

Date: January 30, 2017

File No.: 6500-20. Watershed
Management

To: Salt Spring Island Local Trust Committee: For the meeting of February 9, 2017

From: Justine Starke, Island Planner, Local Planning Services

Re: Watershed Management

RECOMMENDATIONS

1. It is recommended THAT the Salt Spring Island Local Trust Committee approve the attached Request for Decision dated January 31, 2017 and authorize staff to forward it for consideration to Trust Council.
2. It is recommended THAT the Salt Spring Island Local Trust administer through the Salt Spring Island Watershed Protection Authority coordinator a partnership with students from Royal Roads University to investigate the potential for rainwater harvesting to offset or contribute to potable and/or non-potable consumption needs in specific Salt Spring Island scenarios.
3. It is recommended THAT the Salt Spring Island Local Trust contribute \$2000 of 2016-17 fiscal funding for the Ministry of Agriculture to undertake a land use inventory of Salt Spring Island agricultural land.
4. It is recommended THAT the Salt Spring Island Local Trust approve the issuance of a service contract for \$2750 (2016-17 fiscal) to conduct an independent hydrology review of the sustainable yield model developed by the Salt Spring Island Watershed Protection Technical Working Group.

REPORT SUMMARY

The Salt Spring Island Local Trust Committee (LTC) has identified watershed management on Salt Spring Island as one of its top priorities. The Watershed Management Program involves a multi-jurisdictional approach to the protection and management of freshwater resources on Salt Spring Island.

The purpose of this report is to update the LTC regarding:

- Salt Spring Island Watershed Protection Authority (SSIWPA)
- 2016/17 Salt Spring Island Special Property Tax Requisition
- Royal Roads University Student Project
- Service contracts towards the Integrated Water Management Program.

BACKGROUND

Salt Spring Island Watershed Protection Authority

The Salt Spring Island Local Trust Committee endorsed an [updated project charter](#) on the Watershed Program at regular business meeting of December 01, 2016.

Since that time the Salt Spring Island Watershed Protection Authority (SSIWPA) has been in the process of adopting a work plan for the Integrated Water Management Program. The forecasted SSIWPA budget for 2017-18 is attached as appendix 1. Minutes of SSIWPA meetings may be found on the [SSIWPA website](#). SSIWPA's minutes include updates from SSIWPA's technical working group and public advisory committee's (if any) during that time.

Special Property Tax Requisition

SS-2016-186

THAT the Salt Spring Island Local Trust Committee advise the Director of Administrative Services that a Budget Proposal will be submitted prior to the October 19, 2016 Financial Planning Committee meeting to support the Salt Spring Island Watershed Management Coordination Services delegated from Trust Council and supported by Special Tax Requisition.

Financial Planning Committee was subsequently requested to administer a special property tax requisition of \$98 500 for the 2017/18 fiscal year, based on the following cost estimates:

Coordinator Contract	\$ 85,000
Meeting Costs:	\$ 5,500
<u>Events and Comm.</u>	<u>\$ 8,000</u>
Total	\$98,500

The funding assumes a similar level of coordination as received in 2016/17. The proposed special property tax requisition for 2017/18 is less than the \$110,500 approved for 106/17, and less than the approved \$119,500 for 2015/16.

In accordance with *Islands Trust Council Policy 6.3.ii -- Special Property Tax Requisition*, the proposed special property tax requisition of \$98 500 for 2017/18 is in the public consultation phase, along with the overall Trust Council budget of 2017-18. A FAQ information sheet features the SSI LTC special tax requisition and has been featured across multiple media venues.

The following consultation plan was implemented:

- Notice of the Salt Spring Island Special Property Tax Requisition was included in the Trust Council 2017-18 Budget Consultation Package.
- A Trust Council Budget ad was placed in the January 25 and February 1 issues of the Driftwood.
- A Banner Ad is running on the Salt Spring Island Exchange Site until February 10.
- A FAQ information sheet on the Salt Spring Island Property Tax Requisition has been linked in the Trust Council 2017-18 Budget Consultation Package.
- The FAQ information sheet has been posted prominently on the Salt Spring Local Trust Committee web page as well as the Salt Spring Island Watershed Protection Authority Website.
- The FAQ information sheet circulated on the Salt Spring Island Exchange List Serve inviting community input.
- A News Update posted on Salt Spring web page seeking public input on tax requisition for watershed management.
- Invitations for feedback sent out using the Salt Spring Islands Trust Subscription Notice.

Trust Council – Request for Decision

As per Island Islands Trust Policy 6.3.ii the LTC must also approve a Request for Decision (RFD) for inclusion in the March Trust Council binder, requesting a bylaw to authorize a special property tax requisition. The RFD is attached as Appendix 2 and includes an assessment of organizational and other implications, a completed copy of the checklist in policy 6.3.ii along with attached documentation.

Subject to LTC discussion, staff recommend approving the RFD.

Royal Roads University Student Project

As part of the SSIWPA Integrated Water Management Program, SSIWPA has formed a Conservation and Efficiency Working Group to undertake assessment of water conservation and efficiency strategies, and their expected impacts, including (but not limited to) alternative water sources, such as rainwater harvesting.

A Royal Roads University student partnership project has been proposed to assist with this new SSIWPA working group study program. Students will conduct an exploration of the potential for rainwater harvesting to offset or contribute to potable and/or non-potable consumption needs in specific Salt Spring Island scenarios.

As the coordinating body of SSIWPA, the Local Trust Committee is the logical body to administer this partnership through its contract SSIWPA coordinator. Staff will work with the SSIWPA coordinator to fulfill the Royal Roads requirements for data sharing agreements, etc. The results will be useful to LTC consideration of land use regulations for rainwater harvesting. Please see the attached project proposal in Appendix 3.

Service Contracts to support the Integrated Water Management Program

Previous direction from the SSI LTC was to have OPUS DaytonKnight Consultants Ltd. (OPUS) provide a detailed peak day/month supply versus demand analysis to determine the current available yield of St. Mary Lake and Maxwell Lake during peak summer demand periods. This updated analysis was to inform reconsideration and possible refinement of recommendations presented in the report “Water Conservation Supply and Demand Management Plan for Salt Spring Island” by OPUS DaytonKnight Consultants Ltd., dated May 6, 2016 (considered by the SSI LTC on July 21, 2016). The additional service contract was forecast to be \$24,000 with funding available in the LTCs current 2016-17 project’s budget.

On September 23, 2016 The Salt Spring Island Local Trust Committee (LTC) considered a Terms of Reference for this work and passed the following resolution:

SS-2016-187

It was MOVED and SECONDED,

that the Salt Spring Island Local Trust Committee request that staff consult with the Salt Spring Island Watershed Protection Authority to review the terms of reference for services relating to a drought risk analysis and a detailed peak day / month supply versus demand analysis to determine the current available yield of St. Mary Lake and Maxwell Lake during peak summer demand periods. CARRIED

Since that time, the Salt Spring Island Watershed Protection Authority (SSIWPA) reviewed the draft deliverables (“Terms of Reference”) and referred it to its member agencies and the Technical Working Group (TWG) for consideration. The Technical Working Group responded with a critique of the original OPUS Report. Staff responded by meeting with selected SSIWPA and TWG members to get a deeper

understanding of the issues. Meetings were held with Ron Stepaniuk (NSSWD), Don Hodgins (TWG), Pat Lapcevic (FLNRO), and SSIWPA coordinator, Shannon Cowan. Discussions were also held with Clive Leung from OPUS. As a result of this process, a number of new deliverables were circulated to the same individuals for feedback. The results were mixed, with some feedback causing staff to question the timing of this additional work in light of the investigations currently under way by North Salt Spring Waterworks in a contract with Kerr-Wood Leidel, by the Ministry of Forests Lands and Natural Resources in a contract with Golder and Associates, and by the SSIWPA Technical Working Group. It was confirmed at the SSIWPA meeting of January 20, 2017 that it is probably premature for the SSI LTC to pursue this work at this time.

Ministry of Agriculture Land Use Inventory

Recently, the Ministry of Agriculture Regional Agrologist has been appointed as a member of SSIWPA. SSIWPA has requested Local Trust Committee funding support in the amount of \$2,000 for updates to land use inventory by the Ministry of Agriculture. Staff at the Ministry describe the project as follows:

The objective of this project is to complete an Agricultural Land Use Inventory (ALUI) and generate Agricultural Water Demand Estimates for the island and for more regional agricultural water demand estimates. The ALUI can also inform agricultural area planning and provide a baseline that will help measure success.

Deliverables will include a geographic database (GIS) of detailed spatial sub-parcel level data on land use and land cover for approximately 463 parcels in the ALR (~2,940 ha) and 150 parcels (~1,500 ha) outside the ALR. On parcels where farming activities exist, the crops, livestock, irrigation, value added and other agricultural activities will be described. On non-farmed parcels in the ALR, availability for farming will be assessed. All data will be summarized and presented in a written ALUI report.

A populated Agricultural Water Demand Model (AWDM) for the island will be developed with the results summarized in a written AWDM report for at least 5 different water demand scenarios. Water resource planning is a key element to a successful agricultural community and the AWDM provides critical information in the form of current and future agricultural water needs (future climate scenarios). Understanding water demand informs the design and operation of water systems and is essential to ensuring adequate water supplies for agricultural production.

Specific objectives of this project include answering the following questions:

- *What is the current water demand for agriculture, both crops and livestock?*
- *What is the current extent and type of irrigation methods in use?*
- *What is the water demand for agriculture in future climate scenarios?*
- *What is the water demand for agriculture in future cropping and livestock scenarios (ex. full land base utilization)?*
- *What is the extent, type, location, and scale of agricultural activities in the region?*
- *How are farmed properties being utilized; land proportion in cropped land, farm infrastructure, residences, natural/non productive land?*
- *How is parcel size, parcel location influencing utilization for agriculture?*
- *What is the extent and type of non-farm use occurring on farmland?*
- *What is the extent and type of farms occurring in the urban/rural fringe.*

Other potential objectives that rely on the data collected include:

- *encourage the protection of agricultural land where appropriate, through the Official Community Plan process and other land use planning tools,*

- *work to support future population growth in urban areas without encroaching on or causing the loss of agricultural land,*
- *develop agricultural profile and submit to the ALC so they understand the diversity of farm systems across the region,*
- *incorporate agriculture and a secure food supply into sustainability, resiliency and emergency programs,*
- *ensure adequate water supplies for agricultural production, and explore options to provide for agricultural needs in the design and operation of water systems.*

Technical Working Group Sustainable Yield Model

SSIWPA relies on its Technical Working Group (TWG) to assist with quantifying existing freshwater supply (groundwater and surface hydrological patterns, including climate change parameters). The TWG has recently developed a “Sustainable Yield Model,” to calculate the water supply of Salt Spring Island’s surface water lakes. SSIWPA has endorsed the need to have an independent review of this work, and has requested the SSI LTC contribute \$2,750 to have an external review completed.

Please see the attached proposal in Appendix 4 for an independent review of the hydrology study. Upon receipt of this proposal, SSIWPA made some changes to the terms, but the content remains the same.

Prepared and Submitted by:

Justine Starke

January 30, 2017

Justine Starke, Island Planner, Local Planning Services

Date

Concurred by

Rob Milne January 31, 2017

- Appendix 1: SSIWPA Budget 2017/18
- Appendix 2: RFD to Trust Council dated January 31, 2017
- Appendix 3: Royal Road University Student Project
- Appendix 4: Independent Review of Hydrology Study

SSIWPA 2017 Budget- ADOPTED (revised January 30, 2017)
Period: April 1, 2017 - March 31, 2018

Revenue			
Item	Source	Cash	In Kind
Coord	Tax Requisition	98,500.00	-
	Local Trust Committee		
	Watershed Protection Project ²		20,000.00
	Office Services ²		250.00
SML	Capital Regional District	16,000.00	-
IWMP	Capital Regional District	3,000.00	-
	FLNRO/MoE SSI Water		
	Budget*	-	30,000.00
	Grants ¹	45,000.00	
Total Income		162,500.00	50,250.00
Expenses			
Coord	Coordinator contracts	85,000.00	-
	Events and Communications	8,000.00	-
	Meetings	5,500.00	-
	Local Trust Committee		
	Watershed Protection Project		20,000.00
	Office Services		250.00
	subtotal	98,500.00	20,250.00
SML	Septic wells - clean up	2000.00	
	Sediment pore chemistry	10000.00	
	Stewardship workshop, signage	1000.00	
	Turnover Lake P monitoring	3000.00	
	subtotal	16,000.00	-
IWMP	Stormwater-groundwater assessment	45,000.00	30,000.00
	Cusheon Monitoring	3,000.00	-
	subtotal	48,000.00	30,000.00
Total Expenses		162,500.00	50,250.00
Surplus/Deficit		-	-

¹ 50% of this amount will likely be sought as matching cash and in kind from SSIWPA agencies and partners

² see Islands Trust addendum

* Provincial project linked to SSIWPA-TWG Groundwater



REQUEST FOR DECISION

To: Trust Council

For the Meeting of: March 14-16, 2017

From: Salt Spring Island Local Trust Committee

Date Prepared: January 31, 2017

File No.: SSI 6500-20
Watershed Management

SUBJECT: Salt Spring Island Watershed Management - Special Property Tax Requisition

RECOMMENDATION:

THAT the Islands Trust Council include a special property tax requisition for the Salt Spring Island Local Trust Area in the amount of \$98,500 in its 2017/18 annual budget, to fund additional operations of the Salt Spring Island Local Trust Committee in preserving and protecting the quality and quantity of water resources within the Salt Spring Island Local Trust Area.

CHIEF ADMINISTRATIVE OFFICER COMMENTS:

The special property tax requisition of \$98 500 will be used to fund the additional operations of the Salt Spring Island Local Trust Committee in exercising its delegated authority to coordinate the work of the Salt Spring Island Watershed Protection Authority.

IMPLICATIONS OF RECOMMENDATION

ORGANIZATIONAL:

The Salt Spring Island Local Trust Committee (SSI LTC) intends to continue to use the requisitioned funds to support coordination of the Salt Spring Island Watershed Protection Authority (SSIWPA) – a multi-agency body dedicated to watershed protection on Salt Spring Island through collaborative watershed management.

Inclusion of the funds enables the continuation of contract coordination services to administer and manage SSIWPA's operations and projects on behalf of the SSI LTC. Some additional administrative work related to contract management, financial management, management of grant awards and related SSI LTC work is undertaken by Islands Trust staff.

FINANCIAL:

The taxation implications of this decision would relate only to the Salt Spring Island Local Trust Area. The funds requisitioned would be spent to fund the additional operations of the SSI LTC, pursuant to the additional powers that Trust Council has delegated to it (coordination of SSIWPA).

The proposed budget is:

Coordinator Contract	\$ 85,000
Meeting Costs:	\$ 5,500
<u>Events and Comm.</u>	<u>\$ 8,000</u>
Total	\$98,500

Please also see Appendix 2 for the SSIWPA 2017-18 Operations Budget.

POLICY:

No implications for current policy.

IMPLEMENTATION/COMMUNICATIONS:

If approved, the request for a special tax requisition within the Salt Spring Island Local Trust Area would be delivered to the Minister of Finance, along with the rest of the Islands Trust property tax requisition request.

The requisitioned funds are accounted for in the same manner that other Islands Trust funds are managed.

BACKGROUND

On June 10, 2013, Trust Council approved Bylaw 154, a bylaw that delegates certain additional powers to the Salt Spring Island Local Trust Committee to support the preservation and protection of water quality and quantity within the Salt Spring Island Local Trust Area. Specifically, Bylaw 154 delegates the SSILTC the powers (from *Islands Trust Act* section 8.2(b)) to:

- *coordinate and assist in the determination of regional, improvement district and government of British Columbia policies;*
- *coordinate the implementation and carrying out of regional, improvement district and government of British Columbia policies.*

Bylaw 154 also requires that funding for related operations be achieved through a special tax requisition within the Salt Spring Island Local Trust Area, where related expenditures will be \$5000 or more.

The mission of SSIWPA is “to cooperate on the development and implementation of policies and initiatives for improved raw water quality, and coordinated management of quantity of Salt Spring Island water sources. SSIWPA member agencies ... collaborate in watershed governance and cooperate to pool resources, gather and share information, strategize on integrated policy development, and coordinate actions for improved raw water quality, management of quantity, and the health and protection of both surface and groundwater watersheds in the Salt Spring Island Local Trust Area.”

Coordination of SSIWPA operations is performed by a contractor with some administrative and other assistance from Islands Trust staff. To date, the SSILTC has primarily used the delegated powers to coordinate a multi-stakeholder planning process that resulted in the “Integrated Watershed Management Plan for the St. Mary Lake Watershed 2015,” on Salt Spring Island. As implementation of the Plan was underway, SSIWPA determined the need to expand its focus to respond to climate change and drought patterns, as well as assessment of the freshwater resource as a whole (groundwater and surface water, in combination).

SSIWPA launched an island-wide effort in late spring of 2016 called “Salt Spring Integrated Water Management Program”, (IWM) in order to address the need to:

- quantify the volume of freshwater available (in a renewable manner) for human use;
- measure and optimize the efficiency of potable water resource uses/demand;
- if necessary, adjust bylaws and regulations to sustainably manage development and the built environment in areas where water quantity sensitivities exist.

The Salt Spring Island Local Trust Committee is requesting a special tax requisition for a fourth year, in order to continue coordinating the work of SSIWPA .

SPECIAL PROPERTY TAX REQUISITION

Pursuant to Trust Council Policy 6.3.ii, an individual Local Trust Committee can request a special property tax requisition for additional operations that are not included within the general operations of all local trust committees. Special property tax requisitions are approved by Islands Trust Council and must be formally requested by resolution of the Local Trust Committee. Trust Council Policy 6.3.ii includes a checklist for LTCs to follow - attached as Appendix 1.

On September 23, 2016 -

SS-2016-186

*It was **MOVED and SECONDED**, that the Salt Spring Island Local Trust Committee advise the Director of Administrative Services that a Budget Proposal will be submitted prior to the October 19, 2016 Financial Planning Committee meeting to support the Salt Spring Island Watershed Management Coordination Services delegated from Trust Council and supported by Special Tax Requisition. **CARRIED***

Financial Planning Committee was subsequently requested to administer a special property tax requisition of \$98 500 for the 2017/18 fiscal year, based on the following cost estimates:

Coordinator Contract	\$ 85,000
Meeting Costs:	\$ 5,500
<u>Events and Comm.</u>	<u>\$ 8,000</u>
Total	\$98,500

The funding assumes a similar level of coordination as received in 2016/17. The proposed special property tax requisition for 2017/18 is less than the \$110,500 approved for 2016/17, and less than the approved \$119,500 for 2015/16.

In accordance with *Islands Trust Council Policy 6.3.ii -- Special Property Tax Requisition*, the proposed special property tax requisition of \$98 500 for 2017/18 is in the public consultation phase, along with the overall Trust Council budget of 2017-18. A FAQ information sheet features the SSI LTC special tax requisition and has been featured across multiple media venues.

The following consultation plan has been implemented:

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- A News Update posted on Salt Spring web page seeking public input on tax requisition for watershed management.
- Invitations for feedback sent out using the Salt Spring Islands Trust Subscription Notice.

SUMMARY OF PUBLIC FEEDBACK RESULTS

At the time of writing, Salt Spring Island constituents have not submitted any correspondence regarding the proposed budget.

REPORT/DOCUMENT:

Appendix 1 – Trust Council Policy 6.3.ii checklist.

Appendix 2 – SSIWPA Proposed Operations Budget – 2017/18

KEY ISSUE(S)/CONCEPT(S):

- Collaborative watershed governance models require coordination of multiple agencies with jurisdiction.
- Trust Council has delegated authority to enable SSI LTC to coordinate the Salt Spring Island Watershed Protection Authority.
- Trust Council Policy requires the SSI LTC to request a Special Property Tax Requisition to fund this work, to carry out related public consultation, and advise Trust Council of the results.
- The Salt Spring Island Local Trust Committee has consulted with the community on the issue of raising a \$98 500 Special Property Tax to coordinate watershed management and has provided the information as required, through this Request for Decision.

RELEVANT POLICY:

Islands Trust Council Bylaw 154

14(3)(iii) of the Islands Trust Act

Islands Trust Council Policy 6.3.ii -- Special Property Tax Requisition

DESIRED OUTCOME:

Improved water quality and quantity management on Salt Spring Island, through Trust Council approval of a special property tax requisition for the Salt Spring Island Local Trust Area in the amount of \$98 500 for the 2017/18 fiscal year.

RESPONSE OPTIONS

Recommended:

THAT the Islands Trust Council include a special property tax requisition for the Salt Spring Island Local Trust Area in the amount of \$98 500 in its 2017/18 annual budget, to fund additional operations of the Salt Spring Island Local Trust Committee in preserving and protecting the quality and quantity of water resources within the Salt Spring Island Local Trust Area.

Alternatives:

1. That the Islands Trust Council include a special property tax requisition for the 2017/18 fiscal year for a lesser amount than requested by the SSILTC
2. That the Islands Trust Council include a special property tax requisition for the 2017/18 fiscal year for a greater amount than requested by the SSILTC.
3. That the Islands Trust Council not include a special property tax requisition for the Salt Spring Island Local Trust Area for the 2017/18 fiscal year.

Prepared By: Justine Starke, Island Planner, Local Planning Services January 31, 2017

Reviewed By/Date: Salt Spring Island LTC February 09, 2017

Financial Planning Committee

Russ Hotsenpiller, CAO

January 31, 2017

**MAJOR PROJECT FOR BSC IN ENVIRONMENTAL SCIENCE
ROYAL ROADS UNIVERSITY
2016/2017**

Name of Sponsor: SSI Watershed Protection Authority
Tel: 250-653-4867 (Coordinator, Shannon Cowan)
Fax:
Email ssiwpacoord@gmail.com

Title of Project: Assessment of water supply and demand opportunities to optimize rainwater use, on Salt Spring Island, B.C.

Background

Salt Spring Island Watershed Protection Authority (SSIWPA) was formed by Islands Trust in late 2013 as a multi-agency roundtable with the mandate of coordinated watershed management on Salt Spring Island. See www.ssiwatersheds.ca/ for more information.

In response to water quality issues in one of Salt Spring Island's primary drinking water sources (St. Mary Lake), SSIWPA completed a multi-stakeholder planning process that resulted in the "Integrated Watershed Management Plan for the St. Mary Lake Watershed 2015", on Salt Spring Island, B.C. As implementation of the Plan was underway, SSIWPA determined the need to expand its focus to respond to climate change and drought patterns, as well as assessment of the freshwater resource as a whole (groundwater and surface water, in combination).

SSIWPA launched an island-wide effort in late spring of 2016 called "Salt Spring Integrated Watershed Management Program", (IWM) in order to address the need to:

- quantify the volume of freshwater available (in a renewable manner) for human use;
- measure and optimize the efficiency of potable water resource uses/demand;
- if necessary, adjust bylaws and regulations to sustainably manage development and the built environment in areas where water quantity sensitivities exist.

As part of the IWM Program, SSIWPA will rely on its Technical Working Group to assist with quantifying existing freshwater supply (groundwater and surface hydrological patterns, including climate change parameters). SSIWPA is also forming a Conservation and Efficiency Working Group in October 2016: it is a task force of local expert volunteers in an advisory role to the SSIWPA Steering Committee. The new working group will undertake assessment of water conservation and efficiency strategies, and their expected impacts, including (but not limited to) alternative water sources, such as rainwater harvesting. A Royal Roads University Partnership project could assist with this new SSIWPA working group study program, by conducting an exploration of the "untapped" (pardon the pun) potential for rainwater harvesting to offset or contribute to potable and/or non-potable consumption needs in specific Salt Spring Island scenarios (see details below).

Requirement

Students will compile and analyze existing information on water utilization on Salt Spring Island. They will create a picture of optimal rainwater harvesting, given the information gathered. Students will ensure that their findings are fitted to the existing by-laws and regulations for Salt Spring Island. Students will compare the existing water utilization situation to the optimal rainwater harvesting situation, and identify how the existing situation could be improved to promote more conservation and efficient utilization of existing water resources.

Students will provide supporting evidence in the form of recommendations and answers the following objectives in report format (and possibly a presentation).

Objectives

- Compile existing potable water consumption information available (likely through existing water metering and billing records) on Salt Spring Island for each of the following scenarios:
 1. A local bed & breakfast operation
 2. A small resort operation
 3. A median-sized single family dwelling (occupied year-round and/or occupied seasonally)
 4. A multi-family dwelling (seniors housing complex, apartment/condo complex)
 5. A small business that requires more than average water supplies to run their business (a car wash, hairdresser or food service, for example)
 6. A civic building such as a library, recreation facility or hospital
- Calculate an estimated percentage of the above water consumption information that is likely to be for potable uses, and the percentage that is likely to be for non-potable usage (for each scenario, 1-6 above, based on evidence in the literature).
- Then, determine the potential rainwater supply available in each of the above examples (1-6, above), utilizing data for rainwater harvesting, recent local precipitation, and hydraulic calculations. How much rainwater supply may be available to offset consumption in each of the above scenarios, as follows: i) potable-only, ii) non-potable-only, and iii) both potable and non-potable consumption? Hint: Please consider multiple structures/rain collection opportunities, where feasible.
- Derive the optimal rainwater storage volumes for the 6 examples. Provide for overall volumes, which include both potable and non-potable consumption estimations. (You may design the systems to be separate, combined, passive or active.)
- Once storage volumes are found, provide the infrastructure costing based on existing rainwater practices allowable on Salt Spring Island. Include construction, materials and installation costing, suitable for health and building department approved uses of collected rainwater.
- Then, take this information and consider the possible results of adding the use of potable rainwater into the water supply for the above scenarios. Determine additional costs required to bring the systems up to potable quality and identify any complications that may arise from converting non-potable systems to potable water supplies.
- Identify any barriers or incentives that could be utilized, that would potentially make rainwater harvesting more attractive to consumers:

- Provide examples of incentives (currently or previously in use) in other jurisdictions
- If possible show how the incentives/dis-incentives have improved water conservation and promoted rainwater harvesting in the applicable jurisdiction.

Anticipated Costs/Budget:

- Direct costs **\$600.00**
 - \$500 - travel for 1 trip to Salt Spring Island from Royal Roads University (mileage, food, transportation)
 - \$100 - printing (two interim reports and a final report)

Faculty Advisor: Faculty Advisors will be assigned to each team and will provide guidance in methodology and dissemination of their findings. Project sponsors are not directly involved in the production of the final report.

MEMORANDUM

To: George Grams, Chair, SSIWPA
Date: January 17, 2017
Subject: External Review Proposal – TWG Sustainable Yield Model for Surface Water Resources (draft report by D. Hodgins)
Project: SSIWPA TWG IWMP
Submitted by: SSIWPA Technical Working Group

Rationale The subject report presents a mathematical basis for determining sustainable yield for surface water resources, together with a worked example for St. Mary Lake. The methods are potentially important for that particular lake and others on Salt Spring Island, and could serve as a basis for determining renewable water limits. Moreover, the yield limits for St. Mary Lake are substantially lower than previous estimates and well below the total withdrawal amount licensed by the Province. Thus, an external review by an expert in hydrology is warranted at this time.

Proposed Reviewer Dr. Steven Weijs is recommended to provide the external review. Dr. Weijs is an Assistant Professor in the Department of Civil Engineering at the University of British Columbia. His research interests are water resources management and hydrology, with a special focus on the dynamics of uncertainty and information within that context. The larger research question that he tries to address is how to optimally channel information flows from our observations of complex water systems and knowledge of underlying physics, to enable informed decisions about water resources. Dr. Weijs holds a Ph.D. (2011) and M.Sc. (2004) in Water Resources Management and Civil Engineering from TU Delft (Delft University of Technology) in the Netherlands. After his Ph.D. he obtained a 2-year AXA Research Fund postdoctoral fellowship to join the Environmental Fluid Mechanics and Hydrology laboratory at EPFL, Switzerland. Later he joined the Cryospheric science group, where he worked for two years. He joined the UBC Department of Civil Engineering in July 2015. His full CV is attached to this memo.

Dr. Weijs is not acquainted with the TWG of SSIWPA, or with Dr. Hodgins, author of the report, and thus can provide an independent opinion. He possesses current knowledge of hydrology and water resource management, and is willing to provide the review.

Scope of Review (as provided to Dr. Weijs) Recently the TWG completed an assessment of the renewable water yield from St. Mary Lake on Salt Spring Island, which serves as a major source of drinking water for the island. It appears that withdrawals are approaching the renewable limit, and the assessment plays an important role in planning and resource management for the future.

The assessment is based on a straightforward lumped parameter water balance model, for which the inputs and outputs are reasonably well quantified. The methods and data are described in technical reports and the model is implemented in Excel and can be easily checked. We would like to have an expert in hydrology review the reports, and perhaps do a bit of checking of the Excel model with a view to uncovering any conceptual errors, or obvious mistakes in the approach. The calculations include an extreme value analysis to provide yield estimates by return period. However, no formal analysis of uncertainty has been done.

Below are two links to supporting documents, which are not for detailed review but can serve as references on data and analysis techniques used in the water balance equation applied to St. Mary Lake.

<http://library.ssiwatersheds.ca/mdocs-posts/report-ssi-drought-analysis-by-d-o-hodgins-nov-2015-copy/>

http://library.ssiwatersheds.ca/mdocs-posts/twg-st-mary-lk-water-balance_dohodgins-september-2015/

The outcome would be a brief report covering your opinion of the analysis and any areas of concern or suggestions for improvement in the accuracy of the results.

Time Frame Review completed by early February 2017, with report by mid- to late February 2017.

Cost the estimated time to complete the review is 14 to 16 hours. Dr. Weijs' hourly rate is \$160. A budget of \$2,750 is recommended. This includes the cost of one trip to Vancouver to meet with Weijs to discuss his findings.

Approval January 20, 2017, to meet proposed schedule.