REGIONAL DISTRICT OF NANAIMO

REGIONAL DISTRICT OF NANAIMO
DRINKING WATER AND WATERSHED PROTECTION TECHNICAL ADVISORY COMMITTEE
AGENDA

Tuesday, September 10, 2019

12:30 P.M.

Board Chambers

Pages

1. CALL TO ORDER

2. APPROVAL OF THE AGENDA

That the agenda be approved as presented.

3. ADOPTION OF MINUTES

3.1 **Summary Report from Action Plan Update Structured Decision - Making Workshops July 9, 2019** 3

That the summary report of the Drinking Water and Watershed Protection Technical Advisory Committee workshops held May 16 and June 20, 2019, be received for information.

3.2 **Drinking Water and Watershed Protection Technical Advisory Committee Meeting - April 25, 3019** 68

That the minutes from the Drinking Water and Watershed Protection Technical Advisory Committee held April 25, 2019, be adopted.

4. PRESENTATIONS

4.1 **Update on Area F Official Community Plan Water Study**

4.2 **Update on Area E Phase Three Water Budget**

4.3 **Update on Vancouver Island University Wetland Research**

4.4 **Update on Monitoring Programs**

4.5 **Update on Rebates**

4.6 **Update on Team WaterSmart Activities**

5. UNFINISHED BUSINESS

6. REPORTS

6.1 Ministry of Health's Drinking Water Officers Guide 2019: Rainwater Harvesting for Potable Use in BC 70

Draft for review.

6.2 Draft Drinking Water Watershed Protection Action Plan 2.0

To be circulated for review and discussion at meeting.

7. NEW BUSINESS

8. ADJOURNMENT

Summary Report

Planning Advisory Group Structured Decision-Making Workshops

Updating the Drinking Water and Watershed Protection Action Plan

Prepared for

Regional District of Nanaimo

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Date

July 9th, 2019

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Executive Summary

At the beginning of 2019, the Regional District of Nanaimo (RDN) began the process of updating its ten-year Drinking Water and Watershed Protection (DWWP) Action Plan. Public input and technical support was sought to refresh the program mandate, priorities, and activities for the next ten years and beyond.[1] One of the steps consisted of running two structured decision-making (SDM) workshops with knowledgeable experts, technical advisors, RDN staff, and select Board members (via a Board Steering Committee) to inform recommendations on updated goals, objectives, prioritized program actions, and key initiatives. This report summarizes the outcomes and recommendations from these two full-day workshops.

The workshops were attended by the RDN Board Steering Committee (BSC), representatives of the DWWP Inter-departmental Working Group (IWG), and the DWWP Technical Advisory Committee (TAC). Together these participants are referred to as the Planning Advisory Group (PAG). The first workshop on May 16th was focused on the review and assessment of several "mock" portfolios that were developed to seek targeted feedback from PAG members on the scale and emphasis of different packages of actions (key initiatives) that a future DWWP Program could be based upon. The mock portfolios allowed the facilitators to probe and explore where acceptable trade-offs may lie between competing interests, such as costs and environmental protection.

Discussion during Workshop #1 converged on themes captured by two of the portfolios — Climate change and Watershed Protection — and more specifically an emphasis on operationalizing data, water-centric planning and a broadened education focus beyond solely conservation. Participants expressed support for scaling up resourcing for the updated DWWP Action Plan, with effort more-or-less split evenly among the three existing program themes of education, science and planning. Accordingly, a revised portfolio was developed for Workshop #2, and expanded upon with a set of proposed key initiatives informed by input from the public, PAG Workshop #1 discussions, as well as outcomes of the 2018 Implementation Review of the DWWP Action Plan.

Workshop #2 on June 20th was focused on reviewing and assessing proposed key initiatives under the blended portfolio theme to inform a draft updated Action Plan. The blended portfolio assumed overall effort increased by 2.5 times, that 'education' themed activities accounted for about 40% of the total (compared to 50% with the status quo), science 25% (compared to 40% with the status quo), and planning 35% (compared to 10% with the status quo). Prominent themes from Workshop #2 discussion include:

- widespread support for scaling up effort in the updated Action Plan, subject to available resources,
- strong support for continued efforts to improve water efficiency through Team WaterSmart Initiatives but a lack of agreement on how or if a more targeted approach for specific water users should be used,
- widespread recognition of the need to operationalize data despite associated technical and capacity challenges,
- a strong desire for more integration of water constraints into land-use planning and related policy, and

[1] For more information about the process undertaken to update the DWWP, please refer to https://www.getinvolved.rdn.ca/dwwp-action-plan-update-2019

- recognition of the importance of collaboration with partners and between departments at RDN to successfully achieve goals in all three thematic areas of education, science, and planning.

Another focus for Workshop #2 was a detailed discussion on updated draft goals and objectives for the DWWP, after a summary of all public feedback was reviewed. The following proposed DWWP vision and mission emerged from this discussion and will inform a draft updated Action Plan:

> **Proposed Draft Vision:** *Healthy, safe and resilient water resources in the region, which are collectively protected through strong partnerships.*
>
> **Proposed Draft Mission for RDN:** *To provide leadership at the watershed scale through coordination of water management, land-use planning and community outreach to support sustainability, climate adaptation, and healthy watersheds.*

Consistent with findings from the 2018 Implementation Review of the initial Action Plan, participants in the SDM workshops are very supportive of the DWWP, they are optimistic about its future under a refreshed Action Plan, and are interested in the Technical Advisory Committee retaining a role in guiding its implementation.

Outlined below are the next steps in the development of an updated DWWP Action Plan that will be shaped by the input summarized in this report.

- Between July and September, 2019, the list of key initiatives discussed during Workshop #2 will be refined and expanded according to the PAG input. Along with progress indicators to measure success and preliminary budget figures, these will comprise a substantial part of a draft updated Action Plan prepared by RDN staff.
- In September and October, 2019 stakeholders and the public will have an opportunity to review and provide feedback on the draft updated DWWP Action Plan.
- In November, 2019 and following consideration of public and stakeholder input, the updated DWWP Action Plan will be presented to the RDN Board for discussion and feedback.
- In December, 2019 it is anticipated that the updated DWWP Action Plan will be approved by the RDN Board.

1. Introduction

At the beginning of 2019, the Regional District of Nanaimo (RDN) began the process of updating its ten-year Drinking Water and Watershed Protection (DWWP) Action Plan. Public input and technical support was sought to refresh the program mandate, priorities, and activities for the next ten years and beyond.[2] One of the steps consisted of running two structured decision making (SDM) workshops with knowledgeable experts, technical advisors, RDN staff, and select Board members to inform recommendations on updated goals, objectives, prioritized program actions, and key initiatives. This report summarizes the outcomes and recommendations from these workshops.

The SDM workshops were attended by the RDN Board Steering Committee (BSC), representatives of the DWWP Inter-departmental Working Group (IWG), and the DWWP Technical Advisory Committee (TAC). Together these participants are referred to as the Planning Advisory Group (PAG). They met on May 16th and June 20th for two full-day workshops.

A consulting team of Compass Resource Management and Econics was hired to facilitate and provide technical support for the SDM workshops. This included assisting with an IWG meeting held on April 17th and attending the April 25th TAC meeting. These April meetings were focused on issue identification and idea generation for the DWWP program as a pre-cursor to the SDM workshops that followed.

A component of updating the DWWP Action Plan was to draw linkages between it and other regulatory and planning initiatives at the RDN such as the RDN Strategic Plan (2019-2022), the Liquid Waste Management Plan (2014), Regional Growth Strategy, Official Community Plans, and emergency services planning.

1.1 Overview of Structured Decision Making Workshops

The purpose of the SDM workshops was to review and make recommendations on the program's goals, objectives, thematic areas, priorities, key actions, partners, resources, and key indicators during the next phase of the program (i.e., from 2020 to 2030). The PAG's role was to explore trade-offs and aim to reach agreement on a recommended package of priorities and key initiatives that would ultimately inform an updated draft DWWP Action Plan for consideration by the RDN Board.

The SDM workshops followed a structured approach[3] for the identification and exploration of different activities and possible actions for consideration in an updated program. The workshops were designed to be iterative and adaptive, as learning was a central feature built into the design. Multiple rounds of assessment were carried out.

The workshops were informed through several preparatory activities and meetings carried out in support of the updating process, which included:

(i) a third-party review of the implementation of the initial DWWP Action Plan carried out by Econics (Sep 2018);

[2] For more information about the process undertaken to update the DWWP, please refer to https://www.getinvolved.rdn.ca/dwwp-action-plan-update-2019

[3] Structured Decision Making (SDM) is centred on a set of core steps that serve as a guide for working through a planning process. These steps are supported by structuring tools and methods that help groups deal with the complexities of technically intensive decisions and multi-dimensional and value based issues.

(ii) an internal review of the program by RDN staff in the spring of 2019;
(iii) participant feedback on the RDN's DWWP Action Plan during an engagement session at the Parksville Water Stewardship Symposium held on April 4th;
(iv) feedback and direction from the DWWP IWG meeting held on April 17th;
(v) preliminary ideas generated at the April 24th TAC/BSC meeting;
(vi) input received during RDN's on-line DWWP survey which took place from March 15th to May 27th, 2019.

1.2 SDM Workshop 1

The first workshop held on May 16th was focused on the review and assessment of several "mock" portfolios that were developed to seek targeted feedback from PAG members on the scale, and emphasis of different packages of actions (key initiatives) that a future DWWP Program could be based upon. The mock portfolios allowed the facilitators to probe and explore where acceptable trade-offs may lie between some of the competing interests (e.g., costs to ratepayers, environmental protection, climate change preparedness, drinking water infrastructure, and other cultural and social considerations). At the workshop, PAG members also had the opportunity to build their own improved portfolios.

1.3 SDM Workshop 2

The second workshop was focused on reviewing and assessing individual priorities and key initiatives identified by stakeholders during the first workshop and earlier preparatory activities. Another focus for the workshop was a detailed discussion on updated draft goals and objectives for the program after a summary from all public feedback was reviewed.

More details from the SDM workshops are provided later in this document (see Sections 2 and 3) and in the appendices where the pre-reading materials are found.

2. Vision, Goals and Objectives from the SDM Workshops

This section provides a summary of the main recommendations around vision, goals and objectives highlighted during the SDM workshops for consideration by RDN on the core elements in an updated DWWP Action Plan.

2.1 Vision / Mission

Proposed Draft Vision

"Healthy, safe and resilient water resources in the region, which are collectively protected through strong partnerships"

Proposed Draft Mission for RDN

"To provide leadership at the watershed scale through coordination of water management, land-use planning and community outreach to support sustainability, climate adaptation, and healthy watersheds"

2.2 Goals / Objectives

Recommended Draft Goals for the Updated DWWP Action Plan

To support programs that:

1. Protect, manage and restore ecosystems and the overall health and value of our watersheds and aquifers.
2. Safeguard and manage source waters used for domestic supply.
3. Increase water-use efficiency and optimize infrastructure investments for water and wastewater systems.
4. Support the enjoyment and protection of social, cultural, and recreational values and amenities in our watersheds, which are central to maintaining well-being and quality of life.
5. Mitigate and better prepare for climate change effects on the region's water resources.

Recommended Draft Objectives for the Updated DWWP Action Plan

Thematic Areas	Proposed Objectives
Education, Communications & Advocacy	• To increase awareness and stewardship of the watersheds and drinking water resources across the region. • To build awareness and strengthen leadership in the interdisciplinary delivery of the program. (INTERNAL)
Water Science & Monitoring	• To support high quality, reliable, long-term data collection, science, and information networks about the status of the region's water resources in terms of both quality and quantity to inform decisions.
Policy & Planning	• To harmonize policies, plans, and programs towards more integrated water management, land-use planning, and design standards. • To identify and advocate for policy actions that will enable efficient water use, water quality protection and maintenance or restoration of watershed function.
Collaboration	• To develop productive long-term collaborative partnerships across jurisdictions, sectors, departments and geographic areas to leverage resources for implementing water initiatives and policies that foster the health of ecosystems and communities. • To facilitate drinking water and watershed related activities, communications and resource-sharing amongst partners, that are consistent with the Region's goals.

3. SDM Workshop 1

3.1 Overview

The first workshop was framed around several "mock" portfolios that were developed to help the PAG explore their values and priorities for an updated program. The mock portfolios facilitated a streamlined approach for receiving feedback on thematic emphasis and resource levels for a new Action Plan, given the large number of combinations of different actions/key initiatives that were possible.

The themes of the mock portfolios were: water conservation (Portfolio 2), climate resilience (Portfolio 3), watershed protection (Portfolio 4), and scaled back (Portfolio 5). Each portfolio was also associated with a different assumed scale of effort relative to the existing program (i.e., the status quo, Portfolio 1).

Please refer to Appendix A for more details about the workshop and the mock portfolios.

3.2 Key Themes from Portfolio Review

Participants were provided with an overview presentation on the mock portfolios, then asked to provide their general responses in a plenary session before engaging in a ranking exercise individually. Key findings from this plenary discussion include the following:

1. **There is broad agreement that addressing the water-related effects of climate change should be a key focus for the program going forward.**
    - Impacts of concern include longer dry periods, reduced snowpack, warmer temperatures, and more intense precipitation events with implications for water quality and quantity, as well as infrastructure and emergency management.
    - Science, planning, and education efforts should emphasize increasing the resilience of people and water systems to cope with water scarcity, and preparedness for droughts and floods.
    - Several participants spoke to the need to be aspirational given the magnitude of the problem and that the program should be oriented around what the world will be like ten or twenty years from now rather than what it is like today.
    - Others spoke to the importance of collaboration with other agencies plays with respect to this issue, noting that action by all levels of government is required and that there are limits to what RDN can accomplish on its own.
    - Internal collaboration within RDN concerning climate change impacts and adaptation was a recurring theme. For example, Emergency Services is increasingly concerned with the prevalence of floods and droughts. Similarly, a climate change lens may assist the Parks Department with future land acquisitions or plant selection for parks.

2. **There is broad support for continuing DWWP Program educational initiatives. However, the group was split on how implementation should proceed going forward**.
    - Some favour an approach in line with the status quo, wherein conservation education is delivered primarily to a broad residential audience more or less uniformly across the region. For example, several participants spoke specifically to the need to continue to engage with schools and children as a priority.

- Others favour a more targeted approach in the future, wherein analysis of water use by sector and area enables messaging directly to high-volume water users or to specific sectors (e.g., commercial, agricultural, specific geographic areas, etc.). Some concern about the practicality and equity of this approach was voiced given the DWWP's status as a regional service, serving both the member municipalities and electoral areas.
- There was also dissonance around how much priority should be placed on water efficiency/demand management in the future, in contrast to more general messaging around the importance of stewardship, watershed protection and preparing for climate change.
    - On one hand, one participant noted that conservation has already had a significant impact on demand and questioned how much more could be achieved in the future. Another suggested that natural uptake of more efficient fixtures and appliances will continue to reduce water demand with or without RDN's efforts.
    - On the other hand, several participants spoke about RDN's unique position to efficiently deliver water conservation education on behalf of the region and its well proven track record in this space. They advocated for enhancing this role in the future.

3. **An increased emphasis in the future on influencing land use planning and water-related policy is broadly supported.**

    - For example, there is support for using data and modelling to identify higher risk areas for special development permits and land-use planning measures based on water quality or quantity considerations. This is consistent with intent expressed in the initial Action Plan, that were not fully realized in the first ten-years of the program, in part due to the need to gather data to inform the policy required to enable such measures.
    - Specific examples might include introducing development restrictions in watersheds prone to low groundwater yield or drought or designating groundwater recharge areas through planning provisions.
    - There was support from both RDN staff members and external partners for continuing to leverage DWWP resources to support implementation of commitments under the Liquid Waste Management Plan related to regional rainwater management.
    - Some participants noted that they are more interested in incentives and regulations to drive changes in land use than a voluntary approach achieved through education.

4. **While there was enthusiasm for the various new initiatives and options brought forward, this was tempered by general support for the status quo.**

    - A number of participants expressly stated that they thought RDN is already doing a "great job". This is consistent with findings from the 2018 program review.
    - Under this theme, people spoke particularly to the role of RDN in conservation education and watershed data collection and science.
    - This could be interpreted as general support for doing more of the same in the future, although possibly at a scaled up level of effort.
    - Several people offered cautionary comments about the potential for the DWWP Program to drift from a focus on things that it can make an impact on into areas that are outside its jurisdiction or realm of expertise.

3.3 Mock Portfolios – Ranking Results

PAG members undertook a ranking exercise to gauge how much they liked the different portfolios relative to one another. This exercise highlighted where there was agreement and disagreement on areas of emphasis for an updated program. It also facilitated development of improved portfolios and identification of potential new or enhanced initiatives that could be explored at the second workshop. A representative example of some of the results from the ranking exercise is illustrated in Figure 1, which shows one of the PAG members' relative rankings across the portfolios (blue dots) and across the other PAG members' rankings (white dots).

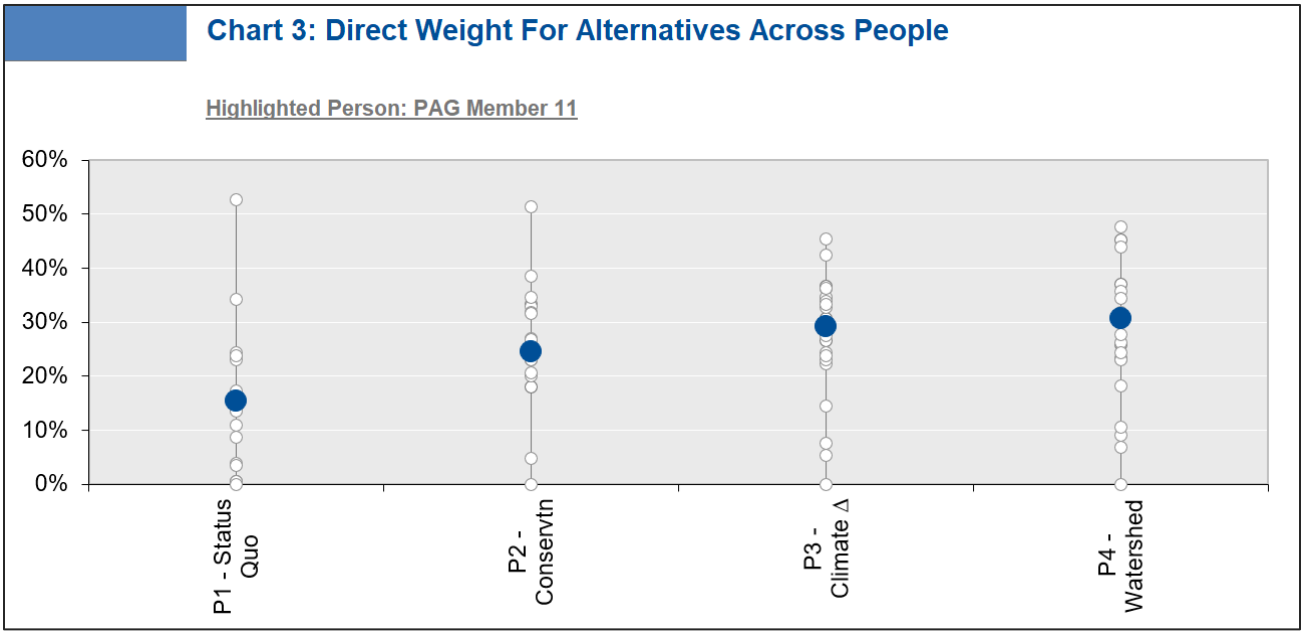


Figure 1: Example Individual Ranking

An additional summary table (see Figure 2) shows the level of support for each of the 23 PAG members' two most liked (in green) and least liked (in red) portfolios. Note that each numbered row is a different PAG member who undertook the exercise. In general, the Climate Change and Watershed Protection Portfolios were the most liked options according to the ranking exercise and subsequent discussion.

	P1 - Status Quo	P2 - Conservtn	P3 - Climate Δ	P4 - Watershed	P5 - 25%Smaller
1	0%	18%	36%	45%	0%
2	0%	26%	37%	37%	0%
3	15%	23%	31%	31%	0%
4	14%	26%	34%	26%	0%
5	17%	33%	27%	23%	0%
6	9%	32%	14%	43%	2%
7	4%	38%	34%	23%	0%
8	16%	24%	32%	25%	3%
9	13%	29%	42%	8%	8%
10	10%	32%	34%	17%	7%
11	15%	24%	28%	30%	3%
12	21%	23%	20%	24%	12%
13	0%	25%	42%	32%	0%
14	21%	24%	21%	21%	12%
15	22%	22%	22%	30%	3%
16	4%	27%	34%	36%	0%
17	15%	24%	27%	30%	3%
18	17%	20%	33%	30%	0%
19	42%	25%	4%	8%	21%
20	16%	25%	28%	31%	0%
21	34%	51%	7%	7%	1%
22	23%	5%	23%	45%	5%
23	17%	21%	27%	34%	0%

Figure 2: Mock Portfolios Ranking Summary

3.4 Construction of a New Portfolio

Following the ranking exercise, participants were asked to construct their own mock portfolios in a facilitated plenary session. This led to discussion about two new portfolios, which merged together key initiatives from both the Climate Change and Watershed Protection portfolios, along with more of an emphasis on operationalizing data, water-centric planning and a broadened education focus beyond solely conservation.

Key take-aways from this session include the following:

- Participants favour a blended portfolio of measures with effort more-or-less split evenly among the three program themes.
- A scale up in effort is almost universally supported. People believe the DWWP Program is doing good work, and that it is both possible and desirable to do even more good work in all three thematic areas of education, planning, and science. The need to deal with the imperatives of climate change and regional growth through more integration of water management with land-use planning are seen as major drivers behind the need to increase effort.
- While there is not complete agreement on where to go with the education theme, a general consensus landed on a blend of general outreach to all residents combined with some targeted efforts for specific sectors and groups.
- The future of the program lies in operationalizing data and more focused data collection and science to support planning applications.
- There is broad support for using data and science to set performance targets for watersheds that will help guide future land use.
- Collaboration across RDN departments will be a key feature of the new plan, including working together to implement commitments under the Liquid Waste Management Plan around rainwater management.

This input was used to develop a new consensus-based portfolio that was subsequently brought forward for the second workshop. This will be discussed further in the next section.

4. SDM Workshop 2

4.1 Overview

As discussed above, the first SDM workshop was centered on the review and assessment of several mock portfolios (i.e., packages of key initiatives and actions that were organized according to some illustrative themes). The feedback and direction from the workshop were instrumental in identifying key initiatives proposed for the updated Action Plan. The consulting team worked with RDN staff to further refine key initiatives after the workshop. This included considering additional initiatives based on the most recent feedback received via RDN's online public survey that closed at the end of May, as well as the various other activities and meetings identified in Section 1.1, above. SDM Workshop 2 was therefore focused on reviewing and assessing the list of identified key initiatives. This included drawing linkages with other RDN programs or activities and other partner organizations. Please refer to Appendix B for a fuller description and additional details about the key initiatives initially discussed at the workshop.

Another focus for the Workshop 2 was to return to a discussion of draft goals and objectives after a review of the feedback received from the public symposium and online DWWP survey, and a synthesis of the revised draft objectives discussed at the April 25th TAC/BSC and April 17th IWG meetings. At the workshop, a draft vision and mission were discussed and revised, as outlined in Section 2 above.

4.2 Highlights of New Portfolio and Proposed Initiatives Review

A new portfolio aligned with the general direction provided by participants during Workshop #1 was constructed and presented in Workshop #2 to facilitate more in-depth discussion of possible key initiatives for the updated Action Plan. Feedback on the key initiatives presented in association with the new portfolio (outlined below) was solicited throughout the workshop to form the basis of a draft updated DWWP Action Plan.

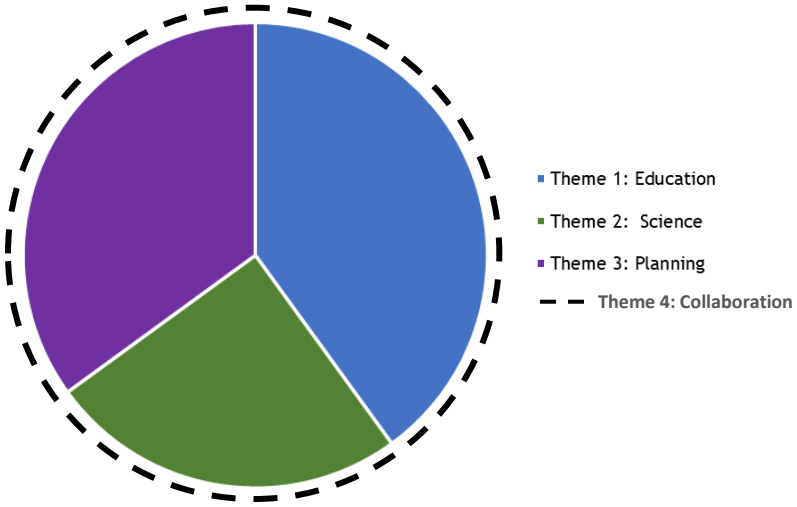


Figure 3: Allocation of Effort - New Portfolio

The relative allocation of effort for the new portfolio presented during Workshop 2 is illustrated in Figure 3. Effort under the "Education" theme accounts for about 40% of the total compared to about 50% under the status quo. "Science" accounts for 25% of the total compared to about 40% under the status quo. "Planning" increases to 35% compared to about 10% under the status quo (see Figure 3). For illustrative purposes, we assumed that overall effort increases by about two and a half times compared to the current program, implying that absolute effort under each theme increases compared to the status quo regardless of their relative distribution.

Education, Communications and Advocacy

Under this programmatic theme, long-standing and successful initiatives such as Team WaterSmart, rebates and school programs would continue. However, the education program would begin to focus more on targeted sectors and demographics. Many of these new initiatives will require further strengthening the already strong partnerships with the region's water service providers (municipalities, improvement districts, etc.). Support for watershed restoration activities would see increased attention, including supporting on-the-ground community-based projects. Water conservation would continue to be a primary focus. However, program messaging will also focus explicitly on explaining the importance of watershed protection, ecosystem services, linkages to climate change, and green infrastructure.

Examples of proposed key initiatives identified through earlier engagement included the following:

- targeted outreach to agricultural water users (E1);
- enhance Team WaterSmart Outreach Program (E2);
- sustainable water management demonstration site(s) (E3);
- support for watershed restoration (E4);
- watershed and water treatment facility tours (E5);
- improve residential and non-residential water use accounting (E6);
- commercial, industrial and institutional (CII) water conservation program (E7);
- targeted conservation programs for high volume and low income residential (E8);
- DWWP program communications and branding update (E9);
- continuation of a number of existing initiatives (e.g., Team WaterSmart; wellSMART workshops; rebates and incentives; Water Purveyor Working Group; etc.).

Workshop participants provided feedback on both the overarching scale and relative thematic emphasis, as well as on the proposed or illustrative initiatives. Key findings include the following:

- Similar to findings from the first workshop, there were mixed reviews from participants about the viability and value of more targeted water conservation programs.
    - While the notion of targeting high-volume water users with conservation programming was supported in principle by many participants, several practical challenges were identified during discussion. For example, some participants noted that this would require extensive integration with municipal water service providers, who are the custodians of customer billing data.
    - RDN's current residential irrigation checkup initiative was cited as a good example of an effective conservation program targeted at a high water users.
    - Similarly, one participant questioned whether agriculture is a worthy target for water efficiency efforts on the assumption that total demand in that sector might be quite small from a regional

perspective. Another participant was more enthusiastic about this initiative and spoke about the importance of partnering with Ministry of Agriculture as a condition for success. Similarly, it was later observed that agriculture water demand will likely double in the future, given the longer hotter growing seasons predicted in a changing climate and that there is a regional emphasis on food security and encouraging agricultural economic development. Additionally, agricultural water infrastructure and water efficiency is an action area in RDN's Agriculture Area Plan. Yet another participant stressed that outreach to agricultural users should focus on both water quantity and quality.

- A number of people identified the challenge of quantifying the demand of large volume water users outside municipal service areas as a significant barrier to introducing a targeted commercial, industrial, and institutional water conservation program.
- Given the per capita demand reductions already attained in the region, one participant questioned how much longer this downward trend can continue but actually saw this as a rationale in favour of targeting specific user groups where the potential for water savings appears high, based on water use data.
- There was general support for providing residential water users with more graphical information about their use and how it compares to neighbours, building on preliminary work carried out by RDN earlier in the decade.
- Several participants spoke to the need to move beyond conservation education and to focus more on advocacy and stewardship of water resources and watershed ecosystems in the future.

- Across other proposed future education initiatives (e.g., sustainable water management demonstration sites; landowner support for restoration; watershed and water treatment facility tours), participants sought clarification on some points or suggested a number of possible minor enhancements. This has been interpreted as general support for the direction emerging for the future program under this theme.

Water Science, Monitoring and Target Setting

Science and monitoring effort under this portfolio would shift progressively towards operationalizing data for decision making, made possible by building on data collection and analysis completed in the first 10 years of implementation. Work on regional water budgets would carry on, specifically to develop numerical models to estimate water supply availability and demand scenarios. Water science would support planning efforts by establishing watershed performance targets and standards to facilitate sustainable land development. Understanding how a changing climate affects both aquatic ecosystems and human health and safety related to water would be a key focus.

Examples of proposed key initiatives identified through earlier engagement included the following:

- implement water monitoring data management framework (S1);
- comprehensive plan for operationalizing water data (S2);

- climate change modelling to identify higher risk areas (S3);
- complete water budget models for all key water regions ("Phase 3") (S4);
- expand watershed monitoring parameters to increase focus on habitat conditions (S5);
- quantify and characterize monitor water use in the industrial, agricultural and other sectors (S6);
- improve water science communications (S7); and,
- continue a number of existing initiatives (e.g., Community Watershed Monitoring Network, observation well network expansion, hydrometric and climate monitoring, etc.).

Workshop participants were asked for their responses to both how the overarching theme was constructed and to the proposed or illustrative initiatives. Key findings include the following:

- The relationship between climate change-focused action and RDN's ongoing water budget project was explored. Several participants noted the major overlap between these two initiatives, suggesting that they could either be merged or that the water budget project could be considered a sub-task of climate change planning.
- The difficulty of gathering sufficient data to run numerical water budgets and set targets for watershed performance was discussed. Having enough data to validate models will be a challenge, particularly if the intent is to use them to guide land use and development. One participant suggested that people need to be realistic about the amount of data available and the extent to which it can actually support decision making.
- There was a strong consensus that ongoing partnerships with provincial agencies — in particular on data collection, validation, operationalization and hosting —is critical to success. Fortunately, the region starts this new operational period with a strong record of collaboration over the past decade.
- Developing a comprehensive plan for operationalizing water data (initiative S2) was identified as a critical component of the Action Plan Update. Indeed, one participant later observed that this is perhaps better thought of as an overarching theme for the DWWP Action Plan rather than a discrete action.
- The topic of RDN's future role in climate change modelling (initiative S3) generated much discussion. It was noted that numerous other agencies as well as other RDN departments play a part in this. It was not immediately clear to the group what the DWWP Program should do in this space and, again, overlap with Phase 3 of the water budget project was noted. Generally, there was consensus that this initiative needs to be more precisely defined. One participant recommended that this could start with RDN facilitating a regional dialogue about climate modelling to understand what the various agencies are currently doing or planning.
- There was also trepidation about the extent to which RDN should expand the watershed monitoring parameters it currently collects data for, to increase focus on habitat conditions (initiative S5). The significant technical expertise required to do this effectively was noted. Jurisdictional and practical limits on RDN's ability to even collect samples for some parameters was discussed (e.g., on private land).

Several people offered cautionary notes about expanding the scope of the DWWP Program too much into aquatic ecosystems or riparian habitat (and away from drinking water quantity and quality) because it may stretch resources too far and take attention away from the core focus. In sum, participants felt that this initiative could potentially be difficult and resource intensive.

- There was general support for quantifying and characterizing water use in the industrial, agricultural and other sectors. However, the difficulty of doing so for water users outside municipal boundaries was identified as a barrier (due to lack of metering, lack of business licensing, difficulty identifying who large-volume users are, etc.). There was also a question as to whether this role would be more appropriate for Provincial leadership.

Policy and Planning

Key themes for planning and policy work going forward include water-centric land-use policy and planning, protecting natural assets, and promoting green infrastructure. Strong collaboration between departments within RDN and across other governments and agencies such as local governments, First Nations, the Islands Trust, industry and the Province will be essential to success. The DWWP Program would offer active support to various high-profile upcoming planning processes, including updates to a number of Official Community Plans and the Regional Growth Strategy. Watershed and aquifer characterization completed to date can be used to positively influence and support these initiatives. The goal of many activities under this thematic area would be alignment between policy and water-based environmental constraints. RDN would continue to advocate for watershed protection by providing comments to provincial agencies on policy and legislative initiatives on an *ad hoc* basis, and by continuing to review provincial water license applications and others as referral agency.

Examples of proposed key initiatives identified through earlier engagement included the following:

- set water-driven objectives for land-use management in scheduled updates to official community plans, park acquisitions, and the Regional Growth Strategy (P1);
- establish watershed performance targets and standards to manage the impact of land development (as per the commitments for rainwater management under the Liquid Waste Management Plan) (P2);
- identify new incentive-based policy and regulatory tools to increase protection of riparian areas and natural assets on private property (P3);
- identify regulations, education programs or incentives for developers who create low-impact and water efficient developments (P4);
- pursue stronger engagement with First Nations (P5);
- continue a number of existing initiatives (e.g., providing comments to the Province on water policy and legislation initiatives, continuing to support Development Application reviews based on monitoring data).

Workshop participants were asked for feedback on how the overarching theme was constructed and on the proposed initiatives. Key findings include the following:

- Generally, there was strong support for direction set out for the future program under this theme.
- It was noted that there are important integrations between the planning theme and mandatory commitments under RDN's Liquid Waste Management Plan, which includes (among other things) specific actions for rainwater management like developing a strategy with targets and standards to mitigate impacts of land development.
- Strong support was voiced for setting water-driven objectives for land-use management (Initiative P1) to ensure land-use planning takes into account water-related constraints. Less support was expressed for initiative P2 - setting watershed performance targets and standards (such as maintenance/base flows or impervious surface cover), in to maintain watershed health and function over time.
- Participants found that there was some confusion about the difference between these proposed initiatives and suggested this needs to be clarified in the Plan Update.
- As with other themes, the need to collaborate with provincial and other agencies that are already working in these areas was reaffirmed.
- One participant advocated for a role for the program in promoting building standards designed to reduce impacts on water resources (both water demand and impacts on stormwater).
- The importance of clear terminology was emphasized. For example, people need to understand the difference between private and private-managed forest lands. Including a glossary of terms in the updated Plan was suggested as a solution.
- Another participant suggested that the language currently focuses too much on surface water management. Aquifer and groundwater protection need to be prominent in the Plan Update, as does recognition that there are many private groundwater users not served by public water utilities.
- The notion that watersheds provide logical boundaries for planning was discussed. One participant suggested this should be a visible theme in the updated plan.

4.3 Key Initiatives – PAG Survey Results

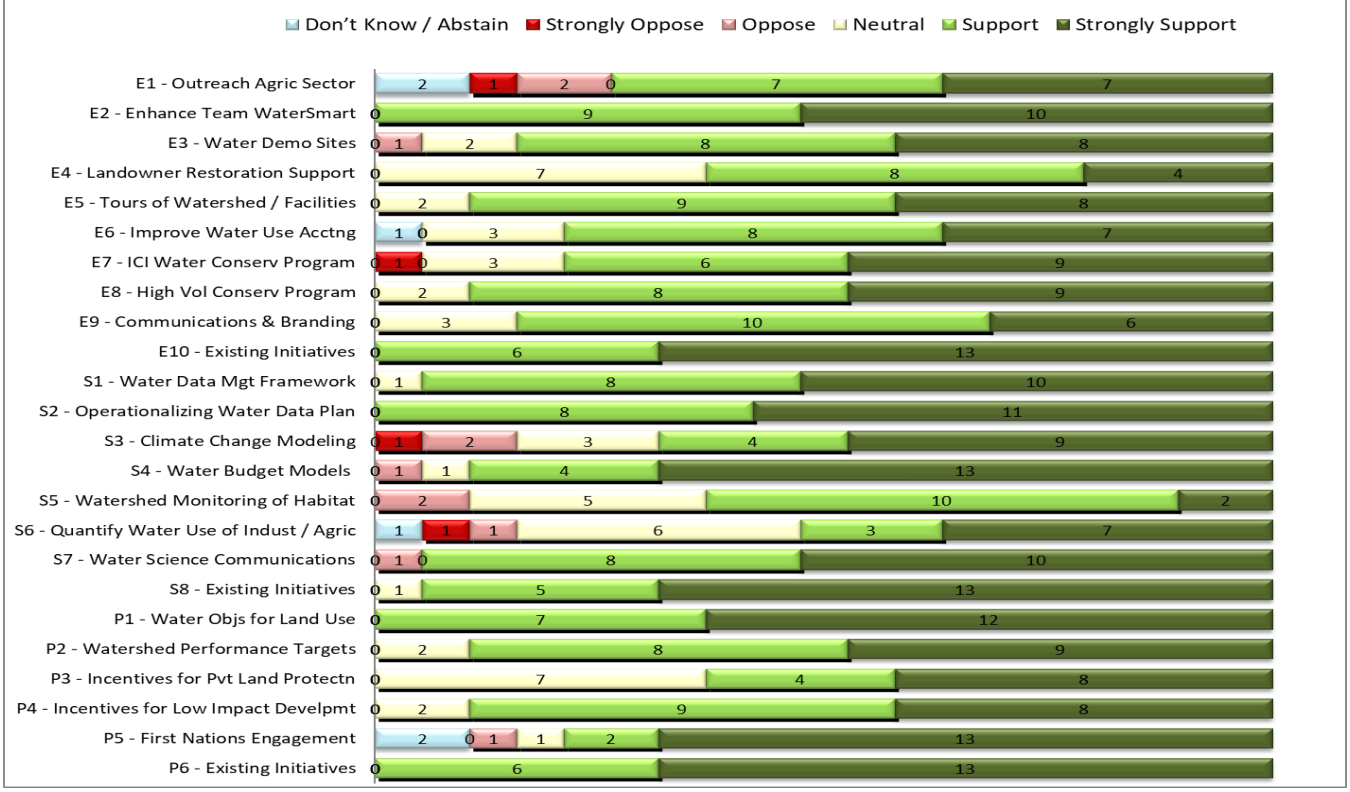
After the review and discussion of the key initiatives (which included making some revisions and additions), PAG members were asked to indicate their level of support for each key initiative by completing a short individual survey. The results were meant to: 1) get a better sense of the degree of support more broadly among and between TAC members, BSC members, and some IWG members; and 2) provide a mechanism to help prioritize the implementation and scope of the initiatives, should there be a requirement to scale back effort and resources at some point, or to help with the sequencing of implementing key initiatives over the lifetime of the plan (all things being equal).

PAG members were asked to indicate their level of support according to the following:

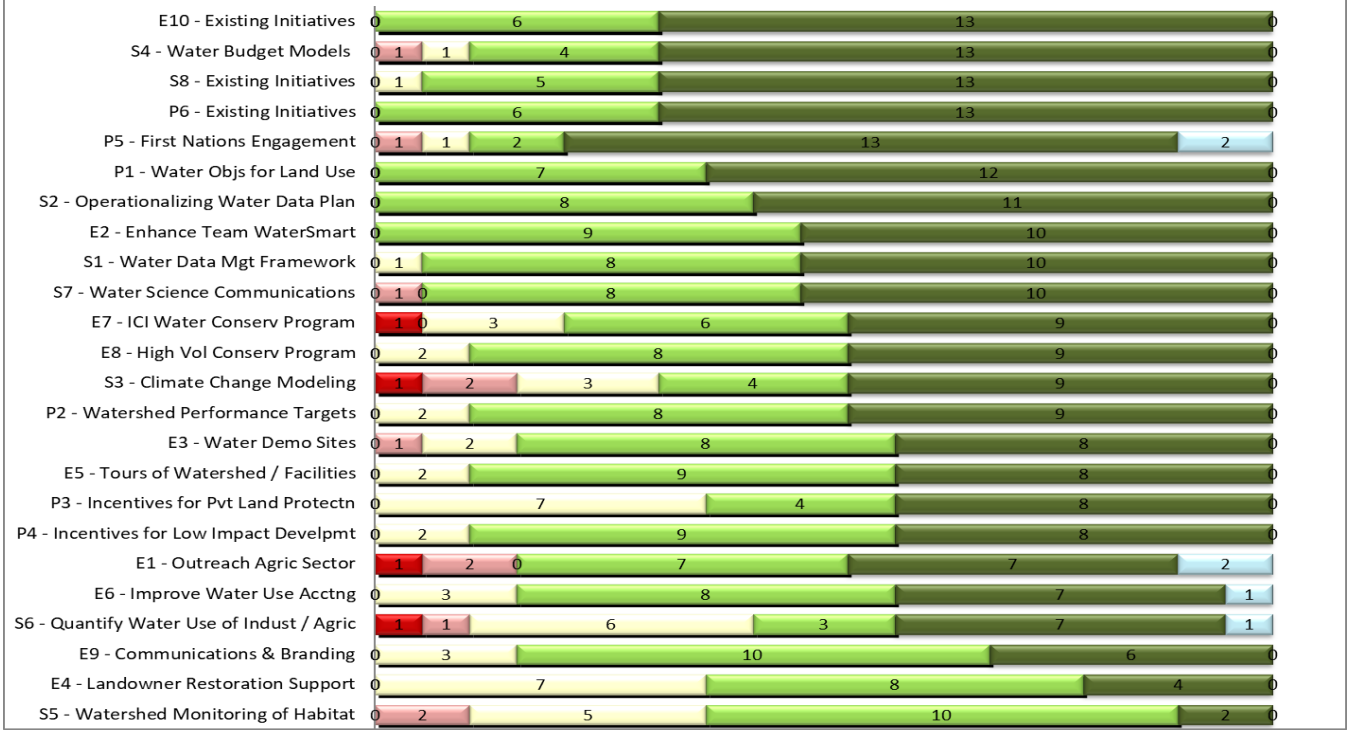
Strongly support	I love it and believe it should definitely be in an updated plan
Support	There are some things about the initiative I am not keen on, but on balance I am in favour of this initiative for the updated plan
Neutral (or indifferent)	I do not have strong opinions either for or against this initiative being included in an updated plan
Oppose	I am not in support of this initiative; on balance the cons outweigh the pros and I would not include this in an updated plan
Strongly Oppose	I have serious reservations for including the initiative in the plan at this time
No comment (Abstain)	I do not feel like I have the information or expertise to comment on this initiative

The following two graphs summarize the results. The first graph shows the level of support according thematic area and initiative number. The second graph prioritizes the key initiatives based on the number of "Strongly Supported" initiatives by PAG members.

Graph 1: Key Initiative - PAG Degree of Support Survey Results



Graph 2: Key Initiatives - Prioritized by # of PAG Strongly Supported



4.4 Summary of Key Findings from Workshop 2

Feedback from participants at the end of the second workshop indicated that people were quite satisfied with the process and felt that significant progress towards an updated Action Plan had been attained. A summary of key findings from the session includes the following highlights:

- There appears to be nearly universal support for scaling the program up in the future, subject to availability of resources. Key drivers include the imperatives imposed by climate change and ongoing growth in the region.
- There is also universal support for continuing education initiatives such as Team WaterSmart. However, there is some disagreement concerning how the program should be structured in the future. Some favour an approach much like the status quo. Others favour a more targeted or strategic approach that would take greater aim at specific groups of water users.
- There is very strong support for progressively operationalizing data for decision making, made possible by building on data collection and analysis completed in the first 10 years. However, there is also acute awareness that linking the science to planning will be technically demanding and will require extensive inter-departmental collaboration.
- Everyone understands that climate change will be a major driver going forward. There is strong support for continuing aspects of the science and monitoring program that are already performing well such as water budget modelling and watershed monitoring. However, there is not a strong consensus around what new initiatives should be introduced under the science theme, such as climate modelling or expanding the range of watershed monitoring parameters.
- Generally, there is there was strong support for continuing to push the program increasingly into promoting integrating water management with land-use planning and policy, protecting natural assets, and green infrastructure. For example, everyone seems to agree that the DWWP Program should offer active support to several forthcoming planning processes in the region, including updates to Official Community Plans and the Regional Growth Strategy. Similarly, there is agreement that the DWWP Program will continue to have a role in implementing commitments under the Liquid Waste Management Plan around rainwater management.
- It was reiterated many times that strong collaboration between departments within RDN and across other governments and agencies such as local governments, First Nations, the Islands Trust, industry and the Province will be key essential to success. It was evident that several member agencies also view the RDN as serving an important role of coordinator of both the entities and the activities related to water management in the region. The continued importance of RDN being cognizant of appropriate jurisdictional roles when working with the Province, member municipalities, and others was also expressed.

5. Conclusion and Next Steps

Consistent with findings from the 2018 program review, participants in the SDM workshop appear to remain very supportive of the DWWP Program and are optimistic about its future under a refreshed Action Plan. Members of the Technical Advisory Committee indicated interest in a continued role of advising the RDN on implementation of the updated DWWP Action Plan.

As climate change and other developments continue to impact water resources in the region, it will be important to maintain a flexible approach to administration of the DWWP Program going forward. Several participants spoke to the need for regular review of the plan and suggested that a 10 year timeframe need not necessarily be rigid or binding. There was consensus that this adaptive element should be explicitly addressed in the updated plan.

Perhaps the most recurrent theme throughout the process was the need for continued collaboration across RDN departments and with external agencies and governments. Fortunately, as the positive outcomes from this process illustrate, there remains a healthy appetite among stakeholders to carrying existing strong partnerships through the next planning period.

In the near term, there are several remaining steps in the development of an updated Action Plan that will be shaped by the input provided by the PAG over the course of the two structured decision-making workshops summarized in this report, as outlined below.

- Between July and September, 2019, the list of key initiatives discussed during Workshop #2 will be refined and expanded according to the PAG input received. Along with progress indicators to measure success and preliminary budget figures, these will form the basis of a draft updated Action Plan prepared by RDN staff.
- In September and October, 2019 stakeholders and the public will have an opportunity to review and provide feedback on the draft updated Action Plan.
- In November, 2019 and following consideration of public and stakeholder input, the draft updated Action Plan will be presented to the RDN Board for discussion and feedback.
- In December, 2019 it is anticipated that the draft updated DWWP Action Plan will be approved by the RDN Board.

Summary Report Appendix Package

Planning Advisory Group Structured Decision-Making Workshops

Updating the Drinking Water and Watershed Protection Action Plan

Prepared for

Regional District of Nanaimo

Prepared by

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Date

July 9th, 2019

This appendix package is a companion document to the main document entitled *Summary Report: Public Advisory Group Structured Decision-Making Workshops* (9 July 2019)

Summary Report Appendix Package

Public Advisory Group Structured Decision-Making Workshops

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Appendix A: Structured Decision Making Workshop 1 Pre Reading Package

Pre-Reading Package – Planning Advisory Group – SDM Workshop 1

This pre-reading package serves as a primer to prepare you with needed background information in the lead up to our first (of two) SDM Workshop on May 16th, 2019. Please ensure you have taken the time to become familiar with the information and context contained within this pre-reading package, as it will serve as the basis for our discussions and guidance we will be seeking from you towards an updated Action Plan for the District's Drinking Water and Watershed Protection Program for the coming ten years (2020 to 2030+). For example, you will be asked to rank and weigh how much you like or dislike a series of illustrative "mock" portfolios (bundles of grouped and themed based actions); and, being familiar with the material in this package will greatly facilitate your input.

The upcoming workshop builds on the joint TAC and Board Steering Committee meeting held on April 25th, 2019 and the Interdepartmental Working Group (IWG) meeting held on April 17th where participants discussed ideas on new and revised goals, objectives and possible actions for consideration in an updated DWWP Action Plan.

Participants to the upcoming workshop(s) include the DWWP Technical Advisory Committee (TAC), DWWP Board Steering Committee (BSC), and representatives from RDN's IWG. Workshop participants will simply be referred to as a Planning Advisory Group (PAG) for the remainder of this pre-reading package. The advisory planning process consists of two workshops and follows a structured decision making (SDM) approach for the identification, assessment, and exploration of key elements in an updated Action Plan. For more information about SDM, please refer to a website dedicated to SDM.

The SDM workshops are being supported and facilitated by a consulting team of Compass Resource Management and Econics. This pre-reading package is organized into the following sections:

If you have any questions, please feel free to contact us.

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1 Workshop Details

1.1 Workshop Time and Location

Date: (Thursday) May 16th – **9:00am** to **4:00 pm**
Location: Administration Office, 6300 Hammond Bay Rd, North Nanaimo
Room: Board Chambers, First Floor

1.2 Draft Workshop Objectives

The following draft objectives have been proposed for the workshop:

- To review and provide an update on the overall planning process (including feedback received to date)
- To review and discuss a preliminary set of evaluation criteria to be used
- To review and assess a preliminary set of "mock" portfolios (groups of bundled actions)
- To build and agree to new "portfolios" to be evaluated at SDM Workshop 2 (June 20)
- To review the next steps of the planning process

1.3 Draft Workshop Agenda

9:00am	**Welcome and Introductions** • Agenda and Meeting Objectives • Planning context (original purpose, key issues, 10yr update, etc.) • Update and overview of SDM workshops • Roles and responsibilities	RDN Compass
9:30am	**Objectives & Evaluation Criteria** • Update on Goals and Objectives • Review a preliminary list of evaluation criteria (constructed scales)	Compass
10:00am	**"Mock" Portfolios - Overview** • Purpose of "Mock" Portfolios • Overview of "Mock" Portfolios	Econics
11:00am	**Break** – *15mins*	
11:15am	**"Mock Portfolios" - Assessing their Performance** • Facilitated discussion • Values-based ranking exercise	Compass / Econics
12:15pm	**Lunch** *(Provided) – 60mins*	
1:15pm	**"Mock Portfolios" – Building Support** • Detailed review of ranking exercise • Review and discussion of emerging and preferred portfolio(s) • Building improved portfolios (for SDM Workshop 2)	Compass / Econics
2:45pm	**Break** – *15mins*	
3:00pm	**"Portfolios" for SDM Workshop 2** • Review and agree to a shortlist of "Portfolios" for review and assessment at SDM Workshop 2 (June 20)	Compass / Econics
3:45pm	**Next Steps** • Actions and preparations for the June SDM Workshop 2	Compass
4:00pm	**Adjourn**	Compass

2 Workshop Overview

The SDM workshops will follow a structured approach[1] for the identification and exploration of different packages of possible actions (we refer to these as "Portfolios") with an aim of reaching agreement on a recommended package of actions for consideration by RDN in their updated DWWP Action Plan (2020-2030+). A key role for the PAG will be to explore the trade-offs and aim to reach agreement on a recommended package of actions that balance the competing financial, environmental, and social interests inherent with program like DWWP. This is no small task given the reality that it is not just the right composition of actions, but also the right scale of effort (resources and time) that should be allocated towards any single or group of actions.

The goal of the consulting team will be to keep the information needed to weigh the trade-offs at the appropriate level recognizing that there is a near infinite combination of different actions and activities that could be considered. The focus we will be striving for is to keep the deliberations of the PAG at a strategic level in order to not wade unnecessarily deep into the weeds; and also in recognition that many PAG members will continue to play a key advisory role during the more detailed delivery and implementation of the updated action plan moving forward *(and when weed-wading will be necessary!)*.

The last thing we want to emphasize is that the SDM workshops are designed to be iterative and adaptive. Learning is a critical part built into these workshops and this will be facilitated through one or more rounds of different portfolios being developed and collectively assessed.

The remainder of this pre-reading package will be centered on a number of "mock" portfolios that have been developed along with a preliminary set of evaluation criteria to help in the assessment of the how well the "mock" portfolios are performing.

[1] Structured Decision Making (SDM) is centred on a set of core steps that serve as a guide for working through a planning process. These steps are supported by structuring tools and methods that help groups deal with the complexities of technically intensive decisions and multi-dimensional and value based issues.

3 "Mock" Portfolios

As mentioned, we have developed some illustrative or "Mock" portfolios to expedite the process of reviewing potential new and existing actions in an updated draft plan. The "Mock" portfolios have been developed based on themes or **strategies*** consisting of logical groupings of different actions (and key initiatives). At this point, **the purpose of the "mock" portfolios is to provide contrast and differentiation for what a future draft Action Plan could look like**; none of the portfolios are expected to be the right one! The portfolios are expected to be good enough, however, to elicit clear direction from PAG members to:

a) Mix and match different **combinations of actions** towards new portfolios to be developed and reviewed;
b) Explore different **strategy areas** or combinations (e.g., conservation, climate resilience, watershed protection, etc.) that the program should be focused on;
c) Assess the **appropriate scale of effort** (e.g., time and resources) for the program to be geared towards;
d) Evaluate the allocation of effort between the program's **core thematic areas** of Theme 1: Education & Outreach; Theme 2: Science & Data Collection, and Theme 3: Planning and Policy (plus the proposed overarching theme of Collaboration].

In other words, the assessment and discussion of the "Mock" portfolios serves as a prop for us to seek targeted input and direction to build better and more acceptable portfolios for discussion at SDM Workshop 2.

The development and identification of the key initiatives (actions) within the "mock" portfolios were based on:

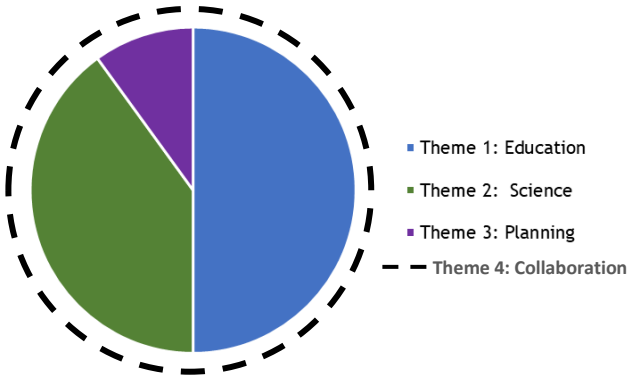
(i) preliminary ideas generated at the April 24 TAC/BSC meeting;
(ii) input from RDN's Inter-Departmental Working Group (IWG) held on April 17, 2019;
(iii) feedback on the RDN's DWWP during the Parksville Watershed Symposium held on April 4, 2019;
(iv) input received so far through RDN's on-line DWWP survey (up to April 29); and
(v) findings from the 10 Year DWWP Action Plan Implementation Review carried out by Econics (Sep 2018).

The **level of effort and scale** of the "Mock" portfolios vary relative to the existing program (Status Quo Portfolio 1). Accordingly, we have used the scale of the existing program as a reference point for the "Mock" portfolios (Note. The current program is associated with a parcel tax of up to $8 across the region, plus planned increases in 2022 and 2025, plus all the in-kind support from the various parties involved). We scaled the "Mock" portfolios either up or down – *relative to the SQ Portfolio 1* – based on an informed **"guess"** for what it would take to implement the highlighted key initiatives in a modest way consistent with the initial intent of the **strategies**. As we discuss these portfolios, the scale and costs of any one portfolio could be adjusted up or down as needed.

*** Strategies** selected for the "Mock" portfolios consisted of an emphasis of actions/key initiatives towards either Water Conservation (Portfolio 2), Climate Resilience (Portfolio 3), Watershed Protection (Portfolio 4), and a down scaled portfolio (Portfolio 5) based off of the current program.

The remainder of this section summarizes the "mock" portfolios in greater detail, which includes pie charts providing a relative sense of the scale of effort (i.e., size of the pies) and the allocation of effort across the main thematic areas of education, science and planning (i.e., size of the slices).

Portfolio 1: Status Quo



Allocation of Effort – Portfolio 1 (Status Quo)

- This portfolio describes a future DWWP program that mirrors recent actual implementation in terms of **maintaining the overall resource level**, and distribution of effort between the three thematic areas of education, science, planning & policy.
- The program currently expends about half of its effort on education and outreach. This includes funds for water stewardship incentive and rebate programs, which require direct cash outlay to residents, as well as RDN's direct expenditure on Team WaterSmart outreach.
- About 40% of effort goes towards science and monitoring. This includes direct expenditure by RDN, for example to support field work and data collection, funding of third party analysis, and information systems. It also includes a portion of the many in-kind contributions from other agencies and organizations that can be directly attributed to the program.
- Effort on planning and policy has been relatively less than the other two themes to date, at about 10% of the total. This includes studies and projects to support planning processes and to influence Provincial legislation and policy. Effort is primarily in the form of RDN staff time (including by Strategic and Community Development Services) and some funding for expert third party studies and projects.

Considerations

- The success of the first DWWP Action Plan was enabled in part through extensive relationship and capacity building with partners and community members to extend the reach of available funds.

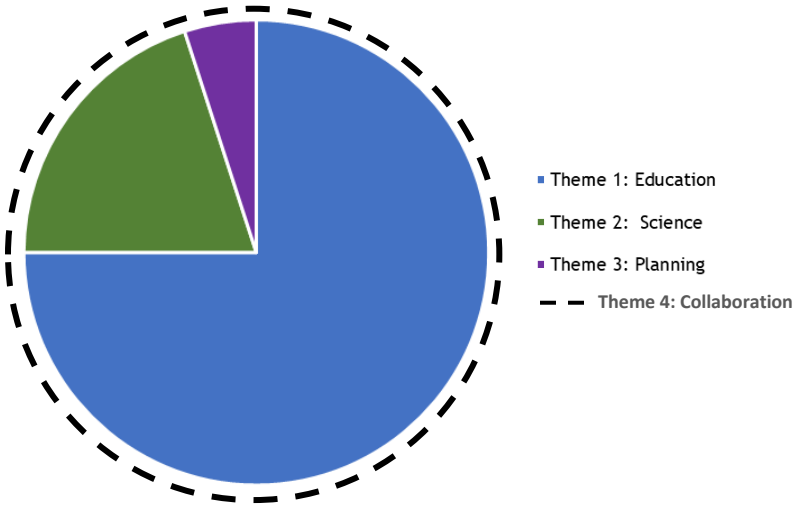
Illustrative Examples of Past Key Initiatives:[2]

- Completed Phase 1 of the Regional Water Budget project (2013).
- Established Community Watershed Monitoring Network (2011).
- Climate and Hydrometric Monitoring Network Scoping Study (2015).
- Team WaterSmart program and water stewardship rebates.
- Rainwater Harvesting Best Practices Guidebook (2012).
- Technical review of aquifer characteristics in Area H to support OCP.
- Submissions to Water Sustainability Act development (2013-2015).

[2] See Econics (2018) for a comprehensive inventory of DWWP Program achievements since 2009.

Portfolio 2: Conservation Plus

- Program effort reflects a dramatic increase in investment in water conservation programs, enabled primarily through enhanced and more focused public education.
- Analysis of water use by sector and area enables efficiency targets to be set and informs the selection of appropriate strategies to target high water users/uses or those with the most potential for efficiency.
- In addition to better integrating RDN's land-use planning with water availability, some planning & policy actions (e.g. conservation-oriented water pricing, advanced system loss management) are directed to all water service providers in the region, such as conservation-oriented water pricing or advanced system loss management.



Allocation of Effort – Portfolio 2 (Conservation Plus)

Considerations

- While actions would be directed at water users and water service providers to achieve more sustainable levels of consumption, aquatic ecosystems would benefit from reduced use of surface water and hydraulically connected groundwater.
- Outside of the water systems managed by RDN, success will depend on the participation of other purveyors in the region and effective engagement with individual residents using private water sources.

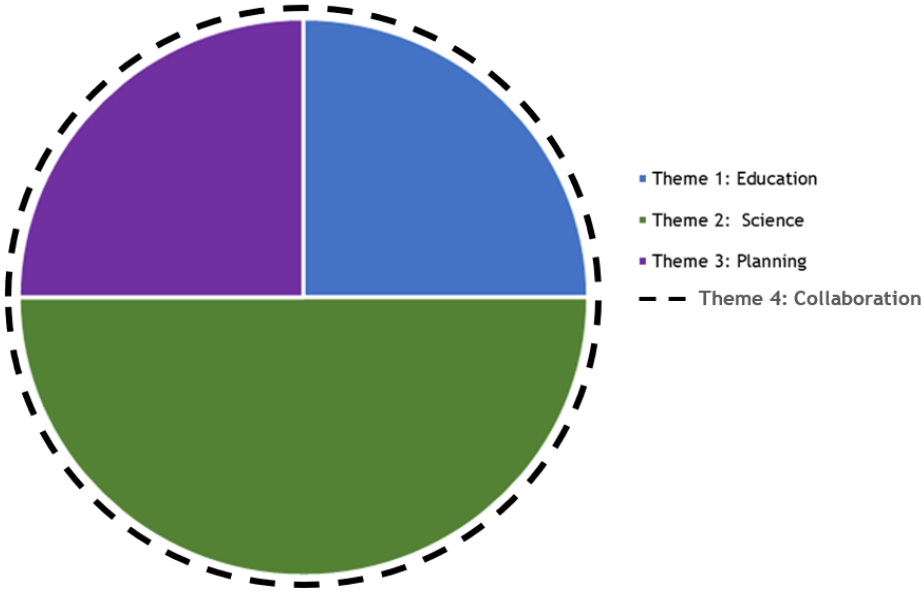
Comparison to Status Quo Portfolio

- **Overall program effort doubles**, with corresponding RDN budget lift requirements.
- Education program funding triples to account for 75% of total effort.
  Science and planning effort are maintained at status quo levels in absolute amounts. Their relative proportions of total program shrink to 20% and 5% respectively.

Potential Initiatives

- Water use analysis in community water systems to identify high water users and sectors (including studies to characterize water use by sector in unmetered areas).
- Develop a region-wide water conservation plan with aggressive, quantified demand reduction targets.
- Incentives and education to convert landscapes to rain gardens to reduce water use and impacts from road drainage.
- Targeted outreach to high-volume water users and sectors (e.g. agriculture).
- Free home visits to help with rainwater management – e.g. drainage, storage.
- Demonstration facility(s) to showcase water sustainable technology and projects (e.g., at RDN parks or in partnership with developers).

Portfolio 3: Climate Change Resilience



Allocation of Effort - Portfolio 3 (Climate Resilience)

- Program effort both grow and shift to focus primarily on preparing the region for the anticipated climate change impacts of longer dry periods, reduced snow pack, warmer temperatures, and more intense precipitation events.
- Science, planning, and education efforts emphasize increasing the resilience of people and water systems to cope with water scarcity, and preparedness for droughts and floods.
- The outcomes of downscaled climate modelling direct planning and science activities to high risk geographic areas and those most likely to build resilience to climate change impacts.

Considerations

- Effort directed to understanding and monitoring water quality is greatly reduced (excluding that conducted on drinking water sources and Province-led monitoring).
- Consideration of aquatic ecosystem health is de-prioritized and relies mostly on the Province's capacity, in order to focus available RDN effort on water security and public safety for the region's residents.

Comparison to Status Quo Portfolio

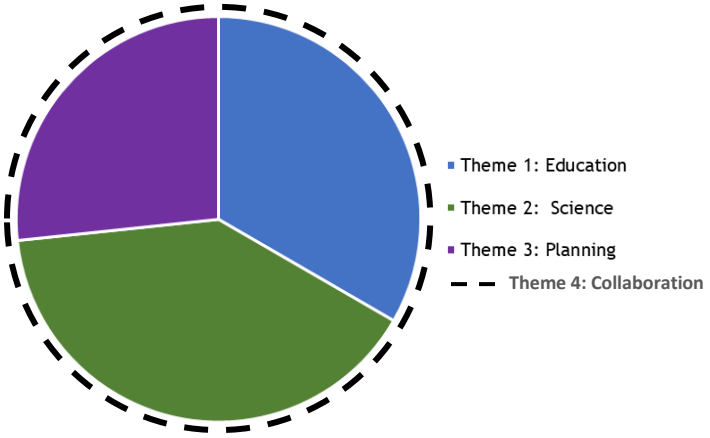
- **Overall program effort triples**, with corresponding RDN budget lift requirements.
- With a narrower focus, education program funding increases by 50% and accounts for 25% of total effort in an expanded program; science program increases by almost four-fold accounting for 50% of the expanded program; and planning & policy increases by just over seven-fold and accounts for the other 25%.

Potential Initiatives

- Use climate change modelling to identify higher risk areas in terms of surface and groundwater shortages.
- Develop watershed-scale drought response plans.
- Expand drought monitoring & communication protocols with the Province.
- Introduce planning restrictions in areas prone to low flow and drought.
- Increase water storage capacity at the individual and water system scales through planning requirements and infrastructure investments.
- Address barriers to using rainwater to support individual household water needs.
- Designate groundwater recharge areas through planning and monitor recharge areas.
- Refocus education on water efficiency & drought/flood preparedness.
- Explore impacts of changing forest composition on water quantity & quality.

Portfolio 4: Watershed and Aquatic Ecosystem Protection

- Program effort would shift focus to science and planning to boost protection of aquatic ecosystems through integrated watershed management.
- Program activities reflect a desire to manage water to serve a variety of values and encompass water quality, water quantity, and aquatic ecosystems considerations.
- Watersheds are the unit of planning and administration.



Allocation of Effort – Portfolio 4 (Watershed Protection)

Considerations

- In contrast to other non-status quo portfolios, human needs for water are not elevated above environmental needs.
- Considerable collaboration with other entities (the Province, property owners, water users, industry), and integration with land-use planning is required to realize success.

Comparison to Status Quo Portfolio

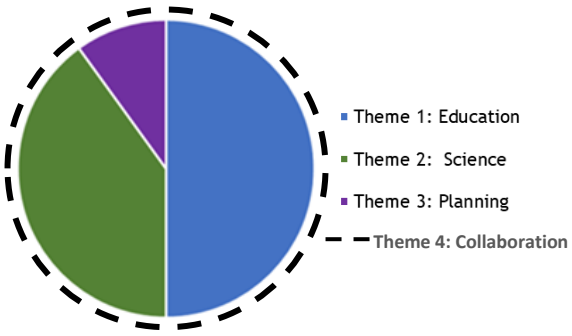
- **Overall program effort grows by 50%,** with corresponding RDN budget lift requirements. Partner agencies are asked to increase effort correspondingly.
- Planning effort quadruples to account for just over 25% of the total. Science effort grows by 50% to account for 40% of the total. Education is maintained at status quo levels in absolute amount and would account for about a third of the new total.

Potential Initiatives

- Calculate environmental flow needs for each major river.
- Establish watershed-based "carrying capacity" thresholds to manage water for competing uses through planning and regulations.
- Introduce a macrobenthic invertebrate monitoring program to serve as an indicator of watershed health over time.
- Use data and modelling to identify higher risk areas for special development permits and land-use planning measures based on water quality or quantity considerations.
- Conduct studies to determine if hydraulic connectivity between surface and groundwater exists for ecologically important watersheds.
- Require/incentivize new developments to incorporate green infrastructure to increase groundwater recharge and reduce impacts on receiving surface waters.
- Protect riparian health and natural assets on private property through incentive-based policy and regulation.
- Establish watershed performance targets to mitigate the impact of land development (e.g., LWMP).
- Better coordinate messaging with RDN's Emergency Services (FireSmart), Waste Water (Rain as a Resource) and Parks (e.g., natural landscaping).

Portfolio 5: 25% Smaller

- This portfolio decreases total effort by about 25%.
- Proportional allocation of effort is unchanged from Portfolio 1 (status quo). In other words, less is be done under each theme, but the relative amount of work under each is the same.



Allocation of Effort – Portfolio 6 (25% Smaller)

Considerations

- RDN's capacity to support the relationships and partnerships used to leverage DWWP funds during its first decade may be undermined by a program budget cut.
- Partner agencies may choose to reduce or increase their commitments to the program at their own discretion.

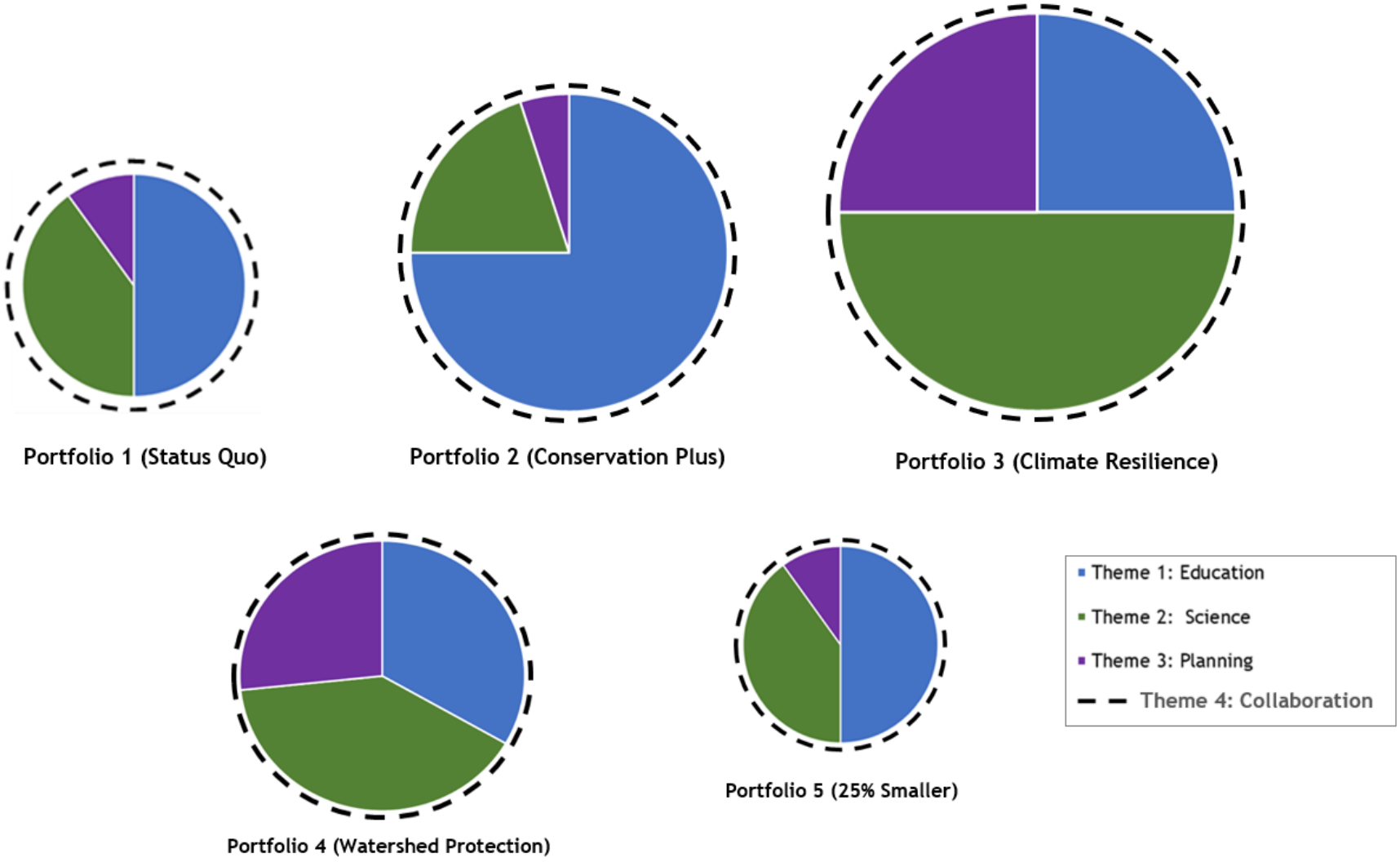
Comparison to Status Quo Portfolio

- **Overall effort decreases by 25%.**
- Allocation of effort is comparable to the status quo (50% education, 40% science, 10% planning).

Potential Initiatives

- With an across-the-board cut of resources, RDN and partners would have to make strategic choices about what programs to discontinue or scale back, or they would have to find ways to increase efficiency. Some of the various potential new projects listed under Portfolios 2,3 and 4 might be initiated, but this would likely entail cuts elsewhere.

Summary of Thematic Focus and Relative Effort across the "Mock" Portfolios



4 Preliminary Evaluation Criteria

In order to better compare and assess the "mock" portfolios, we have proposed some draft evaluation criteria. These preliminary evaluation criteria are incomplete and inadequate, but we believe they will be a helpful starting point to begin to discuss which "mock" portfolios are performing better (or worse) from your perspective (and WHY?). Accordingly, we intend to update and revise these early indicators of performance and also to use them to understand what else is important when comparing across the portfolios.

We also want to underscore that no modeling will be carried out in estimating the consequences of the portfolios using these evaluation criteria (as summarized in Section 5). We relied on our judgement and used qualitative scoring as described later in this section (i.e., based on a 5-point constructed scale for most criteria). Accordingly, these criteria are not anticipated to be particularly precise and we expect a healthy dose of scepticism when we get to reviewing the results (and some debate on scores for some of the portfolios as either too high or low from your perspective). All this to say that is okay and the POINT HERE is to have a targeted and structured conversation about the performance of the portfolios, and it has been our experience that preliminary (and imperfect) evaluation criteria can be very helpful to expedite people's opinions and preferences towards finding more common ground on group committees like this.

The preliminary evaluation criteria was based on trying to measure the fundamental outcomes for what the program was originally intended to achieve. A review of the current program led us to interpret those outcomes as follows (in no particular order of priority):

- Increasing water use efficiency in communities to avoid costs of expanding water supply infrastructure;
- Reducing costs to RDN ratepayers;
- Protecting ecological values in the watersheds;
- Protecting other social and recreation values in the region;
- Improving the quality of water resources information.

In addition to these desired outcomes, there are some other inferred outcomes that may be important when considering portfolios related to fairness and equity; and public awareness and stewardship of drinking water resources and watersheds. Secondary evaluation criteria could also be introduced later when we are narrowing in on one or more preferred portfolios, if there are differences with implementing the portfolios/key initiatives (e.g., ease of implementation, degree of RDN control over outcomes, likelihood of receiving supporting in-kind or financial contributions from external agencies/partners, alignment with RDN policies and strategic priorities, etc.).

The following table summarizes our shortlist of preliminary evaluation criteria that we used to assess the "mock" portfolios in the next section. Again, we can add, revise and/or delete these criteria if they are not aiding your assessment of the portfolios and we will discuss this during the upcoming workshops.

Pre-Reading Package – SDM Workshop 1 – Planning Advisory Group

Area	Prelim Evaluation Criteria	Description / Comments
Water Use Efficiency	1. Annual Water Demand	• This represents potential estimated reductions in average daily per capita water use relative to status quo (SQ) Note Other evaluation criteria could be added to this area: for example, if there were expected to be meaningful differences between the portfolios related to maximum daily demand or sector specific water demand reductions, etc.
Financial	2. Costs to RDN Ratepayers / Annual Parcel Tax	• This represents direct costs to RDN to manage and deliver the DWWP Program (capital costs, staff time, expenses, etc.) Note Other cost criteria could be added to this area: for example, related to household / sector costs that may be required, costs to provincial government, property / parcel tax incentives, etc.
	3. Future costs reduced / deferred	• This represents potential costs savings or deferrals of expenditures by RDN (e.g., deferred capital infrastructure upgrades)
Environment	4. Environmental Flow Needs	• The represents potential increasing protection to better meet environmental flow needs
	5. Ecosystems	• This represents potential benefits to aquatic or terrestrial ecosystems that is not otherwise already covered off by EFN criteria above (e.g., riparian and wetland areas)
	6. Resilience to Climate Change	• This represents the capacity of people and communities to withstand the impacts to climate change ("resilience")
Other (non-market)	7. Fairness and Equity	• To represent any distributional effects in how the program is delivered between users / areas (rural/urban, sectors, sub-areas, etc.)
	8. Recreation Opportunities	• To represent any differences between portfolios related to water-based recreation, wildlife viewing, aesthetic considerations, etc.
Knowledge & Awareness	9. Quality of Water Resources Information	• To represent our understanding of water availability, resources (aquifers), and water use (e.g. water budgeting), etc.
	10. Understanding (and addressing) risks to water resources	• To represent our understanding of risks to address land use, climate change, etc., effects; and, as evidenced by operationalizing data in land use policy and planning
	11. Public Awareness & Stewardship of DW resources and Watersheds	• To represent the degree of public awareness and community involvement in stewardship of drinking water resources and watersheds (e.g., education events, stewardship opportunities, etc.)

The scoring legend we used for the preliminary evaluation criteria is summarized in the following table.

Please note that for the most part we used a 5 point constructed scale where the directionality was always the same: the lower the number, the better. Accordingly, the best performance was represented by a score of "1" and the worst score was always a "5". And in most cases, the scoring of the portfolios was relative to the Status Quo Portfolio 1.

5-Point Constructed Scale Legend

Evaluation Criteria	BEST				WORST
	1	2	3	4	5
Annual Water Demand	Greater than a 50% reduction	Up to 50% reduction from SQ	Up to 25% reduction from SQ	No change from SQ	Increase in Water Demand above Status Quo
Costs to RDN Ratepayers	25% less than current ($6/parcel)	Current ($8/parcel)	150% x current ($12/parcel)	200% current ($16/parcel)	300% current ($24/parcel)
Future costs reduced / deferred	Non-negligible cost reduction/deferment certain	Reasonable likelihood of some non-neglible cost reduction/deferment	Possible reduction/deferment of minor costs	No Change from SQ	Contributes to higher future costs
Environmental Flow Needs	Strong Protection (relative to current)	Moderate	Low-Moderate	No Change from SQ	Weaker Protection
Ecosystems	Strong Protection (relative to current)	Moderate	Low-Moderate	No Change from SQ	Weaker Protection
Resilience to Climate Change	Much greater capacity to withstand impacts ('resilient')	Moderate increase in capacity to withstand impacts	Slightly increased capacity to withstand impacts	No Change from SQ	Reduced capacity to withstand impacts
Fairness / Equity	Completely equal across sectors / areas	Slightly Unfair	Moderately Unfair (1 or 2 areas/sectors more impacted)	Mod-Highly Unfair (>2 areas/sectors more impacted)	Extremely Unfair (inequities are widespread)
Recreation Opportunities	Opportunities Significantly Enhanced	Opportunities Slightly Enhanced (as per SQ)	Opportunities Maintained (as per SQ)	Slight Decrease in Opportunities	Notable Decrease
Quality of Water Resources Information	Excellent	Much better	Slightly better	No Change from SQ	Worse than SQ
Understanding / Addressing Risks	Excellent	Much better	Slightly better	No Change from SQ	Worse than SQ
Public Awareness & Stewardship	Excellent	Much better	Slightly better	No Change from SQ	Worse than SQ

5 Assessing the "Mock" Portfolios

Based on the preliminary evaluation criteria summarized in the previous section, we made a first attempt at estimating the performance of the portfolios. This was a subjective exercise and we recognize somewhat imperfect, as it depends on a number of conditionalizing assumptions and details still not defined in the portfolios at this point. During the workshop, we can adjust this preliminary assessment as needed. With these caveats in mind, the following consequence table is provided as a summary of our preliminary assessment using the evaluation criteria.

Prelim Evaluation Criteria	"Mock" Portfolios				
	Portfolio 1 (Status Quo)	**Portfolio 2 (Conservation Plus)**	**Portfolio 3 (Climate Change Resilience)**	**Portfolio 4 (Aquatic Ecosystem & Watershed Protection)**	**Portfolio 5 (25% smaller)**
Annual Water Demand	**4** No change from SQ	**2** Up to 50% reduction from SQ	**3** Up to 25% reduction from SQ	**4** No change from SQ	**4** No change from SQ
Costs to RDN Ratepayers	**2** Current ($8/parcel)	**4** 200% current ($16/parcel)	**5** 300% current ($24/parcel)	**3** 150% x current ($12/parcel)	**1** 25% less than current ($6/parcel)
Future costs reduced/defered	**4** No Change from SQ	**2** Reasonable likelihood of some cost reduction/deferment	**1** Non-negligible cost reduction/deferment certain	3 Possible reduction/deferment of minor costs	**4** No Change from SQ
Environmental Flow Needs	**4** No Change from SQ	**2** Moderate	3 Low-Moderate	**1** Strong Protection (relative to current)	**5** Weaker Protection
Ecosystems	**4** No Change from SQ	**3** Low-Moderate	**5** Weaker Protection	**1** Strong Protection (relative to current)	**5** Weaker Protection
Climate Change Resilient People & Communities	**4** No Change from SQ	**2** Moderate increase in capacity to withstand impacts	**1** Much greater capacity to withstand impacts	**3** Slightly increased capacity to withstand impacts	**5** Reduced capacity to withstand impacts
Fairness / Equity	**2** Slightly Unfair	**4** Mod-Highly Unfair (>2 areas/sectors more impacted)	**3** Moderately Unfair (1 or 2 areas/sectors more impacted)	**2** Slightly Unfair	**2** Slightly Unfair
Recreation Opportunities	**3** Opptys Maintained (as per SQ)	**2** Opptys Slightly Enhanced (as per SQ)	**4** Slight Decrease in Opptys	**2** Opptys Slightly Enhanced (as per SQ)	**3** Opptys Maintained (as per SQ)
Quality of Water Resources Information	**4** No Change from SQ	**3** Slightly better	**1** Excellent	**3** Slightly better	**5** Worse than SQ
Understanding / Addressing Risks	**4** No Change from SQ	**3** Slightly better	**2** Much better	**3** Slightly better	**5** Worse than SQ
Public Awareness & Stewardship	**4** No Change from SQ	**2** Much better	**2** Much better	**3** Slightly better	**5** Worse than SQ

Pre-Reading Package – Planning Advisory Group – SDM Workshop 1

The following table is colour-coded to allow easier comparison between the "mock" portfolios. The blue column is the reference portfolio (in this case, Portfolio 1 – Status Quo) and shows the performance of all the other portfolios relative to the highlighted reference portfolio. If an adjacent cell is highlighted green, it indicates that that portfolio performs better for that evaluation criteria relative to the reference portfolio (i.e., P1). If an adjacent cell is highlighted red, it indicates that that portfolio performs worse for that criteria relative to the reference alternative. And finally, if an adjacent cell is not shaded, it indicates that portfolio performs more or less the same relative to the reference portfolio for that criteria. The table therefore more easily identifies the fundamental trade-offs that are important when comparing between the portfolios. We will explore this table in much more detail during the workshop.

Objective	Units	Dir	P1 - Status Quo	P2 - Conservtn	P3 - Climate	P4 - Watershed	P5 - 25%Smaller
Water Use Efficiency							
Annual Water Demand	Scale (1-5)	L	4	2	3	4	4
Financial							
Costs to RDN Ratepayers	Annual Parcel Tax ($)	L	8	16	24	12	6
Future Costs Reduced / Deferred	Scale (1-5)	L	4	2	1	3	4
Environment							
Environ Flow Needs	Scale (1-5)	L	4	2	3	1	5
Ecosystems (other)	Scale (1-5)	L	4	3	5	1	5
Resilience to CC	Scale (1-5)	L	4	2	1	3	5
Other							
Fairness & Equity	Scale (1-5)	L	2	4	3	2	2
Recreation Opportunities	Scale (1-5)	L	3	2	4	2	3
Knowledge & Awareness							
Quality of Water Resources Info	Scale (1-5)	L	4	3	1	3	5
Understanding Risks	Scale (1-5)	L	4	3	2	3	5
Public Awareness / Stewardship	Scale (1-5)	L	4	2	2	3	5

Appendix B: Structured Decision Making Workshop 2 Pre Reading Package

Pre-Reading Package – Planning Advisory Group – SDM Workshop 2

This pre-reading package serves as a primer to prepare you with needed background information in the lead up to the second (of two) SDM Workshop on June 20th, 2019. Please ensure you have taken the time to become familiar with the information and context contained within this pre-reading package, as it will serve as the basis for our discussions on key elements for the updated Action Plan of the District's Drinking Water and Watershed Protection Program for the coming ten years (2020 to 2030+). For example, towards the end of the workshop you will be asked to complete a survey indicating your level of support of a number of key actions / initiatives identified for an updated Action Plan.

The upcoming workshop builds on discussions and feedback received at SDM Workshop 1 held on May 16th; and through feedback sessions held earlier in the spring during a public symposium, on-line survey, and meetings held with the DWWP Technical Advisory Committee (TAC), DWWP Board Steering Committee (BSC), and RDN's Interdepartmental Working Group (IWG). [Note. Participants to the upcoming workshop are referred to as the Planning Advisory Group (PAG) and include representatives from the TAC, BSC, and the IWG.]

The SDM workshops are being supported and facilitated by a consulting team of Compass Resource Management and Econics. This pre-reading package is organized into the following sections:

If you have any questions, please feel free to contact us.

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1 Workshop Details

1.1 Workshop Time and Location

Date: (Thursday) June 20th – **9:00am** to **4:00 pm**
Location: Administration Office, 6300 Hammond Bay Rd, North Nanaimo
Room: Board Chambers, First Floor

1.2 Draft Workshop Objectives

The following draft objectives have been proposed for the workshop:

- To review and provide an update on the overall planning process (including on-line survey results)
- To review and discuss a draft vision, goals and objectives for the updated program
- To review and discuss a recommended set of key actions / initiatives
- To discuss and make recommendations on other core elements of an updated program
- To review the next steps of the planning process

1.3 Draft Workshop Agenda

9:00am	**Welcome and Introductions** • Agenda and meeting objectives • Process overview • SDM Workshop 1 recap	RDN Compass
9:30am	**Summary from On-Line Public Survey** • Key Themes – DWWP Objectives and Priorities • Ideas Generation – Review of Key Initiatives & Ideas for Action	RDN
10:00am	**A Draft Vision and Updated Goals & Objectives** • Draft Vision • Proposed Goals and Objectives • Discussion	Compass / RDN
10:45am	**Break** – *15mins*	
11:00am	**Proposed Key Initiatives** • Organization and selection • Overview and introduction of proposed key initiatives • Discussion	Econics
12:15pm	**Lunch** *(Provided) – 60mins*	
1:15pm	**Proposed Key Initiatives - Continued** • Detailed review (partners, linkages, costs, resources, indicators, etc.) • Aggregated package of key initiatives (scope & scale of updated program) • Discussion and recommendations • PAG's Degree of Support (i.e., short survey)	Econics / Compass
2:45pm	**Break** – *15mins*	
3:00pm	**Other Recommendations** • Other suggestions on core elements of an updated program? • Discussion	Compass / Econics
3:45pm	**Next Steps**	RDN

	• Review of next steps to an updated Action Plan (e.g., process timeline, TACs continuing role during implementation, key dates, etc.) • Other?	
4:00pm	**Adjourn**	Compass

2 Workshop Overview

The first SDM workshop held on May 16th, 2019 was centered on the review and assessment of a number of mock portfolios (i.e., packages of key initiatives and actions that were organized according to some illustrative themes). The feedback and direction from the workshop – *which included some recommended new portfolios* - was instrumental in the identification of key initiatives proposed for the updated Action Plan summarized later in this document. A review of the new portfolios proposed at the last workshop highlighted more similarities than differences and this led the consulting team to narrow our focus on specific initiatives and actions as the basis to discuss at SDM Workshop 2. Since that time, the consulting team has been working with RDN staff to further refine the key initiatives identified at the last workshop and to review and consider additional initiatives based on the most recent feedback received via the on-line public survey that closed at the end of May. In addition, the consulting team reviewed our growing list of potential key initiatives against the current program and the recommendations in Econics' 10-Year DWWP Program Review. In our proposed list of key initiatives to discuss at the upcoming workshop we have highlighted whether the key initiative is unchanged from the current program or whether it has been significantly altered or is an entirely new initiative. We have tried to also draw linkages between each key initiative with other RDN programs or activities and other partner organizations; and we have included more information in relation to costs, resources, lead agencies / partners, timelines, etc., and possible progress indicators where appropriate.

At our meeting therefore, the bulk of the time will be centered on reviewing and revising (and adding to) the preliminary list of key initiatives for consideration to RDN in their updated Action Plan. As a first step for our meeting, **we want to encourage everyone to review the preliminary list of proposed key initiatives and highlight any missing initiatives that you think would be important to include in an updated program.** Once we have an updated list of key initiatives, you will be asked to indicate your level of support for each key initiative through a short survey. This serves two purposes: 1) to get a better sense of the degree of support more broadly among and between TAC members, BSC members, and some IWG members; and 2) to provide a mechanism to help prioritize the implementation and scope of the initiatives should there be a requirement to scale back effort and resources, at some point, or to help with the sequencing of when key initiatives should be implemented over the ten year (+) timeline of the plan (all things being equal).

As well, we will return to the objectives for the updated program based on the discussions and feedback from the public symposium and on-line survey; and the review and revisions of the draft objectives presented at the April 25th TAC/BSC and April 17th IWG meetings. We said at the SDM Workshop 1 that we would ground-truth these objectives based on the evaluation of the mock portfolios (e.g., based on the evaluation criteria and key drivers

behind people's review of the mock portfolios) and the ensuing discussions. We did this and it revealed a couple of gaps, as the earlier discussed objectives were more specific to the thematic program areas rather than the overall program itself. Accordingly, this led the project team to think more broadly about the whole program and the need for overarching goals and objectives (summarized below). From this, it became evident that a Vision and Mission for the program would also be helpful.

3 A Draft Vision and Proposed Program Goals

3.1 Draft Vision and Mission

As mentioned, something that was missing from the original DWWP (2007) was an overarching vision statement and more specific mission for what RDN was aiming for. The following draft vision and mission is therefore proposed for the updated DWWP Action Plan to serve the program in the coming decade and beyond.

Proposed Draft Vision

"We will bring together key partners to collectively protect the health and resilience of our region's water resources"

Proposed Draft Mission for RDN

"We will integrate land use planning and water management to support water sustainability, climate resilience, and preservation / restoration of watershed health in the Region"

3.2 Proposed Draft Goals and Objectives

A number of draft goals and objectives are proposed to guide the program in the next phase of the DWWP. The goals speak more to the fundamental endpoints for what the program is trying to achieve whereas the proposed draft objectives are more specific to how the goals will be reached in relation to the thematic program areas (i.e., education & outreach, science & monitoring, policy & planning, collaboration). In short, the goals serve as the "ends" and the objectives are more the "means" by which the goals can be achieved.

The draft goals are new and have not been reviewed by the TAC, IWG, or BSC or public at this point. But they were informed by the discussions at past meetings and the feedback received from the public during the engagement and ideas generation phase.

The draft objectives were discussed in a fair bit of detail at the April meetings with the TAC and IWG. As a reminder, the starting point for the draft objectives were the original objectives in the DWWP Action Plan (2008).

At our upcoming workshop, we will have an opportunity to review and revise these goals one more time. Please take the time to review these and give thought to any needed changes or additions.

Proposed Goals for the Updated DWWP Action Plan (2019)

1. To protect ecosystems and the overall health of our watersheds and aquifers.
2. To increase water use efficiency and reduce costs to rate payers associated with water supply infrastructure (and adapting to anticipated climate change effects).
3. To support local economic development and protect property values through better land use planning.
4. To better protect social, cultural and recreation values and amenities in our watersheds and park areas (which are central to maintaining our well-being and quality of life).

Additionally - could add a specific climate change goal but this seems more of a "means": in other words, preparing for climate change is motivated with protecting the environment and/or reducing costs of climate change and adaption/mitigation, etc. Here is an example one to discuss during the workshop regardless.

- To mitigate and better prepare for anticipated climate change effects.

Proposed Objectives for the Updated DWWP Action Plan (2019)

Thematic Areas	Proposed Objectives
Education, Communications & Advocacy	□ To increase awareness and stewardship of the watersheds and drinking water resources across the region.
Water Science & Monitoring	□ To support high quality, reliable, long-term data collection and information networks about the status of the Region's water resources in terms of both quality and quantity.
Policy & Planning	□ To harmonize policies, plans, and programs towards more integrated land use planning and water management □ To identify and advocate for policy actions that will enable efficient water use, water quality protection and maintenance or restoration of watershed function.
Collaboration	□ To develop productive long-term collaborative partnerships across jurisdictions, sectors, departments and geographic areas to leverage resources to implement water initiatives and policies that foster the health of ecosystems and communities. □ To facilitate drinking water and watershed related activities, communications and resources amongst partners consistent with the Region's goals.

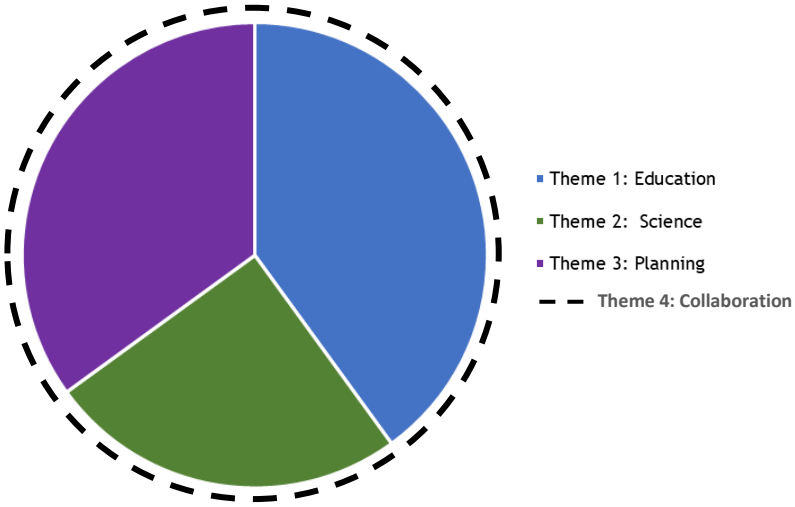
4 New Portfolio and the Proposed Key Initiatives

4.1 Overview

As mentioned previously, given the similarity of ideas for the development of new portfolios during the last SDM workshop, we are proposing only one portfolio at the upcoming workshop where we have focused on the details of specific key initiatives that have been highlighted in the process up to now. To give a better sense of the overall package of key initiatives, we have followed the same structure to summarize the aggregated key initiative in a new Portfolio. More details are provided about the key initiatives in the following section and there is a summary table further towards the end of the document for your reference.

4.2 Portfolio Summary

- This portfolio generally reflects our interpretation of the consensus from the May 16 SDM workshop for what the updated DWWP Program should look like in the future.
- Effort under the "Education" theme accounts for about 40% of the total compared to about 50% under the status quo. "Science" accounts for 25% of the total compared to about 40% under the status quo. "Planning" increases to 35% compared to about 10% under the status quo.
- Because total effort increases by about two and a half times over the current program, absolute effort under each theme increases compared to the status quo.



Allocation of Effort – New Portfolio

Education, Communications and Advocacy

- Under this portfolio, long running and successful initiatives such as Team WaterSmart, rebates and school programs will continue. However, the education program will begin to focus more on targeted sectors and demographics.
- For example, new initiatives might more explicitly target high volume users, the commercial sector, or agriculture, or work to assist with increasing affordability of water services.
- Many of these new initiatives will require further strengthening the already strong partnerships with the region's water service providers (municipalites, improvement districts, etc.).
- Support for watershed restoration activities will see increased attention, including supporting on-the-ground community-based projects including on private property through education, advocacy and possibly incentives/seedfunding.
- Water conservation will continue to be a primary focus. However, program messaging will also focus explicitly on explaining the importance of watershed protection, ecosystem services and green infrastructure.

Water Science, Monitoring and Target Setting

- Science and monitoring effort under this portfolio will shift progressively towards operationalizing data for decision making, made possible by building on data collection and analysis completed in the first 10 years of implementation.
- Work on regional water budgets will carry on, specifically to develop numerical models ("Phase 3") and on setting objectives for watershed health that can be adhered to in the face of changing land use activities.
- The science program will be continuously improved over the next 10 years by implementing a data management framework and by developing a comprehensive plan for operationalizing water data.
- Water science will support planning efforts by establishing watershed performance targets and standards to mitigate the impact of land development.
- Understanding how a changing climate affects both aquatic ecosystems and human health and safety is a key focus. This will include undertaking climate change modelling to identify higher risk areas in order to guide adaptation activities. Partnering with other agencies already engaged in this kind of modelling will be a preferred avenue.

Policy and Planning

- Key themes for planning and policy work going forward include resilient land use policy, protecting natural assets, and promoting green infrastructure as it pertains to water sustainability and watershed protection.
- Strong collaboration between departments within RDN and across other governments and agencies such as local governments, First Nations, the Islands Trust, industry and the Province will be key essential to success.
- Over the next operational period, the lines between RDN's policy and planning work and the DWWP science and data program will become increasingly blurred. Planning will inform where and how data is collected and what science is needed.
- At the same time, as noted above, the science program will establish watershed performance targets and standards to mitigate the impact of land development. Establishing linkages to the mandatory commitments under the Liquid Waste Management Plan will be important.
- The DWWP Program will offer active support to various pending high profile planning processes including updates to a number of Official Community Plans and the Regional Growth Strategy. Watershed and aquifer characterization completed to date can be used to positively influence and support these initiatives. The goal is alignment between policy and water-based environmental constraints.
- RDN will continue to advocate for watershed protection by providing comments to provincial agencies on policy and legislation initiatives on an ad hoc basis and by continuing to review Provincial license applications as referral agency.
- Protection of riparian areas and natural assets on private property will be an area of increased focus. The program will explore options for incentive-based policy and regulatory tools to support landowners with their conservation efforts.
- The program will also look at providing education programs or incentives for developers who create low-impact and water efficient developments.

4.3 Summary of Proposed Key Initiatives

Education, Communications, and Advocacy

E1	**Initiative:** Targeted outreach to agricultural water users	
Status: New	**Cost (H,M,L):** High	**Target:** Agriculture sector
Description: RDN will facilitate access to tools and resources to assist agricultural producers with understanding their water use, conservation, and reducing impacts on downstream aquatic ecosystems. Measures may include preparation of new outreach resources that reflect local circumstances, quantifying and communicating water use in the sector, direct on-farm outreach through program staff, or connecting producers with pre-existing resources (e.g., the BC agriculture calculator at www.bcagriculturewatercalculator.ca). Success with this initiative would require working closely with partners in the Province and the sector itself.		
Partners: MoA, MoECC, agriculture sector		
Possible Success Indicators: - number of initiative participants - reduction in metered water use (where available) - changes in conditions at identified riparian monitoring sites		
Source: 2019 DWWP update engagement; 2012 RDN Agricultural Area Plan		

E2	**Initiative:** Enhance Team WaterSmart Outreach Program	
Status: Enhancement	**Cost (H,M,L):** Medium	**Target:** Residential (rural and urban)
Description: Team WaterSmart is a long running, successful and valued part of the DWWP Program. Feedback gathered during both the 2018 program review and 2019 DWWP update process indicate overwhelming support. The future will see it continuing, including staffing summer community events, maintaining the resource-rich website and coordination of municipal and electoral area conservation outreach. The program will be enhanced by improving quantitative measurement of impact, more use of community-based social marketing methodologies, and a review of the website to improve navigability and use of multimedia. Opportunities to improve coordination with other RDN departments and programs (e.g., Parks, Emergency Services) will also be explored.		
Partners: Municipalities, other RDN departments, FLNRORD		
Possible Success Indicators: - Metered water use at residences of program participants vs. controls - Pre- and post- market research surveys with program participants - Satisfaction of municipal program sponsors		
Source: 2019 DWWP update engagement, 2018 program review		

E3	**Initiative:** Sustainable water management demonstration site(s) at RDN parks and public locations	
Status: New	**Cost (H,M,L):** Medium	**Target:** Gardeners, landscapers
Description: One or more sustainable water management landscape demonstration sites will be established at prominent public locations in the region. Features may include native and drought tolerant plantings, xeriscaping, interpretative signage, and use of alternative water sources (e.g., rainwater) to demonstrate how property owners can reduce water use and support improve stormwater management practices. It will be promoted through Team WaterSmart outreach and perhaps through direct communication in partnership with the garden and landscape sector (e.g., promotional posters at local nurseries).		
Partners: Parks, Garden and landscape sector		
Possible Success Indicators: - Metered water use for irrigation at facility (will require dedicated meters) - Number of visitors (e.g., potentially using remote monitoring technology)		
Source: 2019 DWWP update engagement		

E4	**Initiative:** Landowner support for watershed restoration	
Status: New	**Cost (H,M,L):** High	**Target:** Landowners
Description: RDN will support the restoration of watershed ecosystems (e.g. streams, wetlands) on private land through the provision of limited resources such as seed money for plans, planting and habitat enhancement measures, or educational resources. The intention is not to fund expensive large scale restoration projects, but to support smaller community based initiatives. Long term commitments to maintain restored ecological function (e.g., through conservation covenants) might be a condition for participation. A model such as Conserve 2 Enhance may help enable this initiative, as well as support other water conservation objectives. This initiative would also involve local volunteer stewardship groups (e.g., to provide labor for restoration efforts).		
Partners: Stewardship groups, private landowners		
Possible Success Indicators: - Number and cash value of seed funding issued - Number of restoration projects completed - Changes in ecological function indicators at restored sites over time		
Source: 2019 DWWP update engagement		

E5	**Initiative:** Watershed and water treatment facility tours	
Status: Enhancement	**Cost (H,M,L):** Low	**Target:** Residential
Description: Building on programs already offered by RDN (e.g., school watershed tours) and similar programs offered elsewhere (e.g., CRD, Metro Vancouver), RDN will offer periodic guided tours of watershed areas, parks and key infrastructure (e.g., Englishman River treatment plant). Goals will be to improve community appreciation of watershed function and the value of water services. The program will be promoted through Team Watersmart and other channels and delivered in partnership with forestry companies, municipalities and other landowners.		
Partners: Forestry companies, municipalities		
Possible Success Indicators: - Number of program participants - Results of post-participation surveys		
Source: 2019 DWWP update engagement		

E6	**Initiative:** Improve residential and non-residential water use accounting	
Status: Enhancement	**Cost (H,M,L): Low**	**Target:** All sectors
Description: Working with municipalities and other water service providers, RDN will improve accounting of water use in the region across different sectors. This may include employing standard methodologies for benchmarking residential water use, identifying high use commercial and industrial, and strategies to account for and reduce non-revenue water. It is noted that municipalities already meter and do their own leak audits, so engagement with them will be required to determine how RDN can add additional value. Results may be used to guide conservation program effort, set targets, and for program communications. Water service providers, as custodians of much of the required data, will be key partners in this initiative. As technology evolves, a rebate program for voluntary smart water metering for well owners may be explored		
Partners: Municipalities, improvement districts, etc.		
Possible Success Indicators: - Residential per capita water demand - Total system water demand per capita - Infrastructure leakage indices		
Source: 2019 DWWP update engagement		

E7	**Initiative:** Commercial, industrial and institutional (CII) water conservation program	
Status: New	**Cost (H,M,L):** High	**Target:** CII sector
Description: To date, Team WaterSmart initiatives have primarily focused efforts on the residential sector. However, best practice in other jurisdictions reveals that significant and low-cost water use reductions can also be attained in the commercial, industrial and institutional sectors. Low hanging fruit may be found, for example, in the restaurant, food services and hospitality sectors. Large volume water users (e.g., industrial facilities) in each municipality may also be appropriate partners, as they can often attain significant cost savings on their water and energy bills as a result of operational improvements. As another example, inefficient once-through cooling systems in CII establishments have become an area of focus for many leading demand management programs across North America. Since CII organizations are typically customers of municipal water service providers, cross agency partnerships will be key to success with this venture.		
Partners: Municipalities		
Possible Success Indicators: - Metered water use at participating facilities - Number of participating organizations - Average return on investment for participants measured in simple payback period		
Source: 2019 DWWP update engagement, 2018 program review		

E8	**Initiative:** Targeted conservation programs for high volume and low income residential	
Status: Enhanced	**Cost (H,M,L):** High	**Target:** Residential
Description: Leading water conservation programs in North America have achieved efficiencies by targeting high volume residential users (found by looking at metered water use data) with tailored initiatives, typically involving direct on-on-one contact. RDN will build on work already underway in this area, notably the Irrigation Checkup program. In the future, high volume gardeners may be offered advice on irrigation or plant selection, whereas large households may be offered rebates on efficient indoor technology. Similarly, there is a growing recognition that low income households tend to lag behind on adaptation of efficient technology, which can be remedied in part with targeted rebates, installation assistance, and education. This has the dual benefit of reducing overall demand and addressing water affordability concerns.		
Partners: Water purveyors		
Possible Success Indicators: - Number of program participants - Reductions in metered water use at participating households - Average return on investment for participants measured in simple payback period		
Source: 2019 DWWP update engagement, 2018 program review		

E9	**Initiative:** DWWP program communications update guided by market research	
Status: Enhancement	**Cost (H,M,L):** Low	**Target:** All sectors
Description: The 2018 program review uncovered opportunities to improve DWWP communications. This includes less information-intensity and more focus on select key messages. A branding review will help ensure consistency and clarity of messaging. As noted above (Initiative E2) navigability of the DWWP website could also be improved. RDN can also follow the path of leading jurisdictions, which typically conduct quantitative and qualitative market research periodically. This can provide key insights into resident attitudes towards water sustainability and conservation or answer applied questions about penetration rates of water efficient fixtures and appliances, among other goals.		
Partners: RDN departments (e.g., Parks, Emergency Services), municipalities, water purveyors		
Possible Success Indicators: - Awareness of program based on market research		
Source: 2018 program review		

Current Education, Outreach and Advocacy Initiatives That May Continue

- Team WaterSmart program, with enhancements (see above)
- wellSMART workshops for private well owners
- School field trips and presentations
- Irrigation check ups
- Develop/update key publications (e.g., Landscape Guide to Water Efficiency, Rainwater Harvesting Guide, State of Streams/Aquifers Reports etc.)
- Rebates and incentives (e.g., rainwater harvesting; wellhead upgrades; well quality testing; irrigation upgrade)
- Water Purveyor Working Group for small water system operators
- Harmonized watering restrictions framework and communications coordination
- DWWP Technical Advisory Committee

Water Science, Monitoring and Target Setting

S1	**Initiative: I**mplement water monitoring data management framework
Status: Ongoing	**Cost (H,M,L):** Medium
Description: In 2017 RDN oversaw completion of a Water Monitoring Data Management Framework. This high-level framework provided recommendations for developing a robust data management system for the DWWP program. In addition, staff have various tactical plans for improved data management. In general, these entail continued migration to open provincial systems (ideally) and/or developing more robust internal systems where necessary. This will be an area of continued attention during the next operational period for the DWWP program. It will be delivered in partnership with the Province, which is currently implementing improvements of its own under the Water Information Stewardship Project (WISP).	
Partners: MoECC, FLNRORD, stewardship groups, First Nations	
Possible Success Indicators: - Number of data sets hosted on open provincial systems - Progress on implementation of Water Monitoring Data Management Framework	
Source: 2019 DWWP update engagement, 2018 program review	

S2	**Initiative:** Comprehensive plan for operationalizing water data
Status: Enhancement	**Cost (H,M,L):** High
Description: As the volume of data collected for both surface and groundwater grows, the region's aquifer and watersheds are becoming better characterized. Greater attention (and budget resources) will need to be devoted to analysis in the future and to turning data into useful knowledge that can inform decision making. This will require engaging specialized skill sets, probably through a combination of staffing, outsourcing to third party professionals, and partnerships with the Province and academia. RDN will lead development of a more comprehensive, long term plan for the data it collects. This will identify, in practical terms, what information products are required, what skill sets are needed to produce them, and how they will be used to set and reach objectives for water and watershed management.	
Partners: MoECC, FLNRORD, stewardship groups, First Nations, academia	
Possible Success Indicators: - Completion of research plan and measured progress on implementation	
Source: 2019 DWWP update engagement, 2018 program review	

S3	**Initiative:** Climate change modelling to identify higher risk areas
Status: New	**Cost (H,M,L):** Medium
Description: RDN will partner with others to produce downscaled climate models for the region based on the best currently available science and data. The objective will be to identify likely future climate scenarios in order to better target monitoring and adaptation efforts. For example, this may involve looking at likely impacts of climate change on average stream flows, aquifer levels, timing of flows, and changes in aquatic habitat. This initiative may require development of complex models, possibly involving both dynamical and statistical approaches. It will require the assistance of other agencies such as academia (e.g., PCIC) and the Province.	
Partners: Environment Canada, MoECC, FLNRORD, academia	
Possible Success Indicators: - Completion of climate change modelling	
Source: 2019 DWWP update engagement	

S4	**Initiative:** Complete water budget models for all key water regions ("Phase 3")	
Status: Ongoing		**Cost (H,M,L):** High
Description: In 2013, Phase 1 of the Regional Water Budget project provided a preliminary indication of the level of stress on seven water regions and mapped aquifers. Phase 2 is now underway and is providing enhanced monitoring and water budget development for priority watersheds (specifically, French Creek, Cedar-Yellowpoint and Nanoose). Additional monitoring was deployed in 2017 and the first results are now coming in. This will set the context for developing numerical water budget models in Phase 3, to be completed in the next operational period. A real challenge will be to ensure the results are used to set objectives for managing watershed supply and demand in the face of changing land use activities.		
Partners: MoECC, FLNRORD, RDN Planning		
Possible Success Indicators: - Completion of numerical water budget models for priority watersheds and aquifers		
Source: 2019 DWWP update engagement, 2018 program review		

S5	**Initiative:** Expand watershed monitoring parameters to increase focus on habitat conditions	
Status: New		**Cost (H,M,L):** High
Description: During consultation on the DWWP Action Plan update, some commentators suggested that monitoring should expand beyond water quality and quantity parameter to focus on broader indicators of aquatic ecosystem condition and function. This might include, for example, collecting data on aquatic vegetation, riparian vegetation, or benthic invertebrates. Pursuing this initiative would start with a scoping study to identify benefits and costs, appropriate monitoring parameters, monitoring locations, costs, possible partnerships, and other considerations.		
Partners: MoECC, FLNRORD, DFO, ECCC, stewardship groups, forestry companies		
Possible Success Indicators: - Identification of appropriate expanded monitoring parameters - Change in conditions of selected parameters over time		
Source: 2019 DWWP update engagement		

S6	**Initiative:** Quantify and monitor water use in the industrial, agricultural, and other sectors	
Status: New		**Cost (H,M,L):** Medium
Description: While water allocations in Provincial licensees provide a cap on the amount that industrial, agricultural, forestry and other users can extract, actual consumption among these sectors is often not tracked or reported. While theoretically a provincial responsibility, such reporting is not yet done, so RDN may wish to provide a coordinating function to better understand and monitor water use trends among large users across the region by encouraging voluntary metering and water use reporting. RDN could also provide support with voluntary reporting of use, by expanding existing participation in the Okanagan Basin Water Board's Water Use Reporting pilot project to include large industrial and agricultural users.		
Partners: MoECC, FLNRORD, industry, agricultural sector		
Possible Success Indicators: - Number of users with characterized/quantified water use - Changes in reported water use over time		
Source: 2019 DWWP update engagement		

S7	**Initiative:** Improve water science communications	
Status: Enhancement	**Cost (H,M,L):** Low	**Target:** All audiences
Description: This initiative bridges between the "education" and "science" themes and involves making concerted efforts to improve how science and other information is communicated to stakeholders and the public. The 2018 program review observed that communications products and messaging intended for general audiences can sometimes be very information intensive with tightly packed and highly technical content. This will be progressively addressed by emphasizing best practice techniques in this iteration, including use of infographics and other methods for visualizing and better communicating the science. Use of the program's website will also be reviewed and RDN will look for opportunities to use new technology to improve communications (e.g. dynamic graphs, etc.). Messaging will also shift from focus on factual information to more about what the science tells us and how it informs the importance of watershed protection.		
Partners: MoECC, FLNRORD, municipalities		
Possible Success Indicators: - Website analytics (number of unique users, time on page, etc.) - Statistically reliable market research results		
Source: 2019 DWWP update consultation, 2018 program review		

Current Water Science, Monitoring and Target Setting Initiatives That May Continue

- Community Watershed Monitoring Network (CWMN)
- Annual training through CWMN on surface water quality monitoring
- CWMN monitoring equipment sign-out and Tool Lending Library
- Stewardship seed funding
- GIS Water Map
- BC Observation Well Network expansion
- Volunteer Observation Well Network
- Hydrometric and climate monitoring
- Well water quality - voluntary results submission
- Phases 2 & 3 of Water Budget Analysis (see above)
- Physical Stream Assessments
- Wetland mapping and inventory
- Establish and monitor water quality objectives
- Support for Emergency Operations Centre (EOC)

Policy and Planning

P1	**Initiative:** Set water-driven objectives for land-use management in scheduled updates to official community plans, parks acquisitions and the Regional Growth Strategy
Status: Ongoing	**Cost (H,M,L):** Medium
Description: Over the next decade, various high profile planning processes are pending including updates to a number of Official Community Plans (e.g., Areas A, C, F and G) and the Regional Growth Strategy (last updated in 2011). Watershed and aquifer characterization completed to date under the DWWP Program can be used to positively influence and support these initiatives. A collaborative, inter-departmental effort will help ensure that new plans reflect attainable and universally supportable goals that strike the right balance between protecting water resources and enabling community growth and development. This would include assisting the planning department with advising on where water stressed areas are and where current zoning may not adequately reflect water availability. It may also involve setting water carrying capacities that establish the number of developments or activities that a watershed or aquifer can continue to support without experiencing unacceptable environmental degradation. DWWP can also provide input into corporate decisions about strategic park acquisitions. Past successes identified in the 2018 Program Review provide a template for the future.	
Partners: First Nations, the Province, Island Trust, RDN and municipal planning departments	
Possible Success Indicators: - Incorporation of water-driven objectives in pending planning processes	
Source: 2019 DWWP update engagement, 2018 program review	

P2	**Initiative:** Establish watershed performance targets to mitigate the impact of land development
Status: Ongoing	**Cost (H,M,L):** Medium
Description: Through the DWWP Action Plan update process, commentators have suggested that an important future direction for the program is to leverage data and science assembled to date to identify and set targets or limits for development around impervious cover, riparian area retention, vegetation, or tree cover, for example. It should be noted that there are important integrations here with mandatory commitments under RDN's *Liquid Waste Management Plan*, which, among other things commits to various actions around rainwater management, in particular developing a specific strategy with targets and standards to mitigate impacts of land development. Similarly, commentators noted that there are important linkages with the Ministry of Transportation and Infrastructure's work to regulate rural road drainage, and that there may be a role for RDN to advocate in this area more in the future.	
Partners: First Nations, the Province, Island Trust, municipal engineering departments	
Possible Success Indicators: - Number of watersheds with carrying capacity performance targets established - Performance against carrying capacity targets over time	
Source: 2019 DWWP update consultation; 2015 Liquid Waste Management Plan	

P3	**Initiative:** Identify new incentive-based policy and regulatory tools to increase protection of riparian areas and natural assets on private property	
Status: New		**Cost (H,M,L):** Low
Description: Some stakeholders have suggested that additional regulatory and policy tools are needed to further incentivize protection of riparian areas and natural assets on private property. While it is not immediately clear what these new tools might involve, this may become clearer through an initial scoping study and case study review of best practice in other North American jurisdictions. Based on this initial scan, RDN may identify additional initiatives to implement in the next operational period of the DWWP Action Plan.		
Partners: First Nations, the Province, Island Trust, etc.		
Possible Success Indicators: - Completion of initial scoping study		
Source: 2019 DWWP update engagement		

P4	**Initiative:** Regulations, education programs or incentives for developers who create low-impact and water efficient developments	
Status: New		**Cost (H,M,L):** Medium
Description: Various leading jurisdictions across North America offer incentives, recognition, or resources to assist developers with incorporating water efficiency or low impact design into their projects (e.g., City of Chicago, City of Toronto, City of Seattle, etc.), and increasingly some of these are required through regulation. These examples can be replicated and modified as appropriate to suit the Nanaimo regional context. Example design features might include rain gardens, permeable surfaces, rainwater harvesting, incorporation of water efficient technology, drought tolerant landscaping, and others. Possible incentives might include fee waivers/refunds/reductions, tax incentives, rebates, expedited permitting, density bonuses and recognition through awards and publicity, again among others. RDN could also develop model bylaws for member municipalities interested in regulatory approaches (or coordinate regional alignment with model bylaws that already exist in some municipalities, where appropriate). RDN will explore these options, initially through a scoping study, then potentially a pilot project followed by and full program implementation. RDN will also explore partnerships with member municipalities and the Islands Trust in the roll out of such an initiative. Note that this initiative differs from P3, above, in that it is focused on providing programs directly to developers and on encouraging best practice development features (e.g., "engineering fixes") as opposed to preserving natural assets and ecosystem services.		
Partners: Municipalities, Islands Trust		
Possible Success Indicators: - Completion of initial scoping study - Number of projects featuring water-efficient or low-impact design - Water use from participating project sites relative to a benchmark for conventional projects		
Source: 2019 DWWP update engagement		

P5	**Initiative:** Stronger engagement with First Nations
Status: Enhancement	**Cost (H,M,L): Low**
Description: RDN will continue to engage with the Qualicum, Snaw-naw-as, Snuneymuxw and other area First Nations on program implementation. First Nations could be key partners in watershed monitoring activities (the Qualicum First Nation has assisted with site selection in the past). Traditional ecological knowledge can enhance science-based knowledge created through the program. First Nations communities could be more frequent recipients of outreach support from Team WaterSmart (similar to support already received by municipal governments). However, individual First Nations will have their own perspectives on how (or whether) they want to participate in the program and regional governance generally. RDN will make it a priority to more actively engage with First Nations on a government-to-government basis to identify the ways in which they would like to participate in program implementation in the future.	
Partners: First Nations	
Possible Success Indicators: - Demonstrable First Nations engagement in DWWP Program management and initiatives	
Source: 2019 DWWP update consultation, 2018 program review	

Current Policy and Planning Initiatives That May Continue

- Support for OCP updates and Development Permit Area reviews (see above)
- Providing comments to the Province on water policy and legislation initiatives
- Review Provincial license applications as referral agency
- Continue to support Development Application reviews based on monitoring data

4.4 Proposed Key Initiatives - Summary Table

A summary table of all the proposed key initiatives is provided for your reference.

Thematic Area	#	Proposed Key Initiative	Status	Cost (H,M,L)	Target Area (Sector)	Partner(s)
Education, Communications & Advocacy	**E1**	Targeted outreach to agricultural water users	New	H	Agriculture	MoA, MoECC, Agric sector
	E2	Enhance Team WaterSmart Outreach Program	Enhanced	M	Residential	Local Govts, FLNRORD
	E3	Sustainable water management demonstration site(s)	New	M	Residential Gardeners	Parks, Garden and Landscape sector
	E4	Landowner support for watershed restoration	New	H	Landowners	Stewardship Groups, Private Landowners
	E5	Watershed and water treatment facility tours	Enhanced	L	Residential	Forestry companies, local govts
	E6	Improve residential and non-residential water use accounting	Enhanced	L	All Sectors	Local Govts, Imprvmt Districts, etc.
	E7	Commercial, industrial and institutional (CII) water conservation program	New	H	CII Sector	Municipalities
	E8	Targeted conservation programs for high volume and low income residential	Enhanced	H	Residential	Municipalities
	E9	DWWP program communications and branding update	Enhanced	L	All Sectors	RDN Parks & Emergency Services
	E10	**Existing Initiatives to be continued:** • Team WaterSmart program, with enhancements (see above) • wellSMART workshops • School field trips and presentations • Irrigation check ups • Develop/update key publications (e.g., Landscape Guide to Water Efficiency, Rainwater Harvesting Guide, State of Streams/Aquifers Reports etc.) • Rebates and incentives (e.g., rainwater harvesting; wellhead upgrades; well quality testing; irrigation upgrade) • Water Purveyor Working Group • Harmonized watering restrictions framework and communications coordination • DWWP Technical Advisory Committee	Existing	L-H	All	All
	E11	To be added to as needed				
	E12					
	E13					
	E14					

Pre-Reading Package – Planning Advisory Group – SDM Workshop 1

Thematic Area	#	Proposed Key Initiative	Status	Cost (H,M,L)	Partner(s)
Water Science, Monitoring & Target Setting	**S1**	Implement water monitoring data management framework	Existing	M	MoECC, FLNRORD, stewardship groups, First Nations
	S2	Comprehensive research plan for operationalizing water data	Enhanced	H	MoECC, FLNRORD, stewardship groups, First Nations, academia
	S3	Climate change modelling to identify higher risk areas	New	M	Environment Canada, MoECC, FLNRORD, academia
	S4	Complete water budget models for all key water regions ("Phase 3")	Existing	H	MoECC, FLNRORD
	S5	Expand watershed monitoring parameters to increase focus on habitat conditions	New	H	MoECC, FLNRORD
	S6	Quantify and characterize monitor water use in the industrial, agricultural and other sectors	New	M	MoECC, FLNRORD, industry, agricultural sector
	S7	Improve water science communications	Enhanced	L	MoECC, FLNRORD, municipalities
	S8	**Existing Initiatives to be continued:** • Community Watershed Monitoring Network (CWMN) • Annual training through CWMN on surface water quality monitoring • CWMN monitoring equipment sign-out and Tool Lending Library • Stewardship seed funding • GIS Water Map • BC Observation Well Network expansion • Volunteer Observation Well Network • Hydrometric and climate monitoring • Well water quality - voluntary results submission • Phases 2 & 3 of Water Budget Analysis (see above) • Physical Stream Assessments • Wetland mapping and inventory • Establish and monitor water quality objectives • Support for Emergency Operations Centre (EOC)	Existing	L-H	All
	S9	To be added to as needed			
	S10				
	S11				

Thematic Area	#	Proposed Key Initiative	Status	Cost (H,M,L)	Partner(s)
Policy & Planning	**P1**	Set water-driven objectives for land- use management in scheduled updates to official community plans, park acquistions and the Regional Growth Strategy	Existing	M	First Nations, the Province, Island Trust, etc.
	P2	Establish watershed performance targets and standards to mitigate the impact of land development	Existing	M	RDN Planning, First Nations, the Province, Island Trust, high-volume water users
	P3	Identify new incentive based policy and regulatory tools to increase protection of riparian areas and natural assets on private property	New	L	RDN Planning, First Nations, the Province, Island Trust, etc.
	P4	Regulations, education programs or incentives for developers who create low-impact and water efficient developments	New	M	RDN Planning, municipalities, Islands Trust
	P5	Stronger engagement with First Nations	Enhanced	L	First Nations
	P6	**Existing Initiatives to be continued:** • Support for OCP updates and Development Permit Area reviews (see above) • Providing comments to the Province on water policy and legislation initiatives • Review Provincial license applications as referral agency • Continue to support Development Application reviews based on monitoring data	Existing	L	All
	P7	To be added to as needed			
	P8				
	P9				

4.5 Degree of Support – Workshop Survey

At the workshop, we will be asking PAG members to indicate their level of support for each of the key initiatives after we have reviewed and discussed them.

The purpose of the survey is three-fold

1. To better understand where members are collectively in their level of support;
2. To help inform future prioritizing of the key initiatives should there be a need to;
3. To highlight additional details or information about the key initiatives and/or how they may be implemented in the future.

The results from the survey will be shared with workshop participants and included in the summary notes.

You will be asked to indicate your level of support on each proposed key initiative according to:

Strongly support	I love it and believe it should definitely be in an updated plan
Support	There are some things about the initiative I am not keen on, but on balance I am in favour of this initiative for the updated plan
Neutral (or indifferent)	I do not have strong opinions either for or against this initiative being included in an updated plan
Oppose	I am not in support of this initiative; on balance the cons outweigh the pros and I would not include this in an updated plan
Strongly Oppose	I have serious reservations for including the initiative in the plan at this time
No comment (Abstain)	I do not feel like I have the information or expertise to comment on this initiative

In addition, the survey will invite any additional comments or suggestions on the identified or new initiatives you may have.

REGIONAL DISTRICT OF NANAIMO

REGIONAL DISTRICT OF NANAIMO

MINUTES OF THE DRINKING WATER AND WATERSHED PROTECTION TECHINCAL ADVISORY & BOARD STEERING COMMITTEE MEETING

Thursday, April 25, 2019
12:30 P.M.
Board Chambers

In Attendance:	R. Alexander	Chair
	V. Craig	Director, Area B
	S. McLean	Director, Area H
	B. Geselbracht	Director, City of Nanaimo
	A. Fiddick	Environment Community Representative
	P. Jorgenson	Forest Industry Representative
	P. Lapcevic	BC Ministry of Forests, Lands & Natural Resource Operations
	L. Magee	Island Health
	H. Rueggeberg	General Public Representative (South)
	W. Shulba	Islands Trust Representative
	B. Weir	Municipal Representative (Town of Qualicum Beach)
	G. Wendling	Hydrogeologist Representative
	C. Cole	General Public Representative (North)
	M. Squire	City of Nanaimo
	R. Barlak	BC Ministry of Environment
Regrets:	O. Brandes	Academic Community Representative (POLIS)
	L. Cake	Water Purveyors (Coastal Water Suppliers Association)
	K. Epps	Forest Industry Representative
	A. Gilchrist	Academic Community Representative (VIU)
	N. Leone	Department of Fisheries and Oceans
	K. Miller	Cowichan Valley Regional District
	B. Silenieks	Municipal Representative (City of Parksville)
	F. Spears	Municipal Representative (District of Lantzville)
	K. Fagervik	Ministry of Transportation & Infrastructure
Also in Attendance:	J. Pisani	Regional District of Nanaimo
	M. Walters	Regional District of Nanaimo
	C. Brugge	Regional District of Nanaimo
	L. Fegan	Regional District of Nanaimo
	M. Harstone	Compass Resource Management
	R. Mersereau	Econics

CALL TO ORDER

The Chair called the meeting to order and respectfully acknowledged the Coast Salish Nations on whose traditional territory the meeting took place.

APPROVAL OF THE AGENDA

It was moved and seconded that the agenda be approved as presented.

CARRIED UNANIMOUSLY

ADOPTION OF MINUTES

Drinking Water and Watershed Protection Technical Advisory Committee Meeting - February 14, 2019

It was moved and seconded that the minutes of the Drinking Water and Watershed Protection Technical Advisory Committee meeting held February 14, 2019 be adopted.

CARRIED UNANIMOUSLY

REPORTS/PRESENTATIONS

This meeting was run as an interactive idea-generation session to gather input for the DWWP Action Plan update.

The below reports/presentations were discussed:

- Welcome from DWWP Board Steering Committee
- Meeting overview
- DWWP TAC Roundtable Updates
- Framing the Context on Current and Future Water Management
- Idea Generation - Action Plan Goals and Objectives
- Idea Generation - Action Plan Activities and Initiatives
- Next steps & upcoming meetings

ADJOURNMENT

It was moved and seconded that the meeting be adjourned.

CARRIED UNANIMOUSLY

TIME: 4:45 PM

CHAIR

GUIDANCE FOR TREATMENT OF RAINWATER HARVESTED FOR POTABLE USE IN BRITISH COLUMBIA

Draft / July 2019

1. Objective

This guidance document provides a general overview of assessing risks and treatment of rainwater for potable use in British Columbia (B.C.). It characterizes harvested rainwater as a type of surface water (i.e., water from a source which is open to the atmosphere) and includes streams, lakes, rivers, creeks and springs, as defined in the *Drinking Water Protection Regulation* (DWPR). This document is intended to supplement but not replace the existing surface water treatment objectives as found in the Ministry of Health's *Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia* (referred to herein as the B.C. Surface Water Treatment Objectives).

2. Background and Regulatory Framework

Two documents serve as the primary reference materials for treatment objectives for harvested rainwater: the B.C. Surface Water Treatment Objectives, and the *Rainwater Harvesting Systems standard CSA B805-ICC 805* (produced by the CSA Group and the International Code Council, Inc., and referred to herein as the CSA/ICC Rainwater Standard).

In this guidance document, *rainwater* means: water collected from natural precipitation, and any system used to collect, convey, store, treat and distribute rainwater for use is a *rainwater harvesting system.* This definition is consistent with the CSA/ICC Rainwater Standard.

British Columbia Building Code as well as local bylaws may have additional regulatory requirements for the use of harvested rainwater including its use within single-family dwellings and other buildings. These are not included in this guidance document but should be consulted for reference.

The owner of any drinking water supply system, servicing more than a single-family dwelling, and who wishes to harvest rainwater for domestic use, is required under the *Drinking Water Protection Act* (DWPA) and the DWPR to obtain the necessary permits from the local health authority (HA). The *Water Sustainability Act* (WSA) licences water use from a natural source of water supply, specifically a "lake, pond, river, creek, spring, ravine, gulch, wetland or glacier, whether or not usually containing water, including ice, but does not include an aquifer". As rainwater is not included in this definition, a licence under the WSA is not required for rainwater harvesting.

Under the DWPA, water suppliers have the responsibility to provide potable water to all users of their systems. As such, rainwater harvested for use as potable water in any drinking water supply system must be disinfected[1]. Schedule A of the DWPR specifies bacteriological water quality standards for potable water for the protection of human health. The DWPA and the DWPR give *Drinking Water Officers*[2] (DWOs) the flexibility to address further microbiological, chemical and physical risks through applying site-specific treatment requirements to construction and operating permits. The *Drinking Water Officers Guide* (DWOG) contains drinking water policies that must be considered by DWOs when making these statutory decisions. The DWOG further suggests best management practices which align and/or further build on those as detailed in the *Guidelines for Canadian Drinking Water Quality* (GCDWQ), as developed and updated regularly by Health Canada.

Note: Reliability of water volume and quality should be a key consideration during all phases of development, including during the subdivision of land parcels. Given seasonal variations in precipitation, a water supply that relies solely on rainwater may face significant challenges with volume and storage capacity during periods of drought. In many situations, harvested rainwater may be best suited as a supplementary source to existing water supplies for the purposes of reducing stresses related to water quality and/or quantity.

3. Purpose and Scope

3.1. Purpose

The intent of this guideline is to assist water suppliers and DWOs in ensuring harvested rainwater is made potable.

3.2 Scope

This focus of this guide is on the assessment of risks and appropriate treatment of harvested rainwater for potable use in drinking water supply systems.

This document does not address:

- Non-potable uses of rainwater. These are covered in the draft *Guidance for Using Non-Potable Ambient Water for Domestic Purposes in British Columbia*;
- Stormwater runoff[3] harvested rainwater;
- Assessing collection capacity, storage volumes, reliability nor sustainability of rainwater as a source of domestic water. Note that Annex C of the CSA/ICC Rainwater Standard recommends tank sizing and capacity methodologies;
- The appropriateness of rainwater sources as basis for subdivision approval; or

[1] See section 5 of the Drinking Water Protection Regulation: http://www.bclaws.ca/EPLibraries/bclaws_new/document/ID/freeside/200_2003#section5.

[2] Drinking Water Officer (DWO) is defined in the DWPA as a drinking water officer under Section 3 of the DWPA.

[3] Stormwater runoff, as per Section 3.1 of the CSA/ICC Rainwater Standard, is rainwater that is not roof runoff. This includes precipitation runoff from rain or snowmelt that flows over land and/or impervious surfaces (e.g. streets, parking lots, vegetative roofs, and roofs with public access).

- Standards for chemical contaminants. As with other sources, rainwater chemical parameters should be reviewed against the GCDWQ.

4. Rainwater Harvesting System Design

This section provides an approach to hazard identification, risks assessment and mitigation through system design, as well as determining appropriate treatment objectives to achieve potability.

Applications should be made to the local health authority for the issuance of construction and operating permits under the DWPA prior to commencing any construction. This process will look at how the water supplier plans to mitigate the risks identified for the proposed system. Water suppliers may consider employing contracted consultants familiar with drinking water processes and treatment objectives to assist with this process.

The process of designing a rainwater harvesting system should follow a risk assessment and mitigation strategy similar to any other potable water source in British Columbia. The *Comprehensive Drinking Water Source-To-Tap Assessment Guideline*, *Drinking Water Source-To-Tap Screening Tool* and the *Water System Assessment User's Guide* provide risk assessment and mitigation strategies suitable to a harvested rainwater water supply[4].

4.1 Rainwater Harvesting Risks

Harvested rainwater can become contaminated through numerous pathways of exposure including via airborne particles, animal fecal matter, tree litter, and by the materials used to collect and store rainwater.

Harvested rainwater is at risk of contamination prior to reaching a collection point. This can occur through contact with air pollutants that are either regularly occurring or associated with specific events (e.g., forest fire). As these risks will vary between locations and over time, all existing and potential risk should be considered as part of a risk mitigation approach.

At the collection stage, rainwater passes over surfaces (often a roof) which are likely to harbour residual matter, namely airborne contaminants such as dust, fecal matter from birds or mammals, chemical contaminants or other organic matter (Fewtree & Kay 2008). The source and concentration of contamination may vary depending on conditions, and in some cases with seasons (Zhang et al. 2014).

Materials used to make collection surfaces and conveyancing systems may also have a negative impact on harvested rainwater quality (Ward et al. 2010; Bae et al. 2019). In some environments, metal roofs, concrete tile and cool roofs (reflective roofs) produce a higher quality of harvested rainwater with lower dissolved organic carbon than shingle and green roofs. In particular, green roofs may produce high concentrations of dissolved organic carbon which can lead to the formation of disinfection by-products if not adequately treated (Mendez et al. 2010; Zhang et al. 2014). The growing medium used in some green roofs is further correlated with a higher concentration of metals (such as arsenic) (Mendez et al. 2010).

[4] All three documents are available, along with others, on the **Resources for Water Systems Operators** page at https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/resources-for-water-system-operators

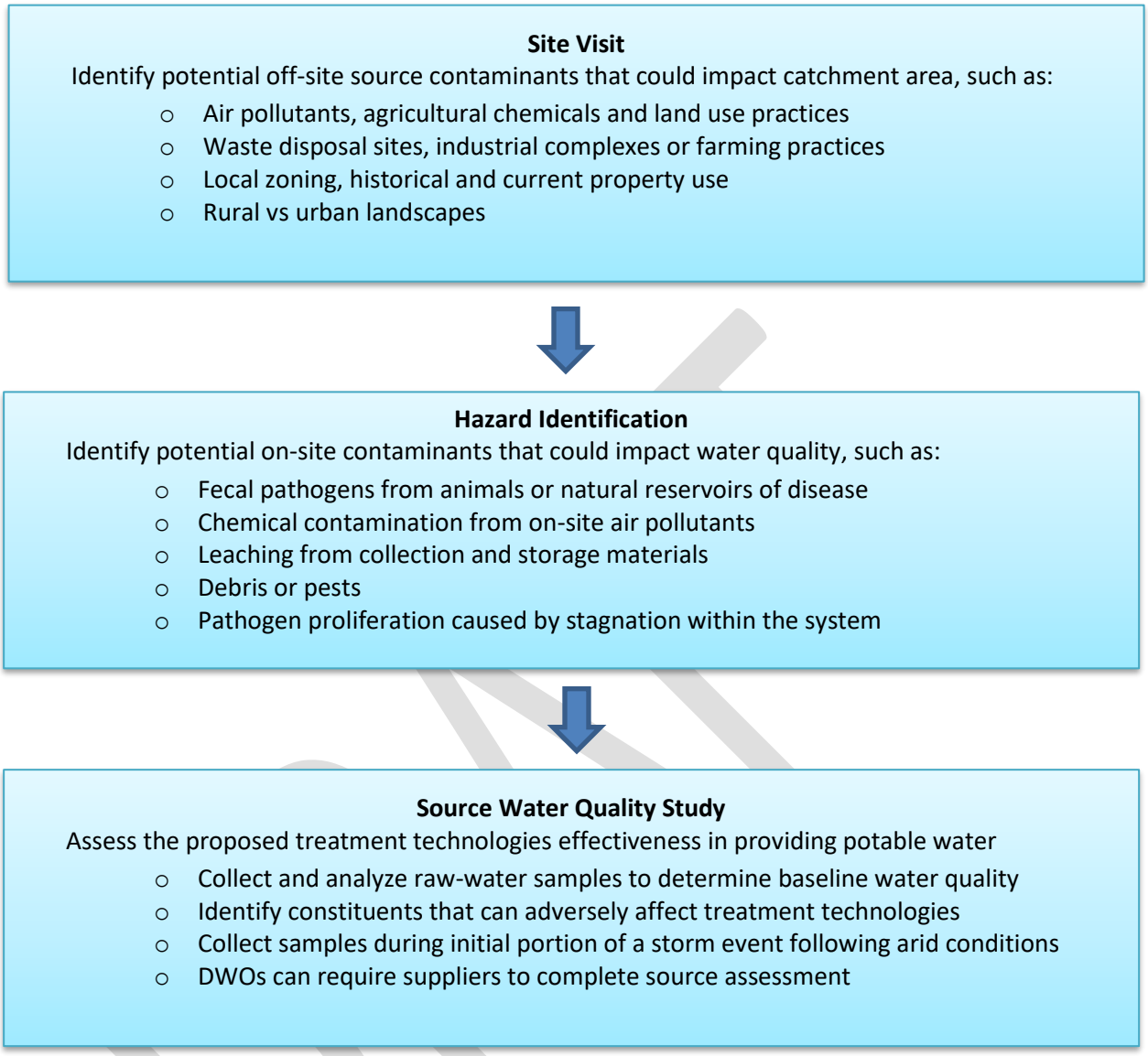
The quality of a harvested rainwater supply is impacted by both storage time (stagnation), the environment, and the materials in which water is being stored (Crabtree et al. 1996; Ahmed et al. 2010a; 2010b). These factors further interact depending on the quality of harvested rainwater as described in the previous paragraph. In general, storage tanks made of a dark coloured polyethylene are associated with creating a warmer environment for harvested rainwater and may impact microbial contamination of rainwater (Struck 2011). The risk of opportunistic pathogens (e.g., Legionella) exists where water temperatures will be stored at a temperature above 25 degrees centigrade, therefore tanks should be stored out of direct sunlight, and storage should be in-ground if there is a risk of temperatures exceeding 25 degrees Celsius.

Best practice for the location of a storage tank recommends they not be located directly under sanitary, waste or storm drain pipes, or in any other location that may increase the risk of contamination, such as above an onsite sewage disposal system (see the CSA/ICC Rainwater Standard). Tanks and all associated components, including but not limited to sealants, fittings and linings contacting collected water, should comply with NSF/ANSI 61 and have a weighted average lead content of 0.25% or less when evaluated in accordance with NSF/ANSI 372. Solders and fluxes used in potable use rainwater harvesting systems should not exceed lead content greater than 0.2% by mass (see the CSA/ICC Rainwater Standard).

4.2 Risk Identification and Assessment

Identifying hazards and implementing control measures to mitigate potential health hazards is an essential aspect of any potable water supply system. A risk assessment process, such as the one outlined in Figure 1 below, serves as a tool for water systems to develop a more comprehensive understanding of the risks to drinking water safety and availability, designing risk mitigation measures, operating more effectively, and ensuring the best possible water quality. Understanding threats and vulnerabilities to drinking water supplies and the interdependency of their components equips water suppliers with the ability to make informed decisions about reducing or mitigating risks.

Figure 1: Flow Diagram for Rainwater Harvesting Risk Assessment Process



A thorough evaluation should be done on land use in the vicinity of the collection surface for both human and natural activity. Hazards identified should be documented to inform risk analysis, application of risk mitigation measures, and for measuring successes over time. The process may include surveys of potential sources of contamination and the frequency of occurrence of contamination events. A period of sampling for microbiological and/or chemical quality to characterize typical nature of the water quality may be valuable to ensuring that the design and treatment objectives (see section 5 in this guideline) applied are appropriate. It may be appropriate to sample in different seasons to obtain a robust representation of water quality throughout the year.

Several tools exist to assist with the above-described process. The *Comprehensive Drinking Water Source-To-Tap Assessment Guideline,* the *Drinking Water Source-To-Tap Screening Tool* and the *Water System Assessment User's*

Guide are intended to help water suppliers develop a better understanding of the risks to drinking water safety and availability[5].

4.3 Design Considerations

Central to the risk assessment process is the implementation of control measures to ensure appropriate and effective risk mitigation. Table 1 below identifies some of the essential design considerations that can be administered in a rainwater harvesting system.

Table 1: Rainwater Harvesting Water System Design Considerations

Design Consideration	Reasoning
Air Gap or Backflow Preventer	Prevent potential cross contamination of other water supply system(s)
NSF/ANSI 61, NSF/ANSI 372 and NSF P151 Materials (or third-party certification)	Ensures the materials adhere to minimum established health effects requirements for any chemical contaminants or impurities that are imparted to the water (USEPA, 2002[6])
Inlet Pre-Filter[7] Systems	Prevents entry of debris and pests into water supply
First-Flush Diverter[8]	Reduce contaminants in the harvested water supply
Collection Potential	Amount of available precipitation in the area
Output Demand	Required storage volume for intended use
Food-Grade Plastic Storage	Retains acidic nature of harvested rainwater which can inhibit microbial growth
Covered or Shaded Storage	Retains cool temperatures of stored water which can slow microbial growth
Mixing Systems	Recirculate, aerate or disinfection of water supply to prevent stagnation and stratification of water supply
Alarm Systems	Systems to monitor, alert or shut-off supply when intake or output water quality standards not being achieved
Secured Access	Prevents unauthorized access to water supply

[5] All three documents are available, along with others, on the **Resources for Water Systems Operators** page at https://www2.gov.bc.ca/gov/content/environment/air-land-water/water/water-quality/drinking-water-quality/resources-for-water-system-operators

[6] USEPA (2002) *Permeation and Leaching. Distribution System Issue Paper.* https://www.epa.gov/sites/production/files/2015-09/documents/permeationandleaching.pdf

[7] Inlet pre-filter, as per Section 3.1 of the CSA/ICC Rainwater Standard, is a device installed on the rainwater conveyance pipe prior to the primary storage vessel on a rainwater system. Note: An inlet pre-filter is intended to mitigate the introduction of, e. g. vermin, leaves, sticks, needles, tree fruit, bark, moss, or any unwanted debris or roof contaminant that could enter the system.

[8] First-flush diverter, as per Section 3.1 of the CSA/ICC Rainwater Standard, is a device or method for removal of sediment and debris from collection surface by diverting initial rainfall from entry into the storage tank. NSF/ANSI 61 provides further guidance on how to perform an effective flush.

5. Treatment Objectives

Drinking water treatment objectives provide a minimum performance target for water suppliers to treat water to produce potable water from harvested rainwater. The actual amount of treatment required will depend on the risks identified (see Section 4.1 and 4.2) and may require levels of treatment over and above those outlined below.

5.1 Treatment Objectives (Microbiological)

As this document has categorized rainwater as a surface water supply, most of the treatment objectives and the supporting reference material for this section can be found in the B.C. Surface Water Treatment Objectives. Further reasoning and explanation is provided when necessary within each sub-section where the treatment objectives differ or expand in the B.C. Surface Water Treatment Objectives.

This section outlines the following treatment objectives for the following pathogenic microbes: enteric viruses, bacteria, enteric protozoa in harvested rainwater for potable use:

- 4-log reduction or inactivation of viruses;
- 4-log reduction or inactivation of *Giardia* and *Cryptosporidium*;
- Two methods of treatment (dual treatment) for harvested rainwater;
- Less than or equal to (≤) one nephelometric turbidity unit (NTU) of turbidity; and
- No detectable *E. coli*, fecal coliforms and total coliform;

5.2.1. 4-log Inactivation of Viruses

A minimum 4-log reduction of enteric viruses is recommended for all potable rainwater harvested systems. This is the same as the B.C. Surface Water Treatment Objectives which also requires a 4-log reduction of enteric viruses.

While the CSA/ICC Rainwater Standard assumes that elevated collection surfaces are unlikely to become contaminated with human viruses and recommends this level of reduction only where a water supply system includes a below-ground tank (where there is potential for sewage contamination), this guideline takes a more precautionary approach to ensure air transported human viruses, or viruses that are capable of cross-species transfer are inactivated.

It is recommended that water supply systems should provide, as a minimum, 4-log reduction of viruses for all rainwater harvesting potable water systems. This is consistent with requirements for surface water in the B.C. Surface Water Treatment Objectives.

5.2.2. 4-log Inactivation of *Giardia* and *Cryptosporidium*

Protozoa, such as *Giardia* and *Cryptosporidium,* can be responsible for severe and, in some cases, fatal gastrointestinal illness. Local climate, the rate of pathogen occurrence, and the potential for higher pathogen concentrations increase the risks to human health associated with harvested rainwater for potable use (Ahmed et al. 2013; Schoen et al. 2017). As reliable and ongoing monitoring remains a challenge with a water supply such as harvested rainwater, the measures in place to ensure protection should aim to reduce the level of risk as much as possible.

A minimum 4-log reduction of enteric protozoa is recommended for all potable rainwater harvested systems. This is a higher level of reduction than recommended in the B.C. Surface Water Treatment Objectives but is aligned with the CSA/ICC Rainwater Standard (see Table 8.1). The 4-log reduction is based on the United States Environmental

Protection Agency (USEPA) health-based target of an annual risk of less than 1/10,000 persons per year (10^{-4} ppy) (USEPA 1989).

It is recommended that water supply systems should provide, as a minimum, 4-log reduction of *Giardia* and *Cryptosporidium* for all rainwater harvesting potable water systems. The higher level of reduction is recommended based on the potential rainwater harvested systems to harbour significantly higher concentrations of protozoa, as well as the potential for such water sources to experience an unpredictable rate of pathogen occurrence, when compared to other surface water sources.

5.2.3. Two Methods of Treatment (Dual Treatment)

To provide the most effective protection, the GCDWQ and the B.C. Surface Water Treatment Objectives recommend that filtration and one form of disinfection be used to meet the treatment objectives. The CSA/ICC Rainwater Standard also supports dual treatment and recommends filtration and disinfection of harvested rainwater supplies used for potable purposes.

It is recommended that dual treatment should be applied to all rainwater harvested potable water supply systems. This is consistent with requirements for surface water in the B.C. Surface Water Treatment Objectives.

5.2.4. ≤1 NTU in Turbidity

Turbidity of treated harvested rainwater should be maintained at less than 1 NTU. Turbidity levels should comply with the GCDWQ on turbidity, as referenced in the B.C. Surface Water Treatment Objectives, and the same exceptions apply (see section 4.4).

5.2.5. No Detectable *E. Coli*, Fecal Coliform and Total Coliform

Schedule A of the DWPR requires that the treatment target for all potable water systems is to contain no detectable *E. coli* or fecal coliform per 100 ml. Total coliform objectives are also zero based on one sample in a 30-day period. For more than one sample in a 30-day period, at least 90% of the samples should have no detectable total coliform bacteria per 100 ml and no sample should have more than 10 total coliform bacteria per 100 ml. If deemed necessary, the DWO may require increased frequency of testing within the operating permit.

5.3. Treatment Objectives (Physical and Chemical)

This document does not outline the required treatment mechanisms or equipment to remove chemical/physical contaminants but recognizes that such contaminants can reduce the effectiveness of disinfection methods (e.g., by increasing the chlorine demand or by blocking/absorbing UV irradiation). Where the risk assessment or subsequent monitoring identifies potential concerns due to the presence of chemicals or turbidity, appropriate treatment technologies should be applied. The GCDWQ should be consulted for further guidance.

6. Operation, Monitoring, Maintenance and Training.

Operational monitoring is critical for ensuring the treatment objectives and control measures in place are effective, and that a system is supplying potable water. Identifying and monitoring critical control points in a water system allows opportunities for corrective actions to be taken. As part of any operation, monitoring and maintenance plan, robust record keeping is required.

Water quality should be monitored for all parameters identified in the risk assessment, regardless if these parameters are required in the DWPR. If there is uncertainty of how water quality from a new supply may vary over time, the DWO may establish different sampling frequencies and parameters than those specified in section 8 of the DWPR.

For rainwater harvesting systems, maintenance activities could include: cleaning and sanitizing the collection, conveyance and storage systems; inspecting and verifying inlet pre-filters and first flush diverters are in working order; and removing overgrown foliage and pest harborage locations.

In B.C., the level of training and certification required for operators is tied to the size of the system and classification level assigned to a drinking water system by the Environmental Operator's Certification Program (EOCP) or as required by the DWO through conditions on the operating permit. Many small water systems are exempt from training as per the DWPR, however a DWO may impose training requirements through conditions on permit when deemed necessary. Training specific to rainwater harvesting systems are listed (based on availability) on the EOCP Customer Relationship Management System, under the Career Management tab. The EOCP website and training guides are available to and recommended for anyone in the water industry.

Unforeseen circumstances that fall outside of an owner/operators' control will always pose a risk to the quality of water produced within any drinking water system. Water suppliers are required, as per Section 10 of the DWPA with requirements outlined under Section 13 of the DWPR, to have an Emergency Response Plan (ERP).
The Ministry of Health's Emergency Response and Contingency Planning for Small Water Systems is a useful tool for developing an ERP. Water suppliers are encouraged to engage with their local DWO on ERP planning.

7. Conclusion

The guidance provided in this document includes recommendations for the purposes of harvesting rainwater for potable use in B.C. and relies on the existing DWOG and the GCDWQ as the primary references for water treatment and potability.

For any water system seeking to use harvested rainwater for potable purposes, the treatment objectives for microbiological, chemical and physical parameters in specific water supply systems must be developed in consultation with a DWO when planning or upgrading drinking water supply systems in the Province.

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