



Evaluation of the Water and Wastewater On-Reserve Program

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Table of Contents

List of Acronyms	ii
Executive Summary	iii
Management Response and Action Plan	viii
1. Introduction	1
2. Program Description	1
2.1 Background.....	1
2.2 Program Narrative.....	4
3. Evaluation Methodology	6
3.1 Scope and Evaluation Issues.....	6
3.2 Design and Methods.....	6
3.3 Limitations.....	7
3.4 Indigenous Engagement.....	7
4. Findings: Relevance	7
4.1 Continued need for the FNWWEF	7
4.2 Continued need for the EPHP.....	8
5. Findings: Water and Wastewater Infrastructure	9
5.1 Infrastructure.....	9
5.2 Operations and Maintenance.....	13
5.3 Assessments	14
5.4 Climate Change.....	15
6. Findings: Environmental Public Health Program	16
6.1 Achievement of Outcomes	16
6.2 Program Design and Delivery	19
7. Findings: Training and Capacity Development	20
7.1 Water System Operators	20
7.2 Circuit Rider Training Program (CRTP).....	22
7.3 EPHP-Delivered Training and Capacity Development.....	23
8. Findings: Roles and Relationships	23
8.1 ISC-RO and ISC-FNIHB	23
8.2 Headquarters and Regions	24
9. Findings: Best Practices	24
9.1 Summary of Best Practices	24
10. Early Impacts of COVID-19	28
11. Conclusions and Recommendations	30
11.1 Conclusions	30
12. Recommendations	32
Appendix A: Evaluation Questions and Issues	33

List of Acronyms

AFN	Assembly of First Nations
API	Annual Performance Inspection
CBWM	Community-Based Water Monitor
CFMP	Capital Facilities and Maintenance Program
CRTP	Circuit Rider Training Program
EPH	Environmental Public Health
EPHO	Environmental Public Health Officer
EPHD	Environmental Public Health Division
EPHP	Environmental Public Health Program
EPHS	Environmental Public Health Services
FNHA	First Nations Health Authority
FNIHB	First Nations and Inuit Health Branch
FNIIP	First Nations Infrastructure Investment Plan
FNWWAP	First Nations Water and Wastewater Action Plan
FNWWEPP	First Nations Water and Wastewater Enhancement Program
GCDWQ	Guidelines for Canadian Drinking Water Quality
ICMS	Integrated Capital Management System
INAC	Indigenous and Northern Affairs Canada
ISC	Indigenous Services Canada
LT-DWA	Long-term Drinking Water Advisory
O&M	Operation & Maintenance
OFNTSC	Ontario First Nations Technical Services Corporation
PWS	Public Water System
RIDB	Regional Infrastructure Delivery Branch
RO	Regional Operations
SWM	Strategic Water Management
SWPP	Source Water Protection Plan
TB	Treasury Board
TSAG	Alberta First Nations Technical Advisory Services Group
WSO	Water System Operator
WWP	Water and Wastewater Activities On-Reserve Program

Executive Summary

This evaluation of the Water and Wastewater Activities On-Reserve program was outlined in the fiscal year 2018-19 Indigenous Services Canada (ISC) Five Year Evaluation Plan, and conducted in compliance with the Treasury Board of Canada *Policy on Results*. The evaluation was undertaken to provide a neutral and evidence based assessment of: relevance; relationships; best practices; and, performance in the areas of infrastructure, environmental public health activities and training and capacity development.

Background

This evaluation focuses on two programs:

1. Infrastructure and Capacity Program - Water and Wastewater, also referred to as the First Nations Water and Wastewater Enhancement Program. The key activity is the provision of proposal-based funds under the Capital Facilities and Maintenance Program for the planning, procurement, design, construction/acquisition, commissioning, assessment, and operations and maintenance of public water and wastewater systems. The ultimate goal is that First Nations people have reliable and sustainable public water and wastewater systems in their communities.
2. Public health-related water and wastewater activities supported by the Environmental Public Health Division of the First Nations and Inuit Health Branch within ISC. The Environmental Public Health Program provides direct or financial support to First Nation communities south of 60° for a range of public health-focused water and wastewater activities including drinking water quality monitoring for bacteriological and chemical parameters. The ultimate goal is that First Nations, Inuit and partners contribute to decreased environmental public health risks.

Evaluation Scope and Methodology

The scope of the evaluation covers the years 2012-2013 to 2016-2017 and also selected activities undertaken from March 2017 up to March 2019 to recognize and provide feedback on new initiatives stemming from Budget 2016.¹ The evaluation was led by an evaluation team from the Evaluation Directorate within ISC, supported by an external consultant. Additionally, although not within its original scope, the evaluation outlines early impacts of the COVID-19 pandemic upon the Water and Wastewater Activities On-Reserve Program, as well as how it has addressed them.

¹ Although not part of the original scope, the evaluation also incorporates more recent data and actions taken by ISC to address water and wastewater programming on reserve in the narrative.

The Methodology Report was approved in September 2019, with primary data collection occurring from September 2019 to February 2020 and September to October 2020. The evaluation relied on a mixed-methods approach that included the following lines of evidence: a document, literature and media review; 35 key informant interviews; survey of 221 First Nations water and wastewater system operators and managers; survey of 52 community-based water monitors; and site visits to 6 First Nations communities in Nova Scotia, Newfoundland and Labrador, British Columbia and Alberta.

Key Findings

Relevance

The evaluation found that there is a continued need for investment in infrastructure, operations and maintenance, training and capacity development for water and wastewater systems in First Nations communities. While significant progress has been made towards achieving the Government of Canada's commitment of eliminating all long-term drinking water advisories on public systems on reserves, continued investment is needed to achieve this goal. There is also a continued need to provide environmental public health services to First Nations communities.

Performance – Water and Wastewater Infrastructure

Overall, the significant investments that have been made towards improving water and wastewater infrastructure in First Nations communities have been achieving results. As of September 30, 2020, 365 water and wastewater projects were completed and an additional 292 projects were ongoing for a total of 657 water and wastewater projects across 581 First Nations communities. Key informants stated that the First Nations Water and Wastewater Enhancement Program is doing well at addressing the highest priority systems, but even with the additional funding provided by Budget 2016 and subsequent funding, there are not enough resources to address all vulnerable systems. Wastewater systems, for example, have received far less investment and attention than drinking water systems. The share of public wastewater systems meeting the Wastewater Systems Effluent Regulations decreased from 80% to 66% between 2015-16 and 2019-20. Insufficient Operation & Maintenance funding poses immediate risks to infrastructure and undermines its longevity.² Climate change poses potential significant future risks to source water and community infrastructure.

Performance – Environmental Public Health Program

The percentage of First Nations communities with access to trained community-based water monitors or environmental public health officers to monitor drinking water quality has met the program target of 100%. All community sites had access to portable test

² On November 30, 2020, \$1.5 billion in additional investments was announced to help meet the government's commitment to ensure clean drinking water in First Nations communities and protect the health, safety, and well-being of First Nations Peoples. The funding includes: \$616.3 million over six years, and \$114.1 million per year thereafter, to increase the support provided for operations and maintenance of water and wastewater infrastructure on reserves; \$553.4 million to continue funding for water and wastewater infrastructure on reserve; and \$309.8 million to continue work to lift all long-term drinking water advisories on public systems on reserve, as soon as possible.

kits from 2012/13 to 2016/17 and the average sampling frequency was 80% in 2016/17 which is close to the target of 84% set for 2021-22. Nearly all (99%) public water systems are monitored for routine/annual chemical parameters. Most (89%) of the water/wastewater system operators surveyed agreed that the frequency of testing drinking water in their community is appropriate while 7% disagreed and 4% were unsure. The overall workload of environmental public health officers continues to be an area of concern. There are currently 108 environmental public health officers which is two thirds of what research indicates to be required to adequately deliver on all program areas (e.g. inspections of restaurants, daycare centres, etc.).

Performance – Training and Capacity Development

The proportion of primary water/wastewater system operators that are certified to the level of their water system has increased to 74% in 2019-20. The proportion of primary water/wastewater system operators that are certified to the level of their wastewater system was just 60% in 2019-20. Water/wastewater system operators noted that adequate opportunities for certification training are available, but other factors limit overall certification rates including water/wastewater system operators turnover and lack of certified back-up water/wastewater system operators, as well as community remoteness and other barriers to advanced education. The Circuit Rider Training Program is considered by key informants to be an effective way of providing on-going hands-on training, support, and continuing education credits for water/wastewater system operators. The Circuit Rider Training Program is a long-standing program but does not have secure long term funding as this is provided only on an annual basis. Several key informants indicated that in the absence of the Circuit Rider Training Program, the number of drinking water advisories would increase substantially over time, as there would not be a sufficient number of trained water/wastewater system operators with the required knowledge to operate the water and wastewater systems. Effective training of community-based water monitors by the environmental public health officers ensures that all individuals that take drinking water samples in First Nations communities receive the required training prior to sampling.

Relationships

With respect to the First Nations Water and Wastewater Enhancement Program and the Environmental Public Health Program, the distinction between infrastructure and public health means that there tends not to be overlap between ISC-Regional Operations and ISC-First Nations and Inuit Health Branch. The relationship between ISC-Regional Operations and ISC-First Nations and Inuit Health Branch programming has benefitted from the priority placed on eliminating long-term drinking water advisories and has resulted in opportunities to develop relationships that may not yet exist with respect to other program areas. Key informants reported that the overall relationship between ISC-Regional Operations and ISC-First Nations and Inuit Health Branch is said to be improving both in the regions and at headquarters. The focus on eliminating long-term drinking water advisories has been accompanied by a move towards more centralized decision making as opposed to regional prioritization of projects. However, this has not adversely impacted the relationship.

Best Practices

A wide range of best practices were emphasized by key informants or described in the literature, media and documents reviewed for this evaluation. They are summarized in this report and relate to: the transformation of ISC; prioritization of long-term drinking water advisories; support for water/wastewater system operators and systems; procurement design and construction; municipal type agreements; outreach and promotion of the profession; and, planning for sustainable systems.

Early Impacts of COVID-19

The COVID-19 pandemic has had a significant impact on both normal, planned, and periodic Water and Wastewater Activities On-Reserve Program activities. Both the infrastructure and public health aspects of the program have been affected. The impacts include: delays in planned infrastructure construction and repair activities on-reserve due to restricted access to communities and travel restrictions for both ISC personnel and outside contractors; backlogs in routine water inspections and sampling; increased costs (as a result of delays), as some work may only be done seasonally, and increased stress on ISC regional staff as they support the COVID-19 response.

Recommendations

- 1. Implement policy and procedures that result in the federal government providing 100% of the operation & maintenance costs for water and wastewater infrastructure in First Nations communities.** Insufficient operation & maintenance funding contributes to the occurrence of drinking water advisories and long-term drinking water advisories, decreased water system operator retention and certification rates, and reduced operational lifespan for infrastructure investments.
- 2. Increase the number of wastewater infrastructure projects undertaken.** To-date wastewater infrastructure projects have received disproportionately less attention and funding than drinking water projects. Many communities have inadequate wastewater services and much of the existing infrastructure has been assessed as a high or medium risk.
- 3. Where applicable, support regions to provide 5-year rather than 1-year funding agreements for the Circuit Rider Training Program and where demand exists among First Nations communities, to expand the model to include other forms of infrastructure.** Where used, the 1-year funding agreement model is inconsistent with the importance of the Circuit Rider Training Program and imposes unnecessary financial uncertainty on Circuit Rider Training Program administrators and circuit-rider trainers.

4. **Proactively incorporate climate change adaptation and mitigation into infrastructure design and construction as well as source water protection.** The response to climate change impacts by the Water and Wastewater Activities On-Reserve Program has been primarily reactive instead of proactive. Program engineers and environmental public health staff should be engaged to determine what relevant policies or guidelines could be implemented in the short-term and what additional data or information is required before additional policies or guidelines can be implemented.

5. **Determine the impact on First Nations communities by program area as a result of current environmental public health officer staffing levels and priorities.** There is compelling evidence that the current number of Environmental Public Health Program environmental public health officers is insufficient, however, overall, the Program is able to deliver drinking water activities successfully. An evaluation of all Environmental Public Health Program program areas as opposed to a single area, as is the focus of this evaluation, is necessary to fully understand the impact of current staffing levels.

Management Response and Action Plan

Evaluation Title: Evaluation of the Water and Wastewater On-Reserve Program

Overall Management Response

Overview

- This Management Response and Action Plan was developed to address recommendations presented in the Evaluation of Water and Wastewater On-Reserve. It was developed by ISC-RO and ISC-FNIHB in collaboration with the Evaluation Directorate.

Assurance

- The Action Plan presents appropriate and realistic measures to address the evaluation's recommendations, as well as timelines for initiating and completing the actions.

Action Plan Matrix

Recommendations	Actions	Responsible Manager (Title/Sector)	Planned Start and Completion Dates	Action Item Context/Rationale
<p>1. Implement policy and procedures that result in the federal government providing 100% of the O&M costs for water and wastewater infrastructure in First Nations communities.</p>	<p>We do concur.</p> <p>1a) In the 2020 Fall Economic Statement, Canada committed \$616.3 million from 2020-21 to 2025-26, and \$114.1 million ongoing thereafter, to support 100% of the formula for O&M funding for water and wastewater on reserve.</p> <p>To deliver on this commitment, ISC will allocate the new O&M investments and revise the departmental policies and procedures to reflect the increase to 100% funding of the O&M formula for water and wastewater in First Nations communities.</p>	<p>Director, Strategic Water Management, Regional Operations with RO Regions</p>	<p>Start Date: March 2021</p> <p>Completion: by Q4 2021-2022 (for allocation of first two years of new funding)</p>	<p>In the 2020 Fall Economic Statement, tabled on November 30, 2020, \$1.5 billion in new funding was announced to help accelerate the work being done to end all long-term drinking water advisories on public systems on reserves, to better support the operation and maintenance of systems, and to continue program investments in water and wastewater infrastructure.</p> <p>The increase of operations and maintenance funding from 80% of the formula funding currently provided to 100% funding for operations and maintenance will enable First Nations to better support approximately 1,200 water and wastewater systems, including:</p> <ul style="list-style-type: none"> • Funding operator salaries, training and certification; • Operating water and wastewater assets to ensure their day-to-day functioning; and • Conducting routine maintenance of assets to increase their reliability and minimize service interruptions.
<p>2. Increase the priority of wastewater infrastructure projects, which to-date have received disproportionately less funding than drinking water projects but pose potential risk to many communities.</p>	<p>We do concur.</p> <p>2a) ISC will work with First Nations to address their wastewater infrastructure, with an increased focus on addressing potential risks posed to communities. Regional offices will prioritize projects at the regional level, which will ensure more critical wastewater projects are funded. To assess progress, this will be</p>	<p>Director, Strategic Water Management, Regional Operations</p>	<p>Start Date: March 2021</p> <p>Completion: Q4 2022-2023 for increased focus on wastewater projects in prioritization process to be assessed through the tracking of funded wastewater projects.</p>	<p>In the 2020 Fall Economic Statement, Canada committed an additional \$553.4 million to help address vulnerable water and wastewater systems. These investments will ensure that the Department can continue to support the planning, procurement, design, construction, and commissioning of water and wastewater minor and major capital projects. This includes</p>

Recommendations	Actions	Responsible Manager (Title/Sector)	Planned Start and Completion Dates	Action Item Context/Rationale
	regularly tracked and reported. The national prioritization process for water and wastewater will at the same time be refocused to better allow for those regional priorities including wastewater projects posing a risk to human health or the environment, shifting away from centralized decision making which focused predominately on long-term drinking water advisories. To assess progress, this will be regularly tracked and reported.			<p>new builds, as well as system repairs and upgrades. Wastewater projects identified as priority may be addressed with this additional funding.</p> <p>Water and wastewater projects are funded from the same funding envelope; as such, water projects often take priority. As work proceeds to address LT-DWAs and vulnerable water systems, more wastewater projects will be able to be funded.</p>
<p>3. Where applicable, support regions to provide 5-year rather than 1-year funding agreements for the CRTP and where demand exists among First Nations communities, to expand the model to include other forms of infrastructure.</p>	<p>We do concur.</p> <p>3a) ISC will develop a plan to put in place 5-year funding agreements for the remaining interested regions who have in place 1-year funding agreements for CRTP. ISC HQ continues to work with regions around this item. ISC will also continue to support capacity development and operator support programs more broadly, for example, through regional technical hubs.</p>	<p>Director, Strategic Water Management, Regional Operations with RO regions</p>	<p>Start Date: January 2021</p> <p>Completion: Q2 2022-2023 for plan for 5-year agreements in place in remaining regions</p>	<p>The CRTP is a long-term capacity development program that has been successfully implemented for water and wastewater infrastructure and provides training and mentoring services to operators.</p> <p>It is designed to raise the competency and confidence level of maintenance personnel while improving asset condition and longevity.</p>
	<p>We do concur.</p> <p>3b) The Department is exploring options for the expansion of the CRTP to schools and other public community infrastructure in First Nation communities. Engagements within the Department (Regions, FNIHB and RO) are underway. This new Program will be subject to funding approval.</p>		<p>Director, Major Infrastructure Project Delivery, Regional Infrastructure Delivery Branch (RIDB)</p>	
<p>4. Develop policies or guidelines that incorporate climate change adaptation and mitigation into</p>	<p>We do concur.</p> <p>4a) ISC will work with partners and First Nations to identify actions for climate change adaptation</p>	<p>Director, Strategic Water Management, Regional</p>	<p>Start Date: March 2021</p> <p>Completion: Q4 2022-2023 for actions identified for adaption and mitigation measures</p>	

Recommendations	Actions	Responsible Manager (Title/Sector)	Planned Start and Completion Dates	Action Item Context/Rationale
<p>infrastructure design and construction as well as source water protection.</p>	<p>and mitigation measures to be integrated into water and wastewater infrastructure design and construction.</p>	<p>Operations and RO Regions</p>		
	<p>We do concur. 4b) As part of the on-going policy and protocol review, ISC will incorporate climate change adaptation and mitigation considerations into its water and wastewater policies where relevant.</p>	<p>Director, Strategic Water Management, Regional Operations and RO Regions</p>	<p>Start Date: July 2020 Completion Q4 2021-2022 for completion of review</p>	<p>ISC is currently reviewing, with First Nation partners, its water and wastewater policies and protocols, which presents an opportunity to better address climate change considerations with respect to water and wastewater infrastructure.</p>
	<p>We do concur. 4c) ISC will work with First Nations partners to develop an analysis or guidance on how climate change adaptation and mitigation measures may be considered in the terms of reference for infrastructure design, thereby requiring their consultants to include these considerations in the design and construction of infrastructure.</p>	<p>Sustainable Operations Directorate (SOD), RIDB in partnership with Director, Strategic Water Management, RO, and RO Regions</p>	<p>Start Date: March 2021 Completion: Q4 2021-2022 for an analysis/guidance on how climate change considerations may be considered in design</p>	<p>First Nations are the owners and operators of their water and wastewater systems; ISC provides financial support and technical advice. In the context of infrastructure projects, the most appropriate means of addressing these issues is through the feasibility and design work of the First Nation's consultants.</p>
<p>5. Determine the impact on First Nations communities by program area as a result of current EPHO staffing levels and priorities.</p>	<p>We do concur. 5a) Produce a synthesis report that will use existing and future reports and documentation to evaluate and better understand the impact of the current EPHO numbers on the ability of the Program to meet the National Environmental Public Health Program Framework, and look to identify trends regarding potential risks and hazards observed during inspections in First Nations communities.</p>	<p>Director, Environmental Public Health Division, First Nations and Inuit Health Branch</p>	<p>Start Date: March 2021 Completion: By the end of Q3 2022-2023 – Complete a comparative analysis of inspection data from the last five fiscal years (16/17 to 20/21).</p>	<p>Existing evidence (gap analysis, PM deep dives) have showed that additional EPHOs are needed to address longstanding program integrity gaps in environmental public health services provided in First Nations communities south of 60. This includes the provision of environmental public health services in eight core areas: food safety, housing, solid waste disposal, communicable disease control, emergency preparedness and response, drinking water, and wastewater, regardless of the source of the funding.</p> <p>EPHOs are assigned communities to which they provide all eight of these services at the request of and in consultation with the communities. EPHOs in regions with the greatest gaps in EPH services serve a</p>

Recommendations	Actions	Responsible Manager (Title/Sector)	Planned Start and Completion Dates	Action Item Context/Rationale
	<p>We do concur.</p> <p>5b) Program will undertake an analysis of EPHO gaps on food safety/food facilities and potential risks to health of community members and identify potential mitigation measures.</p>	<p>Director, Environmental Public Health Division, First Nations and Inuit Health Branch</p>	<p>Start Date: March 2021</p> <p>Completion: By Q2 2021-2022 – Complete analysis of food facility data from 2018-2019 to 2019-2020, including a comparative analysis by fiscal year</p>	<p>greater number of communities.</p> <p>In addition to its previous annual reporting on the number of inspections done the Program will undertake a more detailed comparative analysis of inspections done over the last 5 fiscal years (16/17 - 20-21) in all core areas. The analysis will include looking at: the number and frequency of inspections against the National Framework; observations/risks recorded; and the number of EPHOs. This report will look to detail, given current EPHO numbers, the ability of the Program to meet the National Framework and identify potential risks and hazards in First Nations communities.</p> <p>A special focus is put on food safety and food facilities given previous analysis showing the relatively high number of critical violations.</p> <p>Context is provided above</p>

1. Introduction

The overall purpose of the evaluation was to examine the Water and Wastewater Activities On-Reserve Program (WWP) and its constituent programs and policy areas, as outlined in the Five Year Evaluation Plan of Indigenous Services Canada (ISC), and in compliance with the Treasury Board (TB) of Canada *Policy on Results*. The two areas of focus were: the Infrastructure and Capacity Program - Water and Wastewater, also referred to as the First Nations Water and Wastewater Enhancement Program (FNWWEP); the second is public health-related water and wastewater activities supported by the Environmental Public Health Division (EPHD) of the First Nations and Inuit Health Branch (FNIHB) within ISC.³

2. Program Description

2.1 Background

Responsibility for safe drinking water on reserves is shared between First Nations communities and the Government of Canada.

ISC-RO provides funding and advice regarding planning, procurement, design, construction, upgrading, operation and maintenance and commissioning of water treatment facilities on First Nations reserves. They also provide financial support for the training and certification of water system operators.

ISC-FNIHB works with First Nation communities to protect public health by assuring verification monitoring programs are in place to provide a final check on the overall safety of drinking water at tap in public water systems, semi-public water systems, cisterns and individual wells in First Nations communities.⁴ ISC-FNIHB monitors systematically all systems with 5 or more connections, as well as systems with less than 5 connections where the public has a reasonable expectation of access. For remaining systems, ISC-FNIHB offers residents, upon request and free of charge, bacteriological testing services of their well water.

Chief and Council are responsible for planning and developing their capital facilities that provide for the basic infrastructure needs of the community, including drinking water. They are also responsible for the day-to-day operation of water and wastewater systems on reserves, including sampling and testing drinking water (operation monitoring).

³ The EPHD was previously under the jurisdiction of Health Canada. Since the creation of ISC, EPHD has transferred from Health Canada to the new Department.

⁴ Note that private wells are the responsibility of the homeowner.

FNWWEF

The FNWWEF is part of the Capital Facilities and Maintenance Program (CFMP), the umbrella program for ISC-RO's infrastructure investments in Indigenous communities. Decisions on project funding are built around the First Nations Infrastructure Investment Plan (FNIIP) process, where communities submit proposals to ISC based on their infrastructure needs. ISC's regional offices align those needs with program criteria, priorities, and resources. ISC's headquarters ensures accountability and the allocation of funds to regions, which are then distributed to Indigenous communities. Oversight is principally provided through the regional offices, which oversee cost-effectiveness by ensuring that projects are publicly tendered, and through the ISC Operations and Service Delivery Committee, which provides high-level oversight for major projects which could have significant national, risk, resource, or policy impacts. The FNWWEF is managed by ISC-RO, where both the Strategic Water Management (SWM) Team, ISC-RO regional offices, and the Regional Infrastructure Delivery Branch (RIDB) manage delivery through the CFMP.

ISC-RO Regional offices update the First Nations Infrastructure Investment Plans to support ongoing investment decisions, perform monitoring tasks as required by risk assessments, and proactively communicate project issues to the Regional Infrastructure Delivery Branch (RIDB) for early interventions. The RIDB supports regional offices in the management of projects, and provides additional oversight on specific projects as necessary.

Headquarters distributes program funds to the regional offices following priority-ranking exercises. Once a project is approved, the regional offices oversee project delivery and compliance with departmental policies and directives, which include requirements for competitive procurement and value for money.

The key activity in the FNWWEF is the provision of proposal-based funds under the CFMP for the planning, procurement, design, construction/acquisition, commissioning, assessment, and operation and maintenance of public water and wastewater systems. From this activity, the program funds three outputs:

- i. Capital projects related to public water and wastewater systems: focusing on the planning, design, construction, renovation, and/or repair/replacement of water and wastewater systems in First Nations communities on-reserve.
- ii. Assessments of public water and wastewater systems: ensuring ISC and First Nation communities have the information they need to make strategic decisions and allocate resources to manage public water and wastewater systems within established health and safety standards.
- iii. Training and capacity building: funding for supporting First Nation communities to develop the skills and capacity to operate and maintain their water and wastewater systems, as well as water quality testing.

EPHP

The primary objective of the EPHP is to “identify, address, and/or prevent human health risks to First Nations and Inuit communities associated with exposure to hazards within the natural and built environments.” Within ISC-FNIHB, the EPHP is coordinated regionally by Environmental Public Health Services (EPHS) and supported nationally by the Environmental Public Health Division (EPHD). All program activities are provided in agreement with and by request of First Nations Authorities.

In First Nations communities south of 60°, EPH programming is delivered by Environmental Public Health Officers (EPHOs) employed by ISC or First Nations communities and/or Tribal Councils. All EPHOs must have a Certificate in Public Health Inspection (Canada), which is recognized by health organizations in Canada as evidence of satisfactory training and competency. Key programming under public health assessments continues to include activities that focus on eight core areas: Drinking Water; Wastewater; Solid Waste Disposal; Food Safety; Housing; Facilities Inspections; Environmental Communicable Disease Control; and, Emergency Preparedness and Response. The role of the EPHP is to assist communities by providing training and education around EPH risks according to community priorities, developing recommendations for addressing EPH risk based on investigations, and reviewing infrastructure plans from a public health engineering perspective. Key activities include public health inspections and assessments, public education and training, and providing advice and guidance. Environmental public health surveillance and risk analysis programming includes community-based and participatory research on trends and impacts of environmental factors, such as chemical contaminants and climate change on the determinants of health (e.g., biophysical, social, cultural, and spiritual).

Nearly half of EPHOs serving First Nations communities are employed by First Nation communities or organizations, and in First Nations communities where Environmental Public Health Programs are transferred, the First Nations stakeholders are responsible for drinking water quality monitoring. More specifically, FNIHB works in partnership with First Nations communities south of 60 degrees parallel in Canada, excluding British Columbia, to monitor drinking water as per the Guidelines for Canadian Drinking Water Monitoring. ISC-FNIHB works together with First Nations communities and provides funding to Chief and Councils for drinking water monitoring through its Community-Based Water Monitor (CBWM) program.⁵

Community-Based Drinking Water Quality Monitors are trained by EPHO to sample and test the drinking water for potential bacteriological contamination as a final check on the overall safety of the drinking water at tap. If a community does not have a Community-Based Drinking Water Quality Monitor, an EPHO a Certified Public Health Inspector employed by ISC or First Nations stakeholders, will sample and test drinking water quality, with the community's permission.

⁵ A key benefit of the program is that it enables First Nations communities to sample and test their drinking water for microbiological contamination where it is difficult or impossible to do so on a regular basis and/or to get the samples to a laboratory in a timely manner.

EPHOs test drinking water quality for chemical, physical and radiological contaminants and maintain quality assurance and quality control as part of the verification monitoring program. They also review and interpret drinking water quality tests and disseminate the results to First Nations communities. Under the OCAP principle, First Nations assert that the data belongs to First Nations. Drinking Water Advisories data is posted on the website on a real time basis where an authorization has been reached with all First Nations to do so.

In all situations, when a potential concern about the drinking water quality is identified, the EPHO will immediately communicate the appropriate recommendation(s) to Chief and Council for action such as issuing a drinking water advisory. In addition, ISC-FNIHB reviews plans for new and upgraded water treatment systems from a public health perspective, and assists First Nations in planning and siting the development of their individual sewage septic systems upon request. In First Nations communities where EPHPs are transferred, First Nations stakeholders are responsible for drinking water quality monitoring.

Operation Monitoring vs. Verification Monitoring

The water system operators (WSOs) perform operational water quality monitoring, using daily and weekly water quality tests of raw, treated and distribution system water as per a drinking water quality monitoring program for the system(s) under their responsibility. In turn, the Community-based Drinking Water Quality Monitor (CBWM) or EPHO perform the drinking water verification monitoring in the distribution system (at tap) to verify operational monitoring results.

2.2 Program Narrative

Both FNWWEP and EPHP activities align with the Truth and Reconciliation Commission's Call to Action #19, which calls upon "the federal government, in consultation with Aboriginal peoples, to establish measurable goals to identify and close the gaps in health outcomes between Aboriginal and non-Aboriginal communities, and to publish annual progress reports and assess long-term trends."⁶

The Government of Canada's 2015 Speech from the Throne promised a renewal of the relationship between Canada and Indigenous peoples and the Government's first budget proposed an end to long-term boil water advisories by investing an additional \$1.8 billion over five years, starting in 2016-17. As part of Budget 2016, the Government formally announced their commitment to eliminate LT-DWAs by March 2021. As acknowledged by the Minister of Indigenous Services Canada in December 2020, the original target of March 2021 will not be achieved. The Government of Canada will continue to work in partnership with communities to end all LT-DWAs on public systems on reserves as soon as possible.

FNWWEP expected outcomes are:

⁶ Truth and Reconciliation Commission of Canada Calls to Action (2015).

Immediate Outcomes:

- Public water and wastewater systems are planned, designed, constructed/acquired, renovated and repaired/replaced in First Nation communities.
- ISC has the information it needs to make strategic decisions and First Nation communities have the information they need to allocate resources to manage their public water and wastewater systems within established health and safety standards.
- First Nation communities are supported in managing their public water and wastewater systems.

Intermediate Outcomes:

- First Nations' public water and wastewater systems meet established standards.
- First Nation communities have public water and wastewater systems that protect health and safety and which enable participation in the economy.
- First Nation communities have developed the skills and capacity to adequately operate and maintain their public water and wastewater systems and are, consequently, better equipped to transition to a multi-year and community infrastructure plan-based funding approach.

Ultimate Outcome:

- First Nations people have reliable and sustainable public water and wastewater systems in their communities.

EPHP expected outcomes are:

Immediate Outcomes:

- First Nations have access to EPH risk identification activities.
- First Nations, Inuit and partners have knowledge of EPH issues, risks and practices.
- First Nations have capacity to engage in investigation of environmental hazards.

Intermediate Outcomes:

- First Nations, Inuit and partners use environmental public health risk reduction practices.

Ultimate Outcome:

- First Nations, Inuit and partners contribute to decreased environmental public health risks.

3. Evaluation Methodology

3.1 Scope and Evaluation Issues

The scope of the evaluation covers the years 2012-2013 to 2016-2017 as per Treasury Board Requirements⁷ and also selected activities undertaken from March 2017 up to March and including fiscal year 2018-2019 to recognize and provide feedback on new initiatives stemming from Budget 2016. Moreover, although not part of the original scope, the evaluation also incorporates more recent data and actions taken by ISC to address water and wastewater programming on reserve in the narrative. The evaluation was led by an evaluation team from the Evaluation Directorate within ISC, supported by an external consultant. Additionally, although not within the original scope of the evaluation, it will also outline early impacts of the COVID-19 pandemic upon the WWP, as well as how it has addressed those impacts.

The evaluation was undertaken to provide a neutral and evidence based assessment of: relevance; performance in the areas of infrastructure, environmental public health activities and training and capacity development; relationships; and, best practices. Appendix A of this report lists the specific questions and issues that guided the evaluation.

3.2 Design and Methods

The evaluation was led by a team from the Evaluation Directorate within ISC, supported by an external consultant. The Methodology Report was approved in September 2019, with primary data collection occurring from September 2019 to February 2020 and from September to October 2020.⁸

The evaluation relied on a mixed-methods approach that included the following lines of evidence: a document, literature and media review; 35 key informant interviews with ISC-RO and ISC-FNIHB representatives and external stakeholders including the AFN, FNHA, OFNTSC and TSAG; a survey of 221 First Nations water and wastewater system operators and managers; a survey of 52 Community-Based Water Monitors (CBWM); and site visits to 6 First Nations communities in Nova Scotia, Newfoundland and Labrador, British Columbia and Alberta.

Following the initial data collection phase described above, the evaluation team also investigated the impacts of Covid-19 on water and wastewater activities by conducting follow-up interviews with ISC-RO and ISC-FNIHB staff at both headquarters and in the regions.

⁷ TBS *Policy on Results*. <https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=31300>

⁸ Data collection activities were postponed in March 2020 due to the COVID-19 pandemic.

3.3 Limitations

Site visits were carried out in communities located in the Atlantic, Alberta and British Columbia Regions, but not in other regions as a result of COVID-19 pandemic travel restrictions. Data collected from the survey of water and wastewater system operators and key informant interview data helped to compensate for the change to the data collection plan by providing data from regions that were not visited. The change in the number of site visits did not have an impact on the overall findings, conclusions and recommendations of the evaluation.

The survey of community-based water monitors was not available to CBWMs in all regions due to the availability of contact information from ISC regional offices. As a result, findings from the CBWM survey includes responses from only Quebec, Atlantic, Manitoba and Alberta regions.

3.4 Indigenous Engagement

The issue of water and wastewater on-reserve is of great significance to First Nations in Canada.⁹ As such, Assembly of First Nations collaboration, input, and advice was sought to provide input into the evaluation in terms of scope, lines of inquiry, evaluation questions, and appropriate informants. Additionally, the evaluation team participated on-site at the Alberta First Nations Technical Services Advisory Group (TSAG) Regional Drinking Water Safety Forum conference in Calgary, AB, which brought together many water system operators (WSOs) and community-based water monitors from many First Nations communities in southern Alberta. The purpose of the Forum was to seek feedback from participants on service gaps and additional water and wastewater needs in First Nations communities, as well as to inform Program direction.

4. Findings: Relevance

4.1 Continued need for the FNWWEP

There is a clear and continued need for investment in infrastructure, O&M, training and capacity development for water and wastewater systems in First Nations communities.

ISC provides funding and support for over 725 water and 450 wastewater systems in approximately 620 communities with the goal of bringing on-reserve water and wastewater systems to a level of service comparable to what is enjoyed by Canadians living in other communities of similar size and circumstances.¹⁰ This goal has not yet

⁹ The Evaluation of the Water and Wastewater program was focused solely on First Nations populations that live on formal reserves outlined in the *Indian Act*. Inuit and Metis populations were not included in this evaluation, as they fall outside of the reserve system.

¹⁰ INAC (September 27, 2016). "Overview of the First Nations Water and Wastewater Program." Presentation by Director, Program Design and Partnerships.

been achieved, as people living in some First Nations communities lack access to clean drinking water or adequate wastewater infrastructure, and too many water and wastewater systems are considered to be at a medium- or high-risk for failure.

Significant progress has been made in increasing the safety of drinking water in First Nations communities and towards meeting the federal government's commitment of eliminating all long-term drinking water advisories on public systems on reserves. Since November 2015, through these investments and the work undertaken in partnership with First Nations communities and other partners, the number of LT-DWAs in effect on public systems on reserves declined from 105 to 59 as of March 31, 2019.¹¹ However, continued investment is needed as new LT-DWAs on public systems on reserves continue to be issued and systems in many communities are approaching or have exceeded their expected life.

There is also a continued need to provide funding for operations and maintenance (O&M) as well as training and capacity development. These investments are necessary to ensure that First Nations community members have access to clean and safe drinking water and wastewater services and to avoid drinking water advisories. Appropriate levels of investment in O&M and WSO training maximizes the lifespan of infrastructure assets and 'protects' the investments made by government and communities.

According to key informants, there are several opportunities to expand the scope of the existing programming to focus on, for example, private wells, source water protection, and a greater focus on wastewater systems. Beyond these additional needs, many First Nations communities are growing and new subdivisions, schools, and a variety of other community buildings will require drinking water and wastewater services.

4.2 Continued need for the EPHP

There is a strong consensus that there is a demonstrable and continued need for the program to provide environmental public health services to First Nations communities with respect to their water and wastewater systems.

All people are entitled to basic public health provisions and most communities do not have the breadth of that expertise internally. While nearly half (45/108) of all EPHOs have been transferred to First Nation entities such as Tribal Councils, there remains an ongoing commitment by the federal government to fund these positions. In addition, there is a strong consensus from key informants that there is a demonstrable and continued need for the Program.

Previous evaluations have found a similar need for the Program. The 2016 evaluation of Health Canada's First Nations and Inuit Health Branch's Environmental Public Health

¹¹ This figure reflects LT-DWAs at the time of report writing. As of January 25, 2021: 57 LT-DWAs are in effect.

Program found that many First Nations communities continue to experience significant environmental public health risks compared with other Canadian communities including poor drinking water quality, poorly operated wastewater systems and a lack of certified WSOs; as such, the Program supports a continued and growing need among many First Nations communities to identify and address human health risks associated with exposure to hazards within natural and built environments.¹² The report states that there continues to be a strong, demonstrated need for a program like EPHP to influence health promotion and disease prevention outcomes in First Nations communities, and the need is expected to increase. Drinking water was cited as an EPH Risk area by 95% of EPHOs surveyed in 2016, up from 91% in 2011, and was identified as a high priority by 88% of respondents in 2016, more than for any other EPH risk area. Wastewater risks were cited as an EPH risk area by 72% of respondents, down from 80% in 2011. The 2015 evaluation of the CBWM Program also found a continuing need for the Program because it protects the health of residents of First Nations communities. The evaluation stated that the CBWM Program provides objective verification on the overall drinking water system and drinking water quality through: timely sampling and testing of water; community capacity by training Community-Based Drinking Water Quality Monitors; and, increased awareness of drinking water issues.¹³

5. Findings: Water and Wastewater Infrastructure

5.1 Infrastructure

Significant investment in water and wastewater infrastructure in First Nations communities has reduced the number of long-term drinking water advisories and has led to some progress towards achievement of performance targets.

As of September 30, 2020, a total of 365 water and wastewater projects were completed and an additional 292 projects were ongoing for a total of 657 water and wastewater projects across 581 First Nations communities.

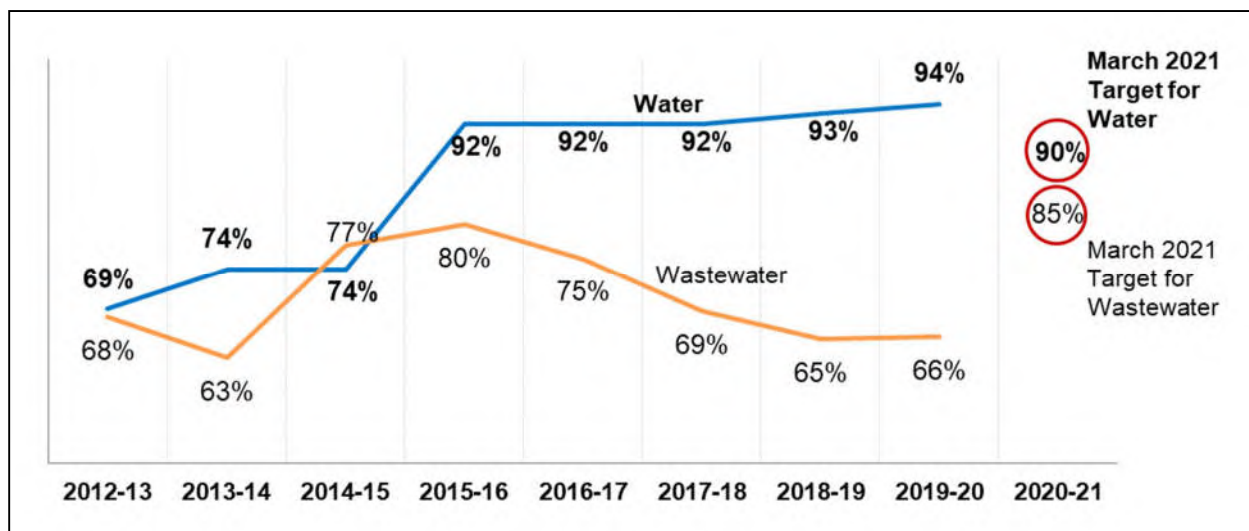
As shown in the figure below, the share of Public Water Systems with treated water that meets the *Guidelines for Canadian Drinking Water Quality* (GCDWQ) reached 92% in 2015-16 and remained relatively constant for the five-year period from 2015-16 to 2019-20, thus meeting the March 2021 target of 90%. The share of Public Wastewater Systems producing treated effluent that meets the *Wastewater Systems Effluent Regulations* increased from 63% in 2013-14 to 80% in 2015-16 before declining to 66% in 2019-20. Despite this decrease, the 2017-18 ISC Departmental Results Report indicates that the 85% target for wastewater systems by March 2021 will be met as more infrastructure projects funded through Budget 2016 are completed.¹⁴

¹² Health Canada, Office of Audit and Evaluation (September 2016). "Evaluation of Health Canada's First Nations and Inuit Health Branch's Environmental Public Health Program 2010 to 2014-15."

¹³ Health Canada (March 2015). "Evaluation of the Community-Based Water Monitor (CBWM) Program."

¹⁴ ISC (2018a). "2017-18 Departmental Results Report."

Figure 1: Percentage of On-Reserve Public Systems meeting the *Guidelines for Canadian Drinking Water Quality and the Wastewater Systems Effluent Regulations*



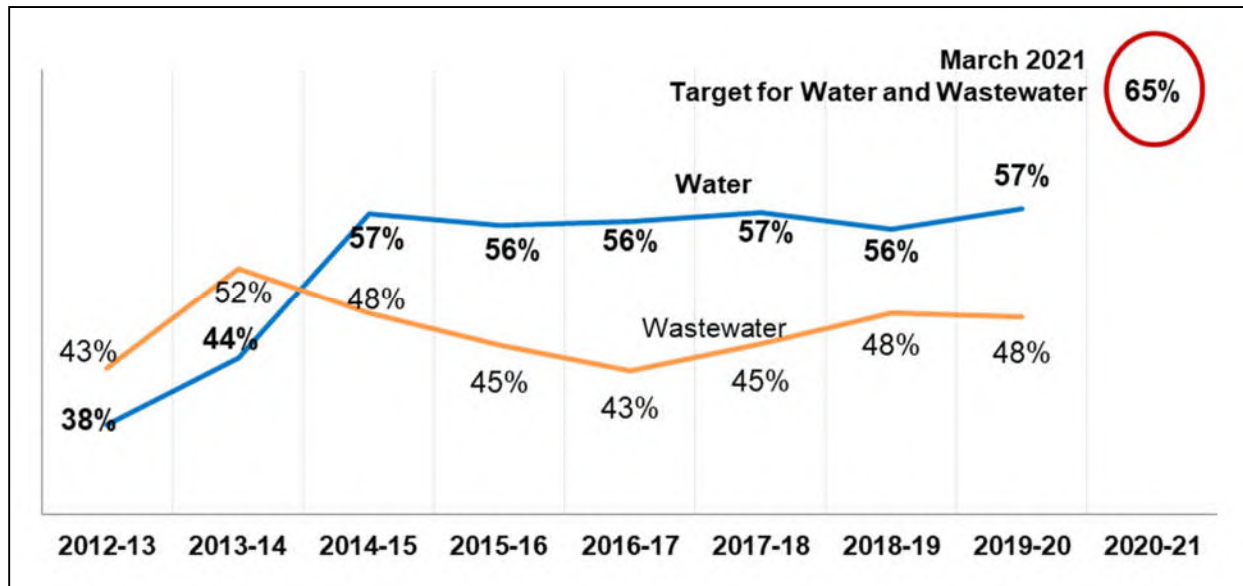
Source: Data provided by ISC Strategic Water Management Team. Targets contained in ISC Departmental Results Reports.

An evaluation of the management risk levels associated with each system is performed as part of the Annual Performance Inspection (API). An API assesses five main components of a system (i.e. effluent/water source risk; design risk; operation and maintenance risk; record keeping and reporting risk; and operator risk) to determine an overall system management risk score. Systems are given a risk score of low, medium or high.¹⁵ As shown in Figure 2, the share of water systems with a low risk score increased between 2012-13 (38%) and 2014-15 (57%), but has been relatively consistent between 2014-15 and 2019-20 (57%). The share of public wastewater systems with a low risk score has fluctuated somewhat over the eight-year period, but the share in 2019-20 (48%) was the same as in 2014-15. The performance targets, which have not yet been achieved, call for the percentage of public systems that have low risk ratings to be 65% for both water and wastewater systems by March 31, 2021.¹⁶

¹⁵ Communication with ISC Strategic Water Management Team, May 2019

¹⁶ ISC (2018a). "2017-18 Departmental Results Report."

Figure 2: Percentage of On-Reserve Public Water and Wastewater Systems that have Low Risk Ratings



Source: Data provided by ISC Strategic Water Management Team. Targets contained in ISC Departmental Results Reports.

In the survey of WSOs undertaken to inform this evaluation, respondents were asked to rate the average quality of their community’s water and wastewater infrastructure since 2013. As shown in the following table, those from Yukon (72%), Atlantic (50%), and Manitoba (50%) Regions were most likely to respond good or very good. Respondents from Alberta were the most likely to respond poor or very poor (40%). Since Alberta has very few LT-DWAs, the survey results imply that LT-DWAs are not always a comprehensive measure of a sustainable system.

Table 1: Distribution of Survey Ratings for the Quality of Community’s Water and Wastewater Infrastructure

Province/Territory of Respondent	Very Good or Good	Satisfactory	Poor or Very Poor	Not Sure
Yukon (n=7)	72%	14%	0%	14%
Atlantic (n=10)	50%	40%	10%	0%
Manitoba (n=16)	50%	19%	19%	12%
Ontario (n=28)	43%	29%	22%	7%
Quebec (n=13)	43%	29%	26%	8%
British Columbia (n=100)	39%	42%	14%	5%
Saskatchewan (n=24)	29%	50%	21%	0%
Alberta (n=20)	15%	35%	40%	10%
Overall (n=218)	38%	38%	18%	6%

Source: Survey of Water System Operators, 2019

WSOs were also asked to indicate if the quality of their community’s water and wastewater infrastructure had improved, worsened or had not changed since 2013. As shown in Table 2, the share of respondents that indicated their community’s infrastructure had improved ranged by region from a low of 22% (Ontario) to a high of

50% (Manitoba), while the share that indicated it had worsened ranged from a low of 11% (Atlantic) to a high of 30% (Alberta).

Table 2: Distribution of Survey Ratings for the Change in Quality of Community's Water and Wastewater Infrastructure since 2013

Province/Territory of Respondent	Improved	Unchanged	Worsened	Not Sure
Manitoba (n=16)	50%	25%	12%	13%
Alberta (n=20)	45%	25%	30%	0%
British Columbia (n=100)	44%	27%	21%	8%
Saskatchewan (n=24)	42%	33%	25%	0%
Atlantic (n=10)	33%	56%	11%	0%
Quebec (n=13)	31%	46%	23%	0%
Yukon (n=7)	29%	57%	14%	0%
Ontario (n=28)	22%	46%	21%	11%
Overall (n=217)	41%	32%	21%	6%

Source: Survey of Water System Operators, 2019

WSOs were also asked whether they agreed or disagreed that their community's drinking water and wastewater services were to a level and quality of service comparable to that enjoyed by Canadians living in non-First Nations communities of similar size and location. As indicated in the following table, overall 76% of WSOs indicated that their community's drinking water services were comparable while only 51% of WSOs indicated that their wastewater services were comparable to that in non-First Nation communities. In all regions, the share of respondents that indicated their community's drinking water was comparable was higher than the share indicated for wastewater services.

Table 3: Distribution of Survey Ratings on whether Community's Drinking Water/Wastewater Services is Comparable to that in Non-First Nation Communities of Similar Size and Location

Province/Territory of Respondent	Drinking Water				Wastewater			
	n =	Agree	Disagree	Not Sure	n =	Agree	Disagree	Not Sure
Saskatchewan	24	88%	12%	0%	24	50%	25%	25%
Yukon	7	86%	14%	0%	7	57%	29%	14%
Quebec	15	80%	20%	0%	15	67%	20%	13%
Atlantic	10	80%	20%	0%	10	40%	20%	40%
British Columbia	100	79%	12%	9%	99	60%	23%	17%
Manitoba	16	75%	0%	25%	16	56%	19%	25%
Alberta	20	65%	20%	15%	20	35%	45%	20%
Ontario	28	68%	21%	11%	27	22%	48%	30%
Overall	220	76%	13%	11%	218	51%	28%	21%

Source: Survey of Water System Operators, 2019

5.2 Operations and Maintenance

The amount of funding provided to First Nations for operation and maintenance of water and wastewater systems is insufficient.

The CFMP provides operations and maintenance funding as a subsidy to assist First Nations in the delivery of community infrastructure services on-reserve. The policy for drinking water and wastewater systems is to provide 80% of the average cost required to operate and maintain equivalent off-reserve capital assets to generally acceptable standards. Unlike capital projects, O&M funding is not based on proposals submitted by First Nations, but is established annually through an internal formula-based system contained in CFMP's Cost Reference Manual. The formula is run automatically using the Integrated Capital Management System (ICMS) each year and is applied to all eligible on-reserve assets contained in the ICMS inventory.¹⁷ Notwithstanding inflationary increases, the formula has been unchanged for nearly two decades and does not adequately reflect new technologies and escalating cost pressures such as the cost of electricity.

The federal government is aware of the problems associated with the funding formula. As stated in the 'Deep Dive' Summary Report into the issue, "insufficient Operating and Maintenance funding for drinking water systems is a huge challenge across First Nations communities" and was highlighted as a significant issue by every region and organization included in the research.¹⁸ Key informants included in this evaluation echoed these concerns and indicated that in addition to the formula not accurately estimating 80% of water and wastewater operating costs, it falsely supposed that communities possess available funds for the remaining 20%. Inadequate O&M funding can impact the provision of water and wastewater services in several ways, including: low salaries for WSOs relative to nearby municipalities, which contributes to WSO turnover; a lack of back-up WSOs and WSOs-in-training; and, an inability to conduct proactive as opposed to reactive maintenance which leads to higher overall costs and reduces the length of time the infrastructure remains operational.¹⁹

Some ISC regional offices have developed top-up programs that are meant to reduce the negative impacts resulting from the formula and Budget 2019 included additional funding to support O&M. However, it is premature to assess the impact of this funding over the short run as the negative impacts of insufficient funding are cumulative. Data

¹⁷ INAC (March 2016). "Capital Facilities and Maintenance Program Manual."

¹⁸ The Privy Council Office, et al. (February 2018) "Deep Dive Summary Report." 7

¹⁹ In November 2020, the Government of Canada announced an additional \$1.5 billion to help accelerate the work being done to end all long-term drinking water advisories on public systems on reserves, to better support the operation and maintenance of systems, and to continue program investments in water and wastewater infrastructure. The new funding will enable an increase to 100% of formula-based funding for operations and maintenance, will enable First Nations to better sustain approximately 1,200 water and wastewater systems, will better protect capital investments in water and wastewater, helping to ensure the sustainability of First Nation's water and wastewater assets over the long-term, and will support training for water operators.

organizations are working in collaboration with The Assembly of First Nations to study the issue and arrive at a more sustainable formula or approach for O&M funding.

Key informants indicate that the most sustainable way to address the issue of O&M funding is through an asset management approach and long-term funding agreements with First Nations. This approach involves describing what infrastructure is owned, what it is worth, its condition and remaining service life, when maintenance is required, how much operations, maintenance and replacement will cost and when those costs will occur, and the financial plans to ensure affordability in the long term.

5.3 Assessments

Annual Performance Inspections are carried out on nearly all water and wastewater systems. They provide high-level information about system risk but are limited in their ability to inform the prioritization of infrastructure projects. The last comprehensive assessment of water and wastewater systems was conducted during the period from 2009 to 2011.

The *CFMP Program Manual* indicates that Annual Performance Inspections (APIs) of First Nations water systems have been required since the introduction of the *Protocol for Centralised Drinking Water Systems in First Nation Communities* in 2006 and the *Protocol for Centralised Wastewater Systems in First Nation Communities* in 2010. The *CFMP Program Manual* indicates that APIs include site visits conducted by a qualified person (e.g. licensed consulting engineer, licensed Tribal Council engineer, provincial water systems inspector or a water system operator) who is certified to a level equivalent to the level of the system being inspected and is not a member of the band involved.²⁰ According to ISC, a total of 784 water APIs were completed in both 2016-17 and 2017-18, and a total of 511 wastewater APIs were completed in both 2016-17 and 2017-18.²¹ It should be noted that APIs are not a measure of public health risk.

Key informants indicated that APIs provide a high-level overview that is helpful for determining which systems require more focused attention. While the APIs are the source of risk measurement available for systems, some key informants indicated that the approach is not easily understood due to the complexity of the API process and is less useful than a priorities-based approach.

As stated in the *CFMP Program Manual*, comprehensive assessments of water and wastewater systems serving First Nations are conducted periodically.²² The most recent comprehensive assessment of water and wastewater infrastructure on-reserve was conducted between 2009 and 2011, during which consultants visited 571 participating First Nations communities to assess the condition of the water and wastewater assets, identified the capital and O&M needs and recommended future servicing options for the

²⁰ INAC (March 2016). "CFMP Program Manual."

²¹ Communication with ISC Strategic Water Management Team, May 2019

²² Indigenous and Northern Affairs Canada (March 2016). "Capital Facilities and Maintenance Program Manual." 64.

period 2010-2020.²³ Key informants indicated that another comprehensive assessment is now required to provide more accurate and up-to-date data for use by communities and ISC.

5.4 Climate Change

Climate change is likely to have a significant impact on source water as well as drinking water and wastewater infrastructure. To date, the response from the program has been primarily limited to reactive as opposed to proactive measures.

A 2008 AFN report describes the significant impact climate change could have on First Nations relationship with water throughout Canada and states that successful adaptation will require solutions that acknowledge and work with on-reserve water conditions. The report notes that impacts could include changes to seasonal water flow patterns; changes to precipitation patterns; warmer surface water temperatures; variations in surface water quantities; changes in surface water and groundwater levels and a higher incidence of drought, which together will result in widespread changes to water quality; and water availability and watershed vitality. Lower water levels eroding shorelines, unpredictable water movement and warmer water temperatures can impact water quality through a range of ways including increased erosion of exposed soils resulting in higher water turbidity levels, greater movement of pollutants into watercourses and larger quantities of solid matter requiring filtration, increased bacteria and fungi concentrations, increased summer phosphorus concentrations, and other effects.²⁴ Additionally, Health Canada has outlined several ways in which climate change could affect the health of communities, for example, by impacting water sources for food gathering, recreational and cultural use.

Overall, the report states that drinking water and wastewater treatment infrastructure will have to cope with filtering the degraded quality of water and will have to be designed and constructed to deal with everything from extreme weather to poorer water quality. Water infrastructure will need to withstand flooding in areas that have not historically been susceptible to floods and sewer systems may have to carry larger volumes of water than have been historically necessary as a result of heavy rains or quick spring ice-melt. Wastewater treatment must emphasize protection against breaches resulting in contamination from changes to 'normal' water levels as a result of climate change.²⁵

Key informants indicated that increased fires, floods and drought conditions have already affected source water and threatened infrastructure in First Nations communities. In addition, they stated that the extent to which potential climate change impacts are accounted for during infrastructure design and planning phases varies significantly based on the consultants involved in the program, and to date has been primarily reactive instead of proactive.

²³ Neegan Burnside Ltd. (April 2011). "National Assessment of First Nations Water and Wastewater Systems."

²⁴ Assembly of First Nations (AFN) Environmental Stewardship Unit (March 2008). "Climate Change and Water: Impacts and Adaptations for First Nations Communities."

²⁵ Ibid.

6. Findings: Environmental Public Health Program

6.1 Achievement of Outcomes

Performance targets related to monitoring drinking water quality are generally being achieved or significant progress has been made towards target values. The performance data shows that all communities have access to trained CBWMs or EPHOs to monitor drinking water quality. Most WSOs surveyed across Canada indicated that the frequency of testing their community’s drinking water for quality is appropriate, and that their community members have confidence in their drinking water.

Monitoring bacteriological parameters in drinking water may be done by either an EPHO or a CBWM trained to conduct testing or through samples sent to accredited laboratories for analysis. According to the 2018 *Performance Information Profile for the Water and Wastewater Program*, the percentage of communities with access to trained CBWMs or EPHOs to monitor drinking water quality has met the target of 100%.²⁶

According to the GCDWQ, Public Water Systems (PWSs) should be sampled four times per month evenly spaced, for a total of 48 out of 52 weeks. To reflect regional realities and challenges in sampling PWSs four times per month (e.g. band office closures, holidays, staff turnover, etc.), eligible PWSs are considered to be in compliance with recommended sampling for bacteriological parameters if it is sampled 85% (44 out of 52 weeks each year).²⁷ The following table indicates the number of PWSs monitored weekly, monthly and not at all during the five year period from 2012-13 to 2016-17. According to key informants, the decrease in the share of PWSs monitored weekly from 64% in 2012-13 to 42% in 2014-15 was primarily a result of travel restrictions imposed by senior management which limited the number of community visits that could be done by EPHOs.²⁸

Table 4: PWSs Monitored for Bacteriological Parameters

Fiscal Year	PWSs Monitored Weekly		PWSs Monitored Monthly		PWSs not Monitored	
	#	%	#	%	#	%
2012-13	413	64%	151	22%	11	2%
2013-14	193	58%	99	30%	23	7%
2014-15	145	42%	52	15%	13	4%
2015-16	157	48%	0	0%	0	0%
2016-17	191	57%	68	20%	0	0%

Source: FNIHB Drinking Water Program National Reports, 2012-13 through 2017-18

Notes: 2012-13 figures include British Columbia; due to transfer of responsibilities to BC FHNA subsequent years’ figures do not include BC. Systems with DWAs in place for an entire year affects the % of PWSs monitored weekly.

²⁶ ISC (Spring 2018). “Performance Information Profile – Water and Wastewater”.

²⁷ FNIHB, “Drinking Water Program National Report”.

²⁸ FNIHB, “Drinking Water Program National Report 2014-15”.

The method described above and presented in Table 4 considers a system to be compliant if the system was monitored 48 out of 52 weeks (or 44 weeks for eligible systems). If a system was monitored, for example, 47 weeks out of 52 instead of 48, it would be considered non-compliant and the 47 weeks of actual monitoring would not be recognized or tabulated. In an effort to improve the statistical analysis of bacteriological monitoring, Statistics Canada was enlisted to suggest a method that could better reflect the bacteriological monitoring taking place. They suggested an averaging method where the sampling frequency of each system is calculated based on the monitoring taking place and not a “pass vs. fail” method. For example, if a system was monitored 47 weeks out of 52 weeks, the system would be considered to have a sampling frequency of 98% (i.e. 47/48).²⁹ The following table reports the average sampling frequency for PWSs has increased from 75% in 2012-13 to 80% in 2016-17. According to the *EPHP Performance Information Profile*, the target value is 84% by March 2022.³⁰

Table 5: Average Sampling Frequency for Public Water Systems

Metric	Actual Values					Target Value
	2012-13	2013-14	2014-15	2015-16	2016-17	2021-22
Average Sampling Frequency	75%	78%	79%	80%	80%	84%

Source: 'Actual Values' from FNIHB Drinking Water Program National Reports, 2013-14 through 2016-17; 'Target Value' from FNIHB EPHP PIP.

As shown in the following table of survey results, most WSOs across all regions agreed that the frequency at which their community tests drinking water (verification monitoring) for quality is appropriate, with respondents from communities in Ontario (100%), Atlantic (100%), Quebec (93%) and Alberta (90%) most likely to have agreed. One-in-five (21%) respondents from Saskatchewan disagreed. Most WSOs indicated that there are a sufficient number of CBWMs in their community but based on survey responses, there may be demand for more CBWMs in certain regions where a higher share of respondents disagreed with the statement including Manitoba (33%), Atlantic (30%) and Saskatchewan (29%).

²⁹ FNIHB. “Drinking Water Program National Report”.

³⁰ FNIHB (2017). “Environmental Public Health Programming Performance Information Profile.”

Table 6: Distribution of Survey Results regarding the Appropriateness of Drinking Water Testing Frequency and the Number of CBWMs

Province/Territory of Respondent	“The frequency of testing drinking water for quality is appropriate”			“There are a sufficient number of CBWMs in the community”		
	Agree	Disagree	Not Sure	Agree	Disagree	Not Sure
Ontario (n=27)	100%	0%	0%	74%	19%	7%
Atlantic (n=10)	100%	0%	0%	70%	30%	0%
Quebec (n=14)	93%	0%	7%	93%	7%	0%
Alberta (n=19)	90%	5%	5%	68%	16%	16%
Yukon (n=7)	86%	0%	14%	86%	14%	0%
British Columbia (n=98)	83%	8%	9%	72%	21%	7%
Manitoba (n=15)	80%	13%	7%	60%	33%	7%
Saskatchewan (n=24)	71%	21%	8%	71%	29%	0%
Overall (n=214)	89%	7%	4%	73%	21%	6%

Source: Survey of Water System Operators, 2019

As indicated in the following table of survey results, 77% of all WSOs agreed that their community has confidence in its drinking water while 14% disagreed. The WSOs from communities in Saskatchewan (30%) and Atlantic (20%) were the most likely to disagree. WSOs were also asked if their community has the capacity to identify water quality problems and potential waterborne diseases. Overall, 80% of WSOs surveyed indicated they had such capacity and 11% indicated they did not. WSOs in Saskatchewan (25%) and Quebec (21%) were most likely to indicate that they lacked that capacity, most often because the community lacked the sufficient equipment to test water locally and must instead send samples away to an accredited lab for analysis.

Table 7: Distribution of Survey Results regarding Confidence in Drinking Water and the Capacity to Identify Water Quality Problems and Potential Waterborne Diseases

Province/Territory of Respondent	“The community has confidence in its drinking water”			“The community has capacity to identify water quality problems and potential waterborne diseases”		
	Agree	Disagree	Not Sure	Agree	Disagree	Not Sure
Yukon (n=7)	86%	0%	14%	86%	0%	14%
British Columbia (n=98)	82%	10%	8%	83%	8%	9%
Atlantic (n=10)	80%	20%	0%	90%	10%	0%
Manitoba (n=15)	80%	13%	7%	80%	7%	13%
Ontario (n=26)	73%	15%	12%	85%	11%	4%
Quebec (n=14)	72%	14%	14%	64%	21%	14%
Alberta (n=19)	68%	16%	16%	68%	16%	16%
Saskatchewan (n=23)	61%	30%	9%	71%	25%	4%
Overall (n=214)	77%	30%	9%	80%	11%	9%

Source: Survey of Water System Operators, 2019

6.2 Program Design and Delivery

The design of the EPHP is considered to be appropriate, although the overall workload of Environmental Public Health Officers continues to be an area of concern. Requests from communities, program fulfilment and emergency response all drive the activities undertaken by EPHOs, who because of the design of the program tend to have effective relationships within communities. Nearly half (45/108) of all EPHOs have been transferred to First Nations control.

Most key informants characterize the design of the EPHP as being very appropriate, despite being under-resourced. EPHOs spend much of their working time in communities and so tend to have effective relationships with community leadership, health and infrastructure managers, WSOs, and others. This element of the Program design is said to be a key strength and is consistent with the 2016 evaluation of ISC-FNIHB's EPHP which found that the Program has demonstrated capacity to work effectively with First Nations communities to identify and to assess risks, and to provide recommendations with respect to addressing environmental risks. In addition, nearly half (45/108) of all EPHOs have been transferred to First Nations control, with ISC continuing to fund environmental health programs through grants and contributions.

Despite the Program's achievements, there have long been concerns raised about available resources for the Program. The Drinking Water Program Reports published by ISC-FNIHB from 2012-13 through 2016-17 states that "the current A-base and FNWWAP allocated FTE positions are insufficient to successfully deliver the program".

Water issues on reserves are a longstanding concern and have received multiple cycles of targeted investment to address specific issues since 2003. Since 1970, with the exception of drinking water, investments have not been made in EPHO capacity and associated resources.

In February 2018, the Deep Dive report estimated the shortfall of Environmental Public Health Officers to be 54 FTEs.³¹ Findings from key informant interviews reinforce the perception that there is a long-standing deficiency in the total number of Environmental Health Officers providing service to First Nations communities.³² The level of demand for EPHO services has increased over time due to limited A-base funding in Regions, population growth in communities, and large infrastructure investments made within communities. The extent to which each of these pressures impacts the provision of EPH

³¹ The Privy Council Office, et al. (February 2018) "Deep Dive Summary Report."

³² Due to the shortage of EPHOs in regions, as mentioned above, National Standards are not being met, and as a result, exposure to environmental public health risks is increased. In 2016/17, only 22% of public facilities, such as daycares, restaurants and schools were inspected, leaving a gap in understanding the magnitude of the problem. For example, 80% of food facilities that have been inspected showed critical public health violations that could lead to enteric illness. In contrast, in 2017-2018, public water systems were monitored for bacteria in 85% of the recommended number of sampling weeks and since November 2015 the number of Long Term Drinking Water Advisories has decreased. The need to address environmental public health gaps was identified in Deep Dive reports to the Prime Minister for both Long Term Drinking Water Advisories and Housing.

services to First Nations communities are subject to variation due to factors such as region, remoteness, community capacity and others.

Key informants also revealed that the EPHP appears to be very reliant on the funding it receives for water and wastewater, despite these being just two of eight Program areas. Notwithstanding emergency issues that arise, the ability to focus on other EPH Program areas in a proactive and timely manner is said to be limited by the clear direction to focus on the Drinking Water Program from the priority placed on eliminating LT-DWAs by the federal government.

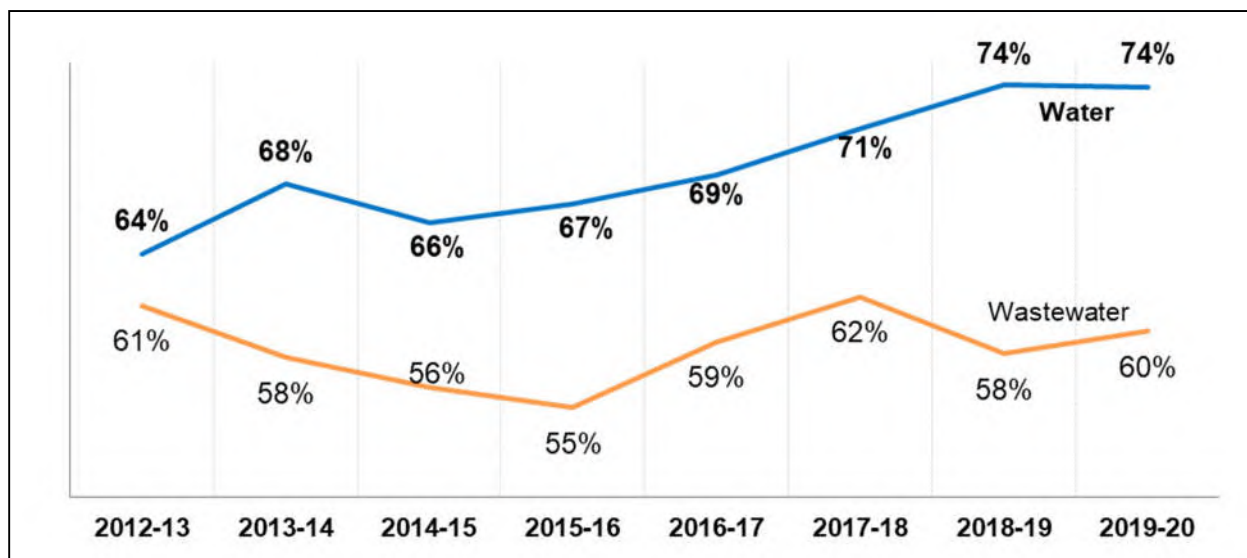
7. Findings: Training and Capacity Development

7.1 Water System Operators

Departmental data shows that not all primary WSOs are certified to the level of the water and/or wastewater system in their communities; however, training is on-going. Key informants indicated that there are several barriers to obtaining a sufficient number of trained WSOs, including a lack of funding for back-up WSOs, and turnover due to certified WSOs moving to higher paid jobs outside of their communities. In addition, most communities lack a succession plan for WSOs.

As shown in Figure 4, the percentage of public water systems that have primary WSOs certified to the level of the system in their communities increased from 64% in 2012-13 to 74% in 2019-20. For wastewater systems, the rate has fluctuated over the eight-year time period shown in the figure; however, the value in 2019-20 (60%) is similar to the value in 2012-13 (61%). The Departmental Results Reports do not state a target value for this indicator. It appears that adequate opportunities for certification training are available, but other factors limit overall certification rates including WSO turnover and lack of back-up WSOs, as well as community remoteness and other barriers to advanced education.

Figure 3: Percentage of Public Water Systems and Public Wastewater Systems that have Primary Water System Operators Certified to the level of the System



Source: Data provided by ISC Strategic Water Management Team.

The presence of a certified primary WSO is important for the safe operation of water and wastewater systems, but an additional concern is having enough WSOs available. As shown in the following table of survey results, 79% of respondents indicated that their facilities have certified WSOs, but nearly half of all respondents (46%) indicated that there were not a sufficient number of trained WSOs. Respondents from Manitoba (69%), Alberta (60%) and Saskatchewan (58%) were most likely to indicate that there are not enough trained WSOs to ensure safe drinking water and wastewater services. Key informants stated that while there is funding available for WSOs to pursue certification, the shortfall in certified WSOs is primarily due to turnover and low pay levels making it difficult to recruit and retain certified WSOs as well as lack of funding for back-up WSOs.

Table 8: Distribution of Survey Ratings

Province/Territory	“The water and/or wastewater facility is operated by a WSO certified to the appropriate level”			“The community has a sufficient number of trained WSOs to ensure safe drinking water and wastewater services”		
	Agree	Disagree	Not Sure	Agree	Disagree	Not Sure
Yukon (n=7)	100%	0%	0%	86%	14%	0%
Quebec (n=14)	93%	0%	7%	46%	39%	15%
Manitoba (n=15)	87%	13%	0%	25%	69%	6%
Alberta (n=20)	85%	15%	0%	40%	60%	0%
Ontario (n=27)	85%	11%	4%	57%	43%	0%
British Columbia (n=99)	75%	16%	9%	51%	42%	7%
Atlantic (n=10)	70%	20%	10%	50%	40%	10%
Saskatchewan (n=24)	70%	30%	0%	42%	58%	0%
Overall (n=214)	79%	15%	6%	49%	46%	5%

Source: Survey of Water System Operators, 2019

7.2 Circuit Rider Training Program (CRTP)

The Circuit Rider Training Program (CRTP) is considered to be an effective way to provide on-going training and support to operators of water and wastewater systems and the model has been successfully extended to other community infrastructure in some regions. The funding in most regions remains annual as opposed to on-going which is a barrier to expansion and a risk to the program overall.

The CRTP is a long-term capacity building program that provides training and mentoring services to operators of First Nations drinking water and wastewater systems. It is one of the primary mechanisms by which ISC supports ongoing training and capacity development among WSOs. The general CRTP model involves qualified experts, known as ‘Circuit Rider Trainers’ or simply ‘trainers’, who provide support to a given number (i.e. a circuit) of First Nations communities by providing hands-on training to operators of water and wastewater systems. Trainers visit communities on a scheduled basis and teach about the specific equipment that is installed in the community. Trainers assist WSOs in obtaining and maintaining their certifications and may also provide advice to Chiefs and Councils. Trainers will also provide remote assistance on an as-needed basis to WSOs experiencing minor operation and maintenance issues and endeavor to provide 24/7 emergency support.³³

The CRTP supports many WSOs to obtain and maintain certification and to operate systems in a safe manner. The key strength of the Program is that it provides hands-on in-community training to WSOs. The hands-on component has multiple benefits, but two are most apparent. First, training is based on the equipment a given WSO uses on a day-to-day basis; and second, the training could not be replaced by other forms of centralized training. In many communities there are not a sufficient number of trained and certified WSOs to allow for individuals to leave the community for training. If in-community delivery of Continuing Education Units (CEUs) through trainers was no longer available, WSOs would be unable or significantly challenged to maintain their certification.

Some regions have extended the CRTP model to include other community infrastructure. For example, in Quebec, the Regroupement Mamit Innuat Tribal Council provides Building Maintenance Trainer activities to 18 communities; and in Manitoba, the Dakota Ojibway Tribal Council delivers a similar Program focused on school infrastructure called the School Maintenance Training Program. Key informants indicated that expansion of the Program could be an opportunity for other regions as well, but that the tendency to fund the CRTP annually as opposed to providing ongoing sustainable funding is a barrier to expansion and a risk to the current delivery of the Program overall.

³³ INAC (March 2016). “Capital Facilities and Maintenance Program Manual.”

7.3 EPHP-Delivered Training and Capacity Development

The Environmental Public Health Program delivers training and capacity development activities through Environmental Public Health Officers. The primary focus is training Community Based Water Monitors and other individuals responsible for sampling drinking water.

The training of CBWMs comprises most of the training and education delivered by EPHOs in First Nations communities. Given the importance of monitoring drinking water for safety and quality, most key informants indicated that this is a very appropriate focus for EPHOs. Materials used for training have not been updated recently (e.g. they refer to Health Canada and not ISC).³⁴

The other focus of the EPHP with respect to education initiatives is the development of communication and educational material. According to ISC-FNIHB representatives, many of these products have been developed in collaboration with First Nations. To date, the primary focus has been on communicating and educating with respect to drinking water advisories. There is an opportunity and demand for additional information for water and wastewater, such as those that relate to manganese, trihalomethanes, mercury, lead, etc.

The 2016 evaluation of the ISC-FNIHB EPHP found continued effort and emphasis placed on the development of public education and awareness materials with over 250 materials in various formats related to EPH risks, including drinking water and wastewater, among others. The 2016 evaluation reported that approximately two-thirds of respondents to the EPHO survey (64%) stated that there had been a positive shift in the community members' awareness and knowledge of EPH risks in the past five years. Most EPHOs (83%) reported that the EPHP had made at least some contribution to community members' levels of awareness of EPH risks through the active dissemination of information, education and site visits.³⁵

8. Findings: Roles and Relationships

8.1 ISC-RO and ISC-FNIHB

The distinction between infrastructure and public health means that there tends not to be overlap between ISC-RO and ISC-FNIHB programming. The relationship between ISC-RO and ISC-FNIHB with respect to water has benefitted from the priority placed on eliminating LT-DWAs and has resulted in opportunities to develop relationships that may not yet exist in other program areas. The overall relationship between ISC-RO and ISC-FNIHB is said to be improving.

³⁴ It should be noted that although ISC-FNIHB is no longer part of Health Canada, documents for the training of CBWMs still reflect accurate information.

³⁵ Health Canada (September 2016). "Evaluation of FNIHB's EPHP."

The distinction between infrastructure and public health programming means that, effectively, there tends not to be overlap between ISC-RO and ISC-FNIHB. For example, there are far fewer ISC-FNIHB engineers than there are at ISC-RO, so ISC-FNIHB engineers have less capacity to review proposed infrastructure. While ISC-RO engineers do look at health risks in reviewing proposed infrastructure, when ISC-FNIHB engineers are involved, they offer a different perspective rather than an overlap. The lack of ISC-FNIHB engineer capacity is significant as the importance of public health risks (as opposed to infrastructure risks) may not receive the necessary attention.

The focus on drinking water and the commitment to eliminate LT-DWAs on public systems on reserves has led to greater integration among ISC-RO and ISC-FNIHB, and has provided opportunities for staff and managers to become acquainted and work in unison towards a shared goal. According to key informants, most other program areas have not experienced the same level of integration.

8.2 Headquarters and Regions

The focus on eliminating LT-DWAs on public systems on reserves has been accompanied by a move towards more centralized decision making as opposed to regional prioritization of projects.

Regional key informants from ISC-RO are supportive of the commitment to eliminate LT-DWAs on public systems on reserve and to see money flowing from Budget 2016 and the FNWWEF, but the commitment has been delivered through a centralized approach, leaving regions with less ability to allocate dollars based on regional priorities as opposed to national ones.

Key informants have raised the concern that as a consequence of the move towards centralized decision-making, regional needs and priorities may not be met, as well as a lessening of focus on unique regional contexts.

9. Findings: Best Practices

9.1 Summary of Best Practices

A wide range of best practices were emphasized by key informants or described in the literature, media and documents reviewed for this evaluation. They are summarized below and relate to: the transformation of ISC; prioritization of LT-DWAs; support for water system operators and systems; procurement design and construction; municipal type agreements; outreach and promotion of the profession; and, planning for sustainable systems.

Transformation of ISC: Several existing and/or proposed organizations are considered to be best practices and examples of how the Transformation of ISC can occur, in that they are led by First Nations or are otherwise independent from the federal government

and have taken on roles once held by Canada to provide services to First Nations communities. Examples of organizations/initiatives include:

- The Alberta First Nations Technical Advisory Services Group (TSAG) and the Ontario First Nations Technical Services Corporation (OFNTSC) both of which provide technical support to First Nations communities and deliver the CRTP in their respective regions.
- The BC First Nations Health Authority (FNHA), which is the first and only provincial health organization of its kind in Canada, provides environmental public health services, including through a Drinking Water Safety Program, to First Nations communities in British Columbia.
- The Atlantic First Nations Water Authority which is being developed by the Chiefs Secretariat of the Atlantic Policy Congress of First Nations and if implemented would be the first water authority constructed, owned and operated by First Nations.
- Another practice that can be thematically linked to the Transformation of ISC has been the devolution of EPHOs to First Nations communities and Tribal Councils and other entities that operate public health programs for their member communities. ISC funds the transferred EPHO positions through grants and contribution agreements.

Prioritization of LT-DWAS: The prioritization of LT-DWAs on public systems on reserve, and the federal government commitment to end LT-DWAs has been highlighted as a best practice because it represents an unprecedented investment in water and wastewater infrastructure and it has demanded high levels of communication and collaboration among stakeholders.

Support for WSOs and systems: WSOs are the front line professionals responsible for water and wastewater systems in First Nations communities. Several best practices are focused on providing training and support to WSOs and on increasing WSO retention. Examples of these approaches include:

- Training and support programs such as the CRTP and the HUB model which has been implemented in Ontario among eight tribal councils supporting 48 communities with hub services. A hub provides economies of scale by providing qualified oversight and assistance to multiple First Nations water and wastewater systems across communities within the hub.
- Including WSOs as much as possible during the design and construction phase of infrastructure projects and ensuring in the contract that training and ongoing support will be provided by the system designer/contractor for a period of time such as the first year of operation.
- Some Regions, including British Columbia and Saskatchewan, have developed a wage subsidy enhancement program for water and wastewater system operators that gain or maintain certification to the level required for their community's system. It is considered a best practice in the context of the current O&M funding arrangement because it can lead to increased rates of certification and retention of WSOs in First Nations communities.

- The FNHA has permitted and supported First Nations communities to undertake in-community testing of water samples using approved technologies. Duplicate samples are also sent to accredited labs periodically for quality assurance, but in-community sampling has allowed communities to test their own water system for total coliform and e-coli. The initiative was first undertaken to assist communities that, due to remoteness, could not supply samples to accredited labs within the required timeframe, but has since expanded to most (approximately 180) First Nations communities in BC.
- Use of technology that facilitates remote, real-time, centralized operational monitoring that can alert various entities if a problem arises at a facility.

Procurement, design and construction: Best practices were identified that relate to the procurement, design and construction phases of infrastructure projects. For example:

- Two pilot projects were carried out by ISC and First Nations communities in 2019-21 to identify potential options for modifying tendering policies that would result in greater participation of First Nations-owned companies in the design and construction of water and wastewater infrastructure.
- The Lytton First Nation in British Columbia partnered with RES'EAU-WaterNET, a strategic network of organizations and academics devoted to providing innovative solutions for the drinking water challenges of small, rural and Indigenous communities. This partnership resulted in the selection of a small, custom-built water treatment plant that fits inside a modified 20-foot shipping container for the community.
- The Government of Ontario's Showcasing Water Innovation Program was conceived to fund a small number of high value drinking water, wastewater and storm water projects, and showcased these projects to all Ontario communities. The Program included projects carried out in Ontario municipalities as well as in three First Nations communities between 2011 and 2015.
- The BC Region funds the work of a project manager who is available to communities that are undertaking infrastructure projects. The practice was developed because of a concern that communities did not otherwise have the resources or capacity to ensure that contractors adhere to timelines and other expectations.

Municipal Type Agreements: Municipal Type Agreements (MTAs) are another area of best practice. Through a MTA, a First Nations community and a neighboring municipality enter into a long-term agreement to share infrastructure and costs. Studies have shown that MTA participation reduces the probability of a system having a high-risk ranking, and for a system failing the *Guidelines for Canadian Drinking Water Quality*. According to the most recent data, approximately 19% of drinking water systems and 22% of wastewater systems in First Nations communities rely on an MTA³⁶. MTAs have been used for recent infrastructure projects including in Semiahmoo

³⁶ Office of the Parliamentary Budget Officer (PBO) (December 2017). "Budget Sufficiency for First Nations Water and Wastewater Infrastructure." https://www.pbo-dpb.gc.ca/web/default/files/Documents/Reports/2017/FN%20Water/FN_Water_EN.pdf

First Nation where a project is underway to install pump stations and pipes to connect to the City of Surrey, BC; and another agreement exists between Wauzhushk Onigum Nation and the City of Kenora, Ontario.

Outreach and promotion: A number of best practices relate to recognizing the profession and individual WSOs and to reaching out to youth to promote the profession. Efforts such as these are important to addressing concerns about WSO retention and succession over the longer term. Examples of such initiatives include:

- The Water First Internship, which provides hands-on training and work experience in water treatment and environmental monitoring to Indigenous youth in their communities and leads to certification as a Water Quality Analyst and Operator-in-Training. The first cohort consisted of 10 individuals and was initiated in 2017 in collaboration with the United Chiefs and Councils of Mnidoo Mnising, Wiikwemkoong Unceded Territory and the Union of Ontario Indians and was delivered in seven First Nations on Manitoulin Island. In February 2020, the Bimose Tribal Council in northwestern Ontario announced their partnership with Water First Education & Training Inc. to deliver the internship to 14 individuals from 10 participating First Nations communities across the Bimose Tribal Council Region. Funding is provided by ISC.
- The National First Nations Water Leadership Award was created by ISC in March 2018 to recognize First Nations individuals or organizations that have demonstrated leadership and outstanding dedication to the advancement of clean and safe drinking water in First Nations communities. Recipients are presented with the award by the Minister of Indigenous Services Canada.
- The Water Awareness Grants were launched in 2016. First Nations communities in BC are invited to submit proposals for a community water awareness day event. The purpose of the grant is to support awareness and preservation of First Nations' community drinking water sources by providing small grants to communities to support hosting these events.

Planning for sustainable systems: A set of best practices were identified that relate to planning approaches that have not yet been applied broadly, but address overall sustainability of systems and the long-term provision of safe water and wastewater services to First Nations communities and community members.

- Source water protection, including source assessments and source protection plans are used to understand water sources, document the observe hazards and manage the risks associated with natural and human-made hazards. It is considered the first step in protecting a drinking water source. The ISC *Protocol for Centralized Water* calls for First Nations to create a source water protection plan (SWPP); however, to date there has been no general funding attached to the development of SWPPs.
- Asset Management Planning is an increasingly common practice among municipal infrastructure owners but has not yet been broadly applied to First Nations infrastructure. Simply put, asset management planning is a long-term approach to the management of assets. It involves describing what infrastructure is owned, what it is worth, its condition and remaining service life, when

maintenance is required, how much operations, maintenance and replacement will cost and when those costs will occur, and the financial plans to ensure affordability in the long term.

- Water Safety Planning is a global best practice with no formal application to date in Canada. It involves the development of water safety plans to ensure the safety and acceptability of a drinking-water supply. According to the World Health Organization, water safety plans require a risk assessment including all steps in the water supply from catchment to consumer, followed by implementation and monitoring of risk management control measures, with a focus on high priority risks. Where risks cannot be immediately addressed, the WSP approach allows for incremental improvements to be implemented systematically over time.³⁷

10. Early Impacts of COVID-19

Though not within the original scope, the evaluation investigated the early impacts of Covid-19 on water and wastewater program activities, both from an infrastructure and public health perspective. Informants addressed the following themes in the context of the COVID-19 pandemic: effects on planned WWP activities; challenges relating to WWP activities; and any unintended impacts as a consequence of ISC's COVID-19 pandemic response.

Effects on planned activities: The COVID-19 pandemic has had significant impacts on both infrastructure and public health planned activities in 2020. This is true especially for planned infrastructure initiatives, with all on-going First Nations water and wastewater infrastructure projects affected to some degree.

- The planned lifting of at least 44 LT-DWAs on-reserve has been delayed, as acknowledged by the Minister of Indigenous Services, who has acknowledged that the federal government will not achieve its original target of March 2021 to end all LT-DWAs. Initiatives are underway to address all remaining LT-DWAs on public systems on reserve as soon as possible.
- As a consequence of the delays, infrastructure costs have increased, as some specific work on water and wastewater systems is only possible during the summer season. Moreover, for remote communities, equipment can only be transported seasonally (i.e. over water-courses or ice roads), meaning that there is often only a small temporal window when construction supplies may be delivered and construction undertaken.
- A backlog in routine water inspections (i.e. water sampling). Without access to some communities or individual residences, there have been delays in transporting water samples for laboratory analysis. However, CBWMs have adapted the drinking water monitoring program due to COVID-19 disruptions. Where physical distancing policies are in place, CBWMs have had to

³⁷ "What are Water Safety Plans (WSPs)?", World Health Organization, Water Safety Portal <https://wspportal.org/what-are-water-safety-plans/>

- temporarily suspend routine sampling of private homes, and consequently, it is expected that the sampling rate decreased during the pandemic.
- Many training activities related to both infrastructure and public health have been cancelled or postponed, as the focus of ISC has pivoted to supporting communities in mitigating the risks of COVID-19 outbreaks.
 - During the pandemic, the top priority of ISC has been on protecting the health and safety of communities. This has resulted in human resources (both ISC-RO and ISC-FNIHB), especially at the regional level, being reassigned from their normal roles to support the COVID-19 response in communities. Consequently, stress and burnout is beginning to occur amongst ISC personnel.

Challenges relating to WWP activities: The COVID-19 pandemic has resulted in the following challenges in the context of water and wastewater programming and activities:

- A number of First Nations communities have restricted access to non-community members in an effort to prevent the spread of COVID-19. Consequently, without access, water and wastewater activities undertaken by ISC personnel, external contractors, and others have been unable to progress.
- Many policies and directives restricting travel to communities have been put in place by provincial governments to limit COVID-19 impacts.
- The collection and transportation of water samples to testing sites was identified as a challenge, as without regular means of scheduled transportation, there have been difficulties in timely analysis.

Unintended impacts of COVID-19 and opportunities: While the COVID-19 pandemic has had a deleterious effect on water and wastewater programming and activities at the community level, the evaluation also noted some unintended impacts of the COVID-19 response which may be considered positive, including:

- The pandemic has served to highlight and increase awareness amongst First Nations community members of the importance of clean water and best practices in public health, as well as water and wastewater programming.
- The role and importance of EPHOs has been emphasized among community members, with many communities requesting additional information and material on water and the importance of good health practices (i.e. hand washing, sanitizing, etc.).
- The pandemic has served to highlight infrastructure deficits that have existed for long periods in communities aside from water and wastewater. These deficits can now be itemized and potentially addressed moving forward.
- In some cases, the pandemic has acted as a catalyst for the retrofit or repair of unused or derelict buildings to isolate COVID-19 cases. On-reserve, there are often few non-communal structures where positive COVID-19 patients are able to isolate themselves. For example, one

community has repaired a derelict arena to isolate COVID-19 cases.³⁸ Once the pandemic has concluded, the community will now be able to use the facility for recreational activities.

11. Conclusions and Recommendations

11.1 Conclusions

11.1.1 Relevance

The evaluation found that there is a continued need for investment in infrastructure, operations and maintenance (O&M), training and capacity development for water and wastewater systems in First Nations communities. While significant progress has been made towards achieving the government commitment of eliminating all LT-DWAs, continued investment is needed to achieve this goal. There is also a continued need to provide environmental public health services to First Nations communities.

11.1.2 Performance – Water and Wastewater Infrastructure

Overall, the process for infrastructure investments is achieving results and significant investments have been made towards improving water and wastewater infrastructure in First Nations communities. As of September 30, 2020, a total of 365 water and wastewater projects were completed and an additional 292 projects were ongoing for a total of 657 water and wastewater projects across 581 First Nations communities.

Key informants stated that the FNWWEPP is doing well at addressing the highest priority systems, but even with the additional funding provided by Budget 2016 and subsequent funding, there does not exist enough resources to address all vulnerable systems. Wastewater systems, for example, have received far less investment and attention than drinking water systems. Whereas treated water from 94% of public water systems in First Nations meet the *Guidelines for Canadian Drinking Water Quality*, the share of public wastewater systems producing treated effluent that meets the *Wastewater Systems Effluent Regulations* decreased from 80% to 66% between 2015-16 and 2019-20.

11.1.3 Performance – Environmental Public Health Program

EPHOs are active in the communities they serve and typically have strong relationships with Band Councils and water and wastewater system operators. The percentage of First Nations communities with access to trained CBWMs or EPHOs to monitor drinking water quality has met the program target of 100%. All community sites had access to portable test kits from 2012-13 to 2016-17 and the average sampling frequency was 80% in 2016-17 which is close to the target of 84% set for 2021-22. Nearly all (99%)

³⁸ ISC has announced emergency funding for First Nations communities over the course of the COVID-19 pandemic. This emergency funding is generally funneled directly to communities, but not specifically for water and wastewater-related issues. It is up to communities to decide how to allocate the additional funding.

public water systems are monitored for routine/annual chemical parameters. Most (89%) of the water/wastewater system operators surveyed agreed that the frequency of testing drinking water in their community is appropriate while 7% disagreed and 4% were unsure.

The overall workload of EPHOs continues to be an area of concern. In February 2018, the Deep Dive report estimated the shortfall to be 54 FTEs. There are currently 108 EPHOs, which is two thirds of what the Deep Dive report indicates to be required to adequately deliver on all program areas (e.g. inspections of restaurants, daycare centres, etc.). With regard to the requirement for CBWMs, 73% of WSOs surveyed agreed that their community had a sufficient number of CBWMs while 21% of WSOs disagreed.

11.1.4 Performance – Training and Capacity Development

The training of water and wastewater system operators conducted between November 2015 and March 2019 consisted of WSOs from 531 First Nations communities participating in the CRTP, WSOs from 222 First Nations communities participating in Operator Training programs (including the Thompson River University Training Program), and WSOs from 176 First Nations communities receiving training from operator conferences or workshops. The proportion of primary system WSOs that are certified to the level of their water system has increased from 64% in 2012-13 to 74% in 2019-20. The proportion of primary system WSOs that are certified to the level of their wastewater system has fluctuated slightly from year-to-year but the value in 2019-20 (60%) is similar to the value in 2012-13 (61%). It appears that adequate opportunities for certification training are available, but other factors limit overall certification rates including WSO turnover and lack of back-up WSOs, as well as community remoteness and other barriers to advanced education.

The CRTP is considered by key informants to be an effective way of providing on-going hands-on training, support, and continuing education credits for WSOs. The CRTP is a long-standing program but does not have secure long term funding as this is only provided annually. Several key informants have indicated that in the absence of the CRTP, the number of DWAs would increase substantially over time.

The EPHP is involved in training and capacity development of EPHOs as well as the training of CBWM's and others responsible for sampling drinking water. Regardless of the title of the position (i.e. EPHO, CBWM, CHR), all individuals that take drinking water samples in First Nations communities receive the required training prior to sampling.

11.1.5 Relationships

The distinction between infrastructure and public health means that there tends not to be overlap between ISC-RO and ISC-FNIHB. The relationship between ISC-RO and ISC-FNIHB with respect to water has benefitted from the priority placed on eliminating LT-DWAs has resulted in opportunities to develop relationships that may not yet exist with respect to other program areas. The overall relationship between ISC-RO and ISC-FNIHB is said to be improving. The focus on eliminating LT-DWAs has been

accompanied by a move towards more centralized decision making as opposed to regional prioritization of projects.

11.1.6 Best Practices

A wide range of best practices were emphasized by key informants or described in the literature, media and documents reviewed for this evaluation. They are summarized in this report and relate to: the transformation of ISC; prioritization of LT-DWAs; support for WSOs and systems; procurement design and construction; municipal type agreements; outreach and promotion of the profession; and, planning for sustainable systems.

12. Recommendations

1. Implement policy and procedures that result in the federal government providing 100% of the O&M costs for water and wastewater infrastructure in First Nations communities.
2. Increase the priority of wastewater infrastructure projects, which to-date have received disproportionately less funding than drinking water projects but pose potential risk to many communities.
3. Where applicable, support regions to provide 5-year rather than 1-year funding agreements for the CRTP and where demand exists among First Nations communities, to expand the model to include other forms of infrastructure.
4. Develop policies or guidelines that incorporate climate change adaptation and mitigation into infrastructure design and construction as well as source water protection.
5. Determine the impact on First Nations communities by program area as a result of current EPHO staffing levels and priorities.

Appendix A: Evaluation Questions and Issues

The evaluation focused primarily on issues of relevance and performance as required by the Treasury Board of Canada's *Policy on Results*. Less focus was given to the question of relevance, as the Government of Canada has explicitly made the improvement of water and wastewater infrastructure systems on-reserve a priority. In addition to the required evaluation issues, other evaluation questions and issues were identified for exploration by the Programs involved, the evaluation team, and in the previous evaluation.³⁹ The questions that guided the evaluation are as follows:

Relevance

- Is there a demonstrable and continued need for FNWWEP?
- Is there a demonstrable and continued need for providing environmental public health services to First Nations?
- Are the current roles and responsibilities of the federal departments and regional bodies involved in water and wastewater infrastructure appropriate and sufficient?
- In what ways can water and wastewater infrastructure activities support the Transformation of ISC? How can the program lead to independent First Nations ownership and operation of water and wastewater systems in their community?

Effectiveness and Efficiency by Results Chain

Water and Wastewater Infrastructure

- Is the process for the planning, design, construction, acquisition, renovation, repairs, and replacements of water and wastewater infrastructure projects working well?
- Is the tendering process for the construction/maintenance of water and wastewater systems functioning appropriately?
- Are the expected outputs being produced?
- Are the expected outcomes being achieved?

Monitoring for Potential Public Health Hazards – Water and Wastewater Systems

- Is there adequate support (e.g. financial, infrastructure, human resources, training, etc.) for the environmental public health needs of First Nation communities for drinking water and wastewater, and, to the extent that they relate to water and wastewater, other areas covered by Environmental Public Health Officers (e.g. housing)?

Assessments

³⁹ Evaluation of the First Nation Water and Wastewater Action Plan 2013-2014, available at <https://www.rcaanc-cirnac.gc.ca/eng/1399311311048>

- Is the process for assessing water and wastewater infrastructure on-reserve working well?
- Are the expected outputs being produced?
- Are the expected outcomes being achieved?

Training and Capacity Development

- Is the process for training and capacity development with regards to water and wastewater infrastructure on-reserve working well? How well is the Circuit Riders Training Program working?
- Are the expected outputs being produced?
- Are the expected outcomes being achieved?
- How well and appropriately are EPHP water and wastewater education initiatives meeting their intended audiences and targets?
- What is the best way to ensure that First Nations have adequate succession plans? How can the program facilitate succession planning in communities?

Operations and Maintenance

- Is the process for operations and maintenance of water and wastewater infrastructure on-reserve working well?
 - Is the 80% funding level for operations and maintenance appropriate?
- Are the expected outputs being produced?
- Are the expected outcomes being achieved?

Relationships

- Does there exist collaboration, complementarity and/or overlap between ISC-RO and ISC-FNIHB programs and employees regarding water and wastewater infrastructure? Is the relationship working well? How could it be enhanced?
- Are there appropriate resources and services across and between regions to assist First Nations in accessing the water and wastewater infrastructure program?

Environmental Public Health Program in First Nations Communities

- Does the design and delivery of EPHP activities effectively and efficiently meet the needs of First Nation communities? How well is the CBWM program working?
- What are the barriers which prevent the implementation of recommendations of Environmental Protection Health Officers?
- Are EPH services comparable to that available off-reserve and consistent from region to region?

Environmental Sustainability

- How is climate change impacting water and wastewater infrastructure on-reserve?

Results

- What progress has been made towards achieving the ultimate outcome of the water and wastewater infrastructure program?
 - How has the water and wastewater infrastructure program responded to previous evaluation recommendations? (See Annex B)
 - How has the Environmental Public Health Program responded to previous evaluation recommendations concerning water and wastewater on-reserve?
 - Do program results vary significantly for First Nations communities based on geography (e.g. remote vs. non-remote, provincially, etc.) or any other systemic reasons?
- Are the performance measurement indicators and tools for this program the best options?
 - If not, what are some tools and indicators that will enhance performance measurement?
 - Do they meet the needs of First Nations?
- Are there internal barriers in the program which prevent full First Nation care and control of water and wastewater systems?
 - If so, what are they and how can the program address these barriers?

Best Practices/Lessons Learned

- What are the best practices and service gaps from regions across the country?