.
	Program Director	
	Executive Director	

3.2.6 Stage 5: Semi-Structured Interviews

Semi-structured interviews were used to identify barriers to and supports for First Nations DWSWP plan implementation and to identify documents to be reviewed. Each interview participant was provided with a brief outline of the project, the interview instrument, and a copy of the consent form (Appendix 2) via email. Prior to beginning each interview, participants signed and dated the consent form, which included a confidentiality statement outlining how their anonymity will be protected, their right to withdrawal, the purpose of the study, and the projected benefits. One potential interviewee was not comfortable signing the consent form and therefore did not participate in this research.

Interviews took place between June 26 and Sept 5, 2014. Twelve interviews took place: four were conducted in person and eight over the phone. n-person interviews, which were voice recorded, and transcribed verbatim by the researcher. Telephone interviews were not voice recorded; rather the researcher took written notes, which were transcribed. All respondents were provided with a written record of their responses, attached to an e-mail, by the researcher, following the interview. Interviewees were given a minimum of two weeks to review and respond with confirmation that their responses were recorded accurately and to provide any additional information relevant to this research. Additional information consisted of clarification of interview responses and additional information regarding programs identified by the respective interviewee during the interview. This information was provided to the researcher via email. All data that resulted from the interviews were used by the researcher to identify existing programs that might support DWSWP plan implementation in First Nations and to identify barriers and supports for the implementation of First Nations DWSWP plans. This data is presented in Table 4.5 in the Interview Results section.

3.2.7 Stage 6: Document Review

Document review was used to analyze program documents identified during the literature review, interviews, and observation through the First Nations DWSWP planning process for data regarding how each program might be a support for or barrier to DWSWP plan implementation in First Nations communities. Documents were selected for review based on whether the document used SWP in the program description. In the context of this research, document review refers to the process by which the researcher reviewed information contained in the documents related to existing programs, which might support implementation of First Nations DWSWP plans and used SWP in the program description. The document review process includes the identification of programs using three methods, the literature review, case study and interviews. After programs were identified, the documents associated with each program were reviewed. Finally, program

documents were analysed to identify supports for and barriers to First Nations DWSWP plan implementation. This process is delineated in Figure 3.5.

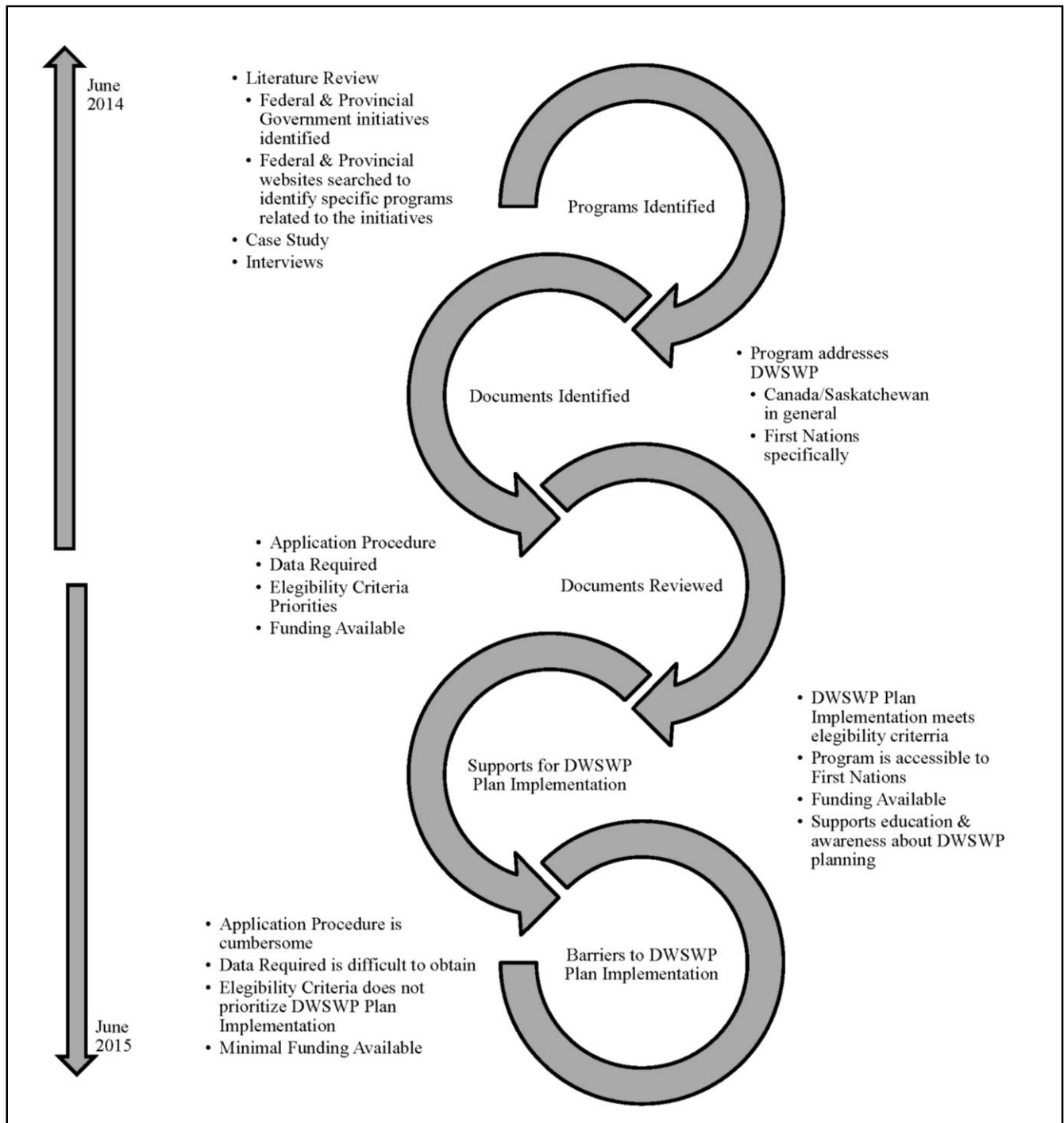


Figure 3.5: Document Review Process

During document review, documents were examined in order to identify policies, programs, and/or tools that might support DWSWP plan implementation in First Nations. Specifically, the documents were analyzed first to identify program accessibility, reflected by the application procedure, data required and eligibility criteria; and funding availability, measured by the amount of funding available, renewability of funding, and eligibility criteria for the allocation of funding. In addition, programs were reviewed to identify those programs that might not provide funds to support DWSWP projects, but that provide training and information regarding planning tools, such as the Guide and Template (AANDC), which could be used to support the implementation of DWSWP plans in First Nations communities. Second, documents were reviewed to identify barriers to accessing the program for the purposes of implementing First Nation DWSWP plans as defined by the document review parameters (Figure 3.6). Third, the documents were reviewed to identify any barriers to the efficient application of these programs, with respect to DWSWP plan implementation in First Nations, primarily defined by the eligibility criteria parameters.

Application Procedure	Data Required	Eligibility Criteria	Funding
<ul style="list-style-type: none"> • Ease of completion: <ul style="list-style-type: none"> • Clear, concise instructions? • Complicated information required? • Multiple steps? 	<ul style="list-style-type: none"> • Easy to attain? • Detailed and specific? • Highly technical? • Responsibility for gathering data? <ul style="list-style-type: none"> • Community? • Consultant? • Government official? 	<ul style="list-style-type: none"> • Priority projects: <ul style="list-style-type: none"> • Water treatment? • Source contamination prevention? • Infrastructure? • Are First Nations eligible? 	<ul style="list-style-type: none"> • Amount of funding available? • Funding renewable over multiple years?

Figure 3.6: Document Review Parameters

3.3 Data Analysis

The methods used to analyze the data at each of the three data collection stages is explained and rationalized. Data analysis took place at each of the three data collection stages followed by data synthesis; this process is described below. Deeper analysis of the data collected using latent analysis allowed for underlying meanings to emerge (Padgett, 2012). Interpretation of the underlying meanings resulted in the emergence of three themes from the content of the data. During this process, known as “coding” the researcher structures the qualitative data for further analysis and discussion (Padgett, 2012; Waitt, 2010). The data was then sorted and classified according to the emergent themes for synthesis of data collected using each of the data collection methods.

3.3.1 Observations

Observational data was analyzed using selective coding to sort the data into three dimensions developed from the research objectives; these are defined in Table 3.3.

Table 3.3: Code Definition

Code	Definition
Risks	Potential sources of chemical and/or biological contamination to source water
Capacity Needs	Institutional, financial, human, social and technical needs for DWSWP plan implementation
Capacity Supports	Legislation and policies which support DWSWP planning and plan implementation
	Programs with capacity support for DWSWP plan implementation

Coded observational data was subsequently sorted into five categories that aligned with the five capacity needs for plan implementation identified (Timmer et al., 2007; de Loë & Kreutzwiser, 2005) for thematic analysis. These were then winnowed down to three themes which emerged from the observational data (Padgett, 2012). This process is shown in Figure 3.7.

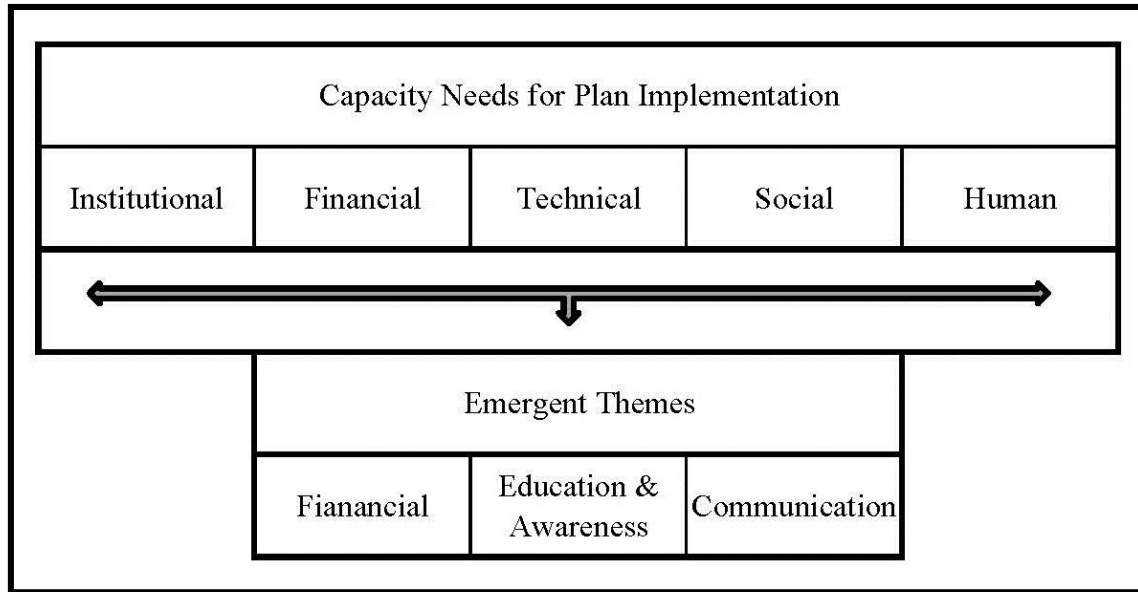


Figure 3.7: Theme Development

3.3.2 Interviews

Interview data was coded using selective coding using the five capacity needs for plan implementation. Next the coded data was analyzed using thematic analysis guided by the three themes developed during observational data analysis (Padgett, 2012). This process is shown in Figure 3.8.

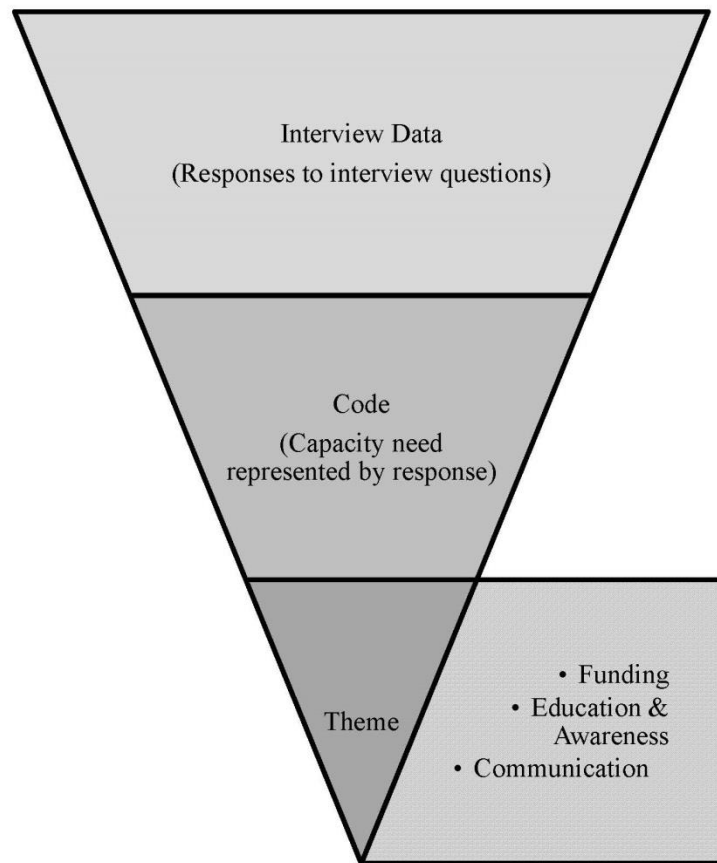


Figure 3.8: Interview Data Analysis

3.3.3 Document Review

Data collected during document review was first documented and described in a table using manifest content analysis (Hay, 2010). Hay (2010) explains that manifest content analysis assesses the visible, surface content of documents. In this research, it was also used to sort the programs according to the four parameters for selection using coding. Next this data was reviewed using latent content analysis to identify each program's suitability for DWSWP plan implementation and sorted into two themes: if the program represented a support for DWSWP plan implementation and any barriers to the program's application for this purpose existed (Padgett, 2012). This process is delineated in Figure 3.9.

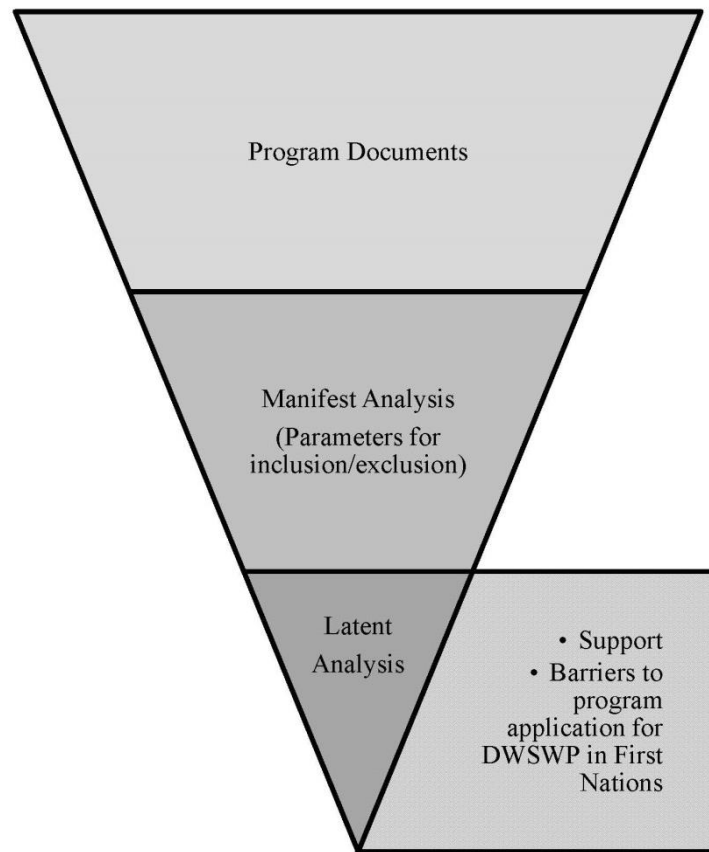


Figure 3.9: Document Review Data Analysis

3.3.4 How data was triangulated

Data obtained during the observation of the First Nation DWSWP process (case study) was supplemented using semi-structured interviews and document review. These two methods of data collection were also used to identify barriers to and opportunities for First Nations DWSWP plan implementation in Canada. Three data collection methods were used to ensure rigour, that is, multiple methods of data collection ensured that the data was both accurate and complete (Padgett, 2012). Rigour was further ensured through the validation of information gathered via case study and interviews during the document review phase of this research (Bradshaw & Stratford, 2010).

Finally, data collected during the case study, interviews and document review, was amalgamated, or synthesized, according to the three themes which emerged during data analysis.

At this stage, documents related to existing programs, identified in the literature review, case study, and interviews, were reviewed to allow for data collected during interviews to be checked. This allowed for the triangulation of data (Figure 3.10) which ensured rigour of the research results (Bradshaw & Stratford, 2010).

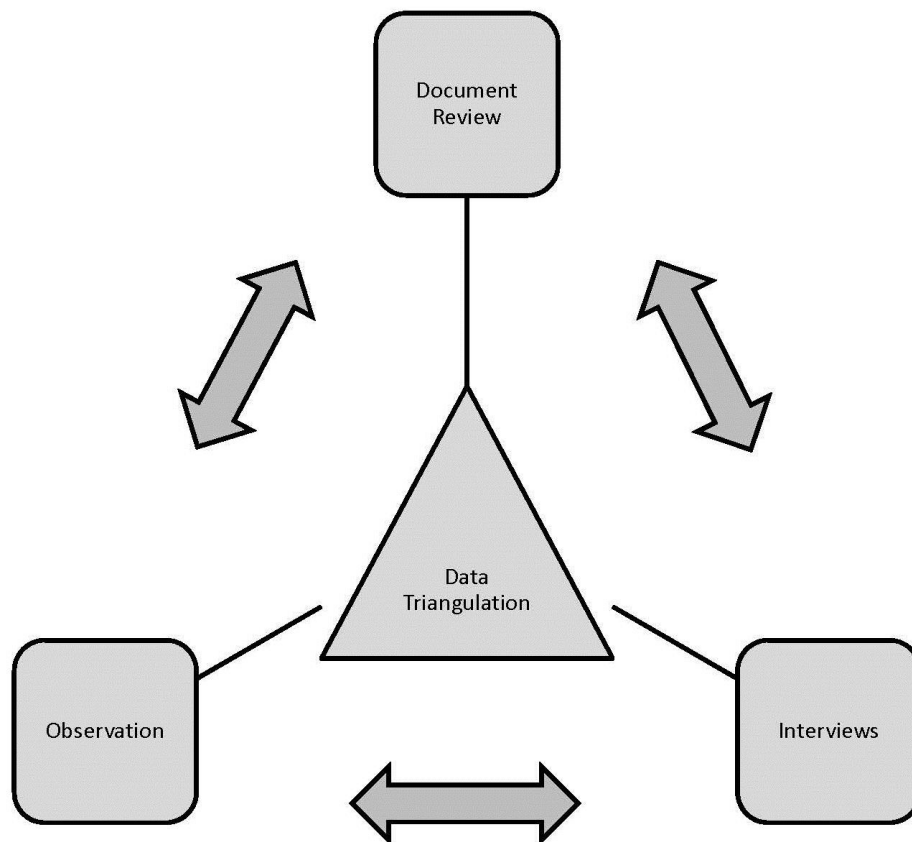


Figure 3.10: Data Triangulation

3.4 Limitations of Methodology

This methodology is limited by the use of a single case study to identify barriers to and opportunities for First Nations DWSWP plan implementation during the development of a DWSWP plan. Although it is possible that some of the barriers to and opportunities for First Nations DWSWP plan implementation identified during the process are unique to Muskowekwan First Nation, the results of the DWSWP planning process revealed significant similarities to those

of other First Nations DWSWP pilot projects using different planning tools. Therefore, the barriers identified during this research can be expected to be transferrable.

The use of semi-structured interviews to verify and supplement the results of the case study increases the validity of the results documented during the DWSWP planning process. The interviewees represent a wide sample of the organizations involved in the provision of safe drinking water for First Nations and with DWSWP planning in Saskatchewan and Canada. However, representatives from Environment Canada declined to participate.

The document review method allowed for the assertions of the working committee and interviewees regarding the applicability and effectiveness of each program to be corroborated. Combined, the three methods were deemed effective in analyzing the early suggestion that the barriers might include inefficient application of available resources intended to improve access to safe drinking water in First Nations communities and that this barrier is due in part to the prioritization of water treatment over DWSWP.

4 RESULTS

The results of this research are divided into three sections that align with the three methods of data collection: observational data collected from the unit of analysis, interviews and document review. These are described below.

4.1 Case Study: Drinking Water Source Water Protection Planning Process (Observation)

4.1.1 Risks

Muskowekwan First Nation's DWSWP plan identified thirty-two risks to their source water and of these the working committee considered over half to be probable or almost certain to take place and to have impacts that are likely to be severe or catastrophic were they to occur (Table 4.1).

Table 4.1: Risks to Source Water - Muskowekwan First Nation:

Contaminant Source	Contaminant of Concern
Lestock Lagoon	Effluent, Chemicals
School Lagoon	Effluent, Chemicals (full basin)
Hunter Lands/ Poitras corner/ old train fill site	Pipe access to Heron Lake, Iron pipe
Private Wells – Treaty Land Entitlement lands	Poor water quality, bacteria
Household Cisterns	Contaminant sources falling in, animals, etc
Septic Outflows	Improper jet out pipe locations - Chemical & biological contamination from untreated wastewater
Old well at Mission Education Centre	Contaminants falling in
Proposed Potash Mine	Salt Tailings
Water treatment plant fill hose	Contamination from dirty hands/gloves when filling private water trucks
Uncapped wells	Contaminants falling in
Improper storage of old household heating fuel tanks, vehicle gas tanks	Gas, oil, propane, antifreeze
Town of Lestock sewer pipes	Effluent
Outside contractors	Improperly dumped vehicle fluids
Trains – potential derailments	Diesel, unknown chemicals

Table 4.1: Risks to Source Water – Muskowekwan First Nation, cont'd:

Contaminant Source	Contaminant of Concern
“Indian lawnmowers” - Fire	Potential contaminants being burned, possible damage to Water Treatment Plant & well heads by fire
Flooding	Increasing rain events might increase chemical contamination from overland drainage (non-point source pollution)
Abandoned houses	Break down of building materials, underground septic
Abandoned vehicles	Vehicle fluids, batteries
Illegal dumping – including former garbage sites	Mice, animals, dogs, dead animals, batteries, appliances, propane tanks
Animal carcasses	Bacteria and waste from animal bodies
Agriculture – Treaty Land Entitlement Lands	Chemicals, fertilizer spills, spraying of pesticides and herbicides
Horses & Dogs	Animal waste, rodents
Diesel Shed (improper storage)	Diesel, Chemicals, empty tanks
Backyard mechanics	Improperly dumped vehicle fluids
Macza Lands (former cattle feed lot)	Chemicals, oil, storage barrels
Designated garbage sites – unlined – Used by Band garbage truck	Mice, animals, dogs, dead animals, batteries, appliances, propane tanks
Decommissioned garbage site – Mission, etc	Mice, animals, dogs, dead animals, batteries, appliances, propane tanks
Transport trucks – deliveries to Muskowekwan	Road debris/contaminants, potential spills
Hide Plant	Animal waste/hides
Acid rain	Unknown contaminants
Lambert Lands Lagoon	Effluent
Climate change effects	Unknown contaminants

The eighteen risks shown in bold in Table 4.1 are similar to the seven risks commonly identified in previous First Nations DWSWP plans listed in Table 4.2.

Table 4.2: Commonly Identified Risks to First Nations Drinking Water Sources

Risk to Source Water
Abandoned wells
Leaching from wastewater, including sewage lagoons and household septic outflows
Waste disposal, including landfills, and improper disposal of household waste & fuel containers
Leaching from agricultural operations, both on- and off-Reserve
On-site septic systems
Leaching from Industrial effluent
Leaching from fuel storage

4.1.2 Problems of Adjacency

Problems of adjacency in the context of this research refer to risks of contamination resulting from adjacent land uses. The Working Committee recorded leaching from nearby agricultural and industrial operations as significant risks to Muskowekwan First Nation's groundwater drinking water source. They also identified risks of contamination arising from the adjacent town of Lestock, which is surrounded by Muskowekwan First Nation's Reserve lands, as a significant risk. The risks from Lestock were recorded as potential contamination originating from Lestock's wastewater.

4.1.3 Implementation Strategy

An implementation strategy was developed, beginning with assigning immediate and long-term management actions to mitigate each of the risks identified during the DWSWP planning process. Next potential stakeholders and/or partnerships that might be established to address each of the risks were identified for each of the management actions and a timeline for the implementation of the DWSWP plan was developed (Table 4.3).

Table 4.3: Implementation Strategy

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
Lestock Lagoon	<p>Immediate Action: Build a new one, relocate. Cost share with town of Lestock</p> <p>The proposed mine will need a lagoon, possible to combine efforts?</p> <p>Contact AANDC</p> <p>Longer term:</p>	<p>Lestock Council</p> <p>FCM funding?</p>	<p>Start:</p> <p>Complete:</p>
School Lagoon	<p>Immediate Action: Relocate and rebuild. This is in the works</p> <p>AANDC/Muskowekwan/PMT for lagoon</p> <p>Application now to AANDC</p> <p>Longer term:</p>	<p>AANDC</p>	<p>Start:</p> <p>In progress</p> <p>Complete: To be determined</p>
Private Wells – Treaty Land Entitlement lands	<p>Immediate Action: 6 wells nearby; 8 wells in total</p> <p>Do Not Consume; Ecoli; total coliform</p> <p>Individual band member homes</p> <p>Chlorine shock treatment (February, 2014)</p> <p>Pump the well down, then shock treat</p> <p>Dept of Health issue a do not consume/boil water advisory</p> <p>Longer term: Install cisterns and add to trucked water delivery system</p>	<p>Muskowekwan Band</p>	<p>Start:</p> <p>In progress</p> <p>Complete: On going</p>
Hunter Lands/ Poitras corner/ old train fill site	<p>Immediate Action: Remove pipe extending from pit to Heron Lake and fill the hole.</p> <p>Contact CN Rail for responsibility</p> <p>Longer term:</p>	<p>Muskowekwan Band</p> <p>CN – possible partner</p>	<p>Start:</p> <p>After April 15, 2014</p> <p>Complete: ASAP</p>

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
Household Cisterns	<p>Immediate Action: Cistern annual cleaning, 500 gal. Neck of cistern not above ground, necks/tanks get damaged by truck driver. Train driver to stop 15 feet before cistern neck, longer fill hose, new truck needed? Hook up houses near village to the village main line. Application now to AANDC. Neck extension on each tank. Use of the produce ZIPEX as a grout repair for cisterns. Current truck 2700 gals. Proposed new truck 4000 gal. Longer term: Move to low pressure water systems at each home (application to AANDC in process?)</p>	AANDC	<p>Start:</p> <p>In progress</p> <p>Complete: On going</p>
Septic Outflows	<p>Immediate Action: Extend pipe, might require larger diameter pipe and stronger pumps. Public education Longer Term: upgrade to in-ground septic system; possible revenue source through sale of liquids for fertilizer.</p>	Muskowekwan maintenance budget	<p>Start:</p> <p>In progress</p> <p>Complete: On going</p>
Old Well at Mission Education Centre	Check status – probably already solved		<p>Start:</p> <p>Complete:</p>
Proposed Potash Mine	Getting more information		<p>Start:</p> <p>Complete:</p>

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
Water treatment plant fill hose	Immediate Action: Clean end of each day Monitor usage Signage for users (for potable use only??) Public information Reduce length of hose? Longer term:	Muskowekwan Band	Start: ASAP Complete:
Uncapped wells	Immediate Action: Identify all well locations; cap securely – possibility that data exists from seismic activity – check with Chief & Encanto Longer term: decommission all wells	Possible grad student project – GIS mapping Possible funding source: Water Security Agency	Start: Complete:
Improper Storage of old household heating fuel tanks, vehicle gas tanks	Immediate Action: collect tanks and dispose of them (underway); ask Bullich if they are interested in collecting tanks for scrap every 6 months as tanks are collected (Band to pick up from homes & store at landfill); create area at landfill to store recyclable materials; signage to direct people to place recyclable items in proper location; educate students about which items are recyclable & what is a fair good & how to recycle them for profit Possible summer student job – scrap collection & recycle for revenue Longer term:	Muskowekwan Band	Start: Summer 2014 Complete: On going

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
Town of Lestock sewer pipes	<p>Immediate Action: clean sewer pipes & truck effluent to waste management facility (underway)</p> <p>Longer term: find new outlet/lagoon for effluent and/or install wastewater treatment facility in Lestock</p> <p>Possible business opportunity: collect liquids for use as fertilizer</p> <p>Longer term:</p>	<p>Lestock Council</p> <p>Responsibility: Provincial Government to fix the problem for town of Lestock; Federal Government to clean up Band land; INAC, Federal & Provincial governments need to work together to solve</p>	<p>Start:</p> <p>Up to Lestock</p> <p>Complete:</p>
Outside contractors	<p>Immediate Action: contracts to include information to direct contractors to “pack out what they pack in”</p> <p>Longer term: enforce contract obligations; develop infrastructure to mediate/prevent this problem eg. Diesel fill station to have proper pad.</p>	<p>Muskowekwan Band</p> <p>Contractors</p>	<p>Start:</p> <p>Immediate</p> <p>Complete: On going</p>
Trains – potential derailments	<p>Immediate Action: emergency training/planning; prevention through maintenance; remediation after spills to protect water source (CN already does this)</p>	<p>CN Rail</p>	<p>Start:</p>

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
	Longer term: detailed identification on outside of rail cars with dangerous goods; call CN when a spill occurs (use number on sign at crossings)	Muskowekwan Band	In progress Complete: On going
“Indian lawnmowers” - Fire	Immediate Action: protect Water treatment Plant & well heads by adding fire guards, sand, pit rock, fire retardant streetscaping, etc.; education – “no fire days” Erect fence around well heads Longer term: prevention is the key	Muskowekwan Band	Start: Summer 2014 Complete: On going
Flooding	Immediate Action: Move flood water to less sensitive areas (pumping); use flood mitigation strategies such as sand bagging in sensitive areas such as lift station; monitor flood prone areas; flood awareness.	Muskowekwan Band	Start: Now Complete: On going
Abandoned houses	Immediate Action: board up Longer term: remove septic & cisterns and & other hazardous materials; cap/decommission wells; move and reuse if possible; demolish ones that are too far degraded	Muskowekwan Band	Start: In progress Complete: On going
Abandoned vehicles	Immediate Action: Solved Longer term: Monitor	Muskowekwan Band	Start: Complete: On going

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
Illegal dumping – including former garbage sites	Immediate Action: Use contracts to ensure that contractors dispose of waste properly (remove from Muskowekwan or take to landfill); relocate existing garbage to the proper location – landfill or fare goods collection site Longer term: education; signage	Muskowekwan Band	Start: Summer 2014 Complete: On going
Animal carcasses	Immediate Action: lease agreement to enforce proper disposal of livestock carcasses on leased lands; proper disposal of Band generated hunting carcasses; education Longer term:	Muskowekwan Band	Start: In progress Complete: On going
Agriculture – Treaty Land Entitlement Lands	Immediate Action: use lease agreements to enforce Best Management Practices; obtain full information as to what chemicals are being used Longer term: Restrict fertilizer use near the community by encouraging crops that do not need fertilizers; use community gardens as a buffer between crops and the community	Muskowekwan Band Lessees	Start: In progress Complete: On going

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
Horses & Dogs	Immediate Action: confine them; bylaws to keep horses out of the village & dogs from roaming; education; spay & neuter program – ie. Fort Qu'Appelle program: 2 free per household Longer term:	Muskowekwan Band Lessees	Start: In progress Complete: On going
Diesel Shed (improper storage)	Immediate Action: Remove shed & sell tanks; remediate the land – excavate & haul away Longer term:	Muskowekwan Band	Start: In progress Complete: Fall 2014
Backyard mechanics	Immediate Action: education; encourage Band members to use free legal dumping service at Lestock Coop Longer term: Monitor	Muskowekwan Band	Start: Spring/summer 2014 Complete: On going
Macza Lands (former cattle feed lot)	Immediate Action: Longer term: education – discuss with owners about the potential risks from this	Muskowekwan Band – Macza partnership	Start: Unknown at this time Complete:
Designated garbage sites – unlined – Used by Band garbage truck	Immediate Action: separation of waste into categories; education of garbage man; signage to direct different categories to proper location; education in school about better waste management practices – recycling, fare goods, reuse, composting, etc.	Muskowekwan Band	Start:

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
	Longer term: 5-year plan to get INAC funding for landfill upgrades; Loraas bin instead of new landfill; hire land fill attendant	INAC	Summer 2014 Complete: On going
Decommissioned garbage site – Mission, etc	Immediate Action: remove fare goods & other recyclable materials (Bullich); Longer term: decommission – reduce by burning & bury; education	Muskowekwan Band	Start: 2014 Complete: 5yr Plan (2019)
Transport trucks – deliveries to Muskowekwan	Immediate Action: Address at next Justice meeting with RCMP – request speed control measures (radar, etc); emergency response training Longer term: Press Department of Highways for passing lane (previously denied)	Muskowekwan Band – discuss with RCMP	Start: In progress Complete: On going
Hide Plant	Immediate Action: education – discuss with owners about the potential risks from this; investigate/enquire about water management Longer term:	Muskowekwan Band – Hide Plant owners partnership	Start: Unknown at this time Complete:
Acid rain	Immediate action: Monitor global environmental risks to evaluate threats Longer term:	Muskowekwan Band	Start: Complete: On going

Table 4.3: Implementation Strategy, cont'd

Contaminant Source	Management Actions	Stakeholders/ Partnerships	Proposed Timeline
Lambert Lands Lagoon	<p>Immediate Action: monitor</p> <p>Longer term: fill/decommission if necessary</p> <p>Longer term: couple with mine development – use dirt from mine construction to fill lagoon</p>	Muskowekwan Band	<p>Start:</p> <p>Complete: 5yr Plan</p>
Climate change effects	<p>Monitor; promote self-sufficiency practices such as community gardening & greenhouses</p> <p>Longer term:</p>	Muskowekwan Band	<p>Start:</p> <p>Summer 2015</p> <p>Complete: On going</p>

4.1.4 Barriers and Supports

The management actions were reviewed and the programs that might support DWSWP plan implementation, as well as any existing barriers to First Nations DWSWP plan implementation, were identified from the perspective of Muskowekwan First Nation as the working committee laid out the implementation strategy for their DWSWP plan. The risks to the groundwater source of drinking water identified by the Working Committee were examined and this research documented the six most direct risks to the community's drinking water source. These are outlined in Table 4.4 in the order of significance to Muskowekwan First Nation, along with the associated barriers and supports for DWSWP plan implementation identified by the working committee.

Table 4.4: Threats to Source Water, Barriers and Supports to DWSWP identified by Working Committee

Threat to Source Water	Barriers to DWSWP plan implementation	Supports for DWSWP plan implementation
Leaching from wastewater lagoons – both on-Reserve and from Lestock	Lack of funding; Lack of coordination with adjacent land users	1a) AANDC funding through annual capital budget; 1b) Cost sharing with the Province and adjacent town; 1c) Cost sharing with future mine operation; Increase communication
Abandoned wells	Lack of adequate funding for well decommissioning	Saskatchewan WSA identified as possible funding source.
Leaching from household septic outflows	Lack of funds	Annual Band maintenance budget
Contamination from discarded fuel tanks	Lack of education regarding proper disposal. Lack of funds to pay Band members to collect and properly dispose.	1a) Create summer student position; 1b) Contract off-Reserve business to purchase recyclable materials from the Band.
Leaching from garbage disposal (including illegal dumping and designated landfills)	Lack of education regarding proper disposal. Lack of adequate funding to decommission improper garbage dumps and create new landfills.	1a) Annual Band maintenance budget; 1b) Sale of fare goods to off-Reserve contractor; Education about recyclable goods.
Leaching from agricultural operations – both on-Reserve lands and on adjacent off-Reserve lands	Absence of mechanisms to reduce potential contamination	Effective use of lease wording to restrict chemical use in close proximity of the community's water source. Increase communication with adjacent landowners

The barriers to DWSWP plan implementation identified in Table 4.4 above indicate that these fall into three broad themes: funding, education and awareness, and communication. The

results from the DWSWP planning process are discussed below as they pertain to each of these themes.

4.1.5 Funding

Observational data suggests that financial capacity for First Nations DWSWP plan implementation is lacking. The costs incurred during the planning process amounted to approximately \$4000 and all salaries were in-kind contributions. While the Working Committee was able to develop an implementation strategy, accessing the required funds to complete the implementation of the DWSWP plan remained a challenge for them. Possible supports that could be applied to the costs associated with the implementation of the DWSWP plan were identified. The Working Committee repeatedly noted that the monies to implement the DWSWP plan would need to come out of their annual maintenance budgets. They were not aware of any government or non-government programs that could be applied to for funding to cover any of the implementation costs.

4.1.6 Education and Awareness

Human, social, technical, and institutional capacity merged to produce the emergent theme, education and awareness. Education and awareness was identified as a barrier to DWSWP plan implementation in two ways during the DWSWP planning process. First, the working committee identified deficiencies in human and technical capacity expressed as a lack of education and awareness into the connection between specific land uses and contamination of their source water as significant. This was apparent in the discussions surrounding management actions to deal with improper disposal of garbage, including discarded fuel tanks and leaching from sewage lagoons and household septic outflows.

Second, the working committee was not aware of any large scale funding programs under which DWSWP plan implementation was eligible for funding. This indicates a lack of social and institutional capacity.

4.1.7 Communication

The working committee expressed a lack of social capacity in the context of the need for better communication with off-Reserve stakeholders and government and non-government organizations as important to the successful implementation of their DWSWP plan. In particular, the implementation strategy identified communication and coordination with the town of Lestock

and the provincial and federal governments as crucial to dealing with the problems of adjacency that have resulted from contamination from Lestock's sewage lagoon.

In addition, partnerships with other external stakeholders, such as adjacent agricultural and industrial land users and the Lower Qu'Appelle Watershed Stewards Inc, require better communication in order to provide support to the implementation of the DWSWP plan. During the development of the implementation strategy, the working committee identified several stakeholder partnerships that, if developed, would help ensure the successful implementation of Muskowekwan First Nation's DWSWP plan.

4.2 Interviews

Twelve semi-structured interviews using an interview instrument were conducted with organizations and individuals associated with SWP, with DWSWP, and with the provision of safe drinking water in Canada in general and in First Nations communities specifically. The twelve interviews took place between June 26 and Sept 5, 2014.

Interviewees were sorted into categories based on their jurisdictional affiliation. In order to identify support from programs two criteria were used: financial capacity defined as evidence of funding, and technical and institutional capacity defined as the availability of tools that might help to support First Nations DWSWP plan implementation. These categories and the programs supporting DWSWP in First Nations communities identified as a result of questions 1 and 2 are shown in Table 4.5.

Table 4.5: Programs identified by Interviewees

Affiliation	Job Title	Program	Capacity Supports
River Basin Council	General Manager	1) Growing Forward 2) Environmental Damages Fund	1) Could be used to fund implementation
			2) Fines are levied for environmental damage; Fines fund the fund; Communities apply for funding for environmental projects.
Saskatchewan Government	Watershed Planning Coordinator	1)Saskatchewan Water Security Agency's Planning and Implementation Program; 2) Farm and Ranch Water Infrastructure Program	1) Not solely dedicated to First Nations DWSWP; No WSA funding at this time for DWSWP in First Nations; Funding would be directed through efforts to develop a watershed plan that would typically seek to address community based SWP efforts; potential partnerships with existing watershed stewardship groups. 2) Well-decommissioning; potential partnerships with existing watershed stewardship groups.
	Program Manager	Not sure if there is any	N/A

Table: 4.5: Programs identified by Interviewees, cont'd

Affiliation	Job Title	Program	Details
Federal Government	Manager	First Nation Water and Wastewater Action Plan	\$330 million nationally/year over 2 years; priority system set up to deal with water treatment plants first - resources are lacking.
	Senior Environment Officer	Lands and Economic Development Services Program	Not specifically for DWSWP; DWSWP could be eligible; DWSWP might not be a high enough priority; applicable to plan making and implementation.
Federal Government	Senior Municipal Engineer	Capital Facilities and Maintenance Program	Annual funding for operation and maintenance of water and wastewater assets; could be used for plan making and implementation.
	Regional Manager	Not aware of any for either plan making or plan implementation	N/A
First Nations	Associate Director	None	None
	Band Manager	None	N/A
	Land Manager	First Nation Water and Wastewater Action Plan	Ensures proper farming practices are occurring; 50/50 cost share on projects for fencing/dugouts, 90% of costs covered for well decommissioning
	Program Director	None specifically	N/A
	Executive Director	Market Housing Funds	Intended to be used to support housing; Will also sponsor housing policies - DWSWP might fall under this.

Two questions on the interview instrument that were used to identify the programs that interviewees' view as necessary to advance DWSWP planning and implementation in First Nations communities. Table 4.6 summarizes the responses by eleven of the interviewees to these

questions in terms of barriers and supports. One of the twelve respondents declined to answer these two questions.

Table 4.6: Barriers and Supports by Interviewee

Affiliation	Job Title	Reported Barriers to DWSWP	Capacity Needs to support DWSWP Plan Implementation
River Basin Council	General Manager	<ul style="list-style-type: none"> • Absence of seed money to get DWSWP process started; • DWSWP might not be a high enough priority with respect to other issues on reserve 	<ul style="list-style-type: none"> • Someone from "grassroots" to lead the process rather than government; • First Nations involvement from ground up; • Money to implement the plan

Table 4.6: Barriers and Supports by Interviewee, cont'd

Affiliation	Job Title	Reported Barriers to DWSWP	Capacity Needs to support DWSWP Plan Implementation
Saskatchewan Government	Watershed Planning Coordinator	<ul style="list-style-type: none"> • Lack of funding; • Lack of technical support; • Lack of cooperation between First Nations and adjacent land users; • Political turn over 	<ul style="list-style-type: none"> • Leadership; • Identification of responsibility for DWSWP; • Funding; • Education for "local champions" to lead the process; • Assignment of responsibility for DWSWP to a single overarching body to lead and teach the process to individual First Nations; • Showcasing of successful DWSWP initiatives and implementation pieces
	Program Manager	N/A	N/A

Table 4.6: Barriers and Supports by Interviewee, cont'd

Affiliation	Job Title	Reported Barriers to DWSWP	Capacity Needs to support DWSWP Plan Implementation
Federal Government	Manager	<ul style="list-style-type: none"> • Lack of money; • People are not convinced that DWSWP is a priority 	<ul style="list-style-type: none"> • Education about the importance of DWSWP; • Pilot projects to showcase the good that comes from DWSWP planning; • Train Circuit Riders in DWSWP and have them take the information to their communities; • Get the information about the importance of DWSWP to decision makers with the authority to budget the money for DWSWP • Shift in thinking from treatment as priority to DWSWP as priority in terms of water management

Table 4.6: Barriers and Supports by Interviewee, cont'd

Affiliation	Job Title	Reported Barriers to DWSWP	Capacity Needs to support DWSWP Plan Implementation
Federal Government	Senior Environment Officer	<ul style="list-style-type: none"> • Benefits of DWSWP not always visible; • Lack of knowledge and training within First Nations; • Linkage between upstream and downstream uses is missing; • Lack of funding; • Federal Government has chosen to prioritize treatment of drinking water over DWSWP; • Other issues on reserve take priority over DWSWP 	<ul style="list-style-type: none"> • Policy decision to produce DWSWP plans needs to be made; • Application of funds for DWSWP planning; • Set DWSWP as a policy priority within the Environmental Department

Table 4.6: Barriers and Supports by Interviewee, cont'd

Affiliation	Job Title	Reported Barriers to DWSWP	Capacity Needs to support DWSWP Plan Implementation
Federal Government	Senior Municipal Engineer	<ul style="list-style-type: none"> • Many First Nations are overwhelmed financially by the operation of their water treatment systems; • DWSWP might not be a high enough priority amidst other issues on reserve; • Lack of knowledge about DWSWP planning; • Lack of education for on reserve decision makers regarding DWSWP 	<ul style="list-style-type: none"> • Communication plan; • Circuit Riders could be educated on DWSWP and spread the message to Chief and Council; • Facilitator to lead the planning process
Federal Government	Regional Manager	<ul style="list-style-type: none"> • Confusion as to who is responsible for DWSWP in First Nations; • Financial and human capacity lacking; • Historical grievances between land users regarding land and water management 	<ul style="list-style-type: none"> • Clarification of roles and responsibilities; • Partnerships between First Nations and adjacent land users; • Financial resources; • More education and information about DWSWP

Table 4.6: Barriers and Supports by Interviewee, cont'd

Affiliation	Job Title	Reported Barriers to DWSWP	Capacity Needs to support DWSWP Plan Implementation
First Nations	Associate Director	<ul style="list-style-type: none"> • Lack of access to resources; • Lack of collaboration between First Nations and adjacent land owners/users; Lack of recognition that First Nations retain rights to their traditional territories and want to be involved in watershed discussions 	<ul style="list-style-type: none"> • Posting of successful DWSWP planning examples on websites accessed by First Nations; • Provincial support for First Nation DWSWP; • Better collaboration; • Ongoing training from operator to management level; Effective DWSWP Guide and Template
First Nations	Band Manager	<ul style="list-style-type: none"> • Lack of funding • Chief and Council often approve projects with economic benefits that might damage the environment 	<ul style="list-style-type: none"> • Money to pay people to assist with DWSWP planning
First Nations	Land Manager	<ul style="list-style-type: none"> • Rights to water is not defined; • Boundaries between adjacent land users over water bodies are not defined; • Lack of laws regarding water protection; • Lack of funding 	<ul style="list-style-type: none"> • Awareness by all parties - Federal, Provincial and First Nations about the importance of DWSWP

Table 4.6: Barriers and Supports by Interviewee, cont'd

Affiliation	Job Title	Reported Barriers to DWSWP	Capacity Needs to support DWSWP Plan Implementation
First Nations	Program Director	<ul style="list-style-type: none"> • Lack of adequate training; • Lack of funding for DWSWP planning training; • Lack of access to information; • Lack of consultation; • Lack of communication from AANDC to First Nations 	<ul style="list-style-type: none"> • Access to information; • Access to training; • Training dollars; • Funding to secure technicians and planners; • Long-term planning on-Reserve
First Nations	Executive Director	<ul style="list-style-type: none"> • Lack of awareness; • Lack of funding; • Weak environmental legislation; • Absence of connection between land use and DWSWP; • Lack of human and financial capacity within First Nations; • Lack of communication 	<ul style="list-style-type: none"> • Set up DWSWP programs in communities; • Political awareness of the importance of DWSWP; • Better communication with adjacent land users; • Good neighbour relationships

The three emergent themes related to the barriers to DWSWP plan implementation, which emerged from the DWSWP planning process, also emerged from the interview data. This is described below.

4.2.1 Funding

All of the respondents noted that DWSWP plan implementation requires dedicated funding. The interviews indicated that there is significant confusion regarding how DWSWP plan implementation should be funded. Two interviewees stated that currently it appears that the money is expected to come from core funds allocated annually by AANDC to each First Nation for their community's operation and maintenance costs and that these costs include a wide array of expenditures in areas such as housing, infrastructure, water treatment, and social welfare. These respondents and two others noted that these funds are currently inadequate when compared to the actual monetary needs of virtually all of the First Nations communities in Canada with regards to 'operation and maintenance.' One interviewee noted that "this funding is most often used up by administration costs 'just keeping the lights on' and paying staff salaries" and another stated that this "limited annual funding is eaten up by higher priorities on-Reserve so there is no money left for DWSWP."

It is important to note that interviewees indicated that currently it appears that funding for First Nations DWSWP plan implementation is the federal government's responsibility because safe drinking water falls under their jurisdiction. However, interviewees also suggested that funding for DWSWP plan implementation could be derived from non-government programs and/or partnerships with other stakeholders within the watershed, such as industrial operations. This suggests that increased social capacity might lead to increased financial capacity for DWSWP plan implementation. Eight government and non-government programs were identified as potential funding sources by interviewees, which suggests that financial supports for DWSWP plan implementation is available, but that awareness regarding the eligibility of DWSWP plan implementation under these programs is lacking.

4.2.2 Education and Awareness

Social, human, and technical capacity, expressed as education and awareness around DWSWP and why it is important, was identified as necessary for the advancement of DWSWP plan implementation by nine of the twelve respondents. These respondents also reported that education and awareness is lacking and that perhaps it is one reason that DWSWP is not assigned a higher priority. For example, the Federal Government's choice to prioritize treatment of drinking water over DWSWP in First Nations indicates that lack of awareness might start there. Furthermore, one respondent stated that "as a result [of the ongoing prioritization of treatment over

DWSWP] those of us who have been in the industry for 30+ years have this mindset and it will likely endure until us old dogs retire.”

Second, one First Nations interviewee noted that awareness of the connection between land use planning and DWSWP planning is absent, indicating a lack of technical capacity. Therefore, the link between activities that support economic development, such as mining, and the possibility of contamination to water sources from these activities is often missing. One First Nations respondent stated that “Chief and Council often approve projects with economic benefits that might damage the environment.” This comment suggests that, at times, a choice between environmental protection and economic development for the community must be made and that often economic development is of a higher priority, which suggests a lack of institutional capacity to support environmental protection. Furthermore, two respondents suggested that, because the direct benefits of DWSWP might not always be readily visible, the importance of it might be missed. These respondents suggested that, if more DWSWP pilot projects were conducted and the resulting plans were posted on websites that are commonly accessed by First Nations people, awareness could be raised.

Third, access to training resources (technical capacity) was reported by interviewees to be lacking. This includes training for Chief and Council on the importance of setting DWSWP as a priority at least on par with economic development. It also includes training for band staff, such as land managers about how to conduct DWSWP planning, what programs are available that could fund DWSWP as an eligible project, and how to apply for these programs. Training is also lacking for band members regarding the importance of protecting raw water sources from contamination through DWSWP planning, how members can participate, and how to develop a DWSWP plan implementation strategy, complete with funding sources.

Furthermore, access to training opportunities includes the accessibility of technical resources such as the Guide and Template, teaching materials, courses and workshops, including training focused on DWSWP planning and plan implementation, and facilitators to lead the planning process along with the associated funds to pay them. Interviewees from AANDC indicated that the Guide and Template was distributed to all First Nations communities in Saskatchewan as a hard copy and that it is available on the AANDC website. However, there is some question as to whether it was delivered to the appropriate staff member in each community. Furthermore, interviews with the First Nations land and band managers indicate that in their

experience band staff is most often overwhelmed managing multiple portfolios due to lack of funds for staff salaries. In essence interviewees suggested that, even if there were band staff members that were trained in DWSWP planning and funds were available for plan implementation, their workloads are so heavy that it quite likely would not be a high enough priority. This indicates a lack of both human and financial capacity.

Finally, respondents suggested that lack of education also includes an absence of programs with DWSWP planning as part of the curriculum. How to conduct DWSWP planning and how to implement the resulting plans were identified as lacking. Two interviewees suggested that DWSWP planning training could be added to the curriculum of existing training programs for First Nations water operators and land managers. Furthermore, interviewees indicated that increased education about DWSWP and its critical role in ensuring the provision of safe drinking water might serve to support the development and implementation of First Nations DWSWP plans.

It was proposed that many First Nations communities are aware of the benefits of DWSWP and the need for it, but that, without adequate training and technical support, it is difficult to start the process. Interviews revealed that the broad dissemination of information about programs under which planning and implementation of projects related to DWSWP are eligible would help remedy this. Finally, both adequate training programs and associated training dollars for programs such as workshops and courses in planning for DWSWP were identified by respondents as important to the advancement of DWSWP planning and plan implementation in First Nations communities.

It was also suggested that, even when awareness of the importance of DWSWP exists, leadership for the project is lacking. One participant suggested that leadership might need to come from the “grassroots” rather than government to get the message out that DWSWP is important and to help identify “local champions” that can raise support within their communities. Interviewees further emphasized that, once local champions are identified, tools such as educational programs will be needed to provide the technical training required for effective DWSWP planning and ultimately the successful implementation of the resulting plans. Four participants suggested that, once local champions are identified and community support is achieved, a facilitator might still be needed to guide the community through the process and to ensure that all potential funding sources are exhausted.

4.2.3 Communication

Communication is an essential tool to support DWSWP plan implementation through increased social capacity within First Nations communities, between AANDC and First Nations, and with other stakeholders within the broader watershed. Interview respondents noted that a lack of communication is hindering the advancement of DWSWP plan implementation and that this lack of communication is apparent in several ways. First, there is a lack of communication between the federal and provincial governments and First Nations regarding DWSWP, specifically regarding who is responsible for doing it and which budget is required to pay for it. This problem was raised by both First Nations band staff and AANDC interviewees who indicated that clarification of roles and responsibilities for DWSWP is important to the advancement of DWSWP plan implementation. One AANDC respondent suggested that “assignment of responsibility for DWSWP to a single overarching body to lead and teach the process to individual First Nations is necessary.” Furthermore, one respondent suggested that the message from the Federal Government is often confusing, which indicates both a lack of social and institutional capacity. For example, one interviewee noted that, despite the emphasis on DWSWP planning stated in the *Safe Drinking Water for First Nations Act*, the reality is that the money budgeted for the purpose of increasing access to safe drinking water in First Nations prioritizes treatment ahead of DWSWP.

Second, six interviewees reported that social capacity was lacking, evidenced by a lack of communication between First Nations and adjacent land users, and the absence of accompanying good neighbour relationships between First Nations and adjacent land users. One WSA respondent noted that, in his experience, this might be exacerbated by historical grievances between land users regarding land and water management in some areas of the province. Four participants suggested that, if partnerships between First Nations and adjacent land users were created and equal participation in larger watershed planning initiatives were developed, communication problems could be resolved.

4.3 Document Review

The document review sought to determine how programs identified during this research might be used to support the implementation of First Nations DWSWP plans and any barriers to the efficient application of these programs for this purpose. The data gathered consisted of information gleaned from documents associated with government and non-government programs.

4.3.1 Selection of documents to be reviewed

Eleven programs were selected for review based on eligibility criteria under which SWP is included and on content indicating that the program might support First Nations DWSWP plan implementation. Data collected during interviews and the document review shows that six of the eleven programs identified have eligibility criteria under which the costs of DWSWP planning and plan implementation of some of the common key actions are eligible. Of these six programs, four were considered to be viable funding sources.

4.3.2 Program document review

Program documents were reviewed using four parameters to identify existing barriers to the efficient application of each program for the purpose of supporting First Nations DWSWP plan implementation. Neither the application procedure nor the data required parameters presented a significant barrier to the use of ten of the eleven programs. Both the eligibility criteria and funding amounts posed a significant barrier to the efficient application of seven of the programs for implementing First Nations DWSWP plans. This is summarized in Table 4.7.

Table 4.7: Document Review Summary

Program Name	Application Procedure	Data Required	Eligibility Criteria	Funding
Safe Drinking Water Strategy	None	Risks to drinking water sources, gathered by stakeholders	DWSWP at watershed scale projects	Core funding for watershed-scale DWSWP planning
25 Year water security plan	None	None	Safe drinking water projects including DWSWP at the watershed scale	None
Lands and Economic Development Services Program – Core Funding	Applications not required	None	Projects associated with economic development and environmental sustainability	Varies

Table 4.7: Document Review Summary, cont'd

Program Name	Application Procedure	Data Required	Eligibility Criteria	Funding
Lands and Economic Development Services Program – Core Funding	Applications not required	None	Projects associated with economic development and environmental sustainability	Varies
Lands and Economic Development Services Program – Targeted Funding	Straightforward	Project description, outlined by the First Nation	Projects associated with economic development and environmental sustainability	Up to \$10 million annually shared amongst eligible projects
First Nation Water and Wastewater Action Plan	Applications not required	Data gathered by AANDC	Projects associated with Water and Wastewater Treatment Infrastructure	Funds allocated to highest risk water & wastewater treatment facilities
Capital Facilities Maintenance Program	N/A	N/A	Projects associated with Water and Wastewater treatment facilities and associated infrastructure	None for DWSWP

Table 4.7: Document Review Summary, cont'd

Program Name	Application Procedure	Data Required	Eligibility Criteria	Funding
Circuit Rider Training Program	N/A	N/A	N/A	None for DWSWP
Farm and Ranch Water Infrastructure Program	Complicated	Complex technical data, gathered by a contractor	Well-decommissioning projects	\$10,000 per well
Environmental Damages Fund	Straightforward	Project details	Projects associated with Restoration, Environmental improvement, Education and Awareness, and which demonstrate national benefit	Varies by region and year to year
New Building Canada Fund: Provincial-Territorial Infrastructure Component, Small Communities Fund	Straightforward	Project details	Infrastructure and economic development projects	\$10 billion annually, shared amongst eligible projects on cost share basis

Table 4.7: Document Review Summary, cont'd

Program Name	Application Procedure	Data Required	Eligibility Criteria	Funding
Indigenous Peoples Resource Management	N/A	N/A	N/A	None for DWSWP

4.3.3 Program description

4.3.3.1 Saskatchewan Water Security Agency (WSA) Programs

The WSA has two guiding documents that set out the province's plan to ensure the provision of safe drinking water to all people in Saskatchewan. These are the WSA's 25-year plan, which highlights DWSWP at the watershed scale, and the Safe Drinking Water Strategy, which emphasizes source to tap solutions to ensuring that the drinking water quality needs of all people in the province are met.

There are no First-Nations-specific DWSWP planning programs from the WSA. Rather, programs and associated funding for DWSWP from the WSA are allocated to planning at the watershed scale and First Nations are invited to participate in watershed planning with other stakeholders. The WSA encourages collaboration through communication and the formation of partnerships among all stakeholders within watersheds to improve water management initiatives such as watershed-scale DWSWP planning and the implementation of the resulting DWSWP plans. Because threats to source water often originate outside of Reserve boundaries, WSA programs are important to support the implementation of First Nations DWSWP plans. While there is no funding available from these programs dedicated to First Nations DWSWP plan implementation, the available funding might be obtainable to support the integration of key actions that are more closely aligned with existing or future watershed-scale plans into those plans.

4.3.3.2 AANDC Programs

There are three programs provided by AANDC, under which eligibility for the program and associated funding is available only to First Nations communities. These are described below.

4.3.3.2.1 First Nation Water and Wastewater Action Plan

In 2008 AANDC introduced the FNWWAP and provided \$330 million in funding over two years for construction and renovation of water and wastewater treatment facilities, operation and maintenance of facilities, training of operators, and related public health activities on-Reserve. In 2010 FNWWAP was extended until 2012, and again in the 2013 and 2014 budget years. Total federal funding since 2008 has been \$2,395,734,434. The main objective of the FNWWAP, as stated by AANDC, “is to help First Nation communities on reserves bring their drinking water and wastewater services to a level and quality of service comparable to those enjoyed by Canadians living in communities of similar size and location.” However, the FNWWAP places water treatment, rather than DWSWP, as the highest priority as indicated by the first two of the following six key components of the FNWWAP, outlined when the program was developed in 2008:

- investments in infrastructure projects to address water and wastewater needs and to maintain existing systems;
- investments in the on-going operations and maintenance of water and wastewater systems;
- funding for the hands-on training of treatment plant operators, to increase the number of certified water treatment system operators;
- water quality monitoring in accordance with the Guidelines for Canadian Drinking Water Quality;
- support for water and wastewater-related public health activities in First Nation communities on Reserve; and
- funding for third-party water and wastewater systems operation under the Safe Water Operations Program, when required.

In 2014 in order to meet the objectives of the program, several program enhancements, which further emphasize treatment and monitoring of treated water over DWSWP, were introduced, including the following:

- a national engineering assessment of existing water and wastewater facilities;
- consultations on a new federal legislative framework for safe drinking water;
- increased training through the Circuit Rider Training Program;

- modification of existing policies related to small water and septic systems and agreements for water and wastewater services;
- investment in a National Wastewater Program; and
- development of waterborne illness procedures.

Although DWSWP projects meet the program's initiatives and eligibility requirements for funding, the FNWWAP project ranking method is set up on a priority system, which ranks problems with water treatment plants highest on the priority scale for support and funding under the program. Therefore, although DWSWP projects meet the eligibility criteria, these projects would not be ranked high enough to receive funding under this program.

4.3.3.2.2 Capital Facilities and Maintenance Program

With a budget of more than \$1 billion per year, the CFMP provides funding for housing, education, water and wastewater systems, and other infrastructure. The main objectives of the program focus on physical assets, such as water treatment plants, and on mitigating health and safety risks; therefore the program cannot be used for DWSWP.

The ranking system ensures that funds are directed towards the most significant health and safety concerns. In virtually all cases, water treatment is a higher priority than other barriers, such as DWSWP, in the MBA to safe drinking water. An interviewee from AANDC, responsible for administering funds under this program, stated that, because the program has been underfunded for several years, many worthwhile projects have been deferred in favour of projects with more immediate health and safety impacts.

4.3.3.2.3 Lands and Economic Development Services Program (LEDSP)

The main objectives of LEDSP focus first on increasing economic development in First Nations and second for First Nations to “take on a broad scope of land and environmental responsibilities, including land use planning, environmental management and compliance” (Aboriginal Affairs and Northern Development Canada: Program Guidelines). Funds available through LEDSP consist of two categories: core funding and targeted funding. To be eligible for funding under LEDSP Core Funding, communities must have transitioned from the *Indian Act* to the *FNLMA*. Communities wishing to transition from the *Indian Act* to *FNLMA* are first evaluated using a “Readiness Assessment,” which assesses a community's ability to “increase their level of

responsibility for land management under the *Indian Act* or the *FNLMA*.” This assessment emphasizes experience and capacity.

Eligible projects for core funding include environmental management activities, compliance activities, and environmental sustainability plans, under which DWSWP would fall. Applications for core funding for individual projects are not required; rather communities submit the Lands and Economic Development Community Profile Report, which serves as the application for the program (for those wanting to be in the program) and as a reporting requirement for the previous fiscal year (for those already in the program). Once a community is accepted into the program, the community, rather than LEDSP, decides how the funds are spent on economic development and environmental sustainability.

The formula for determining funding amounts payable under LEDSP assesses factors such as population and remoteness. Funds available under core funding are outlined in Table 4.8. It is important to note that recipients are not entitled to the maximum amount; rather actual funding depends on the overall availability of funding and each application is reviewed and ranked.

Table 4.8: LEDSP Core Funding

Eligible Initiatives	Maximum Annual Amount Payable Per Recipient
Economic development activities including, but not limited to, capacity development, community economic development planning, and the development of proposals to lever financial resources	100% of eligible costs up to \$3.0M
Initiatives that support First Nations communities that desire to take on a broad scope of land and environmental responsibilities, pursuant to sections 53 and 60 of the <i>Indian Act</i> , including land use planning, environmental management and compliance, on behalf of the Minister	100% of eligible costs up to \$3.0M
Initiatives that support First Nations who are signatories of the Framework Agreement on First Nation Land Management, and are on the schedule for the <i>First Nations Land Management Act</i>	100% of eligible costs up to \$3.0M

The objectives of LEDSP Targeted Funding include facilitating the transition from the *Indian Act* to the *FNLMA*. Activities eligible for targeted funding through LEDSP are based on the Regional and National AANDC priorities, the eligible initiatives, and the funding levels, which are outlined in Table 4.9.

Table 4.9: LEDSP Targeted Funding

Eligible Initiatives	Maximum Annual Amount Payable Per Recipient
Initiatives that support First Nations communities to undertake economic development activities including, but not limited to, capacity development, community economic development planning, the development of proposals to lever financial resources.	100% of eligible costs up to \$3.0M
Initiatives that support the development of land and resources under community control and access to opportunities from lands and resources not under community control	
Initiatives that support compliance with the statutory provisions of the Indian Act and the processing of land management instruments such as leases and permits	
Program management services in relation to community economic development.	
Initiatives that support First Nations participating in the Regional Lands Administration program performing land management activities	
Initiatives that support Aboriginal environmental pollution prevention and improve environmental awareness and compliance	100% of eligible costs up to \$10M

Table 4.9: LEDSP Targeted Funding, cont'd

Eligible Initiatives	Maximum Annual Amount Payable Per Recipient
Initiatives that support the activities of The Lands Advisory Board Resource Centre in supporting First Nations interested in going through the First Nations Land Management process	100% of eligible costs up to \$20M

Eligible activities under the LEDSP program, of which DWSWP planning and plan implementation would qualify under the Eligible Initiatives category, “Initiatives that support Aboriginal environmental pollution prevention and improve environmental awareness and compliance,” include

- initiatives that enhance environmental planning, awareness and support efforts towards pollution prevention on Reserve;
- initiatives that support environmental management best practices with land and community assets on Reserve; and
- initiatives to improve environmental regulatory compliance on Reserve.

Funding allocated for this initiative is \$10 million annually to be shared among eligible projects. The following criteria are also taken into account:

- the relevance of the proposal to the program’s objectives and expected results; expected economic and/or environmental benefits accruing to Aboriginal individuals, businesses or communities;
- the assessment of the risk involved; and
- the demonstrated need for federal funding.

The application form for targeted funding is straightforward, requiring project description, estimated costs, how it will be managed and by who, and the expected benefits to the community, which makes the program easily accessible for First Nations who have made the transition to the *Indian Act* to the *FNLM*.

In addition to the First Nation specific programs discussed above, three programs were identified which are available to First Nation and non-First Nation communities and have funding available that could be applied to SWP implementation. These programs are described below.

4.3.3.3 Agriculture Canada

4.3.3.3.1 Farm and Ranch Water Infrastructure Program (FRWIP)

Eligible projects under FRWIP include well decommissioning, a commonly identified key action in on-Reserve DWSWP plans, with funding available at 90% of the cost to a maximum of \$10,000 per well. A large number of abandoned wells exist on First Nation Reserve lands and these pose a significant threat of contamination to source waters. Therefore, well decommissioning is an important key action in the majority of First Nations DWSWP plans requiring a means to address in the implementation strategy.

The application process for funding under this program is cumbersome. There are several forms to be completed requiring detailed and specific information that is not readily available in many situations. Information required includes well depth, depth to water, well casing diameter and material, and calculations to determine the procedure and amount of material required to seal the well. The WSA provides a program ‘how to’ summary which includes detailed information about the well decommissioning procedure which indicates that a contractor is required to complete the decommissioning. The contractor would, in the majority of situations, complete the application form on the community’s behalf. Due to the time and expertise required to do this, First Nations communities are required to hire a qualified contractor to obtain the necessary information and complete the forms, which would add to the project’s costs.

4.3.3.4 Environment Canada

4.3.3.4.1 Environmental Damages Fund (EDF)

The EDF provides funding based on the polluter-pays principle. Fines are levied against those who cause environmental damage and these fines fund the program. Applicants then apply to the fund for projects that have environmental benefit with emphasis placed on restoration first and then to projects with environmental education and awareness components to them. Funding levels vary depending on funds available, funds requested, the number of applications received, funds requested for each project, and the projects’ alignment to EDF’s priorities. In the 2015 funding year, no funds were available for projects in Saskatchewan and \$116,519 was available nationally. The national funding prioritizes projects with a strong national benefit that have education and awareness components promoting pollution prevention. Furthermore, projects

should demonstrate that the project activities will take place in Alberta, Saskatchewan, Ontario and Quebec.

Priority funding is given to projects that restore the natural environment and conserve wildlife in the geographic region where the environmental damage occurred. For example, if industrial runoff was determined to have damaged a waterway and the business was fined, projects taking place in that region would receive the highest priority for the funds accrued from that fine. Furthermore, to be eligible, projects must address one or more of the following EDF categories:

1. Restoration (highest funding priority)
2. Environmental Quality Improvement
3. Research and Development
4. Education and Awareness

This program review indicates that projects associated with DWSWP would be eligible under categories 2 and 4. Available funding varies, as it is dependent on money being directed to the EDF through fines, court-ordered payments, or voluntary payments. Funding also varies by the geographic area that funds might be used in. In addition, a case can be made for portions of SWP plan implementation to be eligible under the national funding category. The application process is straightforward and First Nations are eligible applicants.

4.3.3.5 Infrastructure Canada

4.3.3.5.1 New Building Canada Fund (NBCF): Provincial-Territorial Infrastructure Component, Small Communities Fund (PTIC-SCF)

Infrastructure Canada has set aside \$1 billion from the New Canada Building Fund for projects in small communities (populations less than 100,000). Provinces and territories then identify and propose projects for funding consideration. In the provinces, the project's eligible expenses are cost-shared on a one-third basis with the community, the provincial government, and the federal government. First Nations are eligible for provincial funding under this program.

Although the objective of the PTIC-STF Drinking Water category is to “invest in water infrastructure that contributes to economic growth, clean environment and stronger communities” and the subcategories relate specifically to drinking water infrastructure, project outcomes include projects that propose to improve the protection of drinking water sources.

Eligibility requirements are straightforward and the application process consists of applicants submitting a brief description of the project, including funding required, to their provincial or territorial Infrastructure Canada office. Project applications must demonstrate how the benefits of the project extend beyond community boundaries.

In addition to the above programs with funding that might support the implementation of First Nations DWSWP plans, two educational programs were identified during interviews that warrant discussion. Although neither of these programs is expected to provide funding for DWSWP plan implementation, both could be amended to address some of the barriers surrounding education and awareness.

4.3.3.5.2 Circuit Rider Training Program (CRTP)

The CRTP provides First Nation water operators with training specific to the operation of the drinking water systems in their own community. The program provides training for operators on their own systems on-site via qualified experts who rotate through a circuit of First Nation communities. The program is available to all First Nation communities across Canada through a variety of partners and service providers including private companies, tribal councils, and First Nation technical organizations. Support is also provided through 24-hour hotlines, which operators can rely on for technical advice.

The funding for water treatment operator training courses and for operator certification testing and registration costs in all regions is provided by AANDC. Training helps to ensure that operators have the level of training and skills required to operate and maintain the water treatment system in their own community. Currently there is no funding or programming related to DWSWP planning through the CRTP; however, the interviews suggested that DWSWP awareness and DWSWP planning training could be added to the program curriculum.

4.3.3.5.3 National Aboriginal Land Managers Association's (NALMA) - Professional Lands Management Certification Program (PLMCP) & University of Saskatchewan - Indigenous Peoples Resource Management (IPRM)

The PLMCP seeks to establish professional credibility at a national level and formally recognizes and authenticates skills and knowledge. The program ensures “that an individual meets specific criteria, remains current in the field of discipline and maintains a professional code of ethics.” The IPRM course delivered by the University of Saskatchewan delivers Level One of PLMCP. In this program, land managers gain the necessary training to understand and perform

the basic environmental, legal, and economic aspects of land management. The IPRM course does not provide funding for DWSWP planning and plan implementation. However, one interviewee suggested that DWSWP planning training could be added to the curriculum.

5 DISCUSSION

In this section, the results from this research are discussed in light of current literature and according to the three themes that emerged: Funding, Education and Awareness, and Communication. First, it is significant to draw attention to the importance of DWSWP planning as part of the MBA to the provision of safe drinking water and therefore as a means to increase the safety of drinking water in First Nations communities. Recent literature suggests that DWSWP is culturally relevant for First Nations due to the interconnectedness of land and water in their lives (Walkem, 2006; Patrick, 2013; Plummer et al., 2013). This was supported by the case study, which showed the empowerment expressed by Muskowekwan First Nation as they took ownership of their DWSWP plan. AANDC also recognizes this interconnectedness and for this reason created the Guide and Template (AANDC, 2013) to help First Nations develop DWSWP plans in an attempt to increase access to safe drinking water through a reduction in drinking water source contamination in First Nations communities. In addition, the similarity of risks to drinking water sources amongst First Nations DWSWP plans identified in the literature review suggests that the implementation needs for these plans might share commonalities as well. This is significant because any management actions and subsequent implementation strategies might also be similar to those required by other First Nations DWSWP plan implementation strategies, so other First Nations might benefit from the knowledge gained by this research.

The commonly identified risks to raw water sources on Reserve lands are due to land use activities such as sewage lagoons, household septic outflows, illegal dump sites, industrial and agricultural runoff, and contaminants entering the source water via abandoned wells. These risks were identified by Muskowekwan First Nation during the DWSWP planning process and they are also listed as risks in the DWSWP plans of five other First Nations in Saskatchewan (NSRBC, 2015) and one in Ontario (Lake Simcoe Conservation Authority), which were identified in the literature review.

The capacity needs for plan implementation identified by Timmer et al. (2007) and de Loë & Kreutzwiser (2005) comprise institutional, financial, human, social, and technical capacity. Recent literature indicates that this lack of capacity might be due to existing problems associated with the implementation of plans dealing with environmental issues in general. Slotterback et al.

(2008:546) state that, “the implementation of planning documents and their associated objectives and strategies, including those related to environmental review, remains a challenge for planners.” It became evident during this research that these implementation needs might be satisfied through governmental, industrial, and adjacent land user partnerships that might provide opportunities for funding and educational programs to support DWSWP plan implementation. Interviews with First Nations respondents in particular suggest that the absence of well-known examples of DWSWP pilot projects limits the available knowledge regarding the implementation of these plans.

The purpose of this research was to advance First Nations DWSWP plan implementation to improve access to safe drinking water in First Nations communities in Canada. This research suggests that the continued prioritization of water treatment over DWSWP combined with an overall lack of capacity contributes to the difficulties associated with the implementation of DWSWP plans in First Nations communities in Canada. In the following section, this lack of capacity will be discussed according to the three emergent themes: funding, education and awareness, and communication.

5.1 Funding

The continued underfunding for the provision of safe drinking water in First Nations communities has been identified in recent literature as a significant barrier to access to safe drinking water (INAC, 2006; Boyd, 2011; Dunn, et al, 2014; de Loë & Kreutzwiser, 2005). Lack of funding was also identified during the DWSWP planning process and by all of the interviewees as a likely barrier to the implementation of DWSWP plans in First Nations communities. The DWSWP planning process indicated that the lack of known programs and other sources of funding dedicated specifically to DWSWP plan implementation in First Nations communities suggests that they believe that the costs must be borne by the communities themselves. This was evident during the development of the DWSWP implementation strategy as the working committee struggled to identify funding sources and therefore identified annual BSF funding as the source of funds for many of the key actions.

Interviews revealed that this annual funding provided to First Nations for the delivery of Band-led initiatives, under which the provision of safe drinking water and, therefore, DWSWP plan implementation would fall, is inadequate. This is mirrored by the opinions of the Expert Panel on Safe Drinking Water when it stated that “the federal government has never provided

enough funding to First Nations to ensure that the quantity and quality of their water systems was comparable to that of off-Reserve communities” (INAC, 2006:22).

Inadequate funding was identified by AANDC themselves when they stated on their website that BSF “may often be the largest source of funding for local governance and administration” for some First Nations. BSF was designed to provide monies to cover the costs related to the administration and delivery of programs and services similar to those of non-First Nations communities of comparable size (AANDC). These programs and services include a vast array of expenditures, such as housing, social programs, annual maintenance, and provision of safe drinking water. The interviewees believe that many of these programs and services are considered to be of a higher priority than DWSWP plan implementation. AANDC recognizes that “this support does not accommodate all circumstances and there is an assumption that [First Nations] citizens will also contribute to their costs of community governance.” This research revealed that DWSWP plan implementation is not likely to be of a high enough priority to be funded by most First Nations community’s BSF allocations.

In addition, this research indicates that the continued prioritization of water treatment and treatment facilities over DWSWP makes access to other funding for plan implementation even more difficult. The predominance of programs with eligibility criteria reduce funding because they restrict eligible projects to those that relate to water infrastructure or water treatment, rather than DWSWP projects. Although the DWSWP planning process failed to identify significant funding sources beyond BSF, programs that might fund DWSWP plan implementation projects do exist; however, most of these are relatively small funding sources. The inability to receive money for DWSWP projects contributes to the lack of financial capacity for plan implementation identified by Lebel and Reed (2010) in their study involving Montreal Lake First Nation.

Data collected during interviews and document review show that six of the eleven programs identified have eligibility criteria under which the costs of DWSWP planning and plan implementation of some of the common key actions are eligible. Of these six programs, two, FNWWAP and CFMP, are not viable funding sources for the following reasons. While projects associated with DWSWP plan implementation are eligible for FNWWAP, it is not a viable funding source because it focuses heavily on water treatment and therefore projects addressing deficiencies associated with water treatment plants are the highest priority. CFMP only funds projects that address physical assets, so it cannot be used for DWSWP. Furthermore, AANDC respondents

stated that these two programs have been underfunded for many years resulting in a large backlog of urgent water treatment facility problems. This in turn means that DWSWP plan implementation is not likely to be of a high enough priority to receive funds from these programs.

There are four programs, FRWIP, EDF, PTIC-SCF, and LEDSP, under which First Nations DWSWP is an eligible project and could be considered a priority. The first three of these programs are smaller funding sources that would need to be consolidated in order to cover some of the plan implementation costs. Therefore, none of these would be adequate to cover all of the costs of implementation, as suggested by the costs associated with the plan developed with Muskowekwan First Nation during this research. Excluding staff salaries and overhead costs such as data entry and analysis, the DWSWP planning process cost approximately \$4000, which was funded as part of this research. The implementation costs for all of the key actions will likely far exceed these costs.

Furthermore, accessing these programs will be a timely process involving the completion of multiple application forms and the collection of detailed technical information. Interviewees echoed recent literature in suggesting that smaller communities, such as First Nations, lack the financial capacity for DWSWP plan implementation (Polaris Institute, 2012; Patrick, 2013; Ivey et al., 2006; Timmer et al., 2007; Walters, 2012). Data collected during interviews show that inadequate annual funding for the operation and maintenance of individual First Nations means that band staffs often carry out the duties of more than one job. Thus, interviewees suggested, staff are burdened with heavy workloads and underfunded budgets. Because they have little extra time to research and complete application forms for multiple programs, they have difficulty accessing the necessary funds from multiple programs for DWSWP plan implementation. Timmer et al. (2007), Patrick et al. (2013) and de Loë, and Kreutzwiser (2005) also reported this lack of financial and human capacity for DWSWP plan implementation.

Finally, funding under LEDSP is the best source of funds for SWP planning and implementation in First Nation communities. Although economic development is a priority for LEDSP, prevention of environmental pollution is one of the initiatives and significant annual funding is available. Furthermore, one interviewee who is responsible for the delivery of the program indicated that LEDSP funds have, in the past, gone unspent due to an absence of applications for funding. This suggests that communities are not aware of the program. This lack of awareness might mean that the program is not effective as it is currently structured, that it is not

well known to communities, or that the projects which are eligible are not well defined, or some combination of these factors. This finding aligns with the statement “the ongoing issues with access to safe drinking in First Nation communities are in part due to a lack of effective programs” (Polaris Institute, 2012).

This research validates Boyd’s (2011) and Patrick’s (2013) statements that, despite initiatives such as the Protocol, water systems in more than thirty percent of First Nation communities continue to pose a risk of drinking water contamination. However, data analysis shows that initiatives such as the Protocol have led to the development of several programs. The problem, though, lies with the prioritization of water treatment over DWSWP rather than with a lack of government initiatives. This focus has led to inefficient application of programs whose goals include improving access to safe drinking water or protection of drinking water sources.

In addition to the government programs identified above, other opportunities for funding were identified by respondents. Three respondents suggested that there is potential for money from private industries looking to locate on First Nation lands, such as mining and large-scale agricultural operations. It was suggested that these private entities often have money budgeted for environmental protection and remediation that is intended to be spent in association with lands directly affected by their operations. Collaboration with industrial land users wishing to locate on First Nations lands has the potential to increase the social and financial capacity of First Nations communities.

Next, because at the provincial level DWSWP planning takes place at the watershed scale, provincial funding and initiatives dedicated to First Nations DWSWP plan implementation is absent. As recent literature indicated, this is the result of the jurisdictional gap between the federal and provincial governments with regard to financial responsibility for the provision of safe drinking water (Davies & Mazumder, 2003). Because the responsibility for First Nations drinking water falls under federal government jurisdiction, First Nations, the provinces, and non-government organizations delivering programs that could support DWSWP plan implementation do not communicate regularly with one another. This in turn indicates a lack of social capacity leading to inadequate financial capacity for DWSWP plan implementation. This corresponds with Powell (2010:56) as he suggests that a significant barrier to plan implementation is the “existing legal, geopolitical, and jurisdictional boundaries coupled with other social forces [which] drive a high degree of both horizontal and vertical fragmentation in land use management.” This was

evident during the DWSWP planning process as the working committee discussed the issues surrounding potential contamination of Muskowekwan First Nation's drinking water source from Lestock's sewage lagoon. The division of jurisdictional responsibilities for resolving this issue is complicated and will require collaboration across horizontal and vertical scales to devise a solution because DWSWP requires the involvement and integration of land use planning and watershed management, which in this case is shared across political jurisdictions.

5.2 Education and Awareness

Education and awareness regarding the importance of DWSWP was identified as a tool necessary to advance DWSWP plan implementation during the DWSWP planning process and was considered second only in importance to funding by virtually all of the interviewees. The DWSWP planning process drew attention to a lack of awareness about DWSWP, why it is important, and how plans can be implemented in First Nations. While the Working Committee easily identified thirty-two risks to their drinking water source, the conversation during the development of the implementation strategy indicated that residents of Muskowekwan First Nation were unaware of the link between these risks and water contamination. Other First Nations DWSWP plans commonly identified threats from similar land uses, so the implementation strategy references the need for education about how to reduce or eliminate the risk as well as identifying a funding source to eliminate or mitigate.

The interviews support this conclusion, suggesting that the link between land uses and water contamination is also lacking among those making decisions, both on- and off-Reserve, regarding funding for activities related to the provision of safe drinking water. Overall, interviewees show the lack of awareness regarding the importance of the role played by DWSWP in the provision of safe drinking water, as part of the MBA, which is represented by the prioritization of water treatment over DWSWP. This lack of awareness appears to be prevalent both on- and off-Reserve and across political and professional affiliations. Recent literature explains that the MBA involves a series of interconnected barriers to ensure that water intended for human consumption is safe and that these barriers include both DWSWP and treatment (Plummer et al., 2010 & 2011; Ivey et al., 2006; Timmer et al., 2007; Patrick, 2009 & 2013; Emelko et al., 2011; Islam et al., 2011). However, this research has found that the emphasis has been on treatment and monitoring of treated drinking water rather than on DWSWP, which has led

to the predominance of funding sources intended to increase access to safe drinking water being allocated to water treatment rather than to the relatively less expensive barrier, DWSWP. Patrick (2009:208) support this with their statement “that it is easier and cheaper to protect source water than to remediate contaminated water.”

Furthermore, interviewees suggested that DWSWP planning presents an opportunity to increase education about the impacts of land uses on drinking water sources to allow for more informed decision-making in First Nations communities. For example, one First Nations respondent noted that, at times, Chief and Council decide to proceed with projects that have significant economic benefits without full knowledge of the potential for environmental harm. Interviewees suggested that elected officials who often do not have knowledge of, or training in, DWSWP commonly make these decisions. The DWSWP planning process suggested that having a DWSWP plan in place to guide these decisions presents an opportunity for Chief and Council to be better informed during deliberations.

Furthermore, as identified by one respondent, projects with economic benefits often present the opportunity to fund some of the key actions identified in the DWSWP plan through industry initiatives as was done during the DWSWP planning process. Having a DWSWP plan implementation strategy in place during discussions with off-Reserve corporations proposing to operate on-Reserve would allow Chief and Council to fully explore these funding opportunities from the outset of discussions which could support plan implementation. It is also important to note that due to the limited BSF received annually and the demands of on-Reserve budgets, decisions regarding DWSWP versus economic development are more often than not based on the availability of funds, as reported by one interviewee.

This research shows that the overall lack of awareness of the importance of DWSWP in the provision of safe drinking water has affected the prioritization of programs and funding for DWSWP. However, this research also found that the lack of awareness into DWSWP has led to limited knowledge regarding the existing supports for plan implementation, such as the existing programs with funding and educational opportunities to support DWSWP plan implementation. Contrary to recent literature suggesting that the initiatives by Health Canada and AANDC have been ineffective in resolving drinking water problems in First Nations communities (Patrick, 2013; Boyd, 2011), this research found that lack of education and awareness of the existing programs is the problem, rather than an absence of programs. Therefore, increasing awareness and education

about existing programs that would fund DWSWP planning and implementation was identified as a potential mechanism to advance the implementation of DWSWP plans in First Nations communities.

Finally, the results of the DWSWP planning process and interviews illustrate the need for an increase in training for DWSWP planning and plan implementation. This training could be included in existing training courses available to First Nations water operators such as the PLMCP, the first level of which the University of Saskatchewan offers through the IPRM program. It is also important to distinguish between Chiefs and Council and higher-level band staff who are likely to make the decisions to undertake DWSWP planning and those who are likely to participate in the planning process. The education and training could and possibly should be different for each group. Lastly, the Circuit Riders and the Circuit Rider training program present another opportunity for increasing awareness about DWSWP. Two respondents suggested that Circuit Riders should be trained in DWSWP and then raise awareness when they visit communities during the course of their regular duties. Alternatively, DWSWP planning could be added to the duties of Circuit Riders, which ultimately might ensure DWSWP plans are developed and implemented in each First Nations community in Canada.

5.3 Communication

Communication is essential to the implementation of DWSWP plans within First Nations communities themselves, between the federal and provincial governments and First Nations, and among stakeholders within the larger watershed. Joseph et al. (2008) suggest that a key barrier to plan implementation results from a lack of coordination of the action items from the plan among the competing interests and diverse agencies involved in implementing the plan. Additionally, Powell (2010:54) stated that “poor intergovernmental coordination and cooperation across regional and eco-regional scales” is one of the most important barriers to implementing regional and eco-regional conservation plans.

Lack of communication with adjacent landowners significantly limits the success of First Nations DWSWP plan implementation. Furthermore, lack of integration of off-Reserve risks to source water identified by DWSWP plans into watershed-scale plans was also identified. The identification of off-Reserve risks to source water during the planning process could allow for these to be brought to the table during watershed-scale planning led by the WSA, thus overcoming

communication issues and increasing the social and technical capacity for plan implementation. The inclusion of First Nations as stakeholders would allow for off-Reserve risks identified during First Nations DWSWP planning to be brought into the watershed-scale plans and implementation strategies for these risks. Furthermore, watershed-scale DWSWP planning provides a venue to increase communication, build good neighbor relations, and lay to rest historical grievances, which could ultimately result in the successful implementation of DWSWP plans.

6 CONCLUSION

This research suggests that the importance of the individual steps in the MBA to safe drinking water might not be well understood, supporting Davies and Mazumder's (2003) suggestion that the role played by DWSWP in the MBA might not be given a high enough priority. This research identified the prioritization of water treatment over DWSWP as a significant barrier to the implementation of First Nations DWSWP plans. This is further accentuated by AANDC's statement that, while risk assessments account for an extensive set of factors that could lead to problems with water and wastewater systems, they speak only about those factors related to water treatment and not about risks to drinking water sources. Furthermore, Davies and Mazumder (2003) stated that the likelihood of water-borne illnesses is higher when drinking water sources are contaminated. Thus, the costs associated with the provision of safe drinking water and the incidence of water-borne illnesses prompting drinking water advisories might be decreased if DWSWP plan implementation were given a higher priority. Setting DWSWP planning as a higher priority could lead to increased funding for the implementation of the resulting plans.

The lack of prioritization of DWSWP is a barrier. As reported by an interviewee responsible for AANDC program delivery, funding is inadequate to meet even the needs of the highest priorities identified in the National Assessment of First Nations Water and Wastewater Systems. AANDC's website supports this viewpoint (last accessed: June 6, 2015), which indicates that the program's target is to increase the percentage of First Nations drinking water systems with low-risk ratings to 50% by 2015. It is important to note that Patrick (2013) reported that 30% of First Nations drinking water systems had high-risk ratings and, as of September 30, 2015, Health Canada's website reported that there were 138 Drinking Water Advisories in effect in 94 First Nation communities across Canada, excluding British Columbia.

This research suggests that with increases in education and awareness about DWSWP and better communication among watershed stakeholders, multiple levels of government, and non-government organizations might increase the priority for DWSWP. DWSWP planning could also serve as a catalyst for better communication among neighbours in the larger watershed and spur better cooperation in an effort to protect drinking water sources, which could also result in raising the priority of DWSWP. Moreover, if the priority for DWSWP increases, more efficient

application of the programs intended to ensure access to safe drinking water in First Nations communities could result in increased funding for First Nations DWSWP plan implementation.

Finally, this research identified some intangibles resulting from the DWSWP planning process with Muskowekwan First Nation. These include a sense of empowerment gained by the community as they took ownership of their DWSWP plan. The community has communicated the results of the planning process through presentations by the plan champion, Julius Manitopyes. The intangible results of strategic planning processes, such as DWSWP, might achieve greater capacity building in support of the provision of safe drinking water.

6.1 Significance

It has been well documented that DWSWP reduces the costs of water treatment as protecting source waters is less expensive than remediating contaminated water at the water treatment facility (Patrick, 2009). However, this research discovered that the emphasis remains on water treatment in First Nations communities to the near exclusion of DWSWP. Furthermore, the practice of funding that prioritizes water treatment might further minimize the importance of DWSWP. Because First Nations community source waters are connected to the larger watersheds in which they are situated, significant communication between the federal and provincial governments will be necessary to ensure the successful implementation of First Nations DWSWP plans. Finally, strong communication across all levels of government and among the stakeholders is needed to develop a successful implementation strategy. This strategy will need to incorporate multiple funding sources and this research indicates that a facilitator will be required to ensure that all potential funding sources are utilized fully.

However, the longstanding jurisdictional framework that places the responsibility for the provision of safe drinking water to First Nations communities in the hands of the federal government amid provincial jurisdictions complicates the implementation of First Nations DWSWP plans. That is, First Nations communities are embedded as distinct areas of land within the provinces under which the province has no regulatory authority. Therefore, First Nations DWSWP plan implementation will be different from that in the rest of the province because the funding system currently in place at the provincial level directs funds to watershed scale planning rather than to DWSWP planning and plan implementation at the community scale.

Awareness, education and communication are the keys to resolving this complication. Further study is required to develop a strategy to bridge this gap.

6.2 Contributions

This research adds to the body of knowledge surrounding access to safe drinking water in First Nations communities in Canada. The purpose of this research was to identify factors affecting the successful implementation of First Nations DWSWP plans in Canada, including the identification of programs to support DWSWP plan implementation and any existing barriers to the efficient application of programs intended to improve access to safe drinking water in First Nations communities. In doing so this research sought to satisfy three objectives: to identify threats to raw water sources in First Nations communities and to determine how these might be addressed through DWSWP planning; to determine barriers to First Nations DWSWP plan implementation; and to identify possible solutions to the existing barriers.

The first objective was studied through a DWSWP planning process to develop a DWSWP plan with Muskowekwan First Nation. More needs to be done to ensure that DWSWP planning becomes commonplace and that DWSWP plans are shared across the watershed, rather than continuing as a collection of one-off pilot projects. Furthermore, the planning process indicated that without significant education into DWSWP and DWSWP planning processes a facilitator will be necessary to lead DWSWP plan development and initiate implementation of the resulting plans.

Furthermore, federal government participation, specifically complete buy-in from AANDC, into DWSWP planning is needed to increase the advancement of First Nations DWSWP plan implementation. A shift in prioritization from water treatment to DWSWP by AANDC is required to initiate this advancement. This might not occur without significant media attention drawing on evidence from DWSWP research initiatives such as this to increase awareness of the important role played by DWSWP in the provision of safe drinking water for all Canadians in general, and for First Nations communities specifically. Following the tragedies in Walkerton and North Battleford along with recent media attention regarding water problems in First Nations communities in Canada, increasing attention paid to DWSWP seems to be a natural progression.

In researching the second objective, the most significant barriers are lack of funding and lack of education and awareness in to the importance of DWSWP. This research determined that both of these barriers could be overcome with an increase in communication about the benefits of

DWSWP plan implementation to the provision of safe drinking water in First Nations communities. However, this research also determined that the ongoing prioritization of water treatment over DWSWP drives the lack of awareness into DWSWP. Since the direction for programs related to the provision of safe drinking water in First Nations comes from the Federal Government, it appears that the importance of DWSWP planning and plan implementation originates there.

Finally, the most important solution to overcoming the barriers identified by this research is to increase the prioritization of DWSWP in First Nations and to complete the implementation of the resulting plans. Increasing the prioritization of DWSWP requires increased awareness and education into the role played by DWSWP in the MBA and ultimately in the provision of safe drinking water in First Nations. Once the prioritization of DWSWP planning becomes commonplace, increased awareness and education will follow along with increased funding to implement the resulting plans.

6.3 Limitations and future research

This research used a single DWSWP planning process to develop a DWSWP plan using the Guide and Template. The benefits to Muskowekwan First Nation have been recorded and assumed to apply to other First Nations communities. It is possible that benefits realized by Muskowekwan First Nation are unique to their community and not applicable to other First Nations communities; therefore, further studies are necessary to verify these results. The similarity between the threats to source water identified by Muskowekwan First Nation and those identified by other First Nations using different planning models indicates that the results of this research can be widely applied.

While additional DWSWP pilot projects are required to increase the awareness about SWP, this research is highly significant because it identifies the importance of holistic water protection strategies offered by DWSWP for First Nations. The interconnectedness of water and First Nations' lives indicates that they are well suited to holistic methods to protect drinking water sources, rather than the heavy reliance on chemical treatment of contaminated water for the provision of safe drinking water. Finally, the Guide and Template can be used as a tool during the DWSWP planning process to promote First Nations DWSWP plan implementation.

Although capacity needs guided discussion of the research results, overall capacity in First Nations has been well-researched and therefore was not the focus of this research. This research focused on plan implementation.

Further pilot projects and increases in training and education in DWSWP planning might be required to change the prioritization, that will ultimately lead to the increase in the provision of safe drinking water for First Nations.

6.4 Recommendations

This thesis represents the first research into the policies, programs and tools intended to advance the uptake of SWP plan implementation in First Nation communities in Canada. The following recommendations have been derived from this study.

6.4.1 Prioritize DWSWP Planning

By changing the focus and therefore priority for the provision of safe drinking water from treatment to DWSWP planning, more plans might be developed and implemented, which could reduce both water contamination at the end user and costs to the provider in the provision of safe drinking water.

6.4.2 Dedicate funding for DWSWP planning in First Nation communities

Funding needs to be dedicated for First Nations DWSWP if it is to become the norm in First Nations communities. In addition, funding needs to be budgeted not only for the planning process but also for implementation, because as one participant stated “it is not uncommon for plans to be completed and then sit on the shelf.”

6.4.3 Increase communication

First Nations DWSWP planning needs to occur. Thus, First Nations should participate in discussions regarding DWSWP planning at the watershed scale, and First Nations DWSWP plans should be used to augment planning at the watershed scale. Better communication regarding funding programs would advance the uptake of DWSWP planning and implementation in First Nations communities through the provision of funds to cover the costs associated with the planning process as well as the implementation costs.

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Appendix A: INTERVIEW INSTRUMENT

Research Questions:

1. How does your organization get involved with Source Water Protection planning?
 - a. Plan making?
 - b. Plan implementation?
2. Please identify programs or policies that you access for Source Water Protection plan making and plan implementation.
3. Do those programs and policies apply to First Nations?
 - a. Plan making?
 - b. Plan implementation?
4. What funding are you aware of for Source Water Protection in First Nations?
 - a. Plan making?
 - b. Plan implementation?
5. What barriers do you think might prevent Source Water Protection in Saskatchewan First Nations?
6. What, in your view, is needed to stimulate and support Source Water Protection in Saskatchewan for First Nations?
7. Can you suggest any other organizations or individuals that I should contact?
8. Do you have any other comments that you would like to make about Source Water Protection planning in this province in First Nations?

Appendix B: CONSENT FORM

Project Title: First Nation Source Water Protection Plan Implementation in Saskatchewan: Barriers and Opportunities

Researcher(s): Kellie Grant, MA Candidate, Geography and Planning, University of Saskatchewan, 306-221-8993, kib119@mail.usask.ca

Supervisor: Dr. Robert Patrick, Geography and Planning, 306-250-9600, robert.patrick@usask.ca

Purpose(s) and Objective(s) of the Research:

The purpose of this research is to identify the tools, policies and programs that support First Nation Source Water Protection Plan implementation in Saskatchewan. The research objectives are:

1. To assist a First Nation in the development of a Source Water Protection Plan.
2. To identify existing opportunities and gaps in federal and provincial policies and programs that may support First Nation Source Water Protection Plan implementation in Saskatchewan.
3. To identify lessons learned respecting federal and provincial programs and policies that support Source Water Protection Plan implementation in Saskatchewan.

Procedures:

- Semi-structured interviews will be conducted. These interviews will be conducted in-person wherever possible and will require approximately 35 minutes of the interviewees time.
- The interviews will be recorded and transcribed verbatim.
- Documents identified during interviews or research will be analysed for identification of policies and programs that may facilitate or constrain Source Water Protection Plan implementation in First Nation communities in Saskatchewan.
- The identification of lessons learned respecting federal and provincial programs and policies that support Source Water Protection Plan implementation in Saskatchewan will be used to develop recommendations.
- Please feel free to ask any questions regarding the procedures and goals of the study or your role.

Funded by: Canadian Pacific Railway Partnership Program in Aboriginal Community Development.

Potential Risks:

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

Potential Benefits:

- The potential benefits of this research include:
 - Increased awareness of existing programs and policies that support Source Water Protection planning and plan implementation in First Nation communities in Saskatchewan,
 - reduction in the cost of drinking water treatment in First Nation communities,
 - increased access to reliable, safe drinking water in First Nation communities, and
 - increased awareness of existing and potential sources of contamination to drinking water sources.

Confidentiality:

- The names of organizations contacted will be included in any written or published works based on this research, however names of interviewees will not be used.
- Recorded interviews and transcripts will be encrypted and stored on a password-protected computer used only by me. Unless otherwise agreed to, data will be anonymized to the farthest extent possible.

Storage of Data:

- The University of Saskatchewan requires that the supervisor maintain a record of research for their students for 5 years. Following this period of time, the data will be destroyed.

Right to Withdraw:

- Your participation is voluntary and you can answer only those questions that you are comfortable with. You may withdraw from the research project for any reason, at any time without explanation or penalty of any sort. Your right to withdraw data from the study will apply until results have been published. After this time, it may not be possible to withdraw your data.
- I will provide you with a written transcript from your interview for your approval or withdrawal (within 14 days of receipt) prior to publication of the data.
- Should you wish to withdraw your input in part or in whole, please notify me as soon as possible. Interview recordings and transcripts will be deleted, and references to your input will be removed.

Follow up:

- Please let me know if you wish to obtain results from the study, if so I will provide you with a link to the full results upon publication.

Questions or Concerns: (see section 12)

- Contact the researcher using the information at the top of page 1;
- This research project has been approved on ethical grounds by the University of Saskatchewan Research Ethics Board. Any questions regarding your rights as a participant may be addressed to that committee through the Research Ethics Office ethics.office@usask.ca (306) 966-2975. Out of town participants may call toll free (888) 966-2975.

Consent:

Option 1 - SIGNED CONSENT

Your signature below indicates that you have read and understand the description provided; I have had an opportunity to ask questions and my/our questions have been answered. I consent to participate in the research project. A copy of this Consent Form has been given to me for my records.

_____	_____	_____
<i>Name of Participant</i>	<i>Signature</i>	<i>Date</i>
_____	_____	
<i>Researcher's Signature</i>	<i>Date</i>	

A copy of this consent will be left with you, and a copy will be taken by the researcher.

Option 2 - ORAL CONSENT

Oral Consent: If on the other hand the consent has been obtained orally, this should be recorded. For example, the Consent Form dated, and signed by the researcher(s) indicating that "I read and explained this Consent Form to the participant before receiving the participant's consent, and the participant had knowledge of its contents and appeared to understand it." In addition, consent may be audio or videotaped.

_____	_____	_____
<i>Name of Participant</i>	<i>Researcher's Signature</i>	<i>Date</i>