WRR Roadmap
Community Water and Resource Recovery Implementation Roadmap

Acknowledgements

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Overview

What is WRR

Water and resource recovery (WRR) is an overarching term for various types of water reuse and resource recovery, broadly defined as the recovery of water and other resources from rainwater, stormwater, blackwater (toilet flushwater) and greywater (all household wastewater other than blackwater)

What is the WRR Roadmap

- Guidance on social engagement for implementing WRR within or nearby communities
- Assists with implementing a WRR project that is informed and supported by people involved in or impacted by the project
- Aligns with current legislation and policies
- Made for WRR with sources such as: large-scale rainwater collection systems, community stormwater ponds, neighborhood greywater reuse, community blackwater resource recovery
- Made for WRR with uses such as: public sports field irrigation, toilet flushing in public buildings, community garden irrigation, street washing

Why use the WRR Roadmap

- Build strong social capital and community support
- Create socially responsible WRR
- Respect community rights

Who is the WRR Roadmap for

- Individuals interested in developing a WRR project
- People from a utility (water, wastewater, and stormwater service providers), private enterprise, local government, or other group
- Anyone interested in WRR can use the WRR Roadmap

How to use the WRR Roadmap

- Use this document after researching WRR and confirming there is reason to pursue it
- Read through the process outlined in this document and consider what is applicable and what information will be needed
- Take note of the resources provided in this document, and what else may be needed
- Work through the process with relevant individuals and groups

Introduction to Water and Resource Recovery in Canada

Water and resource recovery (WRR) refers to the recovery of water and other valuable resources such as nitrogen and phosphorous from rainwater, stormwater, blackwater (toilet flushwater) and greywater (all household wastewater other than blackwater). WRR is an overarching term for various types of water reuse and resource recovery. Examples include using wastewater from taps for toilet flushing and using urban runoff collected in stormwater ponds for irrigation. A key aspect of WRR is to determine appropriate treatment requirements and water quality based on the source and intended use, because not all water needs to be treated to the same quality. This is a fundamental concept in WRR known as fit-for-purpose.

Fit-for-purpose refers to both the source of and use for the water and other resources. This concept helps explain why WRR makes sense in a variety of contexts. Currently, almost everywhere in Canada, all water is treated to drinking water quality regardless of intended purpose. The various types of WRR allow for efficiency in resource use. WRR fits into broader management practices such as Integrated Water Resources Management (Appendix II), which offers a range of opportunities for improving management of our water and wastewater services. Fit-for-purpose WRR varies significantly depending on source and use; in this document a straightforward example of a stormwater pond is used, which is one of the simplest projects under the working definition of WRR.

The development of WRR in a community is influenced by risk and liability, standards for public health and environmental impacts, as well as changes to water allocation. Specific influences vary according to the type of WRR project, location, surrounding community and environment. Social barriers to WRR also exist; primary among these is the "yuck" factor associated with reuse for drinking or other household uses.

In Canada, WRR is not federally regulated and there are minimal provincial regulations directly related to WRR. Consequently, WRR projects go through regulatory review and implementation on a case by case basis, a lengthy process that is a barrier to promoting WRR. To develop support for WRR, guidance must include information on how to work with individuals who may be involved and affected. This document offers guidance informed by a social engagement process involving regulators, developers, utilities, WRR knowledge brokers, potential and currents users, and the general public.

Outline

The Community Water and Resource Recovery Implementation Roadmap (WRR Roadmap) provides supplemental guidance to implement water and resource recovery within communities. It is designed for developing a WRR project that is informed and supported by the community and that aligns with current legislation and policies related to WRR, including environmental regulations and monitoring, water and wastewater strategies, water safety plans, public health guidelines, Water Environment Federation guidance, among others (Appendix II). The WRR Roadmap focuses on social engagement and should be used along with other relevant guidance. The process outlined by the WRR Roadmap is meant to result in a shared understanding of the community context, the state of water and wastewater services, and WRR. The extent to which the WRR Roadmap may be useful depends on the project; however, any project situated in or near a community has implications for that community and those living nearby. Current research on WRR indicates that building strong social capital and community support through public engagement and community partnerships results in more sustainable WRR services. Past research and projects have clearly shown that without community support, a project is unlikely to succeed even with the right technology. Anyone interested in WRR can use the WRR Roadmap as a resource to help build the social capital critical to success.

This document describes the WRR Roadmap and provides guidance on how to use it, with a basic hypothetical stormwater example to illustrate the concepts using a simple example. The WRR Roadmap is for individuals interested in developing a WRR project, who may be a part of a utility, private enterprise, local government, or other group. Use of this document is for implementing WRR where there is a reason to do so. This document is designed to be used by the project leads, referring to those groups organizing and managing the WRR project implementation. A steering committee must be developed to support the project leads by providing various local perspectives is a part of the process outlined in this document. Details are outlined in the next section, as well as how to get started.

After the Getting Started section, the WRR Roadmap is presented and each component is briefly described. Following each structural component of the WRR Roadmap, there is an example using a hypothetical scenario of the implementation process for using a stormwater pond to collect water for irrigation. The final sections offer a glossary of terms and a list of resources on community engagement, evaluation, and other concepts discussed in this document.
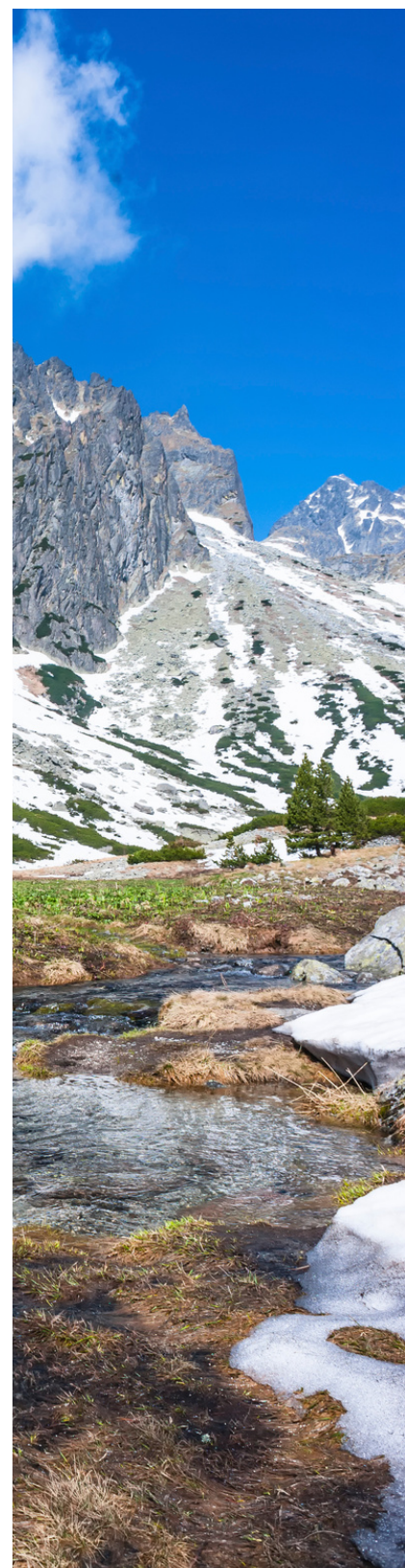
Getting Started

Before investing time and resources into a WRR plan, an initial check should first be undertaken to determine potential for community support and a positive outcome for the community and environment. Prior to beginning the process discussed in this document, alternative solutions (such as conservation) should be considered; this may be an opportunity to employ Integrated Water Resources Management. The WRR Roadmap outlines a variety of steps that may help address highly complex projects; less complex projects may find only some steps relevant and useful.

This section provides an overview of concepts that should be considered at project inception, as well as an introduction to the roles of those leading the project and an outline of other people who may be involved.

Considerations

Context - Context matters, including the reason WRR is being considered, the type of project being proposed, and the geographic landscape. The WRR Roadmap is open to adaptation to local contexts while retaining the overall guiding principles. This requires recognizing and preparing for changes such as the local impacts of climate change, ongoing development in the region, and political cycles.

Governance and current legislation - Different communities in Canada have varying responsibilities and management systems for operating their water services. Every community has strategies and processes, often written into policies and legislation, that must be incorporated in the WRR project plan. Importantly, First Nations, Métis settlements, and Inuit communities have the right to self-government (Appendix II). Indigenous people have local knowledge and governance systems which must respected and upheld according to the Indigenous community expectations.

Community consent and support – An initial check to assess potential for community support should be completed before investing time and resources. Ongoing consent from the community is necessary, and in Canada respect for autonomy is essential when First Nations, Métis, and/or Inuit communities are involved or may be impacted.

Reality - The WRR Roadmap may be limited by governance conflicts, competing priorities, lack of collaboration, and assumptions about trust and relationship building. Be prepared for disagreement. Use the WRR Roadmap as an aspirational process that is adapted to the needs of the community and proposed project.

Leadership: Project Leads and the Steering Committee

Project leads are those people initiating, organizing, and managing the implementation of WRR, and will likely be the first to employ the WRR Roadmap to help guide the process. Project leads could be community leaders, municipal government, developers, a utility, or any individual or group.

The other group responsible for leading the project is the steering committee, which is made up of representatives for groups and individuals who may be involved in or impacted by the WRR project (see table below for details). The steering committee is directly involved in planning and decision making. Project leads select the steering committee based on recommendations from the groups identified as being involved or potentially affected. The steering committee should be created prior to starting the implementation process and will likely expand as the community and other people are engaged.

Project leads should be involved in the steering committee as co-chairs, to facilitate meetings and provide information.

Leadership roles and responsibilities should be determined before starting the implementation process, recognizing this might change once others are involved. Consider the local governance structures and collaborate accordingly. One tool that may help with this is a RACI (Responsible, Accountable, Consulted, Informed) chart (Appendix II). The project leads and steering committee should also determine liability and a decision-making process.

Other People Involved

The WRR Roadmap emphasizes setting goals and organizing based on shared visions, in addition to a shared understanding of terms and language used (Appendix I). This requires working together with the community and other people. The following table outlines the different groups who should be considered (collectively referred to as 'all groups').

Although the specific individuals, groups, and organizations depends on local context, the table and subsequent visual can be used as a starting point for identifying necessary participants and those who may be affected. This list is aspirational and is intended to emphasize inclusivity. Starting with an inclusive engagement process provides the project leads the opportunity to build broad social support.

Table 1: People Involved and Impacted

Groups	Description/definition	Examples
Regulator	Governance bodies operating at all levels (local, regional, provincial and territorial, federal), including those that have legal regulatory authority and other jurisdiction	Municipal government, First Nations, tribal councils, regional districts, provincial and territorial governments, public health, provincial authorities, Government of Canada
Developer	Private or public enterprises working on building the physical infrastructure related to the WRR project	Property developers, construction firm, real estate firm, municipal government
Utility	Water, wastewater, and/or stormwater service provider	Private corporation, municipally controlled corporation, municipal branch, locally owned entity
WRR Knowledge Brokers	Individuals and organizations that have knowledge of various aspects of WRR, including microbiology, treatment technology, policy, infrastructure, and public engagement	Academics, consultants, Indigenous knowledge keepers, WRR entrepreneurs, government staff, local non-profit organizations
Project Mobilizers	Organizations that offer technical, financial, legal, and other kinds of project support that are not directly related to WRR.	Watershed committees and boards, First Nations technical services groups, provincial Métis nation organizations, environmental law organizations
User	People supplied with the end product(s) of the WRR project	Municipal parks & garden staff, prospective and current homeowners, commercial building users, subdivision occupants, nurseries, hydroponics, businesses, special interest groups
Surrounding communities	Including those who live in proximity to the WRR project, who are directly or indirectly effected, and who can represent the local ecology and natural and built environments.	Local ecologists, First Nations reserves, downstream and adjacent communities, community associations, special interest groups

Groups adapted from Watson, R., Fane, S., & Mitchell, C. (2016). *The critical role of impact distribution for local recycled water systems*. International Journal of Water Governance, 4(12): 5-6.
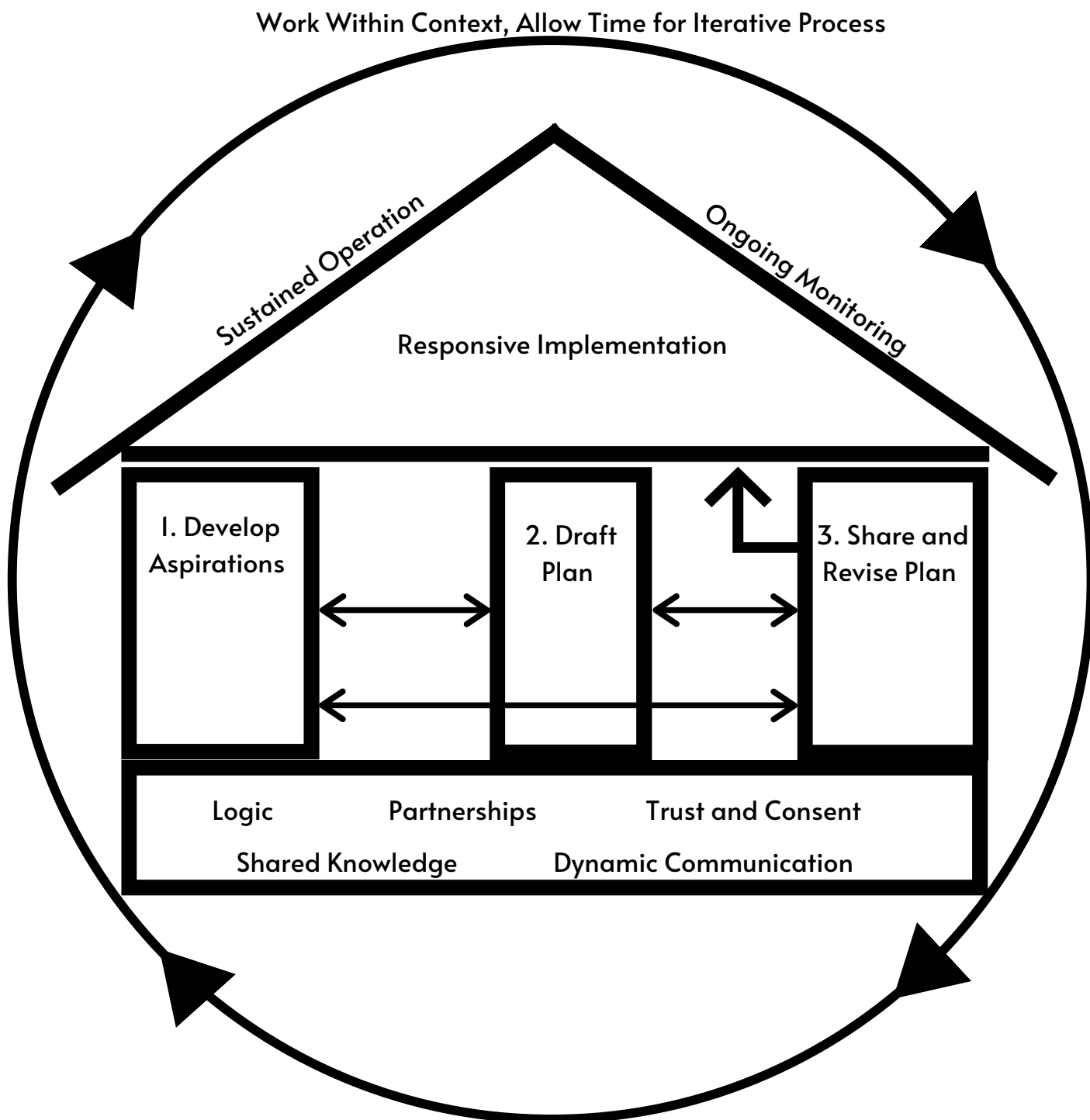
Network of People

The following figure is a visual layout of the above table, with a few examples. This visual is only an example; the specific connections are context dependent for each WRR project.
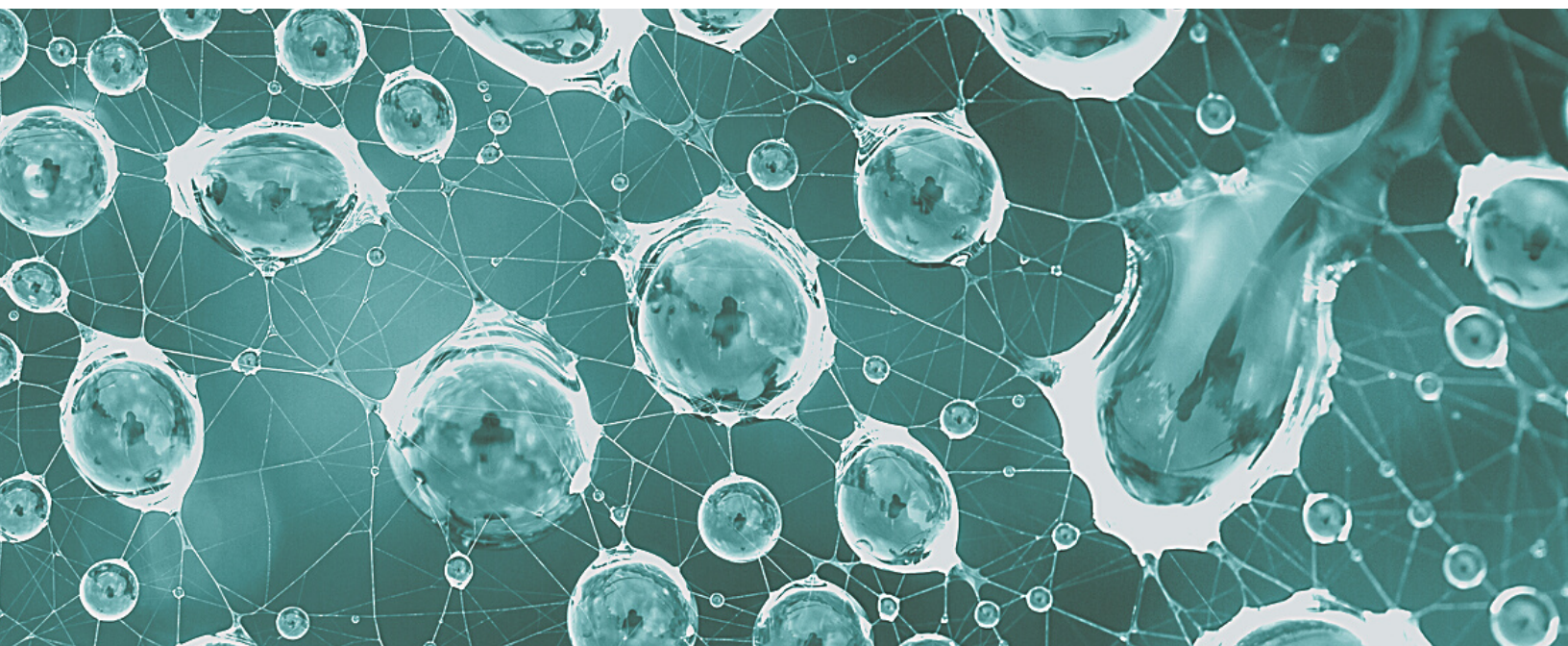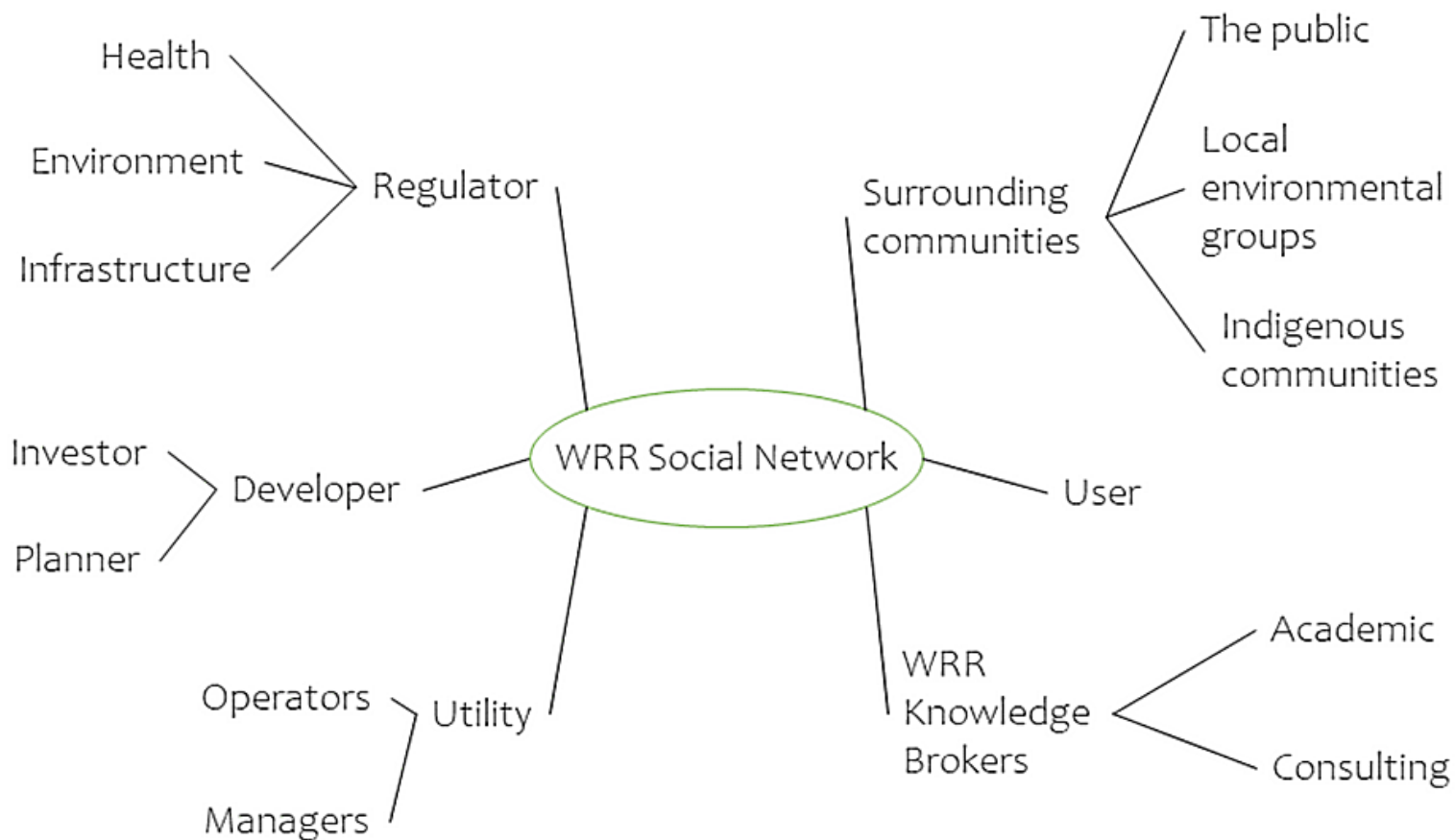
WRR Roadmap

Framed by a circle with arrows, the complete structure has a foundation, three pillars, and roof, representing the steps to developing a project. Presented visually below and described in the following pages.

Work Within Context, Allow Time for Iterative Process

Sustained Operation

Ongoing Monitoring

Responsive Implementation

1. Develop Aspirations

2. Draft Plan

3. Share and Revise Plan

Logic   Partnerships   Trust and Consent

Shared Knowledge   Dynamic Communication

Frame

Work Within Context, Allow Time for Iterative Process

The circle represents the context, and visually identifies that everything happens within context. As such, the entire implementation process must be responsive to other related operations, such as current water services, and other occurrences, such as a change in local government or new environmental protection policy.

The arrows on the circle represent the importance of process and time. Implementing a WRR project involves continuous planning and adapting to changes. Creating timelines and planning for those timelines to change are equally important.
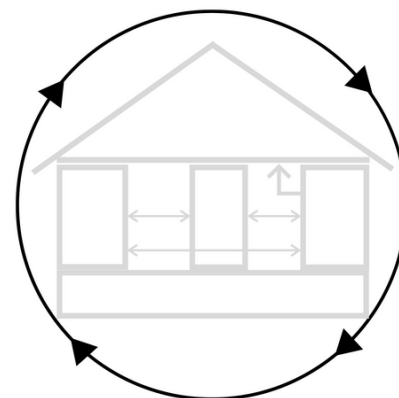
Example: Implementing a stormwater pond for irrigation water

Understanding context and timeline

A small community in Southern Alberta was struggling with water shortages due to an increasing population and a restriction on water withdrawal from the Bow River, their primary water source. The community's water and wastewater were managed by the municipal government, which predicted increased strains on water supplies during the upcoming summer. Municipal potable water was being used for agriculture and municipal greenery irrigation. The municipality was looking for alternative water sources for irrigation and identified stormwater as a preferred source.

To develop and implement a plan to use stormwater for irrigation, municipal government staff from the planning and engineering department and a small enterprise that created naturalized stormwater ponds were the designated project leads. Initially, an ecologist from the municipal parks department, a retired birder who lived in the community, three farmers who lived on different sides of the community, and a member of the community's local environmental group were chosen to be on the steering committee.

An initial analysis of impact determined that:
- The volume of stormwater diverted is covered by the community's current water withdrawal license
- The use is non-potable and does not involve direct public contact, and is therefore does not present a major public health risk
- The land identified by the municipal government's ecologist is appropriate according to an initial environmental risk assessment
- The cost of the project can be covered by a combination of municipal tax revenue and a grant from the provincial government.

Thus, it made sense to proceed with proposing the stormwater project.

Foundation

Logic, Partnerships, Trust and Consent, Shared Knowledge, and Dynamic Communication
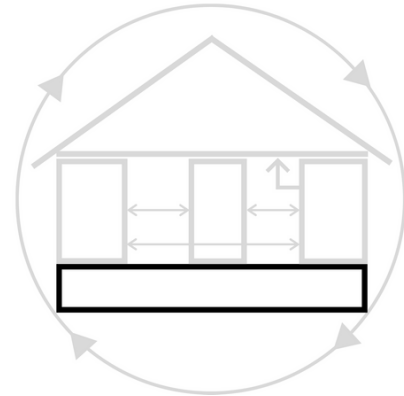
Logic	Prior to beginning a project, identify the intention and rationale, and develop a clear justification. Throughout implementation, the WRR project must make sense to all groups as they strive to meet their shared interests. Consensus building is addressed in the first pillar of the WRR Roadmap.
Partnerships	Partnership development starts at the beginning of the project and new partnerships may emerge during the project. A strong partnership is based on shared goals, values, and trust, and is maintained through consistent check-ins and dialogue about goals and progress. While partners may not agree on everything, acknowledging the intended outcome and impacts of the WRR project is essential.
Trust and Consent	Without consent from all groups, a WRR project cannot be developed responsibly or implemented effectively. Start with mutual understanding of the plan and intent for the WRR project to attain consent and building trust. This must be explicitly determined and regularly re-confirmed through check ins.
Shared Knowledge	Mutual understanding of WRR and the context in which the WRR project is being proposed is essential. Continuous collective learning about the local environment, perceived risks and benefits to health, economic implications, governance systems, relevant legislation, and other details will promote shared understanding.
Dynamic Communication	Dynamic means all groups are listening and listened to. Developing dynamic communication includes agreeing on preferred methods and frequency of communication and providing consistent updates and opportunities for raising and addressing concerns. This allows for efficiency in planning and adapting.

Example: Implementing a stormwater pond for irrigation water

Building a foundation

Initial benefits of the project identified by the steering committee included opportunity for recreation via walking paths and for education via signs about how the pond filters the water and other aspects of the pond. Given the confirmation that the stormwater project concept was logical, the project leads spent time collecting information about the community. The project leads were aware of three important aspects of the community:

1. Communication with the community is relatively easy. The community has a median age of 56, and most community members have access to internet and basic computer literacy skills. The community learns best from a combination of printed brochures distributed to mailboxes and available in local coffee shops, radio and newspaper announcements, and through direct question and answers sessions (either online or in-person).

2. The community is environmentally conscious. Community members understand and appreciate the importance of water conservation and general environmental protection.

3. The community has a history of contention with new development, due to a previous development project resulting in a destroyed greenfield that was not announced as being the construction site. As a result, there is mistrust with the municipal government and with any development proposals.

Pillar 1

Develop Shared Aspirations Among all Groups
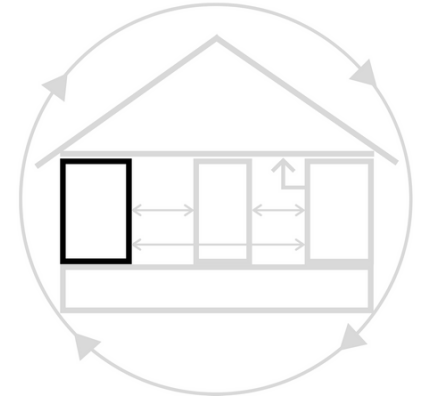
Gather local information, including demographics of users and surrounding community, current relevant legislation, governance systems, values, and other relevant information.
- Work with all groups to understand the complete context in which the WRR project is being proposed, including the water and/or resource challenges and the reason for considering WRR.
- Use current available information to anticipate questions and prepare proactively.
- Identify and understand relevant legislation and regulatory requirements (such as environmental assessments) and how they align with the proposed WRR project.

Engage with all groups
- Use various engagement methods to develop shared knowledge of WRR. Ensure all individuals and groups are represented, particularly those often marginalized. Consider different languages and gathering spaces that may be required.
- Engage the community, including potential users and the surrounding community, to discuss WRR and share knowledge of the local context.
- Engage with regulators to understand current legislation and regulatory requirements, as well as how and when the regulator will be involved
- Engage with WRR Knowledge Brokers and other groups to ensure environmental, infrastructure, and public health safety.
- Learn about and incorporate any misalignment and disagreement that exists among groups, such as between the wastewater industry and infrastructure regulators.

Identify champions and local leaders
- Consult with potential users and surrounding communities to identify and recruit local leaders (e.g. heads of community groups, representatives from local business groups, respected politicians, etc.) to promote the WRR project.
- Expand the steering committee as appropriate

Create a plan for expectations management and identify power distribution
- Define expectations based on the roles and interests of the different groups including responsibilities and involvement in planning and decision making. Take note of expectations and ways to evaluate the satisfaction of those expectations.
- Determine a reasonable plan for reaching consensus, what consensus means to all groups, and the role of the project leads and steering committee when consensus is not achieved to the extent expected.
- Map the social network of the community and identify areas of power and control, including regulatory responsibility and governance, and groups and sectors with significant influence.

Develop terminology and language that makes sense to the community
- Shared language is necessary for understanding the context and project. When possible, use the local terminology, or choose terms that are mutually agreed on.

Discuss and document aspirations and goals for the WRR project
- Discuss project goals and develop shared goals and aspirations, including an explanation of why the project is being undertaken.

Complete context-specific impact assessments and ensure predicted net positive impact
- With all groups, identify social, environmental, and economic risks and benefits.
- Conduct comprehensive risk assessments on environmental, public health, and economics risks.
- Ensure public health and environmental safety are protected using appropriate metrics (e,g, quality of water being released back into environment).
- Consider employing an Integrated Water Resources Management approach to understand the full cycle of the water and the environments it passes through and impacts.

Before continuing, ensure there is an adequate answer to the question "Why is this plan for WRR a good idea for the community?"

Example: Implementing a stormwater pond for irrigation water

Developing shared aspirations

Initially, community members were engaged through online discussions about the current water shortages. There was minimal participation during this outreach. From the limited outcomes it was determined that the proposed stormwater project made sense. Farmers who would be users of the alternative water source participated and identified opportunities for cost savings. Using the results from the online engagement and feedback from the farmers on the steering committee, the project leads decided that the stormwater pond would be a feasible solution.

After local radio stations announced the project, community opposition became apparent. Community members who were aware of the greenfield construction site scandal expressed concerns about the location of the stormwater pond being close to the river and upstream from the drinking water intake.

The project leads responded by recruiting more community members for the steering committee, including those leading the opposition, representatives of community leagues, and a public health regulator who was not involved in the project. The expanded steering committee discussed concerns and worked with the project leads to find solutions, including in-person meetings between the steering committee, community members, and the mayor, who was considered a trusted individual.

It was decided that the stormwater pond would be deeper and cover less surface area to allow a safer distance from the river. The community was also educated on the risks to drinking water safety. The project webpage was updated to include the mutually understood and agreed upon terminology and details of the project. A mailing list was created for providing project updates, as well as an anonymous phone line for community members to share new concerns that would be addressed and shared on the project webpage and by the mayor on social media.

Pillar 2

Develop a Draft Plan

This step primarily involves the project leads and steering committee. The project leads are responsible for creating a draft plan in collaboration with the steering committee. All components of the plan should align with regulatory requirements and include processes and metrics provided by relevant regulatory bodies, whenever available and applicable. Project Management concepts may be useful in developing the plan, as well as the use of a Water Safety Plan. Resources for the concepts in this section are provided in Appendix II.
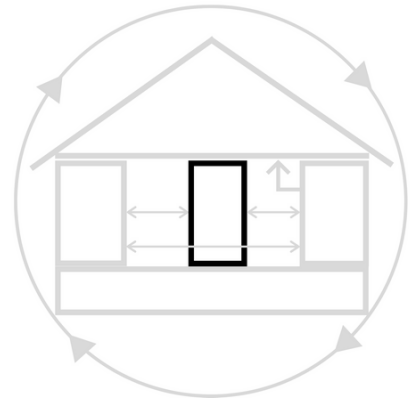
Components to include in the plan:

→ Timeline
Plan the duration of the project, including time for community engagement and plan for dissolution of steering committee. The timeline should address at what point the resources being recovered can be discussed as separate from the "waste", to ensure appropriate action and communication.

→ Education and communication
Plan for how all groups will be engaged and updated throughout project implementation. Use community preferred methods of learning and communicating. Develop evaluation metrics to measure satisfaction of communication expectations.

→ Financial planning
Identify sources of funding, requirements and stipulations to funding, duration of each available source, and plan for long term funding. This section should demonstrate the costs and benefits of the project.

→ Risk
Account for potential risks, including those identified during engagement. When possible, use accepted risk mitigation standards, such as the metrics in the ANSI/AWWA G481-14, ISO/TC 282, and CSA B805-18/ICC 805-2018 water reuse standards.

→ Liability, maintenance, and monitoring
Assign responsibilities and liabilities, accounting for possible changes to personnel, governance, the local environment, and other changes that could impact sustained operation of the WRR service. This may include planning for seasonal changes and disruptions. Specific liabilities and risk depend on the type of WRR project, and local legislation and knowledge should be used to identify the known risks and liabilities.

→ Evaluation

Identify targets and metrics to assess the implementation process and the impact of the WRR project, including an assessment of social, environmental, health and economic goals, WRR operational standards, project coals, and community expectations.

→ Data collection and management

Agree on requirements for baseline and ongoing data and a data collection plan. Assign responsibilities for collecting, interpreting, and managing data, and determine data ownership and knowledge management.

→ Training and support

Plan for training and ongoing support for those who are directly involved in using and maintaining the WRR project. Account for availability of skilled individuals, including operators and users.

Example: Implementing a stormwater pond for irrigation water

Drafting a plan

Because of the initial issues with trusting the municipal government, the steering committee was directly involved in developing a draft project plan along with the project leads. Upon completion, the draft plan included:

- A transparent budget with sources of funding
- Outcomes from the various risk assessments and related metrics for water quality and environmental impact
- Liability for the small enterprise constructing the project and when that liability would transfer to the municipal government
- Designated responsibility for data management
- A clause about alignment with the water license and Alberta Water Act
- A communication and evaluation plan, including outcomes from evaluation of the initial process for providing project updates

The project leads and steering committee agreed the draft plan reflected their understanding of the concerns discussed in the initial engagement activities with the broader community and covered all the important aspects of the project.

Pillar 3

Share the Draft Plan with all Groups and Revise Together

Transparently discuss concerns and ways to address and mitigate those concerns
- Identify concerns about the plan, then develop and share these mitigation strategies and confirm appropriateness for all groups.

Adapt plan
- After sharing the plan with all groups, collect feedback and adjust the plan to reflect the input. If there is disagreement, seek consensus through deliberation.
- Ensure plan reflects the agreed upon vision for the project

Continue process evaluation
- Using metrics in the plan, evaluate the success of the process of engagement and adjust future engagement strategies (e.g. project updates) accordingly.

Identify community champions
- Continue to recruit community members to promote the WRR project.

Confirm consent from all to proceed
- Consider consent the key that must be attained before moving to implementation. In situations where there is disagreement, outstanding concerns must be addressed and mitigated to the extent possible. The steering committee can mediate this step and determine reasonable agreement. This can be a difficult process and previously agreed upon terms of decision making (such as the definition of consent and vision discussed in Pillar 1) should be used.
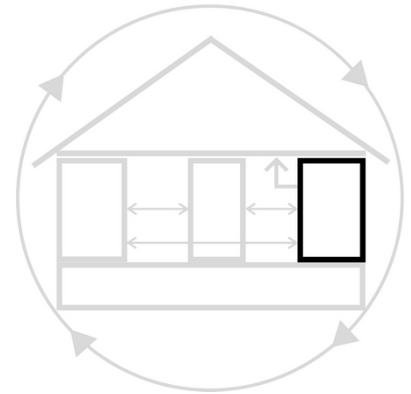
Example: Implementing a stormwater pond for irrigation water

Finalizing the plan

The draft plan was presented to the community using all previously successful methods of communication. Feedback included the need for more detail on water quality metrics and concerns about the use of the stormwater in some farms that are located adjacent to the elementary school sports field. In response, more details were provided in the Water Safety Plan portion of the plan and a schedule of times of day for irrigating was created based on the regional location and agreement from the farmers. During the discussion about times of day for irrigating, several more farmers agreed to be community champions for the project, offering to help provide information to the surrounding farms. After the iterative feedback process was complete and concerns were sufficiently mitigated, consent to proceed with the project was affirmed.

Roof

Responsive Implementation

According to the plan, adapting as needed, construct the WRR project
- The steering committee should continue to guide the process and updates should be provided to all groups as planned.
- Ensure quality control and quality assurance according to the Water Safety Plan or other water safety document in project plan.

Continue process evaluation
- Using prior agreed upon metrics for process evaluation.

Example: Implementing a stormwater pond for irrigation water

Creating the stormwater pond

Throughout development of the stormwater pond, updates were provided through agreed on communication methods. All changes to the initial plan were shared transparently, including providing details on a change to the shape of the pond that was needed.

Process evaluation indicated a need for updates to be provided in more simple language, and the project leads responded by seeking assistance from the communications department in the municipal government. Subsequent updates were well received.

Completed Structure

Sustained Operation and Ongoing Monitoring

After implementation, the WRR project requires ongoing financing, maintenance, compliance with regulatory requirements, and monitoring for issues and changes.
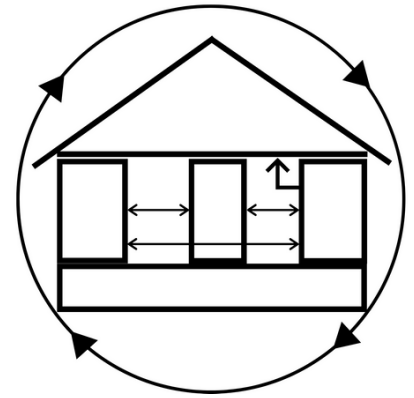
Maintain attention to community needs and changing context
- Consistently reassess social, environmental, and economic context and adapt WRR services accordingly.
- Plan for dissolution of steering committee, when project leads will be done, when liability shifts, if applicable.

Impact evaluation
- Measure impact using metrics from the initial plan and other metrics identified during implementation.

Knowledge sharing
- Share the successes and lessons learned from the project publicly, both with the community and with interested WRR proponents.
- Seek opportunities to share the outcomes and resources with those involved in water, wastewater, and stormwater services, including technical schools training operators and other mentorships opportunities.

Example: Implementing a stormwater pond for irrigation water

Sustained use of stormwater and sharing successes

Stormwater from the pond was used by the farmers and municipal government for irrigating non-food crops and municipal greenery, in compliance with regulations. The project leads and steering committee co-created a final report discussing the process, challenges, and successes, and shared the experience at conferences and with neighboring municipalities interested in pursuing similar projects.

Conclusion

Implementing WRR is a nuanced process that requires a broad understanding of context, including the environmental, social, economic, and political details. WRR is one approach to improving water, wastewater, and stormwater management, which can be employed as a standalone system or as part of an integrated approach. The WRR Roadmap provides supplemental support for implementing WRR that is built on shared knowledge and trust and is responsive to the social dimensions of water. All aspects of the WRR Roadmap are meant to be adapted and used according to what makes sense in context. This guidance supports the development of socially responsible WRR.

Appendix 1: Glossary of WRR terms

Note that these terms and definitions are based on common use, and are not necessarily reflective of what is used or understood in current regulations at local or provincial/territorial levels.

Blackwater: Water flushed from toilets and urinals, which represent the major load of organics, nutrients and pathogens, but only 30% of the volume of traditional municipal wastewater

Greywater: All household wastewater other than from toilets and urinals (i.e. from bathroom sinks, showers, washing machines, etc.) and in some jurisdictions excludes wastewater collected from kitchen sinks

Rainwater: Rain collected directly from roof surfaces before reaching the ground

Stormwater: Precipitation runoff collected from rain or snowmelt that flows over land and/or impervious surfaces in developed areas (e.g., streets, parking lots)

Municipal Wastewater: Water that is collected on a municipal scale that represents a combination of blackwater (e.g. toilets and urinal water, kitchen sinks), greywater (e.g. bathroom sinks, showers, laundry), and/or other wastes from domestic, commercial and industrial sources. It is also referred to as sewage

Water and resource recovery: the recovery of water from rainwater, stormwater, blackwater (toilet flushwater) and greywater (all other household wastewater than blackwater), as well as the recovery of other resources found in those sources, such as nitrogen, phosphorous, and organics for conversion to biogas or use as plant fertilizer

Appendix II: Resources on WRR

Integrated Water Resources Management

Integrated Water Resources Management: basic concepts
iwapublishing.com/news/integrated-water-resources-management-basic-concepts

Integrated Water Resources Management in Canada: Recommendations for Agricultural Sector
Participation
iisd.org/publications/integrated-water-resources-management-iwrm-canada-recommendations-agricultural-sector

Understanding the Legal Complexities Involved in Integrated Water Resources Management
cvc.ca/wp-content/uploads/2016/09/Appendix-B-Understanding-Legal-Complexities-of-Integrated-Water-Management.pdf

WRR frameworks and reports

Beyond User Acceptance: A Legitimacy Framework for Potable Water Reuse in California
escholarship.org/uc/item/2sj6b6nd

Water Reuse in Alberta: Experiences and Impacts on Economic Growth
watersmartsolutions.ca/wp-content/uploads/2018/08/Water-Reuse-in-Alberta-2013-Sust-Reg-Dev.pdf

Water Reuse Roadmap
wef.org/resources/publications/books/water-reuse-roadmap/

ANSI/AWWA G481-14, Reclaimed Water Program Operation and Management
awwa.org/Store/AWWA-G481-14--Reclaimed-Water-Program-Operation-and-Management/ProductDetail/39311630 (cost associated)

ANSI/AWWA G485-18, Direct Potable Reuse Program Operation and Management
awwa.org/Store/AWWA-G485-18-Direct-Potable-Reuse-Program-Operation-and-Management/ProductDetail/69537507 (cost associated)

Water Safety Planning
iwa-network.org/projects/water-safety-planning/

ISO/TC 282 Water Reuse
committee.iso.org/sites/tc282/home/resources.html

CSA B805-18/ICC 805-2018 Rainwater Harvesting Systems
scc.ca/en/standardsdb/standards/29480

Resource Recovery Roadmaps, WEF
wef.org/resources/topics/browse-topics-o-z/resource-recovery-roadmaps/

Water Sensitive Cities
watersensitivecities.org.au/

Examples of relevant regulatory requirements

British Columbia

Reclaimed Water Guideline

gov.bc.ca/assets/gov/environment/waste-management/sewage/reclaimedwater.pdf

Water Protection Act

bclaws.ca/civix/document/id/complete/statreg/00_96484_01

Approved Water Quality Guidelines

gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/water-quality-guidelines/approved-water-quality-guidelines

City of Vancouver Building and Plumbing By-laws, Book II, Division B, Section 2.7

vancouver.ca/operating-permit

Alberta

Reclaimed Water Guidance

alberta.ca/reclaimed-water.aspx

Water and Legislation Guidelines

alberta.ca/water-legislation-and-guidelines.aspx

Ontario

Water Reclamation and Reuse

ontario.ca/document/water-and-energy-conservation-guidance-manual-sewage-works/water-reclamation-and-reuse#:~:text=There%20are%20currently%20no%20provincial,irrigation%20(%20MOE%20%2C%20 2008)

Ontario Building Code

ontario.ca/laws/regulation/120332

Environmental Assessments

ontario.ca/page/environmental-assessments

Indigenous Rights

United Nations Declaration on the Rights of Indigenous People

un.org/development/desa/indigenouspeoples/declaration-on-the-rights-of-indigenous-peoples.html

Truth and Reconciliation

standcanada.org/truth-reconciliation-commission-report-summary/

Nibi (Water) Declaration Unanimously Supported at the Anishinaabe Treaty #3 Chiefs National Assembly

gct3.ca/nibi-water-declaration-unanimously-supported-at-the-anishinaabe-treaty-3-chiefs-national-assembly/

The Human Right to Water: A Guide for First Nations Communities and Advocates

hrw.org/report/2019/10/23/human-right-water/guide-first-nations-communities-and-advocates

First Nations Safe Drinking Water Preliminary Concepts

afn.ca/wp-content/uploads/2018/11/First-Nations-Safe-Drinking-Water-Preliminary-Concepts-July-2018.pdf

Project Management Tools

Government of Canada project management webpage
 canada.ca/en/treasury-board-secretariat/services/information-technology-project-management/project-management.html

RACI Chart racichart.org/

Gantt Chart gantt.com/

Stakeholder Management projectmanager.com/blog/stakeholder-management-plan

Project Management Templates mypmllc.com/project-management-resources/free-project-management-templates/

Project Management, by Adrienne Watt search.library.ualberta.ca/catalog/9017071 (open access)

Creating and Sustaining a Shared Vision
 buildinitiative.org/Resources/Community-Systems-Development-Toolkit/Section-1-Setting-and-Resetting-the-Stage/Section-1C

Financing

Water Valuation Guidance Document
 ccme.ca/files/Resources/water/water_valuation/water_valuation_en_1.0.pdf

Section Two – Full Cost Recovery and Financing, in Canadian Municipal Water. Priorities Report, Towards Sustainable and Resilient Water Management. Canadian Water Network's Canadian Municipal Water Consortium.
 cwn-rce.ca/report/2015-canadian-municipal-water-priorities-report/

U.S. EPA Guidelines for Preparing Economic Analyses; National Center for Environmental Economics, Office of Policy, U.S. EPA: Washington, D. C., 2010.
 epa.gov/environmental-economics/guidelines-preparing-economic-analyses

Evaluation

Types of Evaluation cdc.gov/std/Program/pupestd/Types%20of%20Evaluation.pdf

Independent Evaluation of the NWT Water Stewardship Strategy Implementation Evaluation Report
 nwtwaterstewardship.ca/en/independent-evaluation-nwt-water-stewardship-strategy-implementation-evaluation-report-2015

Better Evaluation
https://www.betterevaluation.org/en/node

Community Engagement

Public Engagement Guide, Government of Newfoundland and Labrador
gov.nl.ca/pep/files/Public-Engagement-Guide.pdf

New Handbook for Water Champions, POLIS
poliswaterproject.org/2019/04/29/new-handbook-for-water-champions/

Alberta Municipal Affairs
municipalaffairs.alberta.ca/documents/MDRS/AMA_Public_Input_Toolkit_Sept2014.pdf

Public Engagement Guide, Rural Municipalities of Alberta
rmalberta.com/news/new-mga-tool-public-engagement-guide/

Community Engagement Toolkit, Social Planning and Research Council of British Columbia
sparc.bc.ca/wp-content/uploads/2017/03/community-engagement-toolkit.pdf

Community Planning Toolkit - Community Engagement, Community Places
communityplanningtoolkit.org/sites/default/files/Engagement.pdf

International Public Participation Models 1969-2020, Bang the Table
bangthetable.com/blog/international-public-participation-models