

**SSI WATERSHED PROTECTION AUTHORITY  
TECHNICAL WORKING GROUP MEETING**  
10:00 am – 12:00 pm on Tuesday April 25th, 2017  
**SD 64 Boardroom, 112 Rainbow Road, Salt Spring I., B.C.**

**\*\*DRAFT\*\* AGENDA**

**1. CALL TO ORDER**

**2. APPROVAL OF AGENDA**

**3. APPROVAL OF MINUTES**

Draft Minutes of the February 28 2017 Watershed Protection Authority's Technical Working Group – *for approval.*

**4. BUSINESS ITEMS**

**4.1 Research updates:**

4.1.1 Soil Phosphorus Pilot Data Analysis – Kevin C.

4.1.2 Safe yield St. Mary Lake – external review by Prof Weijs - summary by Don H

4.1.3 Cusheon Lake Watershed data organization, developing scope of work – Fred B., and Katsky V.

4.1.4 Safe Yield Maxwell Lake (technical presentation of draft report – for discussion and approval) – Don H.

4.1.5 Safe Yield Cusheon Lake (update on progress ) – Don H.

**4.2 Groundwater Subcommittee Workplan Task Scopes**

4.2.1 Scope of Work Task 5a “Well Inventory” for discussion and approval, *attached* - Sylvia B.

4.2.2 Scope of Work Task 5b “Groundwater Monitoring” for discussion and approval, *attached* – Sylvia B.

4.2.3 Scope of Work NEW Task 5d “Common Risk Segment Mapping: SSI Aquifers” for discussion and proposal to Steering Committee – (brief comment by Don H. in John M’s absence), *attached*.

**4.3 Update from CEWG**

**4.4 Report out to Steering Committee May 19, 2017,  
And to CEWG on May 2, 2017.**

**5. OTHER BUSINESS**

5.1 Comments or questions from observers

**6. NEXT MEETING**

May 30th, 2017 10:00am – 12:00pm at SD 64 Boardroom.



**DRAFT MINUTES**  
**of the**  
**SSI WATERSHED PROTECTION AUTHORITY**  
**TECHNICAL WORKING GROUP MEETING**  
10am - 12pm on Tuesday February 28, 2017  
**SD64 112 Rainbow Rd., SSI, BC.**

**Date of Meeting:** Tuesday, February 28, 2017 10:00 – 12:00  
**Location:** 112 Rainbow Rd. portable  
Salt Spring Island

**Members Present:** Fred Beall, Member at large  
Kevin Chipperfield, Member at large  
Ian deBie, Co-Chair  
Don Hodgins, Co-Chair  
Jos Lussenburg, Member at large  
Katsky Venter, Member at large (via web conferencing)  
Dale Green, Capital Regional District, Integrated Watershed  
(via web conferencing)  
Sylvia Barroso, Ministry of Forests, Lands and Natural Resources

**Regrets:** Julie-Ann Ishikawa, Ministry of Environment  
George Grams, Chair, Islands Trust Local Trustee

**Staff Present:** Shannon Cowan, Coordinator

**Others:** Sandra Ungerson, Chair Conservation and Efficiency Work Group  
Ian Peace, Conservation and Efficiency Work Group  
Francois LaFontaine, Conservation and Efficiency Work Group

These minutes follow the order of the agenda although the sequence may have varied.

1. The meeting was called to order at 10:00 am.
2. A suggestion was made to add to the agenda under 4.3 a discussion about "Scope of Work" draft proposals for Task 4a&b, Task 2, and Task 4c&5c which were sent as addendums via email to group members (and available in hard copies in the meeting).



**By general consent**, the agenda was approved, as amended.

3. **By general consent**, Draft Minutes of the January 31, 2017 Watershed Protection Authority's Technical Working Group were *approved*, as written.

#### 4.1 **Work Plan Update**

- Member Hodgins presented the roadmap to explain the approved SSIWPA Workplan 2017-2018, and the template for developing "Scope of Work" summaries that can be agreed by TWG and submitted to Steering Committee.

#### 4.2 **Research updates:**

- Soil Phosphorus Pilot at SML – nothing to report
- Task 3 - CLW existing hydrology, quality data acquisition – was not discussed, due to absent lead member
- Task 1 safe yield estimates – External review of the SML safe yield final draft has begun and will be received by TWG later in March.
- Task 2 climate extremes – See Scope of Work Task 2. Member Hodgins has contacts with University of Victoria (Zwiers) and U Colorado (Gilleland), and has done a cursory literature review. He continues to seek answers from experts to some key questions, such as: "Does downscaling of Global Climate Mean (GCMS) data provide regionally-applicable information for determining drought extreme predictions?" and others.
- A brief overview of the Task 1b) safe yield results for Maxwell watershed were presented and discussed. Draft report to follow for internal review.

**ACTION 4.2.1** – TWG agreed **by general consent** to request that **Dale Green** investigate whether CRD climate assessments/studies are overlapping at all with SSIWPA IWM program work plan, and report back.

- 4.3 Scope of Work draft was presented for Task 4a&4b "Consumption statistics for surface supply", with the template as filled by member Hodgins (lead). Suggested amendments included: add a footnote about OPUS funds, add a note that only aggregated data would be shared



publicly in the output from this task area, and add CRD groundwater wells (Cedar Lane and Cedars of Tuam) consumption data requests to this Task area so that the billing department receives only a single request.

**ACTION 4.3.1** – TWG agreed **by general consent** to forward Task 4a&4b Scope of Work to steering committee, as amended.

Scope of Work draft was presented for Task 2 “Climate extremes” by member Hodgins.

**ACTION 4.3.2** – TWG agreed **by general consent** to forward Task 2 Scope of Work to steering committee, as written.

Scope of Work draft was presented for Task 4c&5c by Coordinator (lead). Suggested amendment: remove request for CRD groundwater consumption statistics from this task area (Cedar Lane and Cedars of Tuam).

**ACTION 4.3.3** – TWG agreed **by general consent** to forward Task 4c&5c Scope of Work to steering committee, as amended.

#### **4.4 Report out to Steering Committee**

TWG agreed **by general consent** to report out on three Scope of Work task areas, as described in actions above.

5. There were no comments or other business.

6. **NEXT MEETING** Tuesday April 25, 2017 10:00am – 12:00pm at SD 64

Boardroom.

## MEMORANDUM

To: SSIWPA, Steering Committee  
Date: April 24, 2017  
Subject: Work scope for Objective 1: safe supply from groundwater – Wells Inventory  
Project: SSIWPA TWG, Task 5a Work Plan  
Submitted by: SSIWPA Contact: Shannon Cowan; TWG Lead – Sylvia Barroso

---

**Purpose:** To improve the inventory and verify the status of use of wells on Salt Spring Island, including within areas of known data gaps identified via mapping of existing information.

**Reason:** For use in overall IWM work plan (merging with Tasks 4c, 4d and development of a hydrogeologic (GIS-based) database and quantification of sustainable water yield for the island).

**Scope of Work:** The project will be jointly managed by the project lead and the SSIWPA Coordinator. Field work, data gathering and processing will involve a contracted staff person under supervision of the project lead and Coordinator. The project leads and/or contractor will report out to the TWG subcommittee at regular intervals and a final report will be submitted to the Steering Committee.

- 1) Mapping exercise to identify well data gaps.
  - a. Identification of land parcels that do not currently have a well mapped/registered within the Provincial WELLS database, that are likely to utilize a groundwater source. This includes cadastral lots outside of water service areas, that are non-vacant (based on BC Assessment data) and that do not have either a well or a water licence point of diversion (POD). The current estimated number of lots that meet these criteria is 1124.
  - b. Identification of land parcels where more information on the status of use of mapped/registered wells could be obtained. This would include, for example, land parcels located within serviced areas that have a mapped/registered well in the WELLS database. These would be the locations to seek additional information from the property owners, to verify if there may be wells that are:
    - i. currently not in use and that could possibly be used as monitoring locations to expand the local groundwater monitoring network (task 5b);
    - ii. currently in use to augment supplies provided from water systems, and therefore of interest to to gather more information on groundwater use at the location;
    - iii. presently unused and unusable, and therefore the wells may require deactivation or decommissioning in order to help ensure protection of the aquifer source.
- 2) Develop a “Well Inventory Survey” project. The project could be undertaken in two phases. The first phase would be to improve knowledge of wells in areas identified as potentially utilizing a groundwater well that is not currently registered in the WELLS database (item a) above). The second phase would be to improve understanding of the location and status of use of wells within areas serviced by a water system (item b) above).

The objectives of the project would be to:

- i. Improve understanding of the location and status of use of wells within areas identified as data gaps through the data mapping exercise, and from the initial results of the (Phase 1) Salt Spring Island aquifer mapping study. Note: This is not intended to be for quantification of groundwater use, for example, in domestic wells;
- ii. Add to the number of registered wells in the WELLS database for Salt Spring Island;

- iii. Provide information to well owners regarding well head and aquifer protection;
  - iv. Identify locations of unused wells or other wells that could be suitable for inclusion in an expanded groundwater monitoring network.
- 3) Complete the proposed work plan as follows:
- Identify areas of data gaps via mapping exercise;
  - Compile budget and determine funds available for hiring of a student/intern. Identify and apply for sources of funding;
  - Hire intern or student to undertake well inventory survey. Resource materials including forms for data collection, notes/talking points, resources for outreach and dissemination to well owners, will be developed and identified by the project manager(s) and provided to the individual during the initial training phase. The SSIWPA Coordinator will be the local contact for day to day supervision and support. Training and oversight of the individual will be completed by staff from Ministry of Forests, Lands and Natural Resource Operations (FLNRO) groundwater protection officer and regional hydrogeologist with respect to completion of site visits and Ministry of Environment (ENV) with respect to standards for well data collection, cross-referencing and well data entry); The student or intern will ideally be based on Salt Spring Island and be involved within a hydrogeology, geography or engineering, undergraduate level, educational program (e.g. Camosun College, Royal Roads, University of Victoria, Vancouver Island University, University of British Columbia, etc.);
  - Contact well and property owners within areas of known data gaps. This could include door-to-door inquiries, dropping off fact sheets on the project, mailouts, posters and information disseminated in the community, including possibly via advertising within the local newspaper and at local events such as the Well Owner Workshop (June 30, 2017);
  - Complete site visits to properties where well owners agree to participate in the survey program. Phase 1 field component to be completed from May – September 2017. Data entry component could be completed by October 2017. The Phase 2 field component and data entry could possibly be undertaken in summer 2018;
  - Compile information collected within the well inventory program including well inspection forms, well construction records, site photos, etc.;
  - Complete data entry to WELLS. Data could include correction of well locations, entry of new well records, and changes to status of use of a well. It will not include changes to well owner name which typically remains as the original owner name within the WELLS database. Referrals will be made, as appropriate, to the FLNRO groundwater protection officer if there is a compliance concern or violation of the *Water Sustainability Act*, Groundwater Protection Regulation identified at an individual well or property. Collection and protection of private information is governed under the *Freedom of Information and Protection of Privacy Act*;
  - Compile statistics and summary of work completed during well survey. This could include progress report to TWG and Steering Committee during critical project stages, to link with other work plan task areas such as monitoring program development, and to help guide next steps.
- 4) Prepare revised maps, utilizing data layers modified as a result of the well inventory program. (WELLS layer is publicly available and downloadable for use from GeoBC and could be combined with other data sources to develop the hydrogeologic database).

**Deliverables:**

	Date	Description	Responsibility
1	May 2017	Map and statistical summary describing known well inventory from WELLS database and combined with other data sources to highlight groundwater data gaps (e.g. number of wells in specific service areas and locations).	FLNRO (work plan lead)
2	October 2017	Entry of data to WELLS database. WELLS layer will be utilized as a source of primary data for SSI hydrogeologic database utilized in SSIWPA projects and programs, such as development of the sustainable yield model	Student/intern
3	October 2017	Report by student and TWG outlining survey results including number of sites visited, outcome of well inspections, and data entry completed during Phase 1. The report could also identify or list wells that may be evaluated for inclusion within a monitoring network (task 5b).	Student/intern
4	October 2017	Revised well inventory map (using similar methodology to deliverable 1).	FLNRO
5	December 2017	Objectives work plan for Phase 2 data collection	TWG

**Resources required: (see table on next page)**

**TWG Task Manager:** Sylvia Barroso, 250-751-3265 [sylvia.barroso@gov.bc.ca](mailto:sylvia.barroso@gov.bc.ca)

**Time frame:** May 2017 – December 2017

Resources required (estimate):

Costs for Resources Task 5a								
	Agency	Individual	Item	hours	\$/hr	Cash Cost	In Kind Cost	
Labour (In kind)	FLNRO	S. Barroso	Project supervision, some travel	24	\$ 80.00		\$ 2,120.00	4 hrs/month, 6 months (24 weeks) + 2 extra trips not within regular SSIWPA meetings for project supervision
Labour (in kind)	FLNRO	R. Lalla	GIS support	10	\$ 60.00		\$ 600.00	
Labour (In kind)	FLNRO	B. Robinson	Training (fieldwork)	30	\$60.00		\$ 1,800.00	Development of training materials, two field days (7.5 h each) including travel for training purposes plus follow-up
Labour (in kind)	Islands Trust	S. Cowan (Coord)	Coordination, student local superv	36	\$ 48.00		\$ 1,728.00	12 hrs/month, 6 months
Labour (cash)	?	Student	Data collection, well inspection serv	480	\$ 25.00	\$ 12,000.00		30 hours/week, 12 - 16 weeks
Equipment	FLNRO	S. Barroso	Loan of equipment			n/a		200 Field equipment such as ipad, forms, clip board, Sonic water level meter, measuring tape, field vest, etc could be provided by FLNRO
Computer	Islands Trust?	?				\$ 1,000.00		Provided by student Or determine if Islands Trust could provide a work space? (Islands Trust typically require an office fee so this would have to be accounted for in the budget)
Data requirements	FLNRO	E. McGinnis		10	\$ 60.00		\$ 600.00	Training on WELLS cross-referencing, ewells data entry; QA/QC of data input
Expenses			Student on-island travel			\$ 1,500.00		\$30/day mileage reimbursement (based on 55km at .53/km Daily allowance)
			Student off-island travel for training			\$ 500.00		One or two half-days spend with ENV staff in Victoria, including ferry, per diems etc.
Grant opportunities	BC Summer Work Experience Program		Too late for 2017 but perhaps for phase 2			\$ -		<a href="http://www.cfeebc.org/resource/youth/">http://www.cfeebc.org/resource/youth/</a>
	Canada Federal Work Experience Program		Too late for 2017 but perhaps for phase 2					<a href="https://www.canada.ca/en/public-service-commission/jobs/services/public-service-jobs.html">https://www.canada.ca/en/public-service-commission/jobs/services/public-service-jobs.html</a>
	First Nations and Inuit Summer Work Experience Program		Too late for 2017 but perhaps for phase 2					<a href="https://www.canada.ca/en/public-service-commission/jobs/services/recruitment/students/federal-student-work-program.html">https://www.canada.ca/en/public-service-commission/jobs/services/recruitment/students/federal-student-work-program.html</a>
<b>Total project cost</b>						<b>\$15,000.00</b>	<b>\$ 7,048.00</b>	

## MEMORANDUM

To: SSIWPA, Steering Committee  
Date: April 7 2017  
Subject: Work scope for Objective 1: safe supply from groundwater – Groundwater monitoring program pilot  
Project: SSIWPA TWG, Work Plan Task 5b  
Submitted by: SSIWPA Contact: Shannon Cowan; TWG Lead – Sylvia Barroso

---

**Purpose:** To improve understanding of groundwater conditions within different aquifers on Salt Spring Island by expanding the groundwater monitoring network. The project will involve a pilot to establish monitoring in 4 to 8 new sites that will add to the long-term record of groundwater conditions presently provided by monitoring of three active Provincial Observation wells.

**Reason:** For use in overall IWM work plan (merging with Tasks 4c, 4d and development of a hydrogeologic (GIS) database.

**Scope of Work:** The groundwater monitoring program expansion project will be managed by a contracted staff person under supervision of the project lead and Coordinator. The contractor or project leads will report out to the TWG subcommittee at regular intervals and a final report will be submitted to the Steering Committee.

1. Write grant application for BC Real Estate Foundation (deadline for first draft June 15, 2017). (During the planning phases, potential project partners will be approached including Ministry of Forests, Lands and Natural Resource Operations (FLNRO), SSIWPA, Islands Trust, CRD or others.) (*Coordinator and Project Lead*);
2. A monitoring project manager/technician will be hired to undertake the logistical aspects of the pilot monitoring program. The pilot project duration will be approximately 1 year after which the program will be re-evaluated. The project manager will work under supervision of the SSIWPA Coordinator and project lead. The primary tasks will include:
  - a. Determining priority areas for groundwater monitoring. These could include areas identified within aquifer mapping and water budget program (tasks 7a and 7b), and previous studies, such as SFU hydrogeology of SSI (Laroque, Allen and Kirste, 2015) and saltwater intrusion risk assessment (Klassen, Allen and Kirste, 2015), taking into account locations of active Provincial Groundwater Observation Well Network wells, and existing monitoring associated with community water systems (identified within task 4a survey of community water systems). The priority areas would include locations in both recharge and discharge zones, and areas of varying well density in order to develop an understanding of the effects of groundwater development on aquifer conditions (water levels or quality).
  - b. The new monitoring locations will be established initially through use of existing well sites identified through the well inventory program (task 5a). In future, funding applications may be prepared to establish purpose built dedicated monitoring wells in priority areas (i.e. phase 2).
  - c. Evaluate list of potential monitoring sites will be evaluated for suitability for addition to the monitoring network using an established set of criteria including location, accessibility, well lithology, yield and capacity, and physical condition, reason for not being in use, ownership, etc. A short-list of pilot areas for monitoring will be created.
  - d. Writing and establishing agreements with private well owners to utilize the wells for monitoring

- e. Purchasing suitable monitoring equipment: pressure transducers that measure water depth (pressure) and temperature. A subset of locations in coastal areas could involve monitoring using conductivity-temperature-depth transducers to understand saltwater intrusion impacts.
  - f. Working with contractors to prepare wells for equipment installation. Wells that are in use with an active pump will require installation of a conduit in the well into which monitoring equipment will be able to be installed. Installation of equipment within inactive wells without a pump may not require a monitoring conduit reducing initial setup costs.
  - g. Install equipment in the wells, revisit the sites within the initial monitoring period to verify that the equipment is working, and quarterly thereafter to download the data. Training may be provided by FLNRO staff (observation well technician and regional hydrogeologist).
  - h. Process and interpret the data and report out to well owners and to SSIWPA on a quarterly to bi-annual basis.
3. Progress report to Steering Committee after 6 months of data collection – *Program manager with Project Lead, Groundwater Committee*
  4. Develop “Derived” data to account for trends in primary data (hydrographs) at each available monitoring well. Share derived data with Islands Trust GIS and FLNRO (by TWG under Barroso lead supervision). – *Lead, Groundwater Committee*

**Deliverables:**

**Deliverables:**

	Date	Description	Responsible
1	June 2017	Grant application for financial support. Submit September 1, 2017 for grant competition.	FLNRO (work plan leads) and Coordinator
2	October- November 2017	Determine priority areas for 4-6 well monitoring sites and list of potential monitoring locations from 5a well inventory.	Project manager/technician with project leads
3	January- March 2018	Establishment of agreements with well owners and equipment installation at 4-6 sites.	Project manager
4	September 2017	TWG report on data interpretation and summary for initial monitoring period	FLNRO
5	December 2017	Recommendations for project continuation or expansion (Phase 2).	TWG

**Resources required:**

Draft budget under development.

**TWG Task Manager:** Sylvia Barroso, 250-751-3265 [sylvia.barroso@gov.bc.ca](mailto:sylvia.barroso@gov.bc.ca)

**Time frame:** May, 2017 – December 2018

## MEMORANDUM

To: SSIWPA, Steering Committee  
Date: Friday, April 14, 2017  
Subject: Work scope – Objective 1: Safe supply from groundwater – Part a  
Project: SSIWPA TWG, Work Plan New Proposed Task 5d  
Submitted by: SSIWPA Technical Working Group – Contact: John Millson

---

**Purpose:** Develop the database and evaluation methods for common risk segment (CRS) maps for groundwater aquifers on Salt Spring Island.

**Reason:** Provides spatial mapping of high-low *risk* and high-low *uncertainty* CRS areas for groundwater supply based on aquifer characterization and existing data availability/uncertainty. This 5d work scope will provide input to forward the IWMP work programme. Results can be applied at the parcel level for island-wide water resources management plan and linked to consumption (task 4). Builds on and extends the Golder study for aquifer characterization and spatial detail (tasks 7a and 7b), and incorporates well inventory data (task 5a) and contributes to groundwater monitoring program (task 5b in 2018).

Notes:

*CRS maps are commonly used in geosciences in oil & gas & mining to delineate geologically driven common risk and uncertainty map segments for key subsurface interval(s). The resultant maps flag common areas of known (favorable or unfavorable) and/or unknown characteristics, and support the development of appropriate work programmes (e.g. data acquisition, exploitation) for discrete areas.*

*The CRS methodology is suitable for use in the development of any map based subsurface evaluation/areal assessment and is flexible enough to allow related project risks to be added (e.g. land accessibility/ownership. proximity to infrastructure etc). The GIS/map based format of CRS map products (and their inputs) facilitates improved understanding and sharing of data and is conducive to cross group cooperative analysis.*

**Scope of Work:** For a SSI water resource oriented CRS mapping project, map attributes include aquifer/aquiclude outlines, recharge areas, structure etc. The existing FLNRO/MOE/IT and current Golder SSI oriented work will provide a significant feed to the CRS mapping project. The per aquifer common risk segment (ACRS) map products will define areas of known high/moderate water resource potential vs. those currently poorly understood/quantified; supporting IWMP “exploit/manage” vs. “justify/define” work programmes. Ultimately allowing poorly understood/quantified areas to be polarized as “high” or “low” risk.

To be conducted/completed in conjunction with the TWG groundwater group in collaboration with FLNRO/MOE and the IT.

1. Review results from Golder Phase 1 study, determine available data resources, assess aquifer delineation/characterization and conceptual water balance model(s). Identify opportunities to build on data and interpretation from an ACRS perspective.

2. Identify and compile existing GIS data and all relevant potential geological controls in a shared GIS\* (see GIS data required table in Appendix A) to support area risk & uncertainty aquifer/recharge mapping.

3. Generate representative geological cross-sections (cf identifying *likely* well/aquifer intersections to facilitate aquifer (s) characterization\*\* Use 1. through 3. to identify key aquifer(s). Where possible

incorporate an improved understanding of shallow “surficial” aquifers (distribution/contribution, recharge connectivity) in this review.

5. Produce key aquifer(s) “common risk segment maps”, based on aquifer(s) geographic extents, variability and assumed spatial controls on aquifer quality and recharge capability/potential, defining “High”, “Low” risk and uncertainty areas for exploit/manage vs. acquire further data decisions.

6. Define a work programme to fill data gaps and improve confidence in the CRS maps, polarizing areas as “H” or “L” risk) for input to any future IWMP water resource potential delineation or moratorium.

Notes:

*\* requires a “shareable working GIS” environment to allow cooperation/integration with other aspects of the TWG “island wide IWMP GIS” deliverable. A shareable, working GIS proposal is outlined under “resources required”*

*\*\* software/platform for geological cross-sections to be determined following a review of Golder/MOE scope of work and their deliverables (cf resources required).*

**Deliverables:**

1. As data allows. Aquifer common risk segment maps and supporting CRS element maps (aquicludes/aquitards, aquifer variability/extents, recharge areas etc) in GIS format.

2. Report describing analysis and methods for CRS mapping, and provide a work programme for aquifer (aquiclude/aquitard) and recharge uncertainty reduction.

3. Documentation of remaining/additional aquifer scope, based on work programme analysis undertaken in 2 (2019-2020 post data acquisition).

4. Provide input to IWMP water resources programme.

**Resources required:**

Task 5d CRS Cost estimate				
		hours	\$/hour	cost
Labour (in-kind)	J. Millson	240	\$ 200	\$ 48,000
Labour (third party)				
Labour (IT/ FLNRO)	GIS staff	300	\$ 61	\$ 18,270
Equipment				\$ -

Computer (software)				\$ 2,500
Data requirements				
Expenses	travel			\$ 300
	rock analysis			\$ 1,200
Total cost				\$ 70,270
In-kind support				\$ 66,270
<b>Cash required</b>				<b>\$ 4,000</b>

Note: labour estimates pertain to 2017-2018 (first year of work).

**TWG Task Manager:** John A. Millson, [millson@mac.com](mailto:millson@mac.com)

**Time frame:**

Aquifer(s) common risk segment maps per geographic area – Early 2018

Outline work programme for uncertainty reduction – mid-2018

Work programme data analysis - late 2018

Documentation of methods and remaining/additional aquifer scope/availability – ongoing to late 2019

**Appendix A Shared GIS metadata/data/map requirements**

**Appendix A Shared GIS metadata/data/map requirements**

GIS layer(s)	Metadata/data/map requirements	Source(s)	Justification
Wells	Depths, lithology (overburden, shale,...), fracture density, hydrofracted wells, flow rates	BC MOE wells database and FLNRO	Key control points - inp deliverability maps
South SSI Mineral, and other oil & gas exploration datasets	Lineaments/faults, hinge lines, unconformities etc Lithology & porosity determinations Terrain heights determinations Gravity and magnetics?	Richfield, 1959 Kidd Creek Mines Ltd, 1985-1989 BCGS/CGS	Determine potential imp geomechanical variability  Review scope for additi ‘exploration” remote se
Bedrock & Surficial geology	Rock characteristics as per BCGS maps	BCGS	Underpins ground water common risk segment n
Catchment basins	Known ground water regions	Hodges, 1995; ??	Starting point for refine
SSI Lidar/DEM	Water flow/ lineaments (derived), terrain variability (m)	<a href="http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/download.web&amp;search1=R=291819">http://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/download.web&amp;search1=R=291819</a>	Determine potential imp density/well rates and (i
Spring lines	Spring lines and/or location of dug wells	FLNRO/IT?	First pass indication of zones of potential shallow
Formation water salinity	Salinity variations- granularity?	FLNRO/MOE?	Insights into zones of po
Vegetation variability	Ecosystem/drainage variability	IT	Insights into main subst system(s) variability
Drainage systems/variability	Drainage types	IT	Insights into main subst
Outcrops (including surfical where possible)	Outcrop/quarry/excavation localities, lithology aquifer/clued characteristics etc	Greenwood, Richfield, Millson ++	Input to calibration of s contribution/recharge ai
Septic fields	Septic field locations	CRD?	Input to aquifer geoche
Academic reporting	Allen et al map overlays, various	Allen/SFU	Provide contact for prio

Aerial photos	Vintage, resolution	CRD/IT?	May support above inte
---------------	---------------------	---------	------------------------